

State of Delaware



Business Plan for the **Development of a GIS Office for Delaware State Government**

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Prepared by



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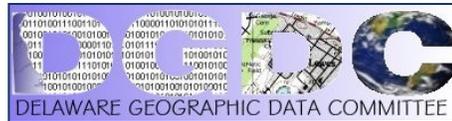


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Executive Summary

This Business Plan was developed to provide a **business case** and further **implementation details** for the major proposal that resulted from the State of Delaware’s Geospatial Strategic Plan from July, 2010. That plan put forward the following two “overarching strategic goals:”

1. *Delaware will establish a formal state government **GIS Office**, led by a state Geographic Information Officer (GIO), that will report into its parent agency and fall under the current geospatial governance framework provided by the Delaware Geographic Data Committee’s Executive Council.*
2. *The Delaware **GIS Office** will be provided recurring funding that is dedicated to the expansion and improvement of Delaware’s framework data and spatial data infrastructure.*

The Business Case:

The business case is predicated on the fact that the state – through a wide variety of agencies - has made substantial investments in geospatial technology over the past ten years and that there is a need to protect and leverage those investments. As an example, the plan identifies over \$3.7M of investments from just four significant initiatives made since 2004. With this volume of spending a more coordinated approach to future investments, orchestrated by a dedicated GIS Office, should help to harvest synergies and avoid duplicative spending.

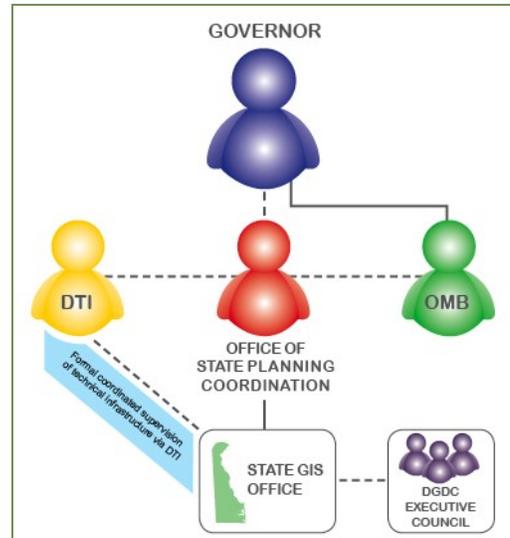
In addition, the business plan identifies three classes of specific “benefits and efficiencies” with specific examples of anticipated savings:

1. **Protecting and leveraging geospatial investments.** Examples include:
 - Ensuring that investments in the Department of Technology and Information’s (DTI) Geospatial Data Exchange are protected by staff who manage the content found within the exchange.
 - Planning for the potential consolidation of the Delaware DataMIL with the Geospatial Data Exchange to create a single system with potential annual savings of \$60,000.
 - Exploring opportunities for interagency technology sharing for things such as web hosting that would avoid new expenditures by smaller agencies.
2. **Development of shared resources.** Examples include:
 - In 2008 the Delaware Coastal Program with Natural Resources and Environmental Control performed a return on investment study that documented close to \$1,000,000 of program savings emanating from their access to shared orthoimagery services. Savings were realized from:
 - \$15,000 - \$30,000 per year of avoided field work by accessing aerial imagery
 - \$925,000 in avoided contracting since aerial imagery is required for routine flood and hydrodynamic modeling projects
3. **Controlling the cost of geospatial technology growth.** Use of geospatial technology within state government continues to grow just as consumers are increasingly using GPS navigation for their private vehicles and location-based services take root on smart phones. As documented in the plan, estimates for public sector geospatial spending growth approach 15%. A more focused

geospatial investment strategy, orchestrated by a dedicated GIS Office, and employing an enterprise-wide approach for state government, has the potential to significantly contain new geospatial spending.

Implementation Details:

Organizational: The business plan recommends that a small, new GIS Office be created as a unit within the Office of State Planning Coordination. The proposed GIS Office would have three staff members and would be led by a Geospatial Information Officer (GIO). The Office would be created under the existing state geospatial governance model whereby the Delaware Geographic Data Committee Executive Council would serve as a form of Board of Directors to the office. In addition, there would be explicit coordination with DTI on technology infrastructure issues.



Mission and activities: The following mission statement was created for the new office:

*“Managing and fostering the development and maintenance of a **statewide geospatial data infrastructure and enterprise geospatial technology platform**. The technology platform and data infrastructure will be available to, and utilized by all units of state government. The state’s public geospatial data assets will be made available to the state’s public and private sector partners and the general public.”*

Specific activities identified in the plan include:

- **Geospatial Coordination, Outreach & Communication**
 - **Intra-governmental** between state agencies
 - **Inter-governmental** between state and federal and local governments
 - **Extra-governmental** between state and private and academic sectors
- **Geospatial Data Coordination**
 - Providing access to state’s geospatial data assets
 - Aggregating third-party data from other levels of government for state use
 - Facilitating standards development and enhanced data quality
 - Catalyzing the development of new data, including collaborative funding strategies
- **Geospatial Technology Coordination**
 - Project and procurement review for large GIS expenditures
 - Planning and implementation of new, shared enterprise technologies
 - Enterprise licensing for GIS software and data

While Delaware has already developed substantial GIS capabilities, at the current increased level of activity and with escalating use in the public safety realm, informal coordination and a decentralized implementation model is leading to inefficiencies and lost opportunities for expanded capability. This plan documents that it is both feasible and practical for Delaware to join the large majority of other states in establishing a dedicated GIS Office to coordinate state government geospatial activity.

1 Strategic Planning Methodology

1.1 Context & Relevance to The Strategic Plan

From September of 2009 through May of 2010 Delaware completed a statewide Geospatial Strategic Plan. The overarching strategic goal from that plan was to establish a new state government GIS Office. The plan stated:

Delaware will establish a formal state government **GIS Office**, led by a state Geographic Information Officer (GIO) that will report into its parent agency and fall under the current geospatial governance framework provided by the Delaware Geographic Data Committee's Executive Council

This business plan aims to clarify the options that the state has for establishing this office and to present a business case for moving forward on implementing this recommendation from the strategic plan.

1.2 Specific Goals & Success Factors

The goal of this business plan is to ensure that the Delaware Geographic Data Committee Executive Council and other decision makers have all the information that they need to make final decisions pertaining to the creation of a new GIS office. These include:

- ◆ The administrative location of this office
- ◆ The staffing configuration
- ◆ The mission and initial priorities

The primary success factor is whether this new GIS Office can be created within the next 1-2 years. This plan contains a strong business case aimed at justifying the creation of this office and the further evolution of an enterprise approach for geospatial technology implementation within Delaware state government.

2 Program Benefits & Justification: The Business Case For A GIS Office For Delaware State Government

The “problem statement” of the Geospatial Strategic Plan¹ describes numerous challenges and inefficiencies that a new GIS Office would help address:

...there is no centralized organization that can build shared resources or perform communal geospatial work that would assist multiple agencies. Similarly, efforts aimed at coordinating with partners in the federal government or local governments are sometimes repeated by multiple agencies. This results in funding inefficiencies and duplications of effort and it inhibits increased adoption of the technology by additional agencies.

Developing a GIS Office for Delaware state government would provide an explicit focal point for state government GIS activities that would supplement the independent efforts of agencies and would replace the current *ad hoc* manner with which geospatial coordination is pursued on a part-time basis, with volunteered staff time. As was said at the Geospatial Strategic Planning Workshop held in Dover in October, 2009, with the continued growth of geospatial technology “collegial and cooperative efforts have gone as far as they can go.” Equally, a new GIS Office would provide a resource that could carry out the recommendations and priorities of the DGDC Executive Council.

2.1 Pattern of Geospatial Investments

Before examining the potential benefits and efficiencies that a new GIS Office might add, it is important to look at the volume of geospatial investments that have been made over time. Indeed, the magnitude of these investments and the variety of agencies involved indicate that there are potential synergies and efficiencies to be harvested with more focused coordination and state government-wide investment strategy.

The following does not represent a comprehensive inventory of *all* geospatial investments made in Delaware. Rather, it presents several representative examples of some of the larger investments in Delaware geospatial data and technology over the past decade. Notably, many of these investments were shared by multiple agencies:

¹ See Section 3.1 of [State of Delaware, Geospatial Strategic Plan](#) from June 2010.

1. The Delaware DataMIL, 2004-2010 for equipment, professional services and operations, split by Delaware Geological Survey (DGS) and the Department of Technology and Information (DTI), and not including the original development costs which were paid for by Federal grants:
\$954,600
2. Statewide orthophotography and LiDAR, 2002 and 2007, split between Federal, State, County and Municipal contributors:
2002: \$500,000
2007: \$640,000
3. DTI has made a variety of investments in platform technologies, including the Data Exchange that is under development and providing enterprise licensing (ELA) of ESRI GIS software:
Data Exchange: \$294,569
ESRI ELA 2007-2010: \$1,400,000
ESRI ELA 2010-2013: \$1,219,875

Delaware has established a pattern of making regular investments in this important technology. At this juncture, and at this level of investment it is appropriate to consider a dedicated GIS Office that can help to maximally coordinate and leverage these investments for the long term.

2.2 Benefits & Efficiencies

The following catalogs three classes of benefits that a GIS Office, and an attendant enterprise GIS orientation for state government can be expected to provide. Each class of benefits is first described in general, and is then followed by an example that illustrates the benefit in tangible terms. While the scope of this study did not allow for a formal cost-benefit analysis, the information below shows the potential scale of benefits and suggests additional analysis that might be conducted to further quantify returns on investment.

1. **Protecting and leveraging Delaware's geospatial investments.** As evidenced by the pattern of investment presented above, Delaware is continuing to make significant investments in geospatial technology, including DTI's eGIS Program and the Delaware Geospatial Data Exchange project. Admittedly, DTI has great expertise in technology infrastructure, but much less experience with the geospatial *data management* issues of what will be housed on that infrastructure. The human resources represented by the GIS Office will have those exact types of data management skills that will help ensure that the *contents* of the Geospatial Data Exchange are properly maintained and managed. This will help ensure that the resource is as useful as possible, and thus is utilized to the greatest extent possible which will help yield the

largest return on investment. Even solid, well performing infrastructure will not be used if it does not deliver current and relevant content.

Similarly, personnel with an inherent geospatial outlook can work with DTI to plan for the further deployment of that infrastructure into new areas. For example, it is plausible to imagine that the Geospatial Data Exchange might in the future be able to replace, or supplement the Delaware DataMIL managed by DGS (see Section 3.1.4, #4 Data Services, below for additional details). Based on the figures presented above (see Section 2.1, Pattern of Geospatial Investment) the budget for maintaining the DataMIL from 2004 – 2010 was approximately \$954,000. This annualizes to approximately \$136,000 per year over that seven year span. If the DataMIL and the the Data Exchange could be managed together, by the same people and on the same infrastructure there is the potential to cut those kinds of costs in half. If that was the case, annual savings of \$68,000 could potentially be realized. These types of savings would be able to cover the transition costs of moving these capabilities from one platform to another in a short amount of time.

Last, a GIS Office with an enterprise outlook can work with other agencies that have advanced systems (e.g. DelDOT, DNREC, DTI) to explore opportunities for leveraging existing agency resources to smaller government units that do not have their own systems. For example, the State of Minnesota has explored having their “mature adopter” agencies provide hosting of web applications to “new adopter” agencies. Under this model, significant costs could be avoided. For example, commercial web serving software, such as ESRI’s ArcGIS Server, can have list prices that approach \$20,000 with an additional \$5,000 of annual maintenance depending on the licensing level. Such costs would be avoided or minimized with interdepartmental and enterprise-wide sharing of web serving capabilities. Even within an enterprise licensing agreement (ELA) environment – such as Delaware maintains with ESRI - this can lead to cost avoidance since the price of ELA renewal (typically, an ELA will cover a 3-year term) is pegged based on the amount of software being deployed. Strong geospatial web servers that serve the needs of a variety of agencies will help minimize the state’s software use and contain the costs of the ELA.

In short, it will be difficult for DTI to fulfill the full promise of enterprise GIS across the state with a focus that is solely on *technical administration* of GIS technology and software contracts. Rather, DTI and the state would benefit from a GIS Office that would be an important partner in geospatial content management and direct interaction with the state's large geospatial community.

2. **Development of shared resources.** States and organizations that have pursued enterprise GIS approaches have developed a variety of “shared resources” that can be accessed by all agencies within the government. Such shared resources are extremely cost effective as **one set of investments can meet multiple purposes**. Equally the availability of such shared resources inhibits the development of duplicated effort, and affords the opportunity to remove existing duplicated effort. The DTI Delaware Geospatial Data Exchange project will create this exact type of infrastructure that is explicitly designed to meet the needs of multiple agencies. Other types of geospatial “shared resources” include, but are not limited to:
 - a. **Shared web mapping services:** that can publish data for consumption by a variety of web sites and applications
 - b. **Share web capability services:** such as geocoding, that can be utilized by a variety of web-sites and applications
 - c. **Enterprise software licenses and/or license pooling:** that allows a fixed number of expensive licenses which are used on an irregular basis to be shared across a wide number of occasional users, from many different agencies
 - d. **Common data distribution portal:** that can provide public data to collaborators and the general public thereby freeing individual agencies from this responsibility²

This type of shared infrastructure cannot be easily developed unless there is an explicit focal point for enterprise GIS activity. The GIS Office will provide this focal point and can actively seek opportunities to further this shared resources outlook and to help agencies take advantage of those resources.

Shared resources have an enormous potential to provide cost efficiencies to Delaware state government. In fact, in 2008 the Delaware Coastal Program (DCP) group within DNREC looked at this exact issue and demonstrated significant returns on investment to the DCP that were generated by the shared 2007 orthoimagery and 2005 LiDAR data acquisition projects. The DCP

² Please note, the Delaware DataMIL (<http://datamil.delaware.gov>) currently fulfills this function for a sub-set of Delaware's geospatial data holdings (i.e., the framework data).

worked with Geospatial Information and Technology Association (GITA) to employ GITA's return on investment (ROI) methodology³. Key observations on quantifiable ROI from that assessment⁴ included:

- ◆ Savings of \$15,000 - \$30,000 per year in staff time due to a reduced requirement for DCP site visits in conducting Federal Consistency Reviews and PLUS Reviews. In short, the availability of high quality orthoimagery and elevation data reduced the amount of time DCP staff needed to spend in the field, as well as saving fuel.
- ◆ Savings of more than \$925,000 in avoided contractual expenses (for both DCP and Shoreline and Waterway Management) to acquire elevation data for various flood studies and hydrodynamic modeling projects. In short, when these types of studies were called for, expensive new data acquisition for imagery and elevation was not needed since those data were already available. Thus, those elements of the projects could be removed from the budget.

The DCP assessment also included a listing of numerous non-quantifiable benefits such as improved abilities to do new work and analysis involving sea level rise and hydrodynamic modeling. It is important to understand that these two returns on investment only reflect the activities of two relatively small offices within a single department (DNREC). It is highly likely that these kinds of benefits and efficiencies might be repeated throughout dozens of other units of the state government and the state's partners, such as counties, that utilize shared data and services.

Given the potential efficiencies of a "shared resources" perspective, the GIS Office can be viewed as a key focal point for ensuring that the correct set of shared resources are properly constructed and that the infrastructure for maximizing sharing is in place. Indeed, the GIS Office will help to ensure that when geospatial investments are made – even by an agency – there is some thought as to how that investment may have broader, unanticipated benefits to the entire enterprise of state government.

³ See www.gita.org for a description of the organization and http://www.gita.org/gita-in-action/roi_workbook.asp for a summary of their ROI approach

⁴ See Appendix 1 for DCP's summary of the ROI study.

3. Controlling the cost of geospatial technology growth. Controlling costs is one of the principal drivers for an enterprise approach to GIS. Even in a state like Delaware that has been using GIS technology for decades, geospatial activity at the agency level continues to grow rapidly. Driven by consumer-oriented location technologies, such as GPS navigation for cars and boats and web-based direction finding from MapQuest, Google and Bing, a growing awareness of the benefits of GIS has resulted in a demand for GIS within agencies that are only beginning to develop their capabilities. Interestingly, some of these are larger agencies – such as the Department of Safety and Homeland Security (DSHS) and the Department of Health and Social Services (DHSS) – with a wide variety of potential applications.

With increasing use and adoption, it can be expected that costs will continue to grow. Daratech, as reported by GIS Café⁵, estimated that GIS “growth in the public sector averaged 15% per year for 2004 – 2006”⁶. An enterprise approach to deploying geospatial technologies has the potential to significantly reduce the rate of increase of GIS costs through the deployment of shared enterprise services, reduced redundancies and other operational efficiencies. As the state builds common geospatial infrastructure, such as the Geospatial Data Exchange, the barriers to entry – including cost – for new geospatial participants will be drastically lowered. As the state further develops enterprise infrastructure, new agencies will not face the costs of building or expanding their *own* infrastructures, rather they will absorb the far lower costs of “plugging in” to, and leveraging existing *enterprise* resources. Thus, a GIS Office focused on building and maintaining the right infrastructure and nurturing agencies that use that infrastructure has great potential to help both in controlling current costs, and avoiding future costs.

2.3 Impacts on Agencies

It is important to understand that the small GIS Office that is being proposed should not be viewed as an alternative to existing and future agency-based GIS personnel. This office is not viewed as a service

⁵ The GIS Café is a web-site that bills itself as a “GIS weekly magazine” that “...delivers to its readers news concerning the latest development in the GIS industry...” Please see: www.giscafe.com for further information.

⁶ See: http://www10.giscafe.com/nbc/articles/view_weekly.php?section=Magazine&articleid=301162 for the full text of the GIS Café article from September 4, 2006.

bureau that provides direct services and products on behalf of agencies. Rather, this office is envisioned as a focused team that builds and maintains shared resources and that *facilitates* agency activity and enterprise efficiencies.

Depending on the level of geospatial maturity, agencies may interact with and benefit from the GIS Office in a variety of ways:

- ◆ **New geospatial adopter agencies:** the availability of technical support and the creation of shared resources lowers the barriers to entry for developing GIS capabilities and lowers agency costs for geospatial investment.
- ◆ **Operational geospatial agencies:** the availability of shared resources provides an infrastructure to tap into and helps extend capabilities while controlling costs.
- ◆ **Mature geospatial adopter agencies:** these agencies may have the fewest direct benefits, however, the enterprise benefits as their existing investments have the potential to be further leveraged.

3 Requirements & Costs For Establishing The Delaware GIS Office

3.1 Organizational Approach

3.1.1 Agree on Organizational Form of the GIS Office

There are two principal options for creating a new GIS Office. The Geospatial Strategic Plan recommended Option 1 – creating and staffing a new office – however, the current fiscal climate requires that a second option be considered, potentially as contingency, or as an interim measure until funding for Option 1 becomes available.

OPTION 1: CREATION OF A NEW GIS OFFICE

Create and staff a small, new office as an independent unit. Most likely, this unit would be placed inside of an existing agency (see Section 3.1.2 below for an enumeration of options). The creation of a new office will help to clearly articulate the mission of providing a focal point for statewide geospatial initiatives. The office and the personnel within it can be unambiguously focused on the new mission and activities that are outlined below (see Section 3.1.3). In addition, a new office will have the opportunity to create its own brand and identity that can be associated with statewide geospatial activity and coordination.

OPTION 2: GIS OFFICE STAFFED WITH EXISTING PERSONNEL THAT ARE REASSIGNED

Given the current fiscal climate it must be recognized that the creation of a “new office” and more specifically *new positions* might be very difficult. One option is to create the new office but have it staffed through the use of existing agency personnel whose positions would be reassigned into the new office where they could be dedicated to the mission and activities described below (see Section 3.1.4), but funded through their current organizations⁷.

Examples of staff that might be considered for reassignment might include existing personnel from the Office of State Planning Coordination, whose staff are already involved in geospatial coordination and who are identified in the DGDC’s enabling legislation as having a person “assigned the role of State

⁷ It should be noted that the current Office of State Planning Coordination was created in a similar manner when it was resurrected in 1995. The State Planning Coordinator position and two others were created anew (or reclassified) and the rest of the staff were reassigned from other agencies.

Geospatial Data Coordinator and [who] shall serve as the nonvoting Chair of the Executive Council of the Delaware Geographic Data Committee.” Staff from other agencies who are already and similarly involved in GIS coordination and support activities might also be candidates for inclusion in the new Office.

In this manner, a federation of personnel from different agencies would team to fulfill the new mission described below. The key difference from the current situation would be that these personnel would be *formally directed* to work on this new mission on a *fulltime basis*. Obviously, this would be administratively delicate and it would be potentially difficult for agencies to give up their own personnel “on behalf of the enterprise,” even if they experienced other benefits from this office coming into being (e.g., current work they are responsible for would be undertaken by the new office). If this were to happen, it would take strong support and creativity from the highest levels of the current administration.

3.1.2 Agree on Organizational Location of the GIS Office

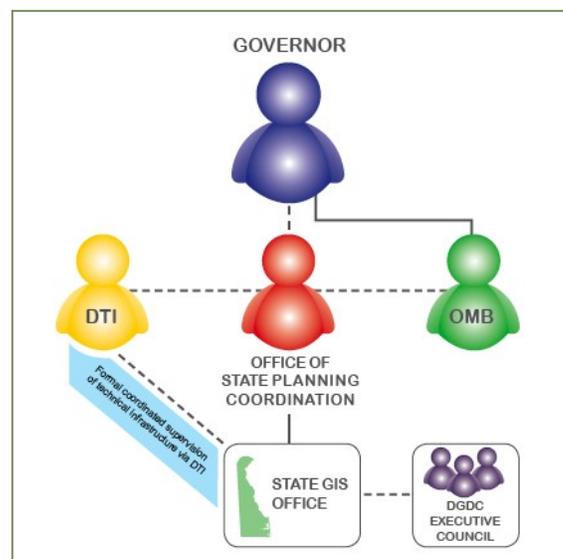
If the option of forming a new office is pursued, there are two leading options for where a Delaware GIS Office might organizationally reside.

- 1. Department of Technology & Information (DTI).** The most common location for GIS Offices across the country is the equivalent of the DTI. This makes sense since geospatial activity is technology oriented and DTI already maintains this type of technology focus. In addition, DTI already provides support across multiple state agencies and maintains an “enterprise outlook”. Similarly, DTI is currently engaged in implementing an eGIS Program and the Delaware Geospatial Data Exchange project. However, it must be recognized that while geospatial activity is technology *oriented*, statewide GIS administration also contains other critical non-technological components such as geospatial *data* administration and interagency *coordination* and collaboration.

During this project this option was discussed with DTI Senior Staff, including the Chief Information Officer, Secretary Jim Sills. While recognizing the precedent from other states, the current DTI team prefers to view their role as supporting shared geospatial *technology infrastructure*. At present, DTI is not prepared to take on the additional data and human coordination roles that a statewide GIS Office would carry out.

2. The Office of State Planning Coordination. The Office of State Planning Coordination (OSPC) resides as an independent office within the Office of Management & Budget⁸ (OMB) and could serve as a home for the GIS Office⁹. The OMB is already identified by statute (Title 29, Sub-chapter IV, Section 9141) as housing a person who is “assigned the role of State Geospatial Data Coordinator and [who] shall serve as the nonvoting Chair of the Executive Council of the Delaware Geographic Data Committee.” Thus, this office provides a logical home for the GIS Office since OMB/OSPC already has linkages to the DGDC and is named in statute as being involved with geospatial activities. The Office of Management and Budget also includes the capacity to manage any data maintenance funds to be coordinated by the new Office. Finally, the Office of State Planning Coordination has significant linkages to local governments and academic partners who are important geospatial stakeholders.

Given DTI’s reluctance to take on this type of office, the geospatial strategic plan suggested the Office State Planning Coordinating as the administrative home for the new GIS Office. The image to the right presents an organizational and governance model for this option.



3.1.3 Governance

The overall geospatial governance model for Delaware would not need to change radically with the development of a new GIS office. The Geographic Information Office would be within the Office of State Planning Coordination and would report to the State Planning Coordinator, operating under the guidance of the DGDC Executive Council. In this manner, the DGDC Executive Council would serve as a policy-setting body, and would act as “board of directors” to help the new GIS office determine statewide priorities in pursuing its mission. The GIS Office will work closely with and through the DGDC

⁸ In Section 80 of the 2011 state budget submitted by the Governor, the Office of State Planning Coordination has (OSPC) was changed so that it reports directly to the Office of the Governor, with it “remaining in the Office of Management and Budget for structural and budgetary purposes”.

⁹ Rhode Island’s 2-person GIS Office is situated within the Division of Planning within the Department of Administration.

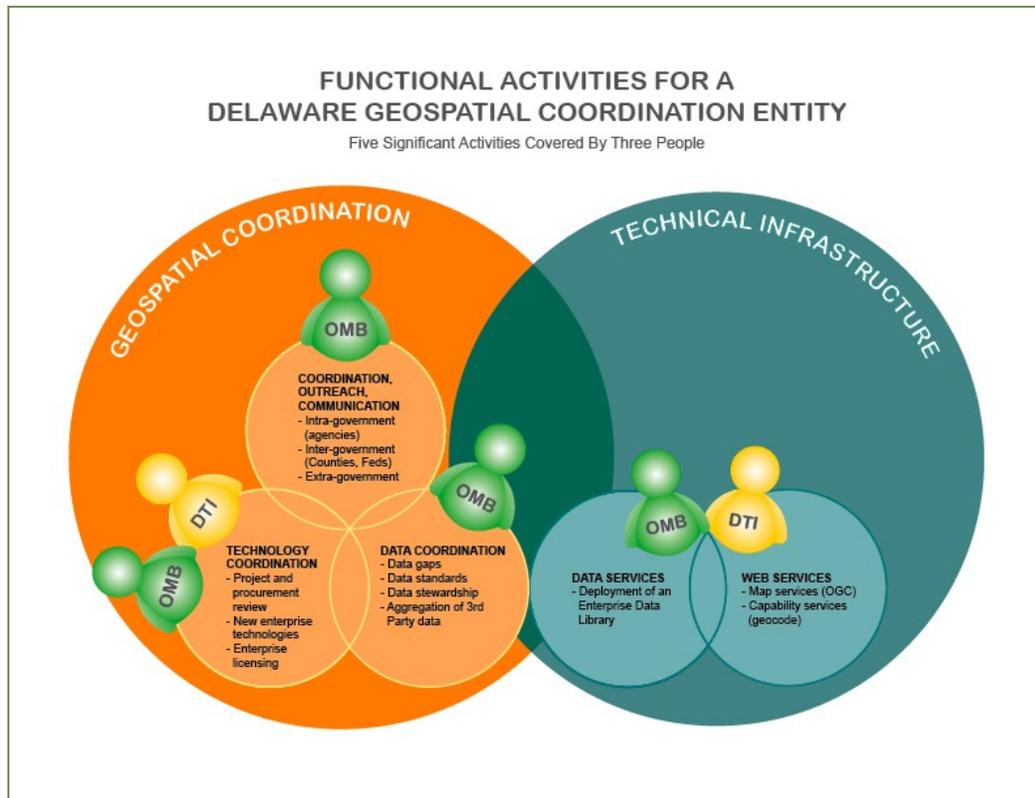
as a GIS user's group. Thus, the existing DGDC and DGDC Executive Council, will play important roles in ongoing coordination, outreach and communication.

3.1.4 Mission & Activities

The mission of the GIS Office can be characterized as follows:

Managing and fostering the development and maintenance of a **statewide geospatial data infrastructure** and **enterprise geospatial technology platform**. The technology platform and data infrastructure will be available to, and utilized by *all units* of state government. The state's public geospatial data assets will be made available to the state's public and private sector partners and the general public.

The graphic below provides a *preliminary* overview of the **activities** that the new Delaware GIS Office would perform in order to fulfill this mission. This series of activities has been constructed based on the



assumption that the GIS Office would include only a small team of 3 people, with available assistance from DTI for technical infrastructure. The diagram below also identifies the activities in which DTI is expected to be involved.

The following provides a more detailed description of the specific activities that the GIS Office would carry out.

GEOSPATIAL COORDINATION ACTIVITIES

1. Coordination, Outreach & Communication. The GIS Office would help fill the gap between agency-specific missions and the need for coordination. The office would provide leadership for state agencies and active outreach to the state's partners and customers. Primary benefits would include leveraged investments that benefit all state agencies, reduced duplication, and stronger adherence to standards. Numerous other benefits such as increased public access to information would also result from a more coherent and strategic approach to investing in, and deploying GIS within state government. Three principal forms of outreach and coordination would be undertaken:

- ◆ **Intra-governmental** coordination between state agencies
 - Shared funding of significant investments (e.g. statewide orthophotos)
 - Development of communal resources available to all agencies (e.g. statewide geocoding services)
 - Lower barriers to entry, and assistance to agencies commencing GIS for the first time
 - Removal of unnecessary redundancy
- ◆ **Inter-governmental** coordination between the state and other levels of government (i.e. local government, federal government, neighboring states)
- ◆ **Extra-governmental** coordination between the state and non-government institutions (e.g. private sector, utilities, non-profits, academia)

2. Data Coordination. Geospatial data represent the largest investments that state government has made in GIS infrastructure. Thus, it becomes key that existing data investments are widely available to all state government users and that future investments become well coordinated between agencies. Formal geospatial data coordination would help address many existing challenges and would provide several benefits that include:

- ◆ Facilitating common **access to the GIS data assets** of the enterprise (i.e., full deployment and maintenance of the Delaware Geospatial Data Exchange effort)
- ◆ Facilitating increased levels of **standardization** and quality for newly created data
- ◆ Catalyzing the development of **new data** – for example, improved statewide street centerline – to **fill existing data gaps** and to support agency business requirements
- ◆ Clarifying **data stewardship** and user expectations for data reliability and the frequency of data update
- ◆ Streamlining the process for collecting, aggregating and standardizing data obtained from commercial and/or **third party data sources** (e.g. parcels collected from counties; US Census data collected from the Federal government)

3. **Technology Coordination.** As described above, one of Delaware’s GIS strengths is the strong departmental efforts that have matured over the past two decades in agencies such as DeIDOT, DNREC, DGS and OSPC. These efforts represent a major knowledge base and some infrastructure that can potentially be leveraged beyond one agency to benefit the entire enterprise of state government. With new agencies just getting started with GIS, there is great potential for new adopters to learn from the technology leaders and to share baseline GIS infrastructure. However, this is less likely to happen without an explicit focal point for coordination.

Similarly, several agencies may be exploring or investing in similar *new* technologies, such as mobile computing or GPS. When agencies make investments in identical, or similar, technology without coordinating with one another, redundant or incompatible investments may result. Active coordination provides an opportunity to reduce duplicated efforts and for agencies to benefit from the experiences and investments made by other agencies.

A GIS Office can provide a holistic view of GIS related projects across multiple agencies. The GIS Office will perform and expedite *technology coordination* through the following activities:

- ◆ **Project and procurement review** for geospatial activities that are above a certain dollar threshold (e.g., \$50,000). The idea is not to provide an approval process, but

rather to help gain a holistic view of the state’s GIS activities and investments and to identify synergies with other agencies that a project proponent might explore. This function might work in a manner similar to how some of DTI’s existing committees – such as the Technology Investment Council (TIC) – operate¹⁰. Alternatively, the TIC might even perform this function with explicit input from the new GIO for geospatial matters. If this course is pursued, then DTI might consider having the Geographic Information Officer become a formal member of the TIC.

- ◆ **Planning and implementation of new enterprise technologies** that may benefit multiple agencies. Some of these activities may be matters of infrastructure such as a shared web service. In other cases, there may be planning for enterprise investments in applications – such as Automated Vehicle Location (AVL) – that may be required by more than one agency.
- ◆ **Pursuing enterprise licensing** for GIS software and commercial data sets.

TECHNICAL INFRASTRUCTURE FOR ENTERPRISE GIS FOR STATE GOVERNMENT

4. **Data Services.** One of the core roles of the GIS Office would be ensuring that there is a smooth and, when required, secure flow of data between state government agencies and also between the state government enterprise and other public and private sector partners. Delaware’s data assets represent the State’s largest GIS investments and ensuring that all parts of state government have access to these data will help the State derive the largest returns on its data investments. The current DTI Delaware Geospatial Data Exchange project provides a strong starting point to providing a data services infrastructure. The GIS Office would work with this infrastructure while pursuing the following activities:

- ◆ **Deployment of an enterprise geospatial data library** that builds on the Delaware Geospatial Data Exchange project. This includes the management and maintenance of the technical infrastructure in association with DTI as well as **management of the data holdings**. Data management activities include active outreach and coordination with data custodians and contributors and ensuring that all data are

¹⁰ See <http://dti.delaware.gov/information/committees.shtml#tic> for further information on DTI oversight committees.

properly documented with metadata. The data library can be expected to hold several types of geospatial data:

- **State data** that is created and managed by state agencies
- **Federal data**, for example National Geodetic Survey control points, obtained from federal partners
- **Local government data**, collected, aggregated and standardized from county data sources
- **Commercial data** that is licensed to the state (e.g. the TeleAtlas road centerlines)

With an enterprise orientation for a geospatial data library, planning can commence on the long-term future of the Delaware DataMIL. With further enterprise infrastructure in place, there is the potential for the DataMIL to be more closely aligned with Geospatial Data Exchange and this could help to both modernize the DataMIL and consolidate the state's geospatial data publication and distribution capabilities.

- ◆ **Providing rich access to the geospatial data library** including both open access and secure access to sensitive data. Over time, this may involve working with the DGS on the future evolution and management of the Delaware DataMIL which could potentially become a part of the data library. In addition, over time the data library could be designed to become a formal NSDI clearinghouse node. Ultimately, the geospatial data library should be expected to provide the following types of access to the state's geospatial data assets:

- **Network based access** for high performance connections from agency desktop systems
- **Web mapping services** (see below) allowing web applications to gain access to map layers
- **Data download** for public dissemination of data
- **Data viewers** for providing visual access to data contents
- **Data synchronization** services that would allow for the automated update of data sets that are maintained by agency, or partner custodians via technologies such as replication

5. **Web Services.** Geospatial web services can be broadly defined as relatively small network based applications that provide geospatial data, maps and discrete GIS functionality (e.g.,

geocoding) based on simple, standards-based (e.g. Open GIS Consortium¹¹ standards) application programming interfaces (APIs). Web services can be consumed by web sites, enterprise applications as well as by desktop GIS software. Web services offer the potential to provide GIS users across the state with the ability to easily access common geospatial data and basic GIS functionality with minimal amounts of hardware and software. Thus, web services are an efficient way of providing geospatial data access and are becoming an increasingly common element of statewide geospatial programs. Indeed, both DelDOT's INFORM and DNREC's EIS efforts currently employ geospatial web services.

The GIS Office might oversee the development and deployment of two types of geospatial web services:

- ◆ **Map and feature services:** In general, map and feature services are accessed via requests for data layers for a specific area (e.g. identified through a bounding box). Map services provide an image (e.g. JPG, PNG) depicting the requested layers. Feature services deliver the geometry of those layers, typically in a simple, standard format (e.g. GML). The Delaware DataMIL currently provides some of these services.
- ◆ **Geospatial capability services:** In general, capability services are accessed through requests, and return *data* to the requesting application. For example, a **geocoding service** would accept a request that included an address, and the service would deliver back to the application the “data” containing the latitude/longitude coordinate pair of the address. The following provides examples of other types of capability services beyond geocoding:
 - **Reverse geocoding**, i.e., a coordinate is provided and the nearest address is returned
 - **Mailing label production** from a set of selected parcels or set of address points
 - **Shortest path routing** between two points
 - **Point-in-polygon** to determine whether a given point falls within the border of a specified polygon

¹¹ See: <http://www.opengeospatial.org> for further information.

3.2 Inventory of Existing Infrastructure & Suitability Assessment

Creating the office is largely an administrative exercise and there are no major requirements for new technological infrastructure. Rather, the personnel will require office space in the parent agency, and appropriate computer and telecommunications equipment and connectivity.

3.3 Human Resource Requirements

As identified in the Geospatial Strategic Plan, ideally, the GIS Office would be comprised of three people with the following roles:

- ◆ **GEOSPATIAL INFORMATION OFFICER (GIO):** Would serve as the group leader and would be responsible for overall geospatial coordination in Delaware.
Salary range: \$70,000 - \$90,000

- ◆ **GEOSPATIAL DATA MANAGER:** Would be responsible for the assembly and management of a statewide geospatial data library. The current project to develop the Delaware Geospatial Data Exchange will result in an infrastructure that could house this database. This person is anticipated to work closely with DTI staff who would manage the technical infrastructure. This person would fulfill the role of managing the data contents of that system, as well as the relationship with data contributors. See Appendix #2 for a more detailed job description for this role.
Salary range: \$55,000 - \$75,000

- ◆ **GEOSPATIAL DEVELOPER:** Would provide application development and management capabilities to the team. Having this expertise in-house would lessen – but not necessarily eliminate - the reliance on contractors for application development and would enable this office to provide application support to agencies that are newly implementing GIS technology. When the workload is high and funding enables contractors to be involved, this person would serve as a resource in specifying the work for the contractors and assisting agencies in managing and providing quality control of the deliverables. This person would also help to administer the geospatial web services. This person would also work closely with the DTI personnel who manage the technical infrastructure.
Salary range: \$55,000 - \$75,000

If it is not possible to create (or staff via reassignment) all three positions, it is probable that an initial team of two would be sufficient at the outset, and that a Geospatial Data Manager could be found who possessed some application development skills anticipated to be provided by the Geospatial Developer. Obviously, a smaller team would have more limited capabilities.

3.4 Budget Requirements

The table below, taken from the Geospatial Strategic Plan, summarizes the anticipated annual costs of creating a new, GIS Office through the creation of new positions. The estimates below Costs are presented as ranges.

Item	Low-cost	High-cost
Staff Salaries		
Geospatial Information Officer*	\$88,739	\$114,093
Geospatial Data Manager*	\$69,724	\$95,078
Geospatial Developer*	\$69,724	\$95,078
Staff Sub-total	\$228,186	\$304,248
Office discretionary budget	\$10,000	\$15,000
Data improvement budget	\$50,000	\$100,000
GRAND TOTAL	\$288,186	\$419,248

* Please note, cost estimates include the salary ranges from Section 3.3 above as well as the 26.77% state OEC rate.

3.5 Assessing Risk

There are several significant risks that must be accounted for and managed.

- 1. Creating a new GIS Office involves fundamental change:** Delaware has been practicing geospatial technology for over two decades, and the capabilities and organization have evolved organically and incrementally. Creating a new GIS Office will be a major change, and there are really no incremental “half measures.” Either this set of recommendations moves forward and the GIS Office is established in some fashion, or the status quo remains. If progress is not possible at this juncture, there will be a future need to address these issues, or a requirement to devise an alternative strategy.
- 2. Maintaining state agency GIS support for this effort:** As documented, many state agencies are effective and self-sufficient practitioners of GIS. They may see some potential risks to new

players becoming involved. From their perspective, there may be less reason to fix something that is not perceived as being broken. Equally, and as documented, there are additional administrative and interagency complexities if new positions are not created and the GIS Office is created through the reassignment and/or federation of existing personnel. Regardless, it will be important to keep state agencies proactively informed and to seek their input and support for moving forward. If such an effort is to be successful, the DGDC Executive Council will need to take an active role in building and sustaining consensus, and in advocating for action.

3. **Short term costs, for longer term savings:** As with replacing the windows on an older home, this proposed program involves short term costs and investment to yield longer term savings and efficiencies. In spite of a long term return on investment, advocating for near term dollars within a tight fiscal situation can be difficult and there is some considerable risk that funding for this effort may prove elusive.

4 Implementation Phasing & Milestones

The timeline presented below is repeated from the Geospatial Strategic Plan and remains feasible in the context of this business plan. While this timeline is aimed at obtaining funding for the FY2012 budget, if required the schedule could be extended for one year to seek funding in a later fiscal year. Under that scenario, the activity titled “Work with Administration to sustain support for funding of new GIS Office as part of FY2012 budget” would likely need to be both broadened and extended. It would be extended for the full year leading to the FY2013 budget cycle, and it would be broadened to include:

- ◆ Work and advocacy with the current Administration
- ◆ Work and advocacy within the DGDC Executive Council
- ◆ Education and advocacy with the broader Delaware GIS community, including the DGDC

Activity	2010			2011				2012			
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Finalize Geospatial Strategic Plan and begin education and advocacy for its recommendations											
Work with current Administration to include potential funding and language changes as part of FY2012 budget											
Work with Administration to sustain support for funding of new GIS Office as part of FY2012 budget.											
Establishment of new Delaware GIS Office						*					
Delaware GIS Office commences operations											