



*Office for Information Resources
GIS Services*

Enterprise GIS Business Plan

July 4, 2008

VERSION 1.1

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1 Executive Summary

Spatial information is becoming a crucial component for government agencies to manage resources and make effective and efficient business decisions to improve service and the quality of life for its citizens. The evolution of Geographic Information Systems (GIS) over the past twenty years, in conjunction with the development and maturation of the internet and web services, has demonstrated that it is an effective tool that enables government to leverage geospatial information and services to accomplish these goals.

With the constant and growing threats to our environment, health, education system, public safety and homeland security, and with the need to balance these concerns with developing new energy sources and developing effective economic development policies, the role and demands of geospatial data and technology that will allow government to become more efficient and effective will continue to increase. These issues facing Tennessee at all levels of government can be addressed through the continued development and management of a coordinated GIS program.

The following enterprise GIS business plan provides a description of how over the next five years, the State of Tennessee should leverage the investment made in the Tennessee Base Mapping Program (TNBMP) to reach the following goals:

- 1. Coordinate GIS Data Development – acquire, consolidate, and maintain the geospatial data needed by State and local government**
- 2. Develop Enterprise GIS Infrastructure and Services – make the information accessible and useful through service provisioning**
- 3. Strengthen Enterprise Relationships – build a stronger GIS community in Tennessee**

Specifically, this business plan defines existing and projected services and an increased role for OIR GIS Services in statewide GIS coordination. Each of the three goals includes the required resources and funding to support specific initiatives and projects.

At its core this business plan incorporates the need to address GIS data and services to State agencies, the primary mission for the Office for Information Resources. However, the plan also addresses the broader role OIR GIS Services plays in coordinating statewide GIS activities and supporting a new enterprise GIS vision for Tennessee.

Enterprise GIS Vision Statement:

To create and maintain geospatial information to support State and local government business processes through a coordinated and centralized approach that results in reducing duplication of effort and a more effective and efficient government.

Similar to other state GIS coordinating offices, the goals and activities identified in this plan work toward the implementation of the National Spatial Data Infrastructure (NSDI). The NSDI is defined as

“the means to assemble geographic information that describes the arrangement and attributes of features and phenomena on the Earth”.¹ Federal support for the NSDI is non-partisan and multi-sector, having been fully supported by both political parties in two Executive branch administrations and by government and non-government organizations at all levels.

In Circular A-16, the U. S. Office of Management and Budget has described the NSDI as the “technology, policies, standards, human resources and related activities necessary to acquire, process, distribute, use, maintain and preserve spatial data”.²

Relevance to Tennessee – Why is this Important?

Tennessee’s ability to develop and sustain a coordinated GIS program for State and local government, and participate in the NSDI is important for a number of reasons but is focused on four primary components:

1. Improving the effectiveness of intergovernmental relationships
2. Ensuring Public Safety
3. Promoting Economic Development
4. Protecting the Environment

Improving the effectiveness of intergovernmental relationships

One of the primary benefits of GIS coordination is the ability to reduce or eliminate redundant GIS data collection. Only through cost sharing with the State are many local governments in Tennessee able to afford and invest in GIS technology. Intergovernmental cost sharing not only makes GIS affordable but through this collaboration concept government becomes more efficient. This concept of “build it once, use it many” is the cornerstone of state GIS coordination. Sharing resources at all levels of government allows our collective efforts to create and maintain GIS data at a higher accuracy and greater detail and serve multiple consumers. For example, as a first step in updating the State’s GIS data, in 2007 OIR GIS Services coordinated an effort between federal, state, and local officials for the acquisition of ortho imagery in Sumner County, Tennessee. Through this unified approach, each level of government acquired necessary data to meet their mapping requirements for a fraction of the cost. This collaborative approach is identified throughout the business plan, not only for GIS data development but also through the use and deployment of enterprise GIS applications and services.

Ensuring Public Safety

Emergency first responders, TEMA, E911 staff, and other local officials have a need for accurate and current digital map information to effectively plan, prevent, and respond to natural or man made disasters. Each emergency communication district in Tennessee is also required to leverage GIS and geospatial information to improve public safety. Through the use of GIS and GPS, accurate maps help locate persons in distress and improve the ability to effectively route emergency vehicles to the correct

¹ National Research Council, Mapping Science Committee, “Toward a Coordinated Spatial Data Infrastructure for the Nation”, 1993.

² U. S. Office of Management and Budget, Circular No. A-16, Revised, August 19, 2002.

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location. When lives are at stake, seconds count. Likewise, disasters usually do not stop at the county line. Establishing and maintaining a statewide digital base map will improve public safety and provide a common operating picture for officials that need a regional or statewide view to analyze and manage these events.

Promoting Economic Development

Development and maintenance of statewide property ownership maps and other GIS data will promote economic development throughout the State. New business development or companies wanting to relocate to Tennessee will have a statewide asset for assisting with site selection and evaluating other geographic data for new construction. Local government will have the ability to locate flood prone areas and guide new development through effective building and zoning ordinances. Utility companies will be able to use the digital base map for building and extending service networks. Ultimately, the accurate mapping of the State's assets will attract new business to Tennessee communities and result in new jobs.

Protecting the Environment

Balancing economic growth with the need to protect Tennessee's environment is an ever increasing challenge. The Governor's Heritage Conservation Trust Fund is an example of the need to identify, protect, and preserve priority tracts across Tennessee. In support of this effort, GIS and the use of geospatial data will improve the ability to protect and analyze impacts on our environment. Statewide mapping of environmental resources will be valuable to conservation groups, sportsmen, hunters, environmental professionals, and non-profit organizations.

Simply put, OIR GIS Services is coordinating and building geospatial data and resources that will serve many needs, interests, and geospatial data consumers across the State. Through the development of standards and a centralized GIS data repository, OIR GIS Services is enhancing the collective value of the State's GIS assets and providing a new approach to solving problems from a spatial perspective. The business plan provides specific details on how partnership development and expanding the relationship between local and federal agencies is crucial to the long term success and viability of the NSDI and maximizing the investment the State has made in geospatial data and services.

2 Background

2.1 Tennessee Base Mapping Program

In 1996, the State set out to accomplish the goal of developing a comprehensive digital base map for the State of Tennessee. The primary goal behind this effort was to provide a resource for State and local government to manage real property more effectively. While some level of existing GIS data was being used at the Federal and State level, the scale and accuracy did not meet the requirements of most local governments. In addition, very little or no parcel-based GIS data existed, and what sparse data was available it was not developed within a statewide coordinated fashion.

Based on existing resources in the Comptroller of the Treasury, Division of Property Assessments, the State was in a unique position to develop a statewide parcel based GIS. However, executive leadership saw an opportunity to go beyond a single agency and use this program as a first step in creating widespread use of geospatial information throughout State government to support economic development, public safety, transportation planning, natural resource conservation, and improve the way State government operates. This “enterprise” approach towards developing and managing a coordinated GIS program led to the creation of GIS Services in the Office for Information Resources in 1997. The long term goal identified in the original GIS business plan is to use the Tennessee Base Mapping Program (TNBMP) data as the foundation for creating an enterprise GIS system managed by OIR GIS Services that State agencies can access to support their business operations.

A critical aspect of the program is the involvement of local government. A core component of the original TNBMP business plan was to promote the use and application of TNBMP data throughout a number of potential users at city, county, public utility, and other local organizations. Over the eight year span of the data production effort (2000-2007), OIR GIS Services promoted the program throughout the State and at the end of the initial production, over 250 local government entities representing 55 counties are active participants in the program (See Map 1). Additional partnership development is ongoing.

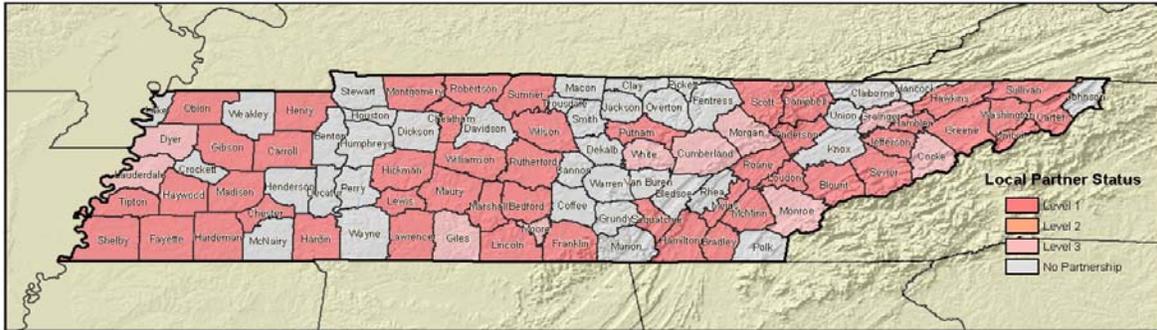
The TNBMP GIS data not only provided local government and the Comptroller of the Treasury with a new source of information to help improve property tax administration and related services, but other State agencies including Transportation, Environment and Conservation, Economic and Community Development, among others, use parcel GIS data for a variety of internal applications. Through the efforts of the TNBMP agencies now have a single source of GIS data for real property information. This concept of creating data once and finding multiple uses provides the primary business case for developing and maintaining an enterprise GIS system. The parcel-level focus of the TNBMP and enterprise approach combines to provide a data resource for State and local government that is not attainable or even feasible through the efforts of a single agency.

OIR GIS Services completed the initial statewide GIS data production efforts of the TNBMP in 2007 and is now poised to fully reap the benefits of this State resource leveraging enterprise GIS technology.

Map 1: TNBMP Local Partners



Tennessee Base Mapping Program
Local Partners



Tennessee Counties
By Partnership Level

Level 1: Local Funding, Local Maintenance	Level 2: Local Funding, Third Party Maintenance	Level 3: Local Funding, State Maintenance	Level 4: No Partnership
Anderson Bedford Blount Bradley Campbell Carroll Carter Cheatham Chester Fayette Franklin Gibson	Greene Hamblen Hamilton Hardeman Hardin Haywood Henry Hickman Jefferson Lawrence Lewis	Lincoln Loudon Madison Marshall Maury McMinn Meigs Montgomery Obion Putnam Roane Robertson	Rutherford Scott Sequatchie Sevier Shelby Sullivan Sumner Tipton Unicoi Washington Williamson Wilson
		Cocke Cumberland Dyer Giles Grainger Lauderdale Monroe Moore Morgan White	Benton Bledsoe Cannon Claiborne Clay Coffee Crockett Davidson Dickson Decatur Dekalb
		Fentress Grundy Hancock Henderson Houston Humphreys Jackson Johnson Knox Lake Macon	Marion McNairy Overton Perry Pickett Polk Rhea Smith Stewart Trousdale Union
			Van Buren Warren Wayne Weakley

2.2 Enterprise GIS Business Drivers

In both the public and private sector, there are many drivers that prompt an organization to consider an Enterprise GIS platform and strategy. An overview of key enterprise GIS business drivers are listed here:

Increased Demand for Geospatial Data and Services

In a 2007 research report by Gartner on GIS in Public Safety, it states that, “By the end of 2009, 90% of all state and local government public safety organizations in North America will either use or be supported by geographic information systems”. Cost associated with developing and maintaining GIS programs has decreased, providing an opportunity for new users and consumers of geospatial data and services.

Enterprise GIS Benefit: Centralized data storage and management will provide agencies with additional capacity for accessing geospatial data and services.

Increased Demand for Data Sharing and Exchange

Existing practitioners see the benefits of leveraging multiple GIS data sources outside their organization. Advancements in GIS data modeling; movement of GIS into mainstream IT via traditional development environments (.NET, Java); standard database management (Oracle, SQL/Server), data exchange protocols (.XML); and development of web map services; has resulted in opportunities to optimize data sharing between organizations.

Enterprise GIS Benefit: Providing agency GIS data stewards with the opportunity to publish their data to a central GIS data repository eliminates the need to replicate data across multiple agency GIS platforms, saving time and money.

Increased Demand for Integrating Geospatial Data and Services with other Enterprise Systems

GIS development and programs have shifted from a project based utility that focused primarily on the technology, to defining specific business requirements and identifying how GIS and geospatial information can support and integrate with existing non-GIS enterprise systems. Here again, with the advancement of the GIS industry over the past five years, GIS data, tools and processes can integrate with other non-GIS enterprise systems through the concept of a service oriented architecture.

Enterprise GIS Benefit: Generic GIS services (geocoding) are developed in a shared environment and can be integrated with other enterprise systems, maximizing the investment in GIS and preventing organizations from duplicating software development and services.

Increased Demand for Spatially Enabling Business Applications

Location in some form is present in many existing business applications. Partnered with the overwhelming presence and proliferation of digital maps and other on-line location-based services (MapQuest, GoogleMaps, Microsoft Virtual Earth, etc.), organizations see the value in 'spatially enabling' their business applications. Adding geospatial data and spatial analysis functions to existing business applications provides a level of new understanding not present in traditional IT solutions.

Enterprise GIS Benefit: Agencies do not need to purchase dedicated hardware, software and data, but can leverage the shared infrastructure provided by the enterprise GIS, saving time and money.

In summary there are both tangible and intangible benefits to implementing enterprise GIS. Tangible benefits are traditionally more difficult to quantify but include:

1. Reduction in personnel costs through streamlined workflow processes.
2. Increased revenue through increased accuracy and access to spatial data.

The intangible benefits are more easily identified in an enterprise GIS and include:

1. provision of better information for improved decision making
2. shared data and services; more consistent access to data; improved services to citizens and/or customers; ability to integrate data among other systems; the ability to generate new 'understandings' from the data; and overall easier access to data.

3 Coordinate Enterprise GIS Data Development

Any GIS, like most IT systems, requires five basic components: hardware, software, data, people, and processes. In the GIS environment, data is the most expensive and the most critical component to success. Therefore, this section of the business plan is dedicated to clearly identify the need for “framework” GIS data products in the State’s enterprise GIS environment. These framework GIS data layers, which represent the basic elements in the NSDI and defined by the United States Geological Survey (USGS), are listed as Complete/In progress or Planned. They include:

A. Complete or in progress:

- 1. Ortho Imagery**
- 2. Transportation (Street Centerline/Address Database)**
- 3. Cadastral (Property Ownership)**
- 4. Hydrography (Surface Water)**
- 5. Administrative Boundaries**
- 6. Geodetic Control**

B. Planned

- 7. High Resolution Elevation Data**

The following section will address these framework data layers and the Homeland Security Infrastructure Program (HSIP) by providing a synopsis of each initiative that includes a brief description, benefit to the enterprise, stakeholder groups, and required funding to acquire and/or maintain these data products within the State’s Enterprise GIS environment.

3.1 Ortho Imagery

Strategic Summary:

Description: Statewide orthoimagery completed in 2006. Completed two year pilot to evaluate specifications and develop color imagery. 2008 begin data production on regional basis.

Benefits: Ability to support all state and local government geospatial operations through standardized imagery datasets, including land use planning, environmental management, transportation planning, property management, and economic development opportunities.

Agency Steward: Transportation, Agriculture

Stakeholders: Finance and Administration, Transportation, Agriculture, Comptroller of the Treasury, Wildlife Resources, Environment and Conservation, Economic and Community Development, and local government.

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The highest priority project of OIR GIS Services for statewide data to date has been the ortho imagery data collection through the TNBMP. This project started in 2000 with the collection of high resolution imagery for 12 counties in Tennessee. By 2004, the project only had enough funding to acquire 46 of the 95 counties. In 2005, through a budget improvement, funding was used to fly 25 counties in 2005 and 23 counties in 2006 and complete the statewide production efforts.

During this time, the Department of Transportation identified a need to modernize their Aerial Surveys Division and acquire a digital camera that could be leveraged to support acquisition of ortho imagery through the use of existing State resources. Through several meetings and discussions, OIR GIS Services developed a contract with TDOT for acquisition of digital ortho photography in each TDOT region once every four years. OIR GIS Services will host the “leaf off” imagery in the enterprise GIS repository and make this available in the public domain. The end result of this agreement is to generate a statewide, standardized, current and accurate ortho photography product for both State agencies and local government.

In 2007, OIR GIS Services participated in a cost sharing partnership with the US Department of Agriculture Farm Service Agency (USDA/FSA) and the Tennessee Department of Agriculture to collaborate in a summer 2008 imagery collection project for all 95 counties through the National Agricultural Imagery Program (NAIP). The resulting “leaf on” imagery is important for agricultural compliance through farm subsidies, but has other important uses including: forest management, search and rescue, land records management, wild land fire fighting, environmental planning and wildlife management. This 1 meter imagery product should be available Q2 FY09.

A long term goal for the “leaf on” imagery is to acquire this through the USDA and the “Imagery for the Nation” concept introduced by the National States Geographic Information Council. Through this proposal 100% federal funding would be used to acquire annual updates of NAIP imagery statewide. However, until this initiative is federally funded, the State plan is to acquire the NAIP imagery once every three years. This will begin in 2011 for Tennessee.

Current F&A Cost to support:

\$160,000 once every three years

F&A Budget Allocated:

\$160,000 once every three years

F&A Manpower Requirements:

0.2 FTE

F&A Current Manpower Allocation:

0.2 FTE

3.2 Transportation (Street Centerline/Address Database)

Strategic Summary:

Description: Data enhancement work completed in 2008. Statewide road and address data to support geocoding, mapping, routing and advanced GIS analysis.

Benefits: Provide local governments with a single street address database to support public safety and emergency response in the E911 districts across the State. Provide State agencies with a consistent and reliable GIS database to support the Location Based Services (LBS) application development and hosting by OIR GIS Services.

Agency Steward: Finance and Administration

Stakeholders: Finance and Administration, Transportation, Revenue, TBI, Health, Human Services, TWRA, Comptroller of the Treasury, Environment and Conservation, Economic and Community Development, Agriculture, and local emergency communication districts.

Through the initial production efforts of the Tennessee Base Mapping Program, OIR GIS Services acquired a statewide enterprise license of the TeleAtlas (TANA) Dynamap Transportation product in 2004. All State agencies and local governments have access to this commercial product, which includes all Tennessee counties and a one county buffer in other States that border Tennessee. In addition, a three year project to enhance the spatial accuracy and address information was completed in 2008. The license agreement provides Tennessee with unrestricted rights to the digital map and a portion of the database attributes. Using this foundation, OIR GIS Services has developed its own street address database branded as Tennessee Information for Public Safety (TIPS). The TIPS data is being maintained through a contract with the State Emergency Communications Board and through a relationship with local E911 districts.

Although many counties and E911 districts with active geospatial programs have spent time and money developing street and address information similar to TANA, it is often difficult or impossible to merge street data with neighboring counties because of different standards of accuracy and different data record standards. Emergencies don't stop at the county line so the need for a consistent, standardized statewide street address database is critical for public safety officials to locate and dispatch for cell phone and voice over IP (VoIP) calls across multiple jurisdictions. The value for Tennessee public safety is tremendous, because it allows us to create a "Common Operating Picture" (COP) to visualize and analyze local, regional, and statewide data. This resource has been widely advertised and distributed to multiple State agencies and local governments to all of the sublicense constituents, and will support government and emergency response business needs across the entire state.

While the primary consumer base is public safety officials, the commercial data products are being used to support other agency GIS applications and internal business functions. Through the use of this statewide enterprise license, OIR GIS Services is developing and hosting applications that agencies couldn't afford on their own. Additional details on these applications are discussed in Chapter 4.

Working with the Department of Transportation, the TIPS data will help interagency development of the Tennessee One Road project. The goal for this effort is to develop a coordinated transportation database

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that not only provides the ability to perform address geocoding, mapping and routing, but to facilitate TDOT requirements for road inventory, linear referencing and modeling transportation networks. Establishing a single unified transportation database that meets TDOT and F&A requirements will provide the State with a more efficient approach for data maintenance and analysis.

Current F&A Cost to support:

\$500K/year

F&A Budget Allocated:

\$500K/year

Manpower Requirements:

4.1 FTE's

Current Manpower Allocation:

4.1 FTE's

3.3 Property Ownership (Cadastral)

Strategic Summary:

Description: Completed statewide production of digital cadastral data in 2006, need to develop and maintain a process to replicate local property data into a statewide database to support State agency access and applications.

Benefits: Having an accurate and up-to-date statewide multi-purpose parcel database will help agencies focus on business applications of real property data to support economic development, land conservation, transportation planning, and real property management.

Agency Steward: Comptroller of the Treasury

Stakeholders: Finance and Administration, Transportation, Revenue, Health, Human Services, TWRA, Environment and Conservation, Economic and Community Development, Agriculture, and local government.

Currently, about half of Tennessee counties maintain digital parcel data in the property assessor's office. The remaining counties are updated digitally by the Comptroller's Office annually. Through the use of web services, this effort will allow the State to aggregate local data into a statewide database. This data aggregation workflow process will help maintain the statewide database and eliminate redundant data collection by agencies that make business decisions based on property ownership across the State. Developing an enterprise approach to GIS enables each agency to focus on its business process, while simultaneously supporting the sharing of GIS data and related information. Agencies with existing GIS programs participate and benefit by sharing existing data, and reducing redundant data maintenance and management responsibilities. Agencies beginning to explore GIS technology will have a head start on

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developing GIS applications in an enterprise environment by having a readily accessible data resource. Through the development of an enterprise GIS infrastructure, existing GIS users will have access to centralized data and services.

Current F&A Cost to support:

\$100,000

F&A Budget Allocated:

\$100,000

F&A Manpower Requirements:

0.2 FTE's

Current F&A Manpower Allocation:

0.2 FTE's

3.4 Local Resolution National Hydrography Data

Strategic Summary:

Description: Develop and maintain a statewide local resolution hydrography (surface water) GIS layer using TNBMP and USGS data, scheduled for completion by late 2008.

Benefits: Will provide multiple agencies with a more accurate and complete set of hydrography features to support water pollution control, stream assessment, environmental impact studies, watershed management, wildlife habitat monitoring, stream flow modeling, flood control, and economic development.

Agency Steward: Environment and Conservation

Stakeholders: Environment and Conservation, Finance and Administration, Transportation, Economic and Community Development, TWRA, Agriculture, United States Geological Survey (USGS), US Environmental Protection Agency (EPA), US Census Bureau, and local government.

Through the initial investment of the Tennessee Base Mapping Program (TNBMP) a statewide hydrography GIS layer was created. However, based on limited funding at the outset, a complete set of attributes to support hydrography applications and modeling was not developed. Through a federal program administered by USGS, Tennessee acquired the National Hydrography Data set (NHD).

The local resolution NHD project is designed to integrate the high quality attributes currently available in the USGS NHD data and merge (conflate) these to the more complete set of hydrography features in the TNBMP data. The result is an extremely robust GIS data set that will support a host of GIS applications throughout State government. The success of the local resolution NHD will depend on the partnerships established with a wide variety of agencies that work with geospatial hydrographic data.

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These organizations will work cooperatively to implement a program to exchange updates and improvements to the NHD.

Projected F&A Cost to support:

\$50,000

F&A Budget Allocated:

\$50,000

F&A Manpower Requirements:

0.2 FTE's

F&A Current Manpower Allocation:

0.2 FTE's

3.5 Administrative Boundaries

Strategic Summary:

Description: Several State agencies are currently maintaining city and county boundaries in Tennessee, but level of completeness and spatial accuracy is varied and no official source exists. Need to identify a single State agency steward for maintaining and updating administrative boundaries.

Benefits: Having an accurate and up-to-date statewide administrative boundaries database will help eliminate redundant data collection and maintenance. This will provide State agencies with the ability to access a single source of data that reflects updates from local jurisdictions.

Agency Steward: To be determined (Potential candidates include: Comptroller of the Treasury, Finance and Administration, Transportation)

Stakeholders: Finance and Administration, Transportation, Revenue, Economic and Community Development, Human Services, TWRA, Environment and Conservation, Economic and Community Development, Agriculture, United States Census Bureau, Municipal Technical Assistance Service (MTAS) and local government.

A primary benefit is a more accurate source of information that can provide the Department of Revenue (DOR) with the ability to accurately distribute income tax and sales tax revenue to the appropriate jurisdiction. In addition, an up to date administrative boundaries database will help DOR to comply with the federal Streamlined Sales Tax initiative which requires states to develop and maintain a Jurisdictional Rates and Boundaries database that will provide retailers information on "destination-based sourcing". This requires SST member states to apply the sales tax rate of the product delivery location for retail transactions. Currently, OIR GIS Services is providing a web based application and a customized GIS database to satisfy the federal requirements, but no long term solution exists for applying annexations to the statewide administrative database. Establishing a State law that would

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require all municipalities to report all annexations to the agency steward is an essential step to ensure the success of coordinating State maintenance of the administrative boundaries.

As OIR GIS Services integrates local updates into the official administrative boundaries database, access would be provided to other State agencies and the general public through OIR's enterprise GIS environment. This data would also be made available to the Census Bureau to help State participation in their Boundary and Annexation Survey (BAS) program.

Projected F&A Cost to support:

\$80,000

F&A Budget Allocated:

\$80,000

Manpower Requirements:

1.0 FTE's

Current Manpower Allocation:

0.0 FTE's

3.6 Geodetic Control

Strategic Summary:

Description: Maintain and enhance the Tennessee Geodetic Reference Network (TGRN) consisting of horizontal and vertical control monumentation across the State.

Benefits: The TGRN supports a vast array of state, federal and local mapping and surveying projects. Enhancing this existing network will result in the ability to perform aerial and field surveys with reduced logistical issues and improve the efficiency of existing GPS staff.

Agency Steward: Department of Transportation

Stakeholders: Finance and Administration, Transportation, National Oceanic and Atmospheric Administration's (NOAA) National Geodetic Survey, State agencies, local government, and local surveyors.

Geodetic control surveys are usually performed to establish a basic control network from which supplemental surveying and mapping work is performed. These permanent surveys are established with far more rigorous accuracy and quality assurance standards than surveys for general engineering or mapping purposes.

Tennessee has a long history of pioneering advancements in geodetic control. In 1992, TDOT working in conjunction with the National Geodetic Survey established the first High Accuracy Reference Network in the United States. Since then several re-observations of the original geodetic network were

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included. The TGRN was used in conjunction with the initial data production efforts of the Base Mapping Program and has long been used within the Department of Transportation to conduct a variety of surveying and design projects.

TDOT is enhancing the TGRN with continuously operating reference stations (CORS) across the State. These CORS represent a network of GPS reference stations that continuously run 24x7, collecting, logging, archiving, and allowing user access to GPS data for post processing. When completed, the CORS network will significantly enhance the TGRN and create an enhanced spatial reference network that will result in improved access and accuracy for large scale surveying and mapping projects. The current project scope is focused on TDOT operations, but eventually the GPS CORS data will be accessible by private surveying companies.

Projected F&A Cost to support:

\$0

F&A Budget Allocated:

\$0

F&A Manpower Requirements:

0.1 FTE's

F&A Current Manpower Allocation:

0.1 FTE's

3.7 High Resolution Elevation Data

Strategic Summary:

Description: Statewide digital terrain model (DTM) completed in 2006, need to enhance vertical accuracy of existing data with a statewide Light Detection and Ranging (LiDAR) data product.

Benefits: Support ortho imagery program, flood hazard mitigation, economic development, public safety

Agency Steward: Finance and Administration

Stakeholders: Finance and Administration, Transportation, Comptroller of the Treasury, Wildlife Resources, Environment and Conservation, Economic and Community Development, Agriculture, local government, and NRCS.

Statewide elevation data updates are needed for many reasons. Currently, the primary statewide Digital Elevation Model (DEM) is from the TNBMP, usually only capable of generating a 20' contour, which in some areas is outdated and not accurate enough for most state, county, and municipal purposes. A more current and highly accurate statewide DEM through development of a statewide LiDAR data set would

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be of great benefit in flood map delineation, 3D data visualization, ortho photography projects, stream channel identification, soils mapping, and many other data creation and GIS data analysis projects. Some specific problems which could be addressed by better elevation data include:

- Tennessee and FEMA need to develop a maintenance plan for the digital flood insurance rate maps (DFIRM) and need to acquire new data to support the ability to manage and update the location of floodplains in the state. Flooding is Tennessee's #1 hazard, as identified by TEMA.
- The state has a mandate to work with FEMA in support of the National Flood Insurance Program (NFIP), which is managed by Economic and Community Development.
- Citizens buy flood insurance who don't need it because floodplains are not properly mapped in all areas
- Citizens do without protection because the floodplain is not properly mapped in all areas
- TEMA, National Weather Service (NWS), U.S. Army Corps of Engineers (USACE), TVA, USDA, counties, and other agencies cannot accurately predict flooding risk for major and minor storm events due to incomplete and inconsistent statewide elevation data

Projected F&A Cost to support:

\$1.4 – 1.6M/year

F&A Budget Allocated:

\$1.1M/year

F&A Manpower Requirements:

1.0 FTE's

F&A Current Manpower Allocation:

0.2 FTE

3.6 Homeland Security Infrastructure Project (HSIP)

Strategic Summary:

Description: Project initiated in 2008. Coordinate with the National Geospatial Intelligence Agency (NGA) and local government to acquire and develop geospatial data in support of homeland security and emergency response.

Benefits: The HSIP program is focused on sharing and improving GIS data to create uniform state and federal information on critical infrastructure that will benefit emergency management and first responders at all levels of government.

Agency Steward: Finance and Administration (OIR GIS Services)

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Stakeholders: TEMA, Safety/Office of Homeland Security, TBI, Economic and Community Development, Agriculture, Health, National Geospatial Intelligence Agency, local emergency management officials.

TEMA and OIR GIS Services have started work on this inter-governmental project in 2007. The process involves acquiring tabular data or relational databases that in many cases do not have an existing GIS or spatial format. Relevant officials (e.g. Fire Marshall) are contacted to let them know about the program and ask for their cooperation in the HSIP program. The current emphasis of this program is acquiring data for:

- Fire Stations
- Police Stations
- EMS Stations & Ambulance Services
- Prisons & Jails
- Hospitals & Urgent Care Clinics

OIR GIS Services works with NGA contractors to accept, modify, and quality control the data. If location information is not present within existing tabular data, OIR GIS Services contacts State or local officials to resolve or improve data inaccuracies. There is no monetary cost to the State to develop or acquire data. The contribution is the existing data and coordination with local officials.

Many other states are actively participating in the HSIP program and realizing the benefits of this shared approach. The primary advantage is it provides a mechanism to gather much needed critical infrastructure locations with higher accuracy and more timeliness than the states could accomplish on their own. In Tennessee the HSIP program will provide TEMA, TBI, Safety, and other agencies with access to geospatial information to mitigate, plan, respond, and recover from natural or man made disasters. Sharing and using the same data helps to ensure that decisions made in times of emergency will be consistent, and will provide for a common operational picture and ultimately protect public safety and improve the quality of life for all Tennesseans.

Projected F&A Cost to support:

\$5K/year

F&A Budget Allocated:

\$5K/year

Manpower Requirements:

0.1 FTE's

Current Manpower Allocation:

0.1 FTE's

3.7 Summary of Enterprise GIS Data Assets

The significance of these framework data layers are they are the most widely used data among State agencies and local government. As the program evolves two additional data sets that are not considered framework data but are needed statewide are:

- 1) Utilities
- 2) Land Use/Land Cover

Additional funding would be required to support the development of these data products.

Overall, the benefit for a coordinated approach to develop and maintain these framework datasets is the elimination of redundant and independent mapping activities among local, state, and federal agencies. In addition, development and maintenance of these data products will improve and promote cross border delivery of government services including emergency dispatch, homeland security, and access to health and human services. This will improve efficiencies of government service delivery and improve the quality of life for all Tennesseans.

4 Enterprise GIS Infrastructure and Services

Although the creation and maintenance of geospatial data is the most expensive aspect of operating a GIS at any level of government, OIR GIS Services will need to develop and maintain a dedicated infrastructure in order to maximize the investment in the TNBMP. In step with existing OIR strategic efforts to consolidate State agency IT infrastructure at the State Data Center, enterprise GIS data and other agency GIS data holdings will be stored, managed, and distributed through a central enterprise GIS infrastructure. Branded as the “Tennessee Map” (TNMap), this enterprise GIS infrastructure has two primary goals:

1. Provide geospatial data access to the general public and local government
2. Support State agency GIS business applications.

This section of the business plan will identify specific initiatives that will support the goal of creating and maintaining the TNMap enterprise GIS infrastructure that will help reduce redundant data collection and data management, while improving service delivery and enhancement of government services.

4.1 Vision of the “Tennessee Map” (TNMap)

Historically, GIS within State government was limited to a few agencies (Transportation, TWRA, TDEC, ECD, and Comptroller’s Office) that were project-based and specific to their unique business requirements. Data sharing among agencies was limited to copying data across multiple, yet independent platforms, making it difficult to maintain and update multiple versions of geospatial resources. Contributing factors to this lack of coordination and limited ability to effectively share data across the enterprise of State government were no clear authority to establish enterprise GIS policies, no

dedicated infrastructure to support a consolidated approach, and limited resources to fund the requirements of an enterprise GIS environment. The following strategies represent how OIR GIS Services will address the critical elements of the Enterprise GIS infrastructure and services, and realize the vision for the “Tennessee Map” (TNMap)

Ultimately, this new vision for the TNMap is to create a more effective and efficient way of managing, accessing, and analyzing geospatial data across all of State government.

4.2 GIS Data Repository

Strategic Summary:

Description: Develop a centralized GIS database; consolidate geospatial data storage, classification of public and secured or limited State agency access for information.

Benefits: Reduce duplication and redundancy in data, hardware, software, storage, and maintenance processes of geospatial data.

Agency Steward: Finance and Administration (OIR GIS Services)

Stakeholders: All State agencies, local government, general public

Because agencies have historically developed and maintained GIS data in “stove-pipe” environments, the ability to coordinate geospatial data in an enterprise environment did not exist. Each agency was forced to create unique and independent database, storage, and application development architectures, resulting in duplicate expenditures by each agency. With unique and separate hardware infrastructure, data from other agencies is stored in multiple locations. In addition, there is no uniform process to maintain and update data in multiple locations, resulting in a significant administrative effort to monitor versions of GIS data. As a result of this decentralized approach, there is no single definitive steward for many GIS data sets in State government. City boundaries for example are currently being edited and maintained by four agencies (Comptroller of the Treasury, Transportation, Economic and Community Development and Finance and Administration). Each agency claims responsibility and a need to maintain their own version and no official or definitive source of data exist. Without a centralized, enterprise geospatial data repository to collect and manage the State’s GIS data assets, we will not capitalize on the collective wealth of our agency GIS data initiatives.

Although in its infancy, the TNMap has demonstrated the value and business case to centrally manage base map data and share it across the enterprise of State government. Using standard ESRI server software components (ArcIMS, ArcSDE, and ImageServer), a SQL Server database and dedicated hardware for data storage, the TNMap enterprise data repository was established in 2007 with statewide ortho imagery, streets, parcels, and administrative boundaries. The GIS data repository is currently being replicated within the State Data Center for both public internet access, and limited State agency access via the Wide Area Network (WAN). GIS data stored in the TNMap repository is being backed up on multiple levels. All TNMap data is backed up through a routine process at the Data Center and at a secured offsite location at the Iron Mountain complex. The following table provides a summary of the geospatial data currently being hosted in the TNMap environment, and also provides a list of additional data planned for hosting in the near future.

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Table 1: Current and Planned TNMap Enterprise GIS Data				
Data Published as of 6-1-08				
GIS Data Layer	Agency Steward	Coverage Area	Access/Availability	
			Public	State WAN
Administrative Boundaries	OIR GIS/Revenue	Statewide	Browser, Desktop	Agency Desktop
Agency Administrative Boundaries	OIR GIS/TDEC	Statewide	Desktop	N/A
Agricultural Imagery 2007 (Leaf On)	USDA/State Agriculture	Statewide	Browser, Desktop	Agency Desktop
Child Care Providers	OIR GIS/DHS	Statewide	Browser, Desktop	Agency Desktop
City Boundaries	OIR GIS Services	Statewide	Browser, Application	Agency Desktop
City Elementary School District Boundaries	OIR GIS Services	Statewide	Browser	Agency Desktop
City Secondary School District Boundaries	OIR GIS Services	Statewide	Browser	Agency Desktop
County Boundaries	OIR GIS Services	Statewide	Browser	Agency Desktop
County School District Boundaries	OIR GIS Services	Statewide	Browser	Agency Desktop
Dove Fields	TWRA	Statewide	Browser	Agency Desktop
Dynamap Address Placeholder	Tele Atlas	Statewide	N/A	Agency Desktop
Dynamap Airports	Tele Atlas	Statewide	Browser, Application	Agency Desktop
Dynamap Churches & Cemeteries	Tele Atlas	Statewide	N/A	Agency Desktop
Dynamap County Boundaries	Tele Atlas	Statewide	Browser, Application	Agency Desktop
Dynamap Creeks & Streams	Tele Atlas	Statewide	N/A	Agency Desktop
Dynamap Highway Signs	Tele Atlas	Statewide	Browser, Application	Agency Desktop
Dynamap Interstate Exits	Tele Atlas	Statewide	N/A	Agency Desktop
Dynamap Lakes & Rivers	Tele Atlas	Statewide	N/A	Agency Desktop
Dynamap Landmarks	Tele Atlas	Statewide	N/A	Agency Desktop
Dynamap Major Retail Centers	Tele Atlas	Statewide	N/A	Agency Desktop
Dynamap Minor Civil Divisions	Tele Atlas	Statewide	Browser, Application	Agency Desktop
Dynamap Parks	Tele Atlas	Statewide	Browser	Agency Desktop
Dynamap Places Boundaries	Tele Atlas	Statewide	Browser, Application	Agency Desktop
Dynamap Populated Places	Tele Atlas	Statewide	Browser, Application	Agency Desktop
Dynamap Railroads	Tele Atlas	Statewide	Browser,	Agency Desktop

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			Application	
Dynamap Recreational Areas	Tele Atlas	Statewide	N/A	Agency Desktop
Dynamap Transportation Terminals	Tele Atlas	Statewide	N/A	Agency Desktop
Dynamap Water Bodies	Tele Atlas	Statewide	N/A	Agency Desktop
Dynamap Zip Code Boundaries	Tele Atlas	Statewide	Browser, Application	Agency Desktop
Elevation	OIR GIS Services	county	Desktop	Agency Desktop
Emergency Operations Centers	TEMA/NGA	Statewide	Browser	Agency Desktop
Floodplain	FEMA/ECD	county	Browser, Desktop	Agency Desktop
Geocoded School Locations	OIR GIS Services	Statewide	Browser	N/A
Hatcheries	TWRA	Statewide	Browser	Agency Desktop
Health Care Facilities	OIR GIS/BHLR	Statewide	Browser, Application	Agency Desktop
Health Care Points of Distribution	OIR GIS/BHLR	Statewide	Browser, Application	Agency Desktop
Health Care Practitioners	OIR GIS/BHLR	Statewide	Browser, Application	Agency Desktop
Hunting Lands	TWRA	Statewide	Browser	Agency Desktop
Lakes	TWRA	Statewide	Browser	Agency Desktop
Map Indexes	OIR GIS Services	Statewide	Browser	Agency Desktop
Nation Hydrologic Dataset (NHD) Flow lines	OIR GIS/USGS	Statewide	Desktop	Agency Desktop
NHD Water Bodies	OIR GIS/USGS	Statewide	Desktop	N/A
Ortho Photography Color Pilot (Leaf Off)	OIR GIS Services	Statewide	Browser, Desktop, Application	Agency Desktop
Ortho Photography Panchromatic (Leaf Off)	OIR GIS Services	Statewide	Browser, Desktop Application	Agency Desktop
Parcels	Comptroller	Statewide	Browser, Desktop	Agency Desktop
Private Nonretail Shipping	TEMA/NGA	Statewide	Browser	Agency Desktop
Sex Offender Exclusion Zones	Probation and Parole	Statewide	Browser, Desktop	Agency Desktop
Sex Offenders	TBI	Statewide	Browser, Application	Agency Desktop
State Owned Buildings	TEMA/NGA	Statewide	Browser	Agency Desktop
State Parks	TDEC	Statewide	Browser, Application	Agency Desktop
Streets/Highways	OIR GIS Services	Statewide	Browser, Desktop, Application	Agency Desktop
Tax Rate Boundaries	Revenue	Statewide	Browser, Application	N/A
TN Jewish Synagogues	TEMA/NGA	Statewide	Browser	Agency Desktop
TN Large Protestant Churches	TEMA/NGA	Statewide	Browser	Agency Desktop
TN Roman Catholic Churches in Large Cities	TEMA/NGA	Statewide	Browser	Agency Desktop

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Scheduled TNMap Enterprise GIS Data				
(Not currently available)				
Data	Agency Desktop Steward	Coverage Area	Availability	
			Public	State WAN
Agricultural Imagery 2008 (Leaf On)	USDA/State Agriculture	Statewide	Browser, Desktop	Agency Desktop
Fire Stations	FEMA/NGA	Statewide	Browser, Desktop	Agency Desktop
Game Processors	TWRA	Statewide	Browser, Desktop	Agency Desktop
Local Res. NHD	OIR GIS Services	Statewide	Browser, Desktop	Agency Desktop
Marinas	TWRA	Statewide	Browser, Desktop	Agency Desktop
Oblique Imagery Pilot	OIR GIS Services	county	N/A	Agency Desktop
Ortho Photography Color TDOT (Leaf Off)	OIR GIS Services	Statewide	Browser, Desktop, Application	Agency Desktop
Police Stations	FEMA/NGA	Statewide	Browser	Agency Desktop
Soils	NRCS	Statewide	Browser, Desktop	Agency Desktop
National Wetlands Inventory	USFWS	Statewide	Browser, Desktop	Agency Desktop

Projected F&A Cost to support:

\$50K/year

F&A Budget Allocated:

\$50K/year

Manpower Requirements:

0.5 FTE's

Current Manpower Allocation:

0.5 FTE's

4.3 GIS Data Inventory and Agency Stewardship

Strategic Summary:

Description: Identify a single agency steward for each data set that needs to be shared in the TNMap enterprise environment.

Benefits: Reduce or eliminate redundant data collection and maintenance activities across State government.

Lead Agency: Finance and Administration (OIR GIS Services)

Stakeholders: All State agencies that create and use geospatial data, local government, and the general public.

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OIR GIS Services conducted an initial survey of all GIS data within State agencies in 2006. This was communicated through the State GIS User Group and through the Information Systems Planning process. The goal for the inventory was to determine what geospatial data is created and maintained by agencies, and to determine what federal, commercial and other enterprise datasets are being used or needed. OIR GIS Services compiled this information that includes data access rights, scale, update frequency, and related metadata. Ultimately, the GIS inventory will be updated on an annual basis and reviewed to determine data redundancies across the Enterprise and identify a single steward where these redundancies exist.

Over time, the TNMap will consolidate state GIS data holdings and agency stewards will be identified to manage and update specific datasets as the official source for use by all other agencies. For example, the Department of Human Services will maintain locations for child care facilities. Working with OIR GIS Services, DHS will provide updated GIS data to the TNMap on a predetermined update cycle. OIR GIS Services will host this data for State agency use and public access, and leverage this data for other agency applications. This “build it once, use it many” concept is exemplified with the Board of Probation and Parole. BOPP staff requires the need to view and analyze child care and school locations to create exclusion zones (1000’ buffer distance) around these facilities that will enable them to enforce State law and protect children and their families. BOPP does not have the capacity and resources to develop these efforts on their own, but is instead leveraging the data and services OIR GIS created for DHS. Through the vision of the TNMap enterprise GIS, OIR GIS Services is facilitating GIS data sharing, maximizing State resources, eliminating duplicate data, and ultimately improving public safety.

This stewardship concept will present many challenges when agencies need complete, current, and accurate information. In some cases, agency stewards will need to aggregate local data into a statewide data layer. As an example, the Comptroller of the Treasury will aggregate local parcel data through database replication tools. This will provide many agencies with the best available local parcel data for use in many statewide projects and provide a uniform data layer leveraging the investment made by State and local government. It is expected that each steward may need some additional funding to fulfill their role. This may require additional hardware, software, personnel to perform the stewardship tasks. These costs will be offset by the savings from having a single unified dataset that all agencies can share.

Projected F&A Cost to support:

\$20K/year

F&A Budget Allocated:

\$20K/year

Manpower Requirements:

0.2 FTE’s

Current Manpower Allocation:

0.2 FTE’s

4.4 Hardware and Software

Strategic Summary:

Description: Acquire the necessary hardware and software to support the TNMap GIS data repository and support GIS enterprise applications and services.

Benefits: Provide the public and agencies with the ability to access and use the State's GIS assets.

Agency Steward: Finance and Administration (OIR GIS Services)

Stakeholders: All State agencies, local government, general public

The goal of the TNMap enterprise GIS is to provide public access to the State's geospatial resources and to facilitate interagency GIS data sharing within State government. In order to accomplish both of these goals, OIR GIS Services has developed a mirrored hardware environment at the State Data Center. By working with OIR Data Center staff and the Architectural Review Committee, OIR GIS Services staff have identified that the enterprise GIS Infrastructure should include the following characteristics:

- Implement a dedicated and centralized set of geospatial servers with high availability (24x7) and performance.
- Provide a mirrored set of hardware for internet and intranet access to centralized GIS data.
- Provide a single definitive source for all geospatial data in the State that needs to be shared with the public or limited to State agencies, and leverages the investments of the agencies in creating the geospatial data assets.
- Provide an infrastructure to support GIS applications and reusable geospatial web map services that can be integrated into other agency applications using standard protocols (SOAP, REST, AJAX, Java Script API).
- Support Open Geospatial Consortium (OGC) standards for interoperable data sharing. Development of the TNMap Enterprise GIS Architecture will leverage all of the enterprise and agency geospatial data assets, reduce overlap and duplication of efforts and consolidate data storage

Currently, the TNMap production web map services and applications are leveraging the ESRI server family of software products (ArcIMS, ArcSDE, and Image Server). Annual maintenance and additional software is required to support the expansion of the GIS shared services and agency applications.

Projected Annual F&A Cost to support:

\$250K/year

F&A Budget Allocated:

\$250K/year

Manpower Requirements:

0.2 FTE's

Current Manpower Allocation:

0.2 FTE's

4.5 GIS Shared Services

Strategic Summary:

Description: Develop internet-based GIS applications and other web mapping services to satisfy agency business requirements.

Benefits: Reduce the need for dedicated GIS infrastructure to support agency business process, maximize the use of the geospatial library by using current and common data, and expand the role of geospatial technology throughout State government.

Agency Steward: Finance and Administration (OIR GIS Services)

Stakeholders: All State agencies, local government, general public

In 2005, OIR GIS Services put into production its first GIS application at the Data Center. Using the Location Based Services (LBS) framework and the enterprise GIS data repository, the Department of Human Services is the first customer of the GIS shared services enterprise environment. Providing agency personnel and the general public with a core set of tools to view, search, locate, and provide point to point routing, the LBS application template was expanded to the Department of Health to map hospitals, health care facilities, and practitioners. Within the Tennessee Bureau of Investigation, the LBS application tools were used to interface with the Sex Offender Registry and in the Department of Revenue the LBS application was used to develop a more accurate method to distribute income and sales tax revenue to local jurisdictions. OIR GIS Services is continuing to expand these services to other agencies. A project summary is provided in Table 2 below.

These applications range from using the GIS shared services environment, to OIR GIS Services providing geocoding services in the Department of Health for the National Electronic Disease Surveillance System, or the ability for agencies to use enterprise GIS data for use with other vendor solutions. In the case of the nine regional Human Resource Agencies associated with the Department of Transportation, they were able to save approximately \$40,000 by using the OIR GIS Services statewide license for TeleAtlas street data. Their vendor was able to deliver a routing application (RouteMatch) using the State's licensed data product that improves the ability to provide effective and efficient mass public transportation services for the elderly, low income, and persons with disabilities, which will allow them to participate more fully in their communities.

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Table 2: OIR GIS Services Project Summary:

Government/Agency	Application	Web application/URL
Dept. of Health	Health Care Locator	http://tnetgis.state.tn.us/health
Dept. of Human Services	Day Care Locator	http://tnetgis.state.tn.us/childcare/
Dept. of Revenue	Sales Tax Lookup	http://tnetgis.state.tn.us/sst/taxratelookup.aspx
Tenn. Bureau of Investigation	Sex Offender Registry	http://tnmap.state.tn.us/sor/
Tenn. Wildlife Resources Agency	Hunting Locator	http://tnmap.state.tn.us/twra/
Secretary of State	Polling Place Lookup	In Development
Comptroller of the Treasury	Property Assessment Lookup	http://tnmap.state.tn.us/assessment
TBI./Hamilton Co. (Meth Task Force)	Tennessee Meth Information System	In Development
Dept. of Health	National Electronic Disease Surveillance System	In Development
Dept of Transportation (Regional Human Resource Agencies)	Route Match software Ad hoc Geocoding, Vehicle Routing	N/A
Tennessee One Call	Ad hoc Geocoding, Vehicle Routing	N/A
Dept. of Economic and Community Development – ConnectedTN	Broadband Service Identification	http://www.connectedtn.org/broadband_landscapes/interactive_map.php
Board of Probation and Parole	Offender Exclusion Zone Analysis	In Development
Dept. of Economic and Community Development – Energy Div.	Energy Resource Locator	In Development
Dept. of Environment and Conservation	Greenways and Trails	Planned Development
Dept. of Children’s Services	SACWIS GIS integration	Planned Development
Dept. of Health	Health Information Tennessee (HIT)	Planned Development

In addition to these existing or planned agency projects that are based on ESRI’s ArcIMS environment, OIR GIS Services is planning to migrate to ESRI’s new ArcGIS Server (AGS) platform. AGS will provide improved flexibility for the public to view, query, and access the State’s enterprise GIS resources via the TNMap data browser. AGS can create web services that can be maps, images, geocoding services, or geoprocessing services. In 2008, OIR GIS Services will launch the new public TNMap site that will focus on providing access to the enterprise data through these services. TNMap users will be able to perform relatively simple functions of geospatial data such as address geocoding

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and validation, spatial searches, general mapping and routing. These services will be available to State agencies, local government, regional development districts, and emergency management officials.

Projected F&A Cost to support:

\$150K/year

F&A Budget Allocated:

\$0K/year

Manpower Requirements:

2.0 FTE's

Current Manpower Allocation:

1.0 FTE's

4.6 Cost Model

The cost model for supporting the TNMap enterprise GIS shared services environment is examined from the brief history of existing GIS development and application hosting services. This section of the business plan will define the types of GIS services offered and clearly identify the funding source associated with each. Not all GIS services are recoverable through agency payback. Clearly, the TNMap enterprise environment has a specific role to support State agency business requirements, but the scope of the Base Mapping Program and providing access to statewide geospatial resources is expanded to include the general public.

Starting in 2005, the GIS cost model was initially developed based on supporting agency Location Based Service (LBS) applications. Working with OIR Financial Management personnel, a flat monthly rate to recover the infrastructure costs (hardware, software, and a portion of development cost) was implemented. This monthly hosting fee model is currently in place and is identified within the OIR Catalog of Services. Revenue from five agencies is helping offset the cost of supporting and maintaining the GIS enterprise infrastructure.

It is important to note that the cost associated with creating, converting, and maintaining the Base Mapping Program data, licensed GIS data products, or agency derived GIS data hosted within the TNMap enterprise data repository are not elements included in the cost model. Funding to support these GIS data production and maintenance efforts are identified through legislative appropriation and are detailed in Chapter 3.

To clearly define the distinction between data and application related costs and services, table 3 below provides a comprehensive list of services offered by OIR GIS and the funding source for each.

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Table 3: GIS Services and Funding Source

Type of Service	Funding Source
TnMap Public Portal	State Appropriations / Federal Grants
GIS Data Production	State Appropriations / Federal Grants/ Local Gov. Contracts
GIS Data Maintenance	State Agency
GIS Data Publishing to TNMap portal	State Appropriation
GIS Application Development	State Agency
GIS Application Hosting	State Agency
GIS Training	State Agency
GIS Consulting / Project Planning	State Agency

In addition to these core GIS services, there are other ancillary and ad hoc uses of GIS data and technology within OIR GIS Services. One of the primary opportunities to promote the use of GIS within State government is through the process of creating thematic maps of agency tabular data. These opportunities to showcase the power of GIS data and spatial analysis have led to establishing permanent relationships with other State agencies. While these services are not captured as “billable hours”, they are a valuable marketing tool for OIR GIS Services to promote the core services listed above.

The value of existing State agency GIS data contributing to the TNMap Data Repository should not be underestimated and is worth mentioning here. OIR GIS Services is providing State agencies with the opportunity to share and publish their existing GIS data to the TNMap enterprise. This service requires OIR GIS Services staff time to collect, evaluate, and create web mapping services of agency GIS data. These data sets enrich the TNMap GIS Data Repository which, in turn, increases agency use and participation in this shared enterprise GIS experience. Associating a cost or fee with this service would limit agency participation and create additional constraints on the ability to maximize the TNMap enterprise GIS Data Repository and the ability for OIR GIS Services to reduce or eliminate redundant data collection among State agencies.

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A possible solution to agency access to internet and/or intranet services via a desktop client (ArcInfo, ArcView, ArcGIS Explorer) is the development of a user access fee (UAF). Similar to Microsoft's concept of client access licensing (CAL's) for users accessing applications running on Windows Server OS, the UAF's could be established for each desktop user that is consuming web map services from the GIS Data Repository.

In summary, the OIR GIS Services revenue is generated through agency GIS application hosting and development services, and GIS data maintenance operations. Data development, data hosting, and public access services are funded through State appropriation and federal grants. As OIR GIS Services migrates to the deployment of web services that can be consumed by other applications, a revised or expanded cost model may be required. As opposed to a monthly hosting fee, a new cost model based on agency consumption of these web map services should be examined.

4.7 Geospatial Standards

The viability of the TNMap enterprise GIS system to deliver consistent, reliable, and timely services not only requires the necessary infrastructure elements, but equally important is the need to identify and establish specific geospatial standards that will facilitate data sharing and promote a consistent and compatible approach toward using and managing the enterprise system.

In 2007, OIR GIS Services published a set of basic GIS metadata standards that provide a set of guidelines for agency data stewards to share and publish their GIS data to the TNMap data repository. This metadata standard is consistent with the Federal Geographic Data Committee (FGDC) metadata standard and is the first in an eventual host of geospatial content standards planned to support the enterprise system.

Expanding on the need and benefit of standards, OIR GIS Services in support of its role in coordinating development of an address based street centerline database, developed a content standard for the Tennessee Information for Public Safety (TIPS) data product. This standard will help guide the long term maintenance of this product for use at the local and State agency level. This is important since address standards currently do not exist in most agencies. As a result, each agency database may store address information in slightly different ways, which makes geocoding agency address information inconsistent and incomplete. Using the TIPS content standard along with the development of a geocoding standard, agencies will have a structure to standardize address information in a host of databases. These standards will provide local and State users with a consistent approach for storing, parsing, and managing address information and promote GIS applications and spatial analysis.

The scope and need to develop geospatial standards however, is beyond addressing the needs of developing and sustaining the enterprise GIS system only. The overall goal is to develop a process for the Tennessee geospatial community to assist in developing and adopting geospatial standards and provide guidelines for spatial data development within local governments, State agencies, and their contractors.

OIR's mission also includes reviewing and adopting specific software products as part of the State's Technical Architecture. Since 1992, ESRI has been recognized by the Information Systems Council and OIR as the State software standard. All ESRI server, desktop, and mobile products and services are available to State agencies and local governments through a master purchase agreement. ESRI software

products are used throughout State government and provide a foundation for GIS personnel to share knowledge and skills under a common set of tools and language.

4.8 Personnel Requirements

Staffing in OIR GIS Services to support the GIS enterprise business plan strategies is critical to its success. Although OIR GIS Services experienced a complete staff turnover in 2005, this transition was successful and provided an opportunity to create a new team of GIS professionals dedicated to the mission of supporting the geospatial needs for State and local government. OIR GIS Services has two DOP classifications of positions, GIS Analyst and GIS Technician. The functional roles and responsibilities of these positions to support the department objectives are as follows:

GIS Manager (GIS Analyst 3) - This supervisory role is focused on providing GIS technical consulting services to State agencies interested in developing and maintaining a variety of GIS applications to support their business operations. Specific work requirements include evaluating agency project plans, RFP's, providing feedback and recommendations to agencies on detailed requirements. Scope of duties also includes making software and hardware recommendations, including planning and procurement for OIR GIS internal infrastructure requirements. The GIS Manager works directly with Data Center staff on the development and maintenance of the GIS shared services environment. A percentage of time is also monitoring and assisting with GIS development activities and creating customized GIS databases and applications.

GIS Developer (GIS Analyst 3) - Primary responsibility is application development in support of agency GIS requirements. This includes evaluating and implementing GIS technology for enterprise GIS functions, creating custom GIS analysis tools, developing web mapping services, and supporting production applications. This position also assists with ad hoc desktop GIS projects, map production and analysis, data maintenance, quality control, and project documentation.

GIS Database Administrator (GIS Analyst 3) - A critical component to the success of the TNMap enterprise GIS is data maintenance and version control. The GIS database administrator is responsible for managing the acquisition, verification, and publishing of enterprise GIS data developed from the Tennessee Base Mapping Program, State agencies, or other sources. This position requires performing data verification/validation for all base map data products, creating value added GIS data from existing sources, and assisting with technical recommendations of desktop and server GIS software to support enterprise GIS data services. This position also coordinates with other agencies on enterprise GIS data access and performance, and makes recommendations on additional infrastructure to support enterprise GIS services.

GIS Training Coordinator – Another significant and critical component to maximizing the investment the State has made in the Base Mapping Program is to have a well trained work force throughout multiple State agencies. Without the basic understanding of GIS principles, tools, and data management best practices, the vision of integrating geospatial data and services in local and State government will not be realized. The responsibilities for this position are to provide ESRI professional training courses (ArcGIS I and II) to State employees, provisioning of a customized GIS training course to local government on the use of the federal, State and local

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GIS data and the Tennessee Base Mapping Program, and facilitate GIS education through ESRI instructor-led on-site courses.

GIS Public Safety Manager - This position is focused on managing the development and maintenance of the Tennessee Information for Public Safety (TIPS) data. In a contract with the State Emergency Communication Board, OIR GIS Services is tasked with supporting local E911 districts on the use of a statewide address-based street centerline database. The specific job responsibilities include: manage all data production related activities of the TIPS data, supervise GIS technicians on the validation/verification process of data received from the State's contractor, develop data standards and the internal GIS hardware and software configuration to support data maintenance functions, provide GIS training to local E911 district directors on the scope of the project and value to their emergency dispatch mapping requirements, provide a mechanism for local E911 districts to exchange GIS data with OIR GIS Services, and provide GIS technical consulting services to the E911 districts.

GIS Technician (3 positions) – Also part of a contract with the Emergency Communications Board, three technicians are dedicated to the development and maintenance of the statewide address-based street centerline database. Detailed work requirements include: perform data entry tasks associated with editing and processing street centerline features from local and State sources; perform quality control tasks associated with GIS data production; develop and create maps, tables, reports, and graphics in support of GIS operations; and assist with data distribution, metadata development, and transmittal documentation.

As the demand for geospatial applications and related services increase, OIR GIS Services will need to expand its staffing capacity to meet this demand in service. Over the next five years, OIR GIS expects to add two or three additional GIS Developer/Programmer staff to support the strategic components of the Enterprise GIS business plan.

4.9 Marketing Plan

While a significant component of the Base Mapping Program is based on local government participation and promoting the benefits of GIS to these consumers, the scope of the marketing plan identified here is specific to State agencies consuming web map services or GIS applications hosted by OIR GIS Services in the shared services environment of the TNMap.

As identified in Table 2, OIR GIS Services' initial marketing focus was to support agency implementation of the Location Based Services (LBS) application framework. LBS applications support agency requirements for geocoding and mapping business data, performing point in polygon spatial analysis and supporting point to point routing functionality. These three elements of the LBS application framework proved to be valuable in at least five agencies (Health, Human Services, Revenue, TBI, and TWRA). Using these applications as examples, GIS promotional efforts are directed toward agency IT staff, business directors, and executive leadership.

As new services are developed within OIR GIS, promotional efforts to communicate with potential consumers will be conducted in the following forums:

1. State Agency GIS User Group

2. Information Technology Management Association
3. Information Technology Executive Council
4. Information Systems Planning
5. Communities of Interest

5 Strengthening Enterprise GIS Relationships

Although OIR GIS Services has successfully established many relationships with local government, State agencies, and federal agencies through the initial production efforts of the Base Mapping Program, additional opportunities exist to build stronger relationships in government, business, and public consumers of geospatial data and services. This Chapter will identify specific strategies that OIR GIS Services will undertake to improve communication and coordination of GIS activities throughout Tennessee.

5.1 State Agency Outreach

As previously stated one of two primary goals of the GIS enterprise is to serve State agency GIS users. The scope of outreach to State agencies is beyond simply providing access to GIS services, but involves more direct involvement on education, training, project development, and consulting to better understand their business needs and geospatial programs. These activities are broken down into three primary categories:

1. State Agency GIS User group
2. State Information Systems Planning
3. GIS Training

State Agency GIS User Group

Beginning in 2005, OIR GIS Services began to hold quarterly user group meetings. These meetings provided OIR GIS Services with the opportunity to communicate the vision of developing and maintaining an enterprise GIS environment that all agencies would contribute and share data within State government. These meetings also focused on allowing agencies to communicate their projects and requirements, and help OIR GIS identify priorities for enterprise GIS data and services. This user group represents the core GIS community within State government. A primary accomplishment of this group is the development and maintenance of the GIS Data Inventory. While input for this inventory is solicited through the Information Systems Planning process, the GIS “power users” in many cases are not found within Agency IT departments. This quarterly meeting will include technology highlights, updates to the Technical Architecture, standards development, and rollout of new service offerings to State agencies.

State Information Systems Planning

OIR GIS Services coordinates and assists agency GIS projects through the three year information systems planning process. Through this process OIR GIS Services can effectively communicate and respond to agency GIS projects and identify the potential involvement of OIR GIS and enterprise GIS data and services. This tool provides OIR with information necessary for resource planning and project prioritization. Feedback from agencies is used to coordinate agency briefings, demonstrations, and opportunities to expand the scope of GIS technology in State government. For example, the use of global positioning systems (GPS) is expanding throughout government and society. Through the information systems planning process, OIR GIS Services solicited agency interest in using this technology. In response, OIR GIS is in the process of developing the technical capabilities to train and customize GPS data collection for State field personnel. Overall, information gathered through this process enables OIR GIS Services to respond, develop, and deploy geospatial services and improve agency business.

GIS Training Program

A third methodology for outreach to State agencies is through development of a GIS training program. In 2007, OIR GIS Services implemented a training program specific to State employees. The goal is to provide cost effective and professional training opportunities for employees who are just beginning their experience in GIS or to enhance an existing knowledge base of GIS professionals. OIR GIS Services is fortunate to have a certified ESRI instructor on staff. Through the GIS training courses offered by OIR GIS Services, agencies save money by not having to travel out-of-state, yet receive the same professional quality training offered by ESRI. Through the State GIS user group meeting, agencies help define additional ESRI on-site, instructor-led training courses that are offered to compliment or enhance the OIR GIS Services curriculum.

Courses and student participation in the GIS Training Program as of June 1, 2008:

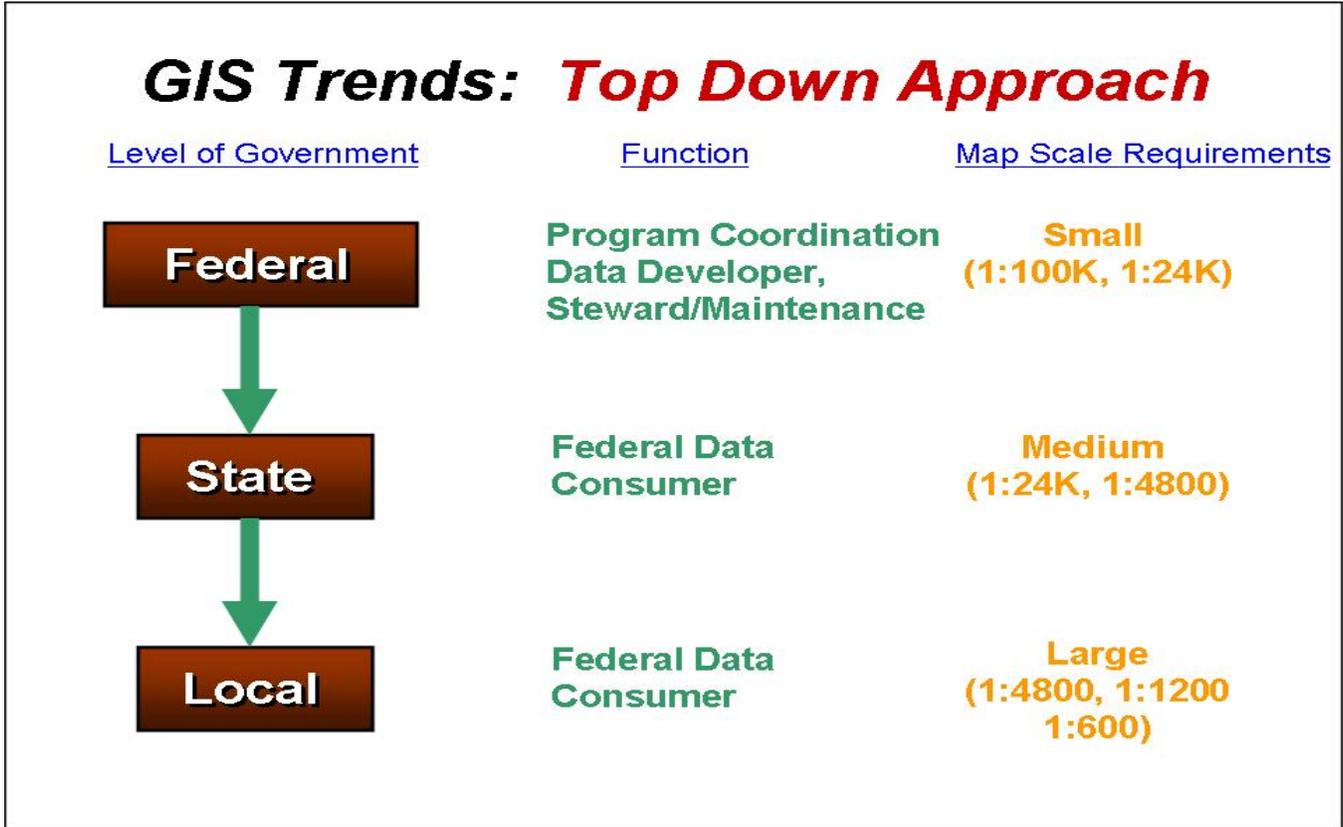
1. ArcGIS I – 54 students
2. ArcGIS II – 13 students
3. Building Geodatabases – 26 students

5.2 Local Government Collaboration

Historically, OIR GIS Services has a very strong and direct relationship with local government. In many respects, they are the primary data consumer for the Tennessee Base Mapping Program. Whether maintaining and analyzing GIS parcel data for property assessment functions, or updating digital street centerlines for address information to support public safety and emergency response, local government has benefited from the Tennessee Base Mapping Program.

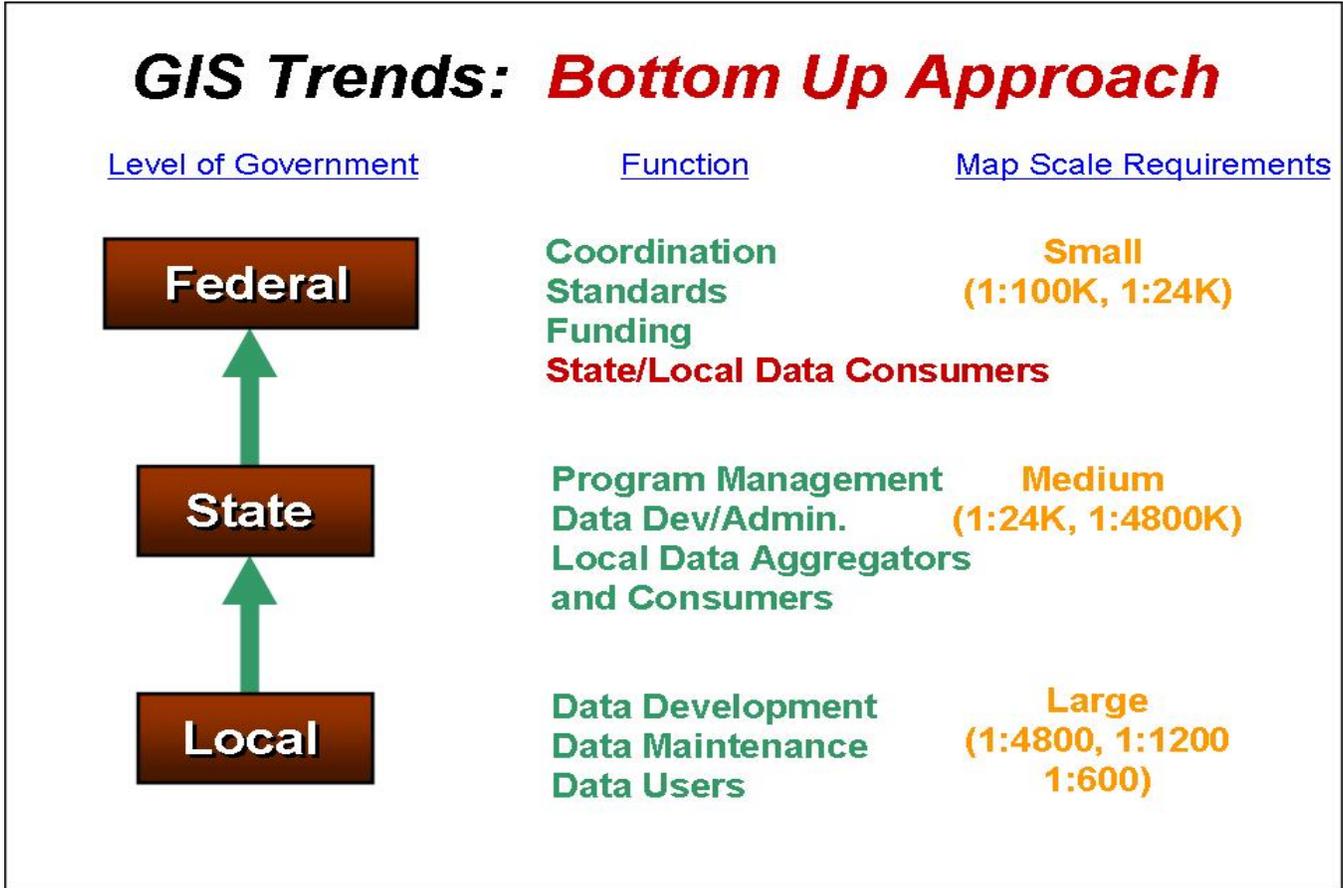
Prior to the Base Mapping Program, only a handful of local governments were using GIS or maintaining digital map data. State and local governments were in most cases consumers of federal mapping programs (e.g. USGS, Census), but these data products didn't satisfy most local needs (See Graphic 1).

Graphic 1: Top Down GIS Data Flow



By developing the base mapping specifications on the large scale and positional accuracy requirements of local government, the Tennessee Base Mapping Program data products provide State and federal users with better data to help support their business applications and mapping programs. This has resulted in a paradigm shift. Instead of the federal government developing, managing, and distributing GIS data to State and local government, State and local governments are cooperating on data development and data sharing that will meet federal requirements (See Graphic 2)

Graphic 2: Bottom Up GIS Data Flow



The two primary GIS datasets that the State is interested in consuming from local government officials are parcels and street centerlines. Through the Comptroller of the Treasury, Office of Local Government, parcel data updates from the county property assessor will be replicated to a centralized geodatabase at the State. The ability to automate this data replication process is built on the GIS database standards implemented through the Base Mapping Program. Ultimately, the updated parcel data will be integrated with the TNMap enterprise data repository and made available to State agencies and the public.

Local government collaboration for street centerline data is built on a long standing relationship with the State Emergency Communications Board (ECB). The ECB monitors and directs public safety policy and technical requirements for local emergency communications (E911) districts. In December 2005, the ECB required all local emergency communications districts to have an operational GIS system to aid in emergency response. Through training programs and working with local E911 districts, OIR GIS Services will be consuming locally updated geometry and tabular information (street addresses, names, etc.) and integrating these local updates into a single, consolidated and standardized street centerline database. In turn, OIR GIS Services will provide local E911 districts with the updated statewide centerline at no cost to the districts. The ability for local E911 districts to share and exchange data with OIR GIS Services will allow the districts to effectively manage their operations and improve their ability to locate and dispatch to locations that may be outside their jurisdiction.

The State is responsible for setting data standards and communication protocols with local governments to consume and aggregate local data into statewide GIS data layers. Through these relationships with local government and the implementation of GIS technology to consume and aggregate local GIS data, OIR GIS Services is eliminating duplicate GIS data development and realizing the concept of “build it once, use it many”.

5.3 Federal Partnerships

Along with local government collaboration, OIR GIS Services has fostered partnerships among several federal agencies. These partnerships range from providing GIS source data to support federal mapping programs, to receiving federal funding to help offset the cost associated with enterprise infrastructure and development of State agency specific GIS data sets. All of these partnerships and activities are centered on the development of the National Spatial Data Infrastructure (NSDI).

Existing Federal Partnerships

Continuing with the “bottom up approach” theme, OIR GIS Services is sharing data to support a number of federal programs. Through a relationship with the Department of Economic and Community Development, OIR GIS Services has provided the Department of Homeland Security and FEMA with all of the data products developed through the Base Mapping Program. FEMA is using the digital elevation data (DTM) to delineate a more accurate boundary for flood hazard areas identified as part of the Digital Flood Insurance Rate Maps (DFIRM). The State receives a benefit by having all new digital flood data mapped on the state base map with property ownership, while FEMA receives a standardized dataset to streamline data production efforts.

OIR GIS is also working with the US Census Bureau to modernize their digital base map used to collect, inventory, and tabulate demographic information. Known as TIGER, this base map was constructed from 1:100,000 or 1:24,000 scale paper maps, not sufficient for local government mapping programs as depicted in Graphic 1. Using the TNBMP data, the Census Bureau is leveraging the increased spatial accuracy of this statewide data resource, resulting in a better map. The benefit of this improved Census map is a more accurate decennial count, which impacts State and local redistricting and creates equity in political representation, improves access to polling places resulting in increased voter response, and supports a wide range of State programs dependent on population based federal funding that includes community health, public safety, and others.

NSGIC and the U.S. Geological Survey

Helping coordinate state and federal GIS activities and promoting the NSDI is the National States Geographic Information Council (NSGIC). The mission of NSGIC is to “create efficient and effective government through the prudent adoption of geospatial information technologies”. NSGIC provides a unified voice on geospatial technology issues, advocates State interests, and supports its membership in their statewide mapping programs. OIR GIS Services represents Tennessee within the organization and benefits from the collective knowledge of other State GIS initiatives, practices and relationships with federal agencies and the professional GIS community as a whole.

Working through the NSGIC membership and State GIS coordinators is the U.S. Geological Survey (USGS) – National Geospatial Programs Office (NGPO). Each state, including Tennessee, is assigned a

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USGS geospatial liaison. These staff are directed to promote, coordinate, and develop GIS data and best practices, and facilitate state opportunities to receive federal grants in support of statewide mapping efforts. Through OIR GIS Services relationship with USGS, Tennessee has received federal funding to support the following activities:

1. Development of TNMap infrastructure - \$50K
2. Stewardship of the local resolution National Hydrography dataset - \$50K
3. Development of State Owned Building dataset - \$50K

The USGS liaison also serves in coordinating State involvement with other federal programs including the International Charter. In addition to FEMA, USGS plays a role to assist States with rapid and accurate assessments of post disaster events. The International Charter works to provide emergency response satellite data free of charge to those affected by disasters anywhere in the world. Each member agency has committed resources to support the provisions of the Charter and, in so doing, is helping to mitigate the effects of disasters in Tennessee and throughout the world. These resources include imagery collected by a variety of civilian and commercial satellites. This alliance of U.S. commercial satellite imagery providers and the member agencies of the International Charter represents a unique collaboration between governments and industry in the area of space imaging. Working through USGS and coordinating with TDOT and TEMA, OIR GIS Services will continue to participate in this effort when earthquake, tornado, flood or other natural disaster strikes in Tennessee.

5.4 Protecting and Maximizing State GIS Assets

The final section of this Chapter, focused on building GIS relationships, examines specific strategies to protect and maximize the State's investment in the Base Mapping Program and enterprise GIS resources. In addition to the primary TNMap enterprise GIS consumer base of State agencies and general public, there are potential State GIS data consumers in local government, federal agencies, and private industry. This section presents an argument for leveraging the Department of Energy's (DOE) large scale computing capacity of Oak Ridge National Lab (ORNL). The mission of ORNL's Geographic Information Science and Technology (GIST) group is to support national environmental, energy, and defense programs through research, development, and application of geographic information and analysis systems. Based on the scope of the organization, an opportunity exists to support the operations of OIR GIS Services and provide GIS services to federal agencies and organizations that have a regional or multi-state scope. These can be broken down into three categories:

1. Disaster Recovery and Business Continuity
2. Regional and Federal Agency GIS Applications
3. GIS Research and Development

Disaster Recovery and Business Continuity

The TNMap enterprise infrastructure, GIS data repository, and agency applications are housed at the State Data Center just north of the State capitol in Nashville. In 2007, OIR GIS Services completed a

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study in conjunction with the U.S. Army Corps of Engineers (USACE) that evaluated the impact of the Wolf Creek Dam failure in Kentucky. Through the use of the Tennessee Base Map data products, USACE created models of flood impact based on water elevations above the dam, and concluded that the State Data Center was at risk. While mitigation plans are being developed to prevent a dam failure and subsequent massive flooding in the Tennessee portion of the Cumberland River basin, this raised an important issue: What is OIR GIS Services plan for disaster recovery and business continuity of TNMap enterprise GIS services in the event of a disaster?

Currently, all TNMap data is backed up through a routine process at the Data Center and at a secured offsite location at the Iron Mountain complex. However, an alternative location may be appropriate to maintain customer reliability and high availability of enterprise GIS services. Partnering with the Department of Energy and Oak Ridge National Laboratory (ORNL) and leveraging their computing and infrastructure facilities will enhance OIR GIS Services' continuity of operations plan (COOP) for statewide GIS data sets. In the case of a disaster, having replicated State GIS data at ORNL will enable OIR GIS Services to improve the response time for bringing data and services back on-line.

Federal Government Access

The value of ORNL facilities and supercomputing capacity, however, far exceeds the benefits associated with disaster recovery. Several federal agencies have expressed an interest or are already using ORNL's facilities to improve business operations or expand service delivery to its customers.

The Tennessee Valley Authority (TVA) is a prime candidate to use the supercomputing resources at ORNL combined with the enterprise GIS data resources provided by OIR GIS Services to maintain and expand their utility infrastructure. The scope of their service area includes Tennessee and parts of Kentucky, North Carolina, Georgia, Alabama, and Mississippi. The regional scope of this federal agency is a primary example of the need to establish a relationship with ORNL to fully maximize the benefits of Tennessee geospatial data assets.

The U.S. Army Corps of Engineers is another federal agency that has a need to consume and perform spatial analysis of Tennessee Base Mapping data on a regional level. The Nashville District encompasses more than 59,000 square miles and includes parts of seven states. It has regulatory, flood control, navigation, hydropower and recreational responsibility for the Cumberland River watershed. It also has regulatory and navigation responsibility for most of the Tennessee River watershed. Through the use of ORNL facilities and the base map data products, the USACE will have a uniform, large scale GIS dataset to manage its resources, conduct hydrologic studies, and protect Tennessee citizens and property.

In the Department of Homeland Security (DHS), the use of geospatial data is becoming an integrated component of the department's mission. With the ever present threat of terrorist attacks within our borders, DHS has a need to facilitate and develop a common operating picture capable of simultaneously displaying geographic data from multiple states and the federal government. This requires the need to develop a data sharing strategy between the States and DHS. Coupled with State GIS data and the facilities at ORNL, DHS will benefit from this partnership and result in a common operating picture that will help prevent terrorism, protect the states critical infrastructure, and improve our homeland security.

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Currently, OIR GIS Services does not have the computing capacity, human resources, or the business justification to serve the needs and interests of these federal agencies. By partnering with ORNL, the State will maximize the use of its geospatial assets and receive a larger return on its investment in the Base Mapping Program.

GIS Research and Development

In addition to providing specific services to federal agencies, ORNL has a specific role to conduct scientific research projects that will benefit the citizens of Tennessee and the nation. The use of geospatial data is critical in many of these research efforts. The data developed through the Base Mapping Program can be used in the following areas:

1. Modeling land use change and effects on the environment
2. Aid in identifying new and efficient energy sources
3. Modeling regional water utility requirements
4. Predicting population growth and its affect on transportation infrastructure
5. 3D Modeling and Visualization

These are only a sample of the potential research projects that ORNL could pursue in the interest of the State and its citizens. Through its mission, experience, and existing relationships with a broad user community at the Federal level, establishing a relationship with ORNL is in the best interest of the State.

5.5 GIS Coordination and Governance

This chapter has identified the critical need to coordinate GIS activities on a statewide basis to eliminate waste and improve efficiency in government. To aid in the process of formalizing relationships among the various stakeholders and to help guide the direction and decisions that affect these groups, many states have developed official GIS Coordination Councils. Usually through executive order, these governing bodies or steering committees are established to provide direction and oversight for statewide GIS coordination and usually are comprised of a broad set of members that represent federal, state, local, private, and non-profit organizations or agencies. Helping drive the development of coordination councils is the Fifty States Initiative. This program is a partnership between the National States Geographic Information Council and the Federal Geographic Data Committee (FGDC). It is designed to bring all public and private stakeholders together in statewide GIS coordination bodies that help to form effective partnerships and lasting relationships.

To date, OIR GIS Services and the Tennessee Base Mapping Program have been guided by the direction of the Information Systems Council (ISC). OIR serves as staff to the ISC which is comprised of key executives within State government, as well as representatives from the public and private sector. While this existing governance model is functional, a more inclusive and broader reach of key GIS stakeholders is appropriate. In particular, what is currently lacking, according to the nine GIS coordinating criteria defined by NSGIC, is official federal participation in the GIS coordination efforts.

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While USGS is actively involved with GIS activities in Tennessee, no federal membership exists within the ISC.

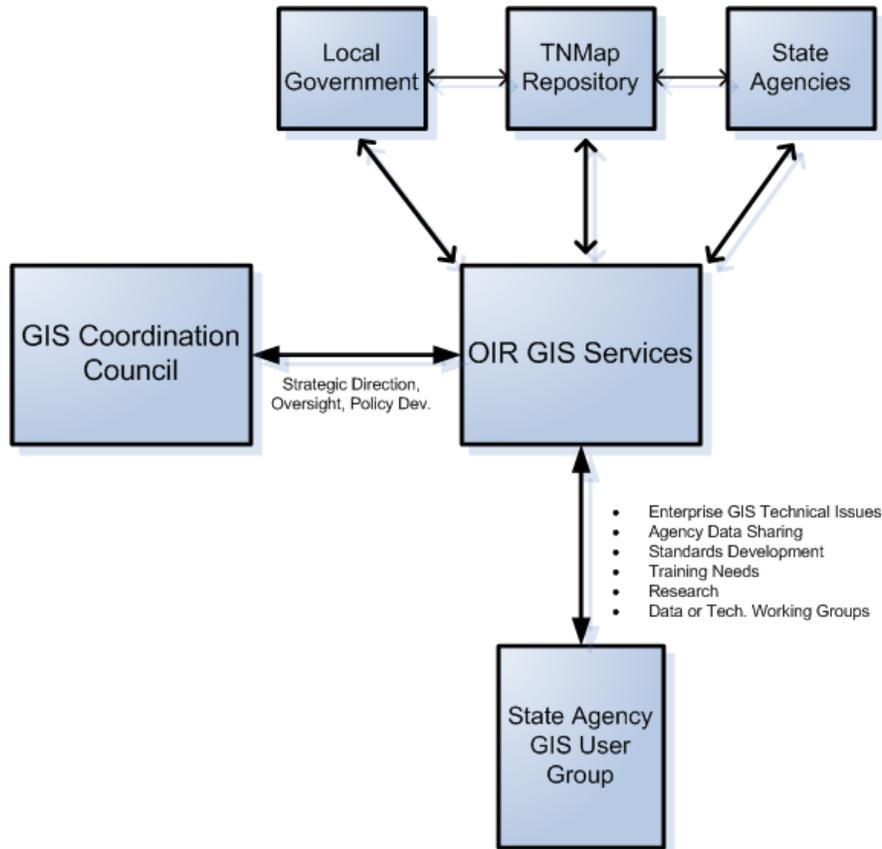
It is recommended that the Information Systems Council (ISC), the political body that governs IT policy within the State, establish a Tennessee Geographic Information Steering Committee (TNGISC) and appoint membership that is focused on these primary objectives:

- *Promote the most effective and efficient use of geospatial technology in Tennessee*
- *Review, analyze, and implement specific strategic plans to support geospatial technology*
- *Identify and recommend policies that foster equitable and appropriate data sharing*
- *Establish a mechanism for addressing policy issues concerning data access, security, distribution*
- *Guide data development priorities and advocate funding to support these efforts*
- *Provide feedback regarding TNMap GIS Data Repository and service provisioning*
- *Promote and encourage the use of the TNMap enterprise GIS system throughout State and local government*
- *Review, analyze, and adopt appropriate data and technology standards*
- *Promote GIS education throughout the UT and Board of Regents system*
- *Provide a forum for GIS stakeholders to identify, address, and resolve issues between government agencies*

With the establishment of a GIS Coordination Council, Tennessee will be in a much better position when working with federal agencies and receiving federal funding. The Fifty State Initiative Action Plan states that allocation of federal grants for development of geographic data, or research and implementation of geographic information technologies should only be awarded to states that conform to the guidelines in the Action Plan. To do this, Tennessee will be required to fund at least one full-time coordinator, which we already do, and the operating costs associated with effective coordination councils.

The following GIS Governance Model depicts the structure and relationship of the GIS coordination council's relationship with OIR GIS Services. While the primary focus is on policy development, strategic planning, and oversight of enterprise GIS activities within the State, the council will also be able to address and explore potential private partnerships.

Proposed OIR GIS Services Governance Model



6 Summary

The details of the GIS enterprise business plan are broad and underpin the need and benefits of coordinating GIS activities within the State. Tennessee is in a truly unique position having created a large scale digital base map that is being used to support government business operations at the local, State, and federal level. The challenge before us now is to maximize the State's geospatial data assets to improve interagency communication and help reduce or eliminate redundant data collection, enhance economic development opportunities, improve public safety, and protect Tennessee's environmental resources.

GIS coordination efforts are shifting from initial data production to data maintenance and supplemental GIS data development, and more importantly, integrating GIS data and technologies with agency business processes and applications. Through the ability to share geospatial data and infrastructure resources in the TNMap enterprise GIS environment, OIR GIS Services is able to provide a cost effective approach for State agencies to consume GIS data and services.

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State agency benefits are only a percentage of GIS consumers in the State. Local government, federal agencies, and the general public benefit from the GIS coordination concept of “build it once, use it many, and maintain it”. This business plan provides the vision for the State GIS program to mature and evolve into a truly sustainable function within State government. Although many challenges exist to reach all of the goals identified in this plan, through dedication and hard work in OIR GIS Services and throughout the State GIS community, we will succeed.