



# Michigan Transportation Data Stewardship Enhancement Plan

September 30, 2010

Prepared for  
Michigan Department of Technology, Management and Budget  
Center for Shared Solutions and Technology Partnerships  
Project funding provided through a FGDC NSDI CAP Grant

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**MICHIGAN STATEWIDE GIS PROGRAM**  
**TRANSPORTATION DATA STEWARDSHIP ENHANCEMENT PLAN**  
SEPTEMBER 30, 2010

“Shared responsibility, shared costs, shared benefits, shared control”

Project funding provided through a Federal Geographic Data Committee NSDI CAP Grant.

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## EXECUTIVE SUMMARY

This Transportation Data Stewardship Enhancement Plan has been accomplished under a project funded as part of the National Spatial Data Infrastructure (NSDI) Cooperative Agreement Program (CAP) Category 5—a grant program administered by the U.S. Geological Survey. It defines a framework and specific initiatives to enhance and expand the Michigan Geographic Framework transportation data themes through building an environment that encourages broad participation through shared responsibility, shared costs, shared benefits, and shared control.

***Data should be built once, incrementally improved in quality where possible and used many times to maximize the return on investment in creation and maintenance.***

Work on plan preparation began in March of 2010 and after a considerable review and comment process, it was completed in September of 2010. The project was administered by the Center for Shared Solutions and Technology Partnerships (CSSTP) of the Michigan Department of Technology, Management, and Budget (MDTMB). The CSSTP assembled a project Steering Committee to oversee plan preparation and have engaged a consultant team from the firm GeoPlanning Services, LLC to gather information and prepare the plan. Input was gathered from the project Steering Committee, and project participants from the statewide GIS community. This Executive Summary provides a brief overview of project background and key elements of the Transportation Data Stewardship Enhancement Plan. The full plan document may be found at: [www.Michigan.gov/NSDI](http://www.Michigan.gov/NSDI).

## STEWARDSHIP DEFINITION AND PURPOSE

***Stewardship is a sustained program supporting regular update and access to spatial data.***

Stewardship is a sustained program with clear roles and responsibilities for organizations or individuals supporting regular update of and access to spatial data. It is a concept rooted in the belief that data should be built once, incrementally improved in quality where possible, and used many times to maximize the return on investment in data creation and maintenance.

Transportation data, particularly road centerline and address ranges, are used by over 90% of all of the GIS users in Michigan. Nearly half of all GIS users reported in an online survey that they either produce their own road centerline data or receive it from an outside source and edit it prior to use. The duplication of effort on these elements combined with the vital utility of these data to support nearly all GIS applications make it clear that building a stewardship program for these data should be a priority for the State.

An effective stewardship program results in an environment where framework data are widely available, trusted by the users, and used to the maximum extent possible. To achieve this goal a culture of “shared responsibility, shared costs, shared benefits, and shared control” (from *Promoting the National Spatial Data Infrastructure Through Partnerships*, Mapping Sciences Committee, National Research Council publication 1994) must be embraced by the GIS community in Michigan. This document not only addresses technical and procedural improvements in the stewardship process but actions that may be taken to increase awareness of the availability of geographic and its use by the GIS user community.

***Stewardship must be based on a culture of shared responsibility, shared costs, shared benefits, and shared control.***

## STEWARDSHIP BENEFITS

There are significant benefits to society and to all organizations that participate in cooperative data building and maintenance effort. Intangible benefits, those that are not easily measured or quantified, include those that are gained by improved decision making derived from improved data availability and quality. Tangible benefits, those that can be quantified, include savings in asset management, improved emergency responses, decreased duplication of efforts, and reduction in data protection efforts.

Tangible benefits identified during outreach to Michigan GIS community were \$66 million dollars over 5 years. Additional benefits identified through this study included saving of at least \$19 million per year from predictive asset management, \$54 million annual from increased transportation efficiencies, and reductions in citizen fire insurance costs of \$22 million per year. These costs savings represent only a small subset of all potential savings, but they suggest a return on investment in the MGF in excess of \$10.83 for every dollar invested.

### Stewardship Benefits:

- Public safety dispatch and response
- Emergency planning, coordination, and recovery
- Economic development
- Real property appraisal
- Environmental protection
- Resource management
- Transportation planning
- Land use planning
- Asset management
- Data protection

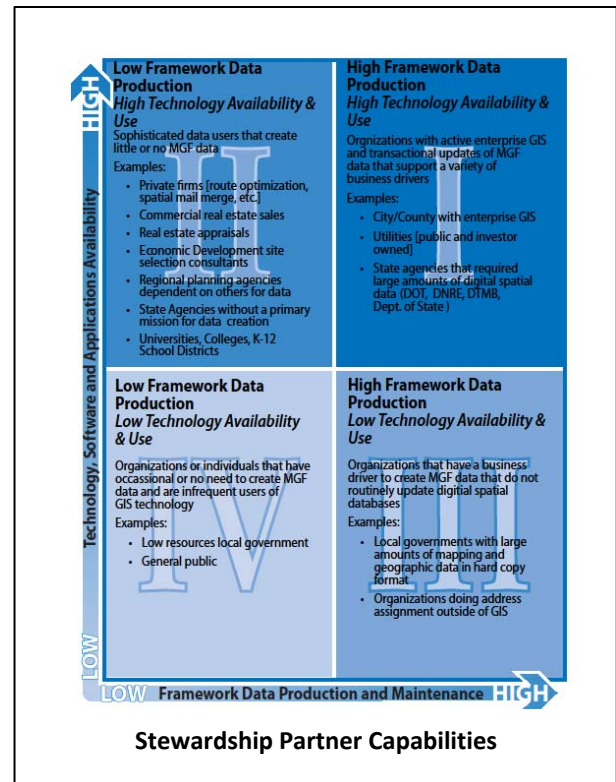
## STEWARDSHIP PARTNERS

Maintenance of the physical assets that make up the transportation network places an enormous burden on finances of governments at all levels. The transportation network provides the means to provide basic government services. Transportation data, like all data, is best developed and maintained by the organization or institution closest to the data creation. In the case of road centerlines and associated addresses this is typically local governments.

The organizations that create and maintain transportation data must be encouraged to share these data with the State and other potential users. To encourage this data sharing the source organization must see benefits from providing data created and maintained at the expense of local taxpayers to others. Benefits are numerous and high value and are best distributed across a broad spectrum of potential users: governments at all levels, non-profit organizations, and the private sector.

Potential participants in a statewide stewardship program have a wide variety of technical capabilities and internal business drivers for data creation and maintenance. The success of the stewardship program must understand the wide variety of potential partners and take advantage of their unique potential contributions.

Specific initiatives must be undertaken to make data contribution easy for technologically sophisticated organizations. Similarly the needs of those organizations that lack technical sophistication must be carefully considered to enable those organizations to enjoy the benefits of participation in the stewardship process.



## STEWARDSHIP ROLES, RESPONSIBILITIES AND CHALLENGES

Successful stewardship requires a clear delineation of roles and responsibilities for all participants. Someone must be assigned the coordination and management responsibilities required of the program. The individual and institutional home for these responsibilities will become the “face” of the program and must possess a diverse set of communications and consensus building skills. Additional roles in the stewardship program include: source stewards, the creators of the data at the local level; framework theme working groups, a technical group that will work to articulate the vision, scope, roles and business rules that will be required to establish and maintain the statewide transportation dataset; and, a framework theme coordinator to provide the technical resources necessary to build the framework. The framework theme coordinator will also serve to make certain that there are efficient and partner friendly methods for data maintenance, exchange, and integration.

Challenges to successful stewardship implementation include:

- Securing commitments from source stewards;
- Identification of stable and sustainable funding;
- Data integration;
- Legal liability;
- Standard enforcements and adoption; and,
- Distribution of and access to data.

## STEWARDSHIP PROGRAM

Effective long term Stewardship requires active involvement by a wide variety of partners with a stake in the success of the program. The plan recommends a number of specific tasks, in tight alignment with the Michigan Statewide GIS Business Plan, to build a framework for the program. These tasks include a number related to governance such as creation of technical working groups to develop a stewardship charter and address specific programmatic issues such as the structure of the transportation stewardship program, data distribution policies, and data standards. These technical working groups will serve the State and Local Cross Boundary Technical Steering Committee and should have participation from a broad group of stakeholders with a variety of technical competencies and needs.

Communications and outreach are the cornerstones of stewardship. A long term strategy to education and information potential stewardship participants of the value of the MGF must be implemented. This strategy should include a variety of communication vehicles, from presentations to executive leadership to regular e-mail communication, but should remain focused on a clear articulation of the cooperative nature of the stewardship relationship.

## 1. INTRODUCTION AND PROJECT BACKGROUND

### 1.1 DATA STEWARDSHIP

This document is intended to establish a foundation and work program for a long range sustainable stewardship program for the Michigan Geographic Framework (MGF). The focus of this document is transportation data themes and structuring a method to maintain and improve over time these data over time. Transportation data, particularly road centerline and address ranges, are used by nearly all of the GIS users in Michigan. Nearly half of all GIS users reported in an online survey that they either produce their own road centerline data or receive it from an outside source and edit it prior to use. The duplication of effort on these elements combined with the vital utility of these data to support nearly all GIS applications make it clear that building a stewardship program for these data should be a priority for the State.

Stewardship is a sustained program with clear roles and responsibilities for organizations or individuals supporting regular update of and access to spatial data. It is a concept rooted in the belief that data should be built once, incrementally improved in quality where possible, and used many times to maximize the return on investment in data creation and maintenance. It is the goal of this document to provide the guidance necessary to build an environment where framework data are widely available, trusted by the users, and used to the maximum extent possible. To achieve this goal a culture of “shared responsibility, shared costs, shared benefits, and shared control” (from *Promoting the National Spatial Data Infrastructure Through Partnerships*, Mapping Sciences Committee, National Research Council publication 1994) must be embraced by the GIS community in Michigan. This document not only addresses technical and procedural improvements in the stewardship process but actions that may be taken to increase awareness of the availability of geographic and its use by the GIS user community.

While the primary focus of this document is a Transportation Stewardship program we believe that the benefits, ROI, and communications recommendations can be applied to a broader definition of the MGF. This broad perspective includes not only the data and programs currently in place at the Department of Technology, Management and Budgets’ (MDTMB) Center for Shared Solutions and Technology Partnerships but include those statewide data themes which have been identify by the GIS user community as being needed statewide. We have used transportation data stewardship in support of the current MGF program at the MDTMB to demonstrate how these principles may be applied to other national spatial data infrastructure framework themes. These data themes constitute the traditional framework spatial data as identified by the Federal Geographic Data Committee (FGDC): geodetic control, ortho imagery, elevation, transportation, hydrography, governmental units, and cadastral information.

These data are those provide basic data that can be used in applications, a base to which users can add or attach geographic details and attributes, a reference source for accurately registering and compiling participants’ own data sets, and a reference map for displaying the locations and the results of an analysis of other data.

This stewardship enhancement plan has been accomplished under a project funded as part of the Federal Geographic Data Committee’s (FGDC) National Spatial Data Infrastructure (NSDI) Cooperative Agreement Program (CAP) Category 5: The National Map. It creates a framework to move the Michigan Geographic Framework (MGF) forward through building a broad collaborative stewardship based community actively participating in the management of the MGF. This Category 5 project was undertaken in tandem with a Category 3: 50 States Initiative business planning project.

Outreach to the community, involvement of a steering committee, and more detailed project history is provided in this document’s companion business plan, *Michigan Statewide GIS Business Plan*. The appendices associated with that document contain full details of information collection, outreach, and project workflow.

This work is being carried out within a national context and adopts the principles defined as part of the National Spatial Data Infrastructure (NSDI). The NSDI program's guiding principles that provide a foundation include an understanding that digital data are the primary driver and a "build once, use many times" approach is important. This approach requires data stewardship and the creation of an authoritative data source to serve as the foundation for the NSDI. To achieve this goal partnerships are critical and these partnerships must involve all levels of government.

Geographic information is essential for decision making at all levels of government and economic sectors. Many Michigan organizations are using Geographic Information Systems (GIS) as the principal analytic and spatial data management tool for a wide range of programs and issues that include emergency management, infrastructure planning and management, natural resource management, social services allocation and management, and revenue management. The lifeblood of these systems is spatially referenced data which are expensive to collect and form into spatial datasets of documented quality, accuracy, currency and completeness. Too often, spatial data are created and stored without providing on-going resources for their maintenance, distribution, long-term management and retirement (if appropriate), or appropriate metadata. This results in diminishing confidence in the quality of the data and, all too often, a requirement for periodic re-collection and re-development of the same data at additional expense to GIS users and taxpayers. Frequently these data are developed piecemeal for specific projects or programs but is not made generally available to users not involved in the project. All levels of government are experiencing increased expectations for service delivery. In addition, there is a rising need for supporting business purposes that cut across agencies and levels of government. A formalized stewardship framework will help meet these expectations and needs.

The stewardship enhancement project is being administered by the Center for Shared Solutions and Technology Partnerships (CSSTP) of the Michigan Department of Technology, Management and Budget (MDTMB), The CSSTP is the state government office responsible for statewide collaboration and partnerships including implementation of the MGF. CSSTP has initiated this project to:

- increase participation on the Michigan Transportation Data Stewardship Program
- develop a better, more complete, more accurate MGF
- identify additional collaboration opportunities
- enhance partnerships and interaction with CSSTP

The objective of this *Stewardship Enhancement Plan* is to define a practical strategy to increase understanding of, support for, and active participation in the Michigan Geographic Framework program. This *Plan* recognizes and attempts to address the many challenges associated with building awareness among key stakeholder groups about the value of the MGF and increasing local government participation within Michigan's home rule environment.

This *Plan* includes the major sections summarized below:

- **Section 1, Introduction Project Background**, provides an overview of the project history, structure, and goals.
- **Section 2, Overview of the Michigan Geographic Framework (MGF)**, provides information about the current user and contributor community to the MGF and identifies community recommended improvements and enhancements.
- **Section 3, Benefits from Stewardship Participation**, identifies some of the benefits from participation in the MGF Stewardship program.
- **Section 4, Stewardship Roles and Responsibilities**, describes the roles and responsibilities of all actors in the stewardship program.

- **Section 5, Transportation Data Stewardship**, makes recommendations for the development of transportation data stewardship program and outlines the actions necessary to build that program.
- **Section 6, Communications, Outreach, and Education**, provided guidance to building a communications, outreach, and educational strategy to further the MGF stewardship goals.
- **Section 7, Stewardship Enhancement Initiatives**, builds on the initiatives outlined in the *Statewide GIS Business Plan* to include additional details and customization to specific MGF stewardship capability groups.

## 1.2 RELATIONSHIP WITH STATEWIDE GIS BUSINESS PLAN

This *Geographic Data Stewardship Enhancement Plan* is a companion document to the recently completed *Statewide GIS Business Plan* ([www.michigan.gov/nsdi](http://www.michigan.gov/nsdi)). The *Business Plan* deals with all aspects of Michigan's statewide GIS program and identifies implementation initiatives for geographic data development and for improved communications and outreach that are addressed in this stewardship plan. Several of the objectives of that business plan are supported by this plan to enhance the Michigan Geographic Data Stewardship program. The objectives of the *Business Plan* which are relevant to enhancing geographic data stewardship include:

- 1. Make changes in statewide GIS organizational structure and governance to improve coordination, collaboration, and service.**
- 2. Continue current support and expand GIS services for State agencies in areas where there are clear benefits.**
- 3. Enhance GIS coordination, collaboration, and partnerships among government, private, and non-profit organizations.**
- 5. Expand and enhance the Michigan Geographic Framework (MGF) program through improvements in data quality, expansion of data content, more effective stewardship, and increased participation of stakeholder organizations throughout the state.**
- 6. Develop new high-priority Web-based applications and GIS services and make them easily accessible by the public .**
- 7. Improve and expand programs and activities for statewide outreach and communication about the Statewide GIS program and its benefits**
- 10. Put in place and activate a process for creation and approval of formal policies and standards that impact the statewide GIS program.**

Each of these objectives supports the Michigan IT goals as outlined in the *IT Strategic Plan for 2008 to 2012*.

The *Business Plan* identifies the following implementation initiatives that call for MGF data improvements, additions of new data themes, improved outreach to increase awareness of MGF benefits, and increased participation in the MGF stewardship program:

- O7: Establish and assign resources for a GIS program outreach and communication business function in CSSTP
- O8: Define/document process for GIS standards and policy development and approval
- D1: Complete version 10 of the MGF and make it available to users

- D2: Prepare high-level logical GIS database design and source matrix
- D3: Expand on the Geographic Data Library to maintain Web-based catalog of sources of geographic data
- D4: Design and put in place a data stewardship model and practices applicable to all GIS data
- D5: Evaluate current quality of Framework data and define actions for quality improvement for next MGF version.
- D6: Develop, approve, and support the use of GIS database standards
- D7: Recruit MGF stewardship participants
- D10: Make enhancements in content and quality to existing MGF data
- D11 to D20: These initiatives call for completion, enhancement or new development for specific data themes (ortho imagery, parcels, addressable structures, NHD, census data, jurisdictional boundaries, utilities, elevation)
- C1: Complete a communications and marketing plan for the state spatial data infrastructure.
- C2: Actively pursue outreach with and support from professional and industry associations
- C5: Prepare and establish formal terms for MGF partnership program
- C6: Design and create promotional materials for statewide GIS program
- C7: Review and improve CSSTP Website design and navigation for improved access to information, services, and resources
- C10: Create and maintain central, web-accessible repository for GIS and related IT standards and policies
- C12: Design and organize training programs for use of MGF resources and other CSSTP GIS services
- C15: Explore and define options for providing GIS services to low-resourced jurisdictions
- S1: Prepare specifications and develop export tools for easy MGF data extract from Oracle Spatial to other common GIS formats
- S3: Examine and develop effective tools for on-line update of MGF data
- S4: Move toward statewide 'virtual portal' for Web-based access to spatial data and services from distributed government and commercial sources

## 2.0 OVERVIEW OF THE MICHIGAN GEOGRAPHIC FRAMEWORK

The Michigan Geographic Framework (MGF) is a digital base map for state government containing foundation data elements including common and standardized infrastructure on which all GIS users of 1:24,000 scale map data can build their applications. The Version 10 release of MGF was recently released and contains features including roads, rivers, lakes, streams, railroads, political jurisdiction boundaries, school district boundaries, census area tabulation boundaries and legislative district boundaries. Specifically, this Michigan base map consists of geographic data in an ESRI ArcGIS format which includes features and attributes based on the current TIGER/Line Files, base map features based on both the Michigan Department of Natural Resources (MDNR) Michigan Resource Information System (MIRIS) Files and an enhanced linear referencing system built from the Michigan Department of Transportation (MDOT) Michigan Accident Location Index (MALI).

MGF is available to any GIS user at no cost. These data can be accessed as ESRI shape files via the Michigan Geographic Data Library (MGDL) ([http://www.michigan.gov/cgi/0,1607,7-158-52927\\_53037\\_12693---,00.html](http://www.michigan.gov/cgi/0,1607,7-158-52927_53037_12693---,00.html)). These data are indexed in the MGDL by geographic extent (state, county or watershed), or by specific theme. To use the files the user is required to download a set of compressed files that includes the Shapefile along with adobe acrobat document files containing details on the Shapefile attributes and an xml metadata file.

While the MGF is viewed by the MDTMB as a programmatic area generating transportation and political jurisdictional data, it is viewed by the State's GIS community in a broad sense to include the entire set of statewide themes (ortho imagery, NHD, SSURGO Soils) and other themes such as elevation and parcels. In general we will refer to the MGF in this broad context it is the transportation and jurisdictional data maintained by the MDTMB CSSTP that will be our focus.

This *Geographic Data Stewardship Enhancement Plan* includes specific actions to establish an environment to facilitate an increase in participation in the Michigan Transportation Data Stewardship Program to ultimately build a better, more complete, and more accurate Michigan Geographic Framework (MGF). For the purposes of this plan, "MGF participation" encompasses both use of the data as well as contributions of data by source stewards. This *Plan* provides a high level overview of the benefits from active participation in the MGF for local data stewards, identifies the necessary actions to implement an effective outreach and education program, and offers an initial framework for building active participation in the MGF.

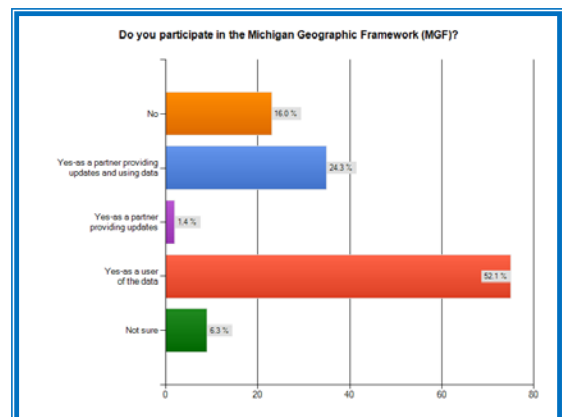
### 2.1 MGF USER COMMUNITY

Preparation of this *Stewardship Enhancement Plan* was based on a significant outreach and information gathering effort. The information

gathering process, explained in more detail in the *Statewide GIS Business Plan*, included a series of listening sessions, a Web-based survey, and targeted interviews with leaders of the state's GIS community. This outreach and information gathering served to provide a comprehensive picture of current MGF use, ideas for improvements, and requirements for improved MGF support and participation.

Over 72% of the respondents to the survey are aware of the MGF and the efforts of Department of Technology, Management and Budget's Center for Share Solutions and Technology Partnerships. The majority

Figure 1. Participation in the MGF



of the respondents to the on-line survey that are aware of the MGF use the data (52.1 %) and another 25% are participating in the MGF as a partner providing updates. These high levels of awareness and participation indicate there are significant strengths with the existing MGF and that it has value to the GIS community in Michigan.

Many of the organizations that reported they were not using data from the MGF indicated that they had no need for the data offered or the data does not meet specific business needs because of accuracy. Several others noted that they were unaware of the specific information available in the MGF and how it might be useful.

Survey respondents and those in attendance at the listening sessions identified the strengths of the MGF:

- It provides a single seamless source of data statewide.
- The MGF is readily available at no cost and can be shared.
- Data is well organized and easy to use.
- The MGF is very data rich and generally the information required is available.
- It is updated on a regular basis so changes can be counted on to be in place eventually.

The listening sessions and survey responses suggest that there is wide variety in the level of technical capabilities and understanding among the users of the MGF. This variability suggests that in order to accomplish the goal of increase participation in the stewardship data program there will need to be a multi-tiered structure to allow for participation since a single strategy will not meet the needs of all potential data stewards. Our outreach revealed that there is a significant difference in the use of the MGF between jurisdictions with healthy and mature GIS programs and lower population, lower tax base jurisdictions.

## 2.2 STEWARDSHIP PARTICIPANT CHARACTERISTICS

Planning for MGF enhancement and increased participation is based on an understanding of the characteristics of Michigan's statewide GIS user community which includes all levels of government, regional agencies, nonprofit organizations, public and private utilities, private firms, and the general public. These GIS stakeholder organizations exhibit a wide spectrum in terms of: a) production/update of geographic data and b) access to GIS technology (systems, software, applications). This wide spectrum is best viewed as a continuum from low to high for both characteristics as demonstrated in Figure 2 below. This characterization of the MGF user community is used as a basis for planning and delivery of services and support to user organizations and the development of an effective stewardship. It recognizes that the GIS community in Michigan is made up of a diverse set of public, private, and non-profit organizations that exhibit a large range in availability and use of GIS technology and existing geographic data compilation and maintenance programs. Recommended actions in this plan take into account these differences.

Stewardship Group I as describe in the upper right of the graphic (Cell I) includes those organizations with active enterprise GIS many of which have in place transactional updates of MGF framework data and apply those data to a variety of business drivers. These organizations have technology, software and applications highly available to their staff and management. Organizations that would fall into this cell also have above average needs to produce and maintain framework data themes.

Conversely an organization or individual that would fall into cell IV are those that have little or only occasional need to create MGF data and are infrequent users of GIS technology. They have little current access to technology, software, and applications and also have lower capabilities to produce or maintain framework data.

Organizations in Groups I and III will likely not be heavy users of the MGF to provide the base for their activities within their service areas or jurisdictional boundaries. Instead these organizations will likely use enhanced base data they have created and look to the MGF to provide a regional context for their operations whenever it is necessary to look outside of their territory. However, these organizations have the potential to significantly improve the quality and quantity of data available for the broader user community through participation.

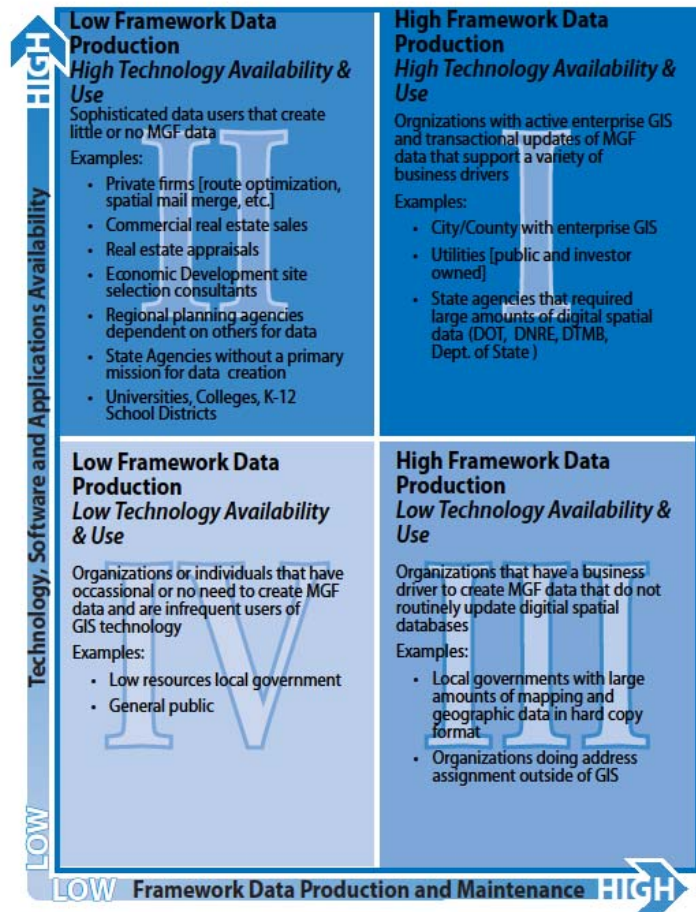
Organizations with less capacity to produce and maintain framework data, those in Groups II and IV, will be more dependent on MGF data. Those in stewardship group II (sophisticated users of geospatial technologies with little or no business drivers to create MGF framework data) will likely have a strong dependency on these data and demonstrate an active interest in securing source data which is appropriate to their specific needs. Organizations in Stewardship Group IV will benefit from the MGF process providing high priority web applications and web based framework data editing.

A primary focus for MGF program improvements is on local governments (county, city, village, and township). Local governments in the more populous regions of the state tend to have more active GIS programs with effective, sustained programs for geographic data maintenance and access to GIS technology. This includes cities and county governments with enterprise GIS programs which may be considered “data and technology rich”. Local governments covering significant lower population areas of the state, in general, have a lower level of access to GIS technology and detailed data important for meeting their business needs.

It is within this broad classification of potential stewardship participants that recommendations must consider moving forward:

- Stewardship Group I—Organizations with active enterprise GIS and transactional updates of MGF data that support a variety of business drivers. These organizations may maintain a digital address assignment process and continuously update road centerline data to support 911 and other critical business drivers.
- Stewardship Group II—Sophisticated data users that create little or no MGF data. Organizations in this group may make extensive use of transportation data but may not be creators of these data. Some of these organizations likely are those that reported receiving data from an outside source and editing it to meet their specific needs.

Figure 2. Classification of Stewardship Participants



- Stewardship Group III—Organizations that have a business driver to create MGF data that do not routinely update digital spatial databases. An example of these organizations may be jurisdictions that perform manual address assignment and maintain MSAG data outside of a spatial environment.
- Stewardship Group IV—Organizations or individuals that have occasional or no need to create MGF data and are infrequent users of GIS technology. This group includes the general public or other occasional users of web mapping services to locate an address, get driving directions, or explore spatial data such as property tax information without any driver to have sophisticated technology.

## 2.3 MGF LIMITATIONS AND COMMUNITY NEEDS

### CURRENT MGF LIMITATIONS

During the outreach phase of this project most members of the GIS community in Michigan reacted positively when asked about the data content, quality and availability of the MGF and there was praise for the MGF staff. There were observations about weaknesses and suggestions for improvement including:

- MGF program will be used in different ways by different types of participants. Counties and municipalities with robust GIS programs, the MGF will not be the primary source of transportation data they use but it is a primary source for lower population/lower resourced counties, cities, villages, and townships. Most of the interviewees representing organizations with robust GIS programs indicated that they would have some use for the MGF—when GIS applications requires transportation and other data outside of their jurisdiction boundary. Most indicated that they would participate in the MGF program as a data provider if the CSSTP provided an efficient way to submit data.
- There was close to full consensus that the CSSTP needs to be doing a better job of outreach and establishing partnerships with local government entities to maintain the statewide MGF databases.
- Some individuals noted that the CSSTP has not provided a clear approach and mechanism for local governments to provide data updates to the MGF—indicating that this has been a factor inhibiting participation by local governments.
- Some local government jurisdictions place limitations and/or charge fees for distribution of certain high value GIS data (e.g., high-resolution ortho imagery, parcels). This circumstance must be addressed, to the satisfaction of these jurisdictions, before statewide access to these data.

Specific comments for improvements to the MGF related to communications to partners and users included:

- Improve communications and understanding of the complexity of the MGF framework data so it can be fully utilized would be enhanced by the production of a training program and associated detailed user guide
- Provide clearer descriptions of MGF datasets and make metadata easy to access to give users information to allow them to make the most effective use of the data
- Improve Web-site navigation and tools to find and access MGF data
- Establish more clarity in how disputes in the data are resolved (for boundary changes for example) and provide better feedback on the status of data corrections and additions while they are in process
- Provide a list of all MGF contacts to facilitate communication between users and data custodians
- Build enhanced applications and Web services to allow users to perform queries and map visualization on-line—without a requirement to download data

## RECOMMENDED MGF ENHANCEMENTS

The MGF user community offered a list of data improvements, enhancements, and additions they would like to see to make the framework more valuable to their business needs. High priority data development items (ortho-imagery, cadastre/parcels, and address points) are specifically addressed within the *Business Plan* and a framework for cooperative development of these items is presented in that document. High priority applications that would assist the members of the MGF community are also identified in that document. These provide some insight into the multitude of uses of the MGF framework themes to benefit the residents of Michigan.

There is a strong need to improve the spatial accuracy of the road centerline and other centerline dependent databases. There is wide variability in the spatial accuracy relative to ortho imagery and although some users acknowledged this does not create an issue for many applications is it troubling from a cartographic and aesthetic standpoint. Other enhancements to the existing MGF transportation data suggested were:

- Master Street Address Guide (MSAG) address data should be merged and synchronized with MFG with reconciliation to other data and standards (NENA/Postal Service)
- Create a permanent ID for all features to ease tracking of changes over time
- Improve road centerline vector attribution to include speed limits, pavement type, weight limits or restrictions, height restrictions, seasonal status, and elevation
- Improve railroad data to include info on active/inactive and notation on inactive if rails have been removed.

Specific data themes were recommended to be included in future version of the MGF to enhance the ability of organizations to meet their business drivers. The *Michigan Statewide GIS Business Plan* identifies ortho imagery, parcels, and address points as themes to be added to the MGF. Table 1 identifies the themes that are most used by the GIS community in Michigan. This information should serve as the basis for future data expansions.

**Table 1. Data Needed to Meet Business Drivers**

Rank	Data Needed	Percent Responding
1	Street Centerlines	99%
2	<i>Ortho Imagery</i>	98%
3	Governmental/Administrative Boundaries	97%
4	Surface Hydrography (water bodies/streams)	96%
5	Wetlands	94%
6	<i>Cadastral/Parcels</i>	92%
7	Elevation—Contours	92%
8	Land Use/Zoning	90%
9	Addresses [Street Centerline Ranges]	90%
10	Elevation—Digital Elevation Models	89%
11	Hydrologic Unit (watershed) Boundaries	89%
12	Land Cover	88%
13	Buildings/Structures	88%
14	Addresses [Point Features]	87%
15	Soils	87%

NOTE: Bold entries in this table are part of the currently available MGF. Italicized entries are proposed for addition to the MGF in the Michigan Statewide GIS Business Plan.

### 3.0 BENEFITS FROM STEWARDSHIP PARTICIPATION

One important element in building participation in a stewardship effort is the ability to communicate the value of participation to all partners. These shared benefits may be tangible or intangible in nature. Tangible benefits are those that can be measured in monetary terms (e.g., dollars saved, generated, or avoided costs) or staff time (e.g., efficiency gains or avoided staff increases). Intangible benefits are those which cannot be easily quantified (improved decision making or responsiveness) or which have a potential quantifiable value but are unpredictable in nature (e.g., saved of property from improved emergency response, enhancements in environmental quality).

As demonstrated through the on-line survey responses the vast majority of organizations using geospatial technologies enjoy benefits from improved decision making, improved timeliness and quality of data and services, and improved staff productivity. Other widely identified benefits from geospatial technologies include serving as a catalyst for partnerships and information sharing and a reduction in duplication and redundancy. Often cited during listening summits were benefits received from the application of geospatial technologies in the eyes of citizens and elected officials to be more professional and efficient. The application of these technologies allows staff to avoid the appearance of giving citizens the ‘run-around.

The *Statewide GIS Business Plan* associated with this document has called for a program of expansion of the MGF that will require an investment of \$9.8 million over a 5 year period. This is large investment assumes significant participation by stewardship partners. The ortho imagery recommendation, for example, anticipates partner investment of \$2.9 million, compared to a State investment of \$1.3 million.

Additionally, the *Business Plan* recommends implementing a cost share structure for development and maintenance of parcel data a reasonable estimate of investment in parcel development and maintenance by county and city governments over the next five years \$35.5 million. The anticipated level of state investment in parcels recommended by the business plan is \$6 million, current expenditures as reported through a survey of GIS accomplished by MiCAMP is \$4.78 million/year or, if current expenditures remain constant, \$23.9 million over 5 years. This means that new investment from stewardship partners will be required of \$5.6 million to accomplish the goal of a statewide parcel dataset.

Clearly there needs to be a demonstrated positive tangible benefit for these stewardship partners to increase their financial commitment.

### 3.1 BENEFITS TO LOCAL GOVERNMENTS FROM STEWARDSHIP PARTICIPATION

Local governments in Michigan (counties, cities, villages, and incorporated townships) represent a stakeholder group that is critical for success of the MGF program. In a broad sense, MGF participation involves two complementary actions: using data from the MGF (data consumption) and contributing updated data to the MGF (data contribution). As discussed above, local governments in Michigan exhibit a large range in their access to GIS technology and the availability of geographic data that supports local government business needs. This range from “data/technology rich” (stewardship group I) to “data/technology poor” (stewardship group IV) directly impacts the type of MGF participation for specific local government jurisdictions. Local governments on the data/technology poor side of the range will have a greater need to access MGF data and often to have access to Web-based hosted GIS applications. Jurisdictions with active GIS programs may be generally categorized as “data/technology rich” (stewardship group I). It is acknowledged that these jurisdictions, which represent higher population areas of the state, will have less routine need for MGF data or hosted services but will still find benefit from use of the MGF in certain circumstances. Accomplishing MGF program goals—the timely maintenance and access to important statewide GIS data themes is dependent on data contributions from all data stewards—including the “data rich” jurisdictions. To support this participation, there must be effective tools and procedures for data contributions so that data providers do not incur significant overhead (staff time) to submit updated data for incorporation into the MGF.

According to a 2007 MiCAMP survey, 28% of Michigan's 83 county governments do not currently have active GIS programs in place. There are 257 villages and 267 cities identified in the MGF V10 Shapefiles and it can be reasonable expected that a similar percentage lack access to GIS software, hardware and applications. For the most part, these jurisdictions are in low population areas of the state or do not have the in-house technical resources to support GIS operations. In some cases, these jurisdictions, particularly smaller cities and townships, have access to GIS data and services from County government or Regional Planning Council GIS programs or have outsourcing agreements with private companies. But there are many areas of the state, which could benefit from GIS data but currently lack the resources to develop and maintain it. Some of these lower population jurisdictions have already made considerable use of data available through the MGF program. In the future, there must be a focus on expanding awareness and access to the MGF for additional local government jurisdictions that are not well-positioned to develop and manage GIS database in-house. Future improvements in MGF data content, format, and quality will deliver substantial benefits to large areas of the state and provide the residents of those areas with the benefits current received in the better resources jurisdictions.

Local government jurisdictions with well-established GIS programs (the data/technology rich jurisdictions that make up Stewardship Group I) which are now regularly maintaining detailed GIS data for their own use have less of a need for accessing MGF data. There is an interest in increasing the role of these organizations as data contributors—to provide periodic updates of GIS data to the MGF for the benefit of the entire statewide GIS user community. Establishing an effective stewardship program must be based on the potential for clear benefits and an efficient process for data submittal and posting to the MGF. The arguments for MGF stewardship participation by all Michigan local governments, as data contributors and data consumers may be summarized as follows:

1. For low population and low resourced areas of the state (generally Stewardship Group III), the MGF stewardship provides a low cost source of data needed to support local government operations.
2. The MGF database provides a cross-jurisdiction source of data that supports regional and statewide applications—alleviating the need to assemble data from multiple jurisdictions. This statewide, cross-jurisdiction nature of the MGF data delivers tremendous benefits for local governments and other organizations in such areas as public safety, emergency planning and response, economic development, and environmental assessment.
3. The MGF Program encourages the adoption and use of data standards which ease the process of data sharing among all stakeholder groups (all levels of government, regional agencies, and the private sector and all Stewardship Groups)
4. The MGF Program, as a foundation of Michigan's statewide GIS program, provides a basis for regional data acquisition and compilation efforts—potentially reducing costs through economy of scale.
5. The MGF provides some “value-added” data and services useful for the entire GIS community. These “value-added” services include making the data available to the user community through the MGD, and providing data such as a linear reference system to assure compliance with Act 51.

Building active participation in the stewardship program requires communication with potential participants about the value derived from the use of statewide geographic data. One important concern voiced by multiple members of the GIS community was that there was no return to local governments from participation and that participation would result in reducing the ability of the community to sell their data. In some cases, local government GIS personnel indicated interest in providing updated data to the MGF but were unclear on the process for data submittal. In other cases local jurisdictions do not participate since they believe that it will circumvent their proprietary rights to the data and will thus reduce the revenue those data can return to the organization through data sales. As such, it is critical moving forward that the notion of “shared benefits” be effectively communicated.

As cited above, major benefits of the MGF result from its statewide nature—the MGF provides a single, seamless location for valuable geographic data that supports government business needs that do not stop at jurisdictional boundaries. Key business needs that often require cross-jurisdictional data include:

- Public Safety Dispatch and Response: Support for assignment and response to emergency incidents by local and state law enforcement, fire, and emergency medical organizations. Cross-jurisdictional data for public safety needs is particularly important for coordinating response to incidents in which emergency organizations from multiple jurisdictions are involved.
- Emergency Planning, Coordination, and Recovery, particularly in the event of major natural disasters, can be an important benefit from participation in a statewide initiative. During a major event that requires support from outside of the community there may be insufficient time to provide maps and local information to responders that are not familiar with local roads and facilities. Making local data available allows for those data to be pre-staged for quick and appropriate use. Natural and man-made disasters do not end at political jurisdiction boundaries and responders are not always local.
- Economic Development is no longer a local issue as communities compete with others around the globe for private investment and job creation. It is critical to economic development success to be able to market an area based on regional demographics and labor availability. Community attributes that contribute to a high quality of life may be available regionally but not within a particular county and can be important to success. These features may include educational facilities and quality of life amenities (performing arts centers, sporting teams, regional airports, museums, etc.). Further, potential buyers and suppliers may be important and the distribution of those firms will be beyond a single county, city, or township.
- Real Property Appraisal—information on neighboring property sales and sales prices are critical for understanding real property values. Not infrequently those transactions for parcels along the borders of a community are more heavily influenced by sales on the other side of a boundary than those within the boundary. When dealing with non-residential properties with larger regional market areas and fairly infrequent transactions this issue is compounded.
- Environmental Protection and Resource Management—habitats, watersheds, and groundwater movement are not controlled by political boundaries and thus often require a regional perspective for effective management and protection.
- Transportation and Land Use Planning and Asset Management—for reasons similar to those of property appraisal a perspective of activities including zoning and land use beyond the borders of a community can be important. Political jurisdictional boundaries do not provide sufficient separation from potentially incompatible land uses. Traffic attractors along a border, for example a large retail center or a school, will generate effects without respect to a political unit boundary. Also the rich data content and linear reference model of the MGF's transportation centerline data provides a valuable source for road-related asset management.
- Data protection afforded by having complete database hosted at a remote site in the event of a hardware failure, localized disaster such as a court house or county administration building fire, or electrical outage can allow for mission function to continue with minimal interruption.

### 3.2 STEWARDSHIP PARTICIPATION BENEFITS FOR NON-LOCAL GOVERNMENT ORGANIZATIONS

While local governments are the primary focus for improvements in the MGF stewardship program, participation by other organizations is important as well. Federal and state agencies, public and private utility organizations, regional agencies, and other organizations can play key roles as data users and data providers.

Multiple state agencies in Michigan have historically been major participants in the MGF program as data providers and users. In addition to the management role played by the Department of Technology, Management and Budget (DTMB), the Department of Transportation (MDOT) and the Department of Natural Resources and Environment (DNRE) have been

active both as data providers and data users. The programs carried out by many state agencies depend on detailed, accurate geographic data available statewide or for large regions of the state. This is the case with current MGF datasets (e.g., transportation, jurisdictional boundaries) and GIS datasets planned for inclusion in the MGF (hydrography, digital ortho imagery, parcels, address points). There are considerable opportunities for increased participation by state government organizations that are not currently major participants in the MGF programs. Such agencies as the Department of Agriculture, Department of Community Health, Department of Energy, Labor, and Economic Growth, the Public Service Commission, and the State Police have missions which could benefit from increased use of MGF data. The *Statewide GIS Business Plan* includes implementation initiatives that call for expansion in GIS use in state government.

Multiple federal government agencies have land management responsibilities in Michigan or provide services which depend on geographic data. Most importantly, these include: a) the U.S. Geological Survey which carries out geographic data collection and management in connection with their geography, biology, geology and hydrography programs in addition to their geospatial liaison role with the state, b) the U.S. Forest Service with land management responsibilities for four National Forests in the state, c) the USDA (Natural Resources Conservation Service and the Farm Services Agency) which support mapping and GIS data collection activities to support agriculture and conservation programs, d) FEMA which oversees flood plan mapping and other emergency management programs requiring GIS data, and e) the National Park Service in their management role of six national parks and natural areas in the state. In addition to these federal agencies, geographic data management is important for projects and programs for the U.S. Environmental Protection Agency, The U.S. Department of Transportation, and the U.S. Army Corps of Engineers. Michigan state government agencies and some regional and local organizations have worked with federal agencies in collection and sharing of geographic data but there are untapped benefits that could result from an expansion of partnerships and joint project work. The *Statewide GIS Business Plan* includes initiatives for increased collaboration with federal agencies that will positively impact MGF management and geographic data access for the entire Michigan GIS user community.

In Michigan, like other states, utility services (water, sewer, electric, gas, and communications) are provided by a large number of public and private organizations including: a) county or municipal utility departments, b) independent public utility districts or commissions (typically providing water and/or sewer service), c) private utility cooperatives, and d) investor owned utility companies. Service areas for these utility organizations range from very small (portion of a county) to multi-County regions but all of them use and generate geographic data on a regular basis and many have effective GIS programs. These organizations should be considered important users of MGF—particularly for base map data that serves as a foundation the compilation and update of utility asset data. There is an interest in including certain utility data in the MGF (taking into account access restrictions for critical infrastructure data). State and local agencies and utility organizations themselves could derive significant benefits from access to utility infrastructure data that crosses service boundaries and government jurisdictions—in such areas as long-range development planning, economic development site selection, emergency planning and response, transmission corridor planning, site selection and planning, and management of tax liability.

For the entire GIS community to enjoy the maximum benefits of the MGF it is critical that tolls be developed to make it possible for large framework data producers to contribute their data to the MGF without having to support a lot of additional overhead and expense for doing so. It will also be important to develop a mechanism to protect the ability of these data creator to continue to profit from their data without jeopardizing the benefits of having foundational information available to all users without charge.

### 3.3 TRANSPORTATION DATA STEWARDSHIP BENEFITS

The benefits of establishing and maintaining a unified, statewide GIS-based road centerline database are well established. The benefits and wide use of road centerline data are exhibited by the Federal Geographic Data Committee (FGDC) identification of transportation centerlines as one of several Framework themes. In addition, over 30 states have established or are pursuing development of statewide road centerline data programs. The interest in statewide road centerline databases is based on the applications for which the data may be used—from basic cartographic uses to a wide

range of transportation planning, public safety, and service delivery applications. Many of these applications benefit from a statewide centerline database in a GIS format that crosses over county and other jurisdictional boundaries.

The most obvious justification for a statewide road centerline stewardship program in Michigan (and other states) is that multiple organizations now expend considerable resources on collecting and maintaining road centerline data. These individual efforts often overlap (in terms of data content) and the fact that individual organizations use their own database formats that serve their own specific business needs complicates the ability for other organizations to use the data. There is an opportunity to save substantial time and resources by better coordination in data compilation and update using a database standard that can serve multiple users and organizations.

The State of Washington, through the WA-Trans program coordinated by the State DOT, conducted a business needs evaluation for statewide road centerline data (see [www.wsdot.wa.gov/mapsdata/transFramework](http://www.wsdot.wa.gov/mapsdata/transFramework)). This evaluation has recognized the value of cross-jurisdictional road centerline database that supports the following business needs (of multiple federal, state, and local organizations):

- Cross-jurisdiction communications and collaboration
- Geocoding and event location
- Emergency planning and management
- Environmental analysis
- Transportation infrastructure asset maintenance
- Traffic safety records management and analysis
- Transportation planning
- Freight mobility planning
- Emergency dispatch and response
- Public transit planning and operations

A preliminary return-on-investment study for the WA-Trans project shows a conservatively estimated return of 11% from the establishment of a statewide transportation Framework. Given the amount of money currently spent in the business areas identified above, the 11% represents significant recurring expenditures.

Similar conclusions have been reached in North Carolina. A study of data road centerline data sharing through the state's NC OneMap program ([www.nconemap.com/Default.aspx?tabid=304](http://www.nconemap.com/Default.aspx?tabid=304)) shows substantial savings by federal, state, and local government agencies—over \$130,000 annual savings in current expenditures for road data compilation and maintenance. The North Carolina business case confirms the need for local road data by a wide range of state and federal agencies and private companies and the ability to access road Framework data from a single source will deliver significant benefits.

The State of Ohio established their Location-Based Response System (LBRS) to support development of detailed road centerline and address data for all counties. A cooperative state-local funding program was set up and detailed road centerline and point address information is being collected at the county level—using a unified, consistent database format and data collection methodologies. The main justification is the support for public safety—the use of accurate road centerline data to support emergency planning and response but recognizes the use of these data for business needs.

Upcoming initiatives to move the current generation of Enhanced 911 systems to the Next Generation 911 (NG911) will require location technologies, matching a “call” to a specific place, be driven by up to date and accurate GIS based transportation data. Historically 911 calls have been driven by voice interaction between the caller and the dispatcher located at a call center either on traditional telephones or cell phones. With the expansion of smart wireless devices and nearly ubiquitous broadband access the NG911 systems are evolving to deal with a highly mobile society. No longer is address relevant to all 911 calls with wireless and smart devices passing sometimes very accurate coordinate location data

to the dispatch center rather than phone number that must be matched to a street address. Many consumers are doing away with traditional hard lined telephones in favor of IP phones or relying only on cell phones for voice service.

Emergency calls may now be automatically dispatched from smart devices in vehicles, via text messages or even e-mails from individuals. The ability to accurately identify the location of these “calls” to dispatch the correct first responders is a critical component of these systems and requires accurate transportation framework and jurisdictional boundary data to be available, up to date, and compliant with standards. Citizens crossing through low resources jurisdictions (those in stewardship group III) have an expectation that they will receive the same level of responsiveness from 911 calls that they receive in other areas. Without a statewide transportation framework data set to support this application that expectation in the level of care will not be met thus delaying response times and jeopardizing life and property.

The GIS outreach process conducted for this project confirms the high interest for access to up-to-date road centerline data by a wide spectrum of federal, state, and local agencies. Road centerline data is needed on a regular basis by municipalities and county governments to support effective infrastructure asset management, address-related mapping and service delivery, emergency dispatch, and public safety planning and response. The value of a consistent, cross-jurisdictional road centerline database supports the following business requirements that are important for Michigan organizations:

- Requirements for public safety response and coordination of fire and law enforcement activities between counties and municipalities and among neighboring counties.
- State Police Emergency Management Division responsibilities for disaster planning, emergency response coordination, recovery support, and mitigation planning.
- Statewide transportation planning and asset management by the Michigan Transportation Department requiring a unified road centerline databases for all federal and state roads and local roads that receive federal or state funding.
- Mapping of road centerline data in support of Road Commissions and other organizations throughout the state under programs managed by the Transportation Asset Management Council—including GIS based data capture using RoadSoft.
- Roads on some federal and tribal lands in Michigan are not always mapped or the road data is not easily accessible by agencies that may need it. Local, state, and federal coordination (for emergency planning, emergency response, recreation and tourism) can benefit from a statewide road centerline database that covers all land in the state.
- Natural resource planning and management activities in the areas of timber resource management, recreation, water rights evaluation, wildlife habitat and corridor analysis, disease management, and agriculture for multiple organizations including local, state, and federal government agencies.
- Utility and energy management at local and regional levels impacting such areas as communications tower siting and asset management for utility transmission and distribution networks.

The majority of Michigan stakeholders, who have a need for road centerline data acknowledge the value in establishing an ongoing program for statewide road centerline Framework data development and stewardship. Michigan, through the current MGF program has a significant advantage over most states in that a significant base of transportation data has already been compiled statewide and is now in its 10<sup>th</sup> release. Michigan faces the same challenge that has been encountered in other states that have a statewide road framework data stewardship program: multiple federal, state, and local organizations are now in the process of compiling road centerline data, but these efforts are not coordinated and are focused solely on the specific business needs of that organization.

This duplication of efforts results in inconsistent database formats, incompatible database formats, and poorly coordinated workflows—making a cooperative, integrated approach difficult to achieve. Overcoming these obstacles will require management decisions and proper allocation of resources.

### 3.4 TANGIBLE BENEFITS REPORTED BY GIS COMMUNITY

During the survey of the GIS community there were a number of areas where information on significant tangible benefits was provided. We received numerous anecdotal examples during listening sessions of savings in staff time in researching land and right of way ownership based on having parcels available digitally, perceived vast savings from a shift of roadway and other asset management to a predictive model based on sound spatial data from a purely reactive maintenance process, from improved response times for first responders, and from economic development support.

The survey of the community asked for specific examples of dollar savings are reported in Table 2. This Table assumes that the average benefits reported can be repeated in each of the 83 counties in Michigan. The \$66.8 million in tangible benefit over a 5 year period (or \$13.37 million per year) is a reasonable and conservative estimate of the benefit to local government entities from development of an enterprise GIS and participation in an active stewardship program.

**Table 2. Tangible Benefits Identified by GIS Community.**

<b>Tangible Benefits Reported (for Last 5 Years)</b>	<b>Average Reported Benefits</b>	<b>Potential Total Benefits Statewide</b>
Staff Productivity and Labor Cost Savings	\$ 139,659	\$ 11,591,697
Revenue Increases [improved collection of taxes, fess, fines, insurance claims, etc.]	\$ 282,191	\$ 23,421,853
Reduction in Duplication and Redundancy	\$ 66,833	\$ 5,547,139
Asset Management	\$ 55,000	\$ 4,565,000
Support for Economic and Business Development Initiatives	\$ 63,722	\$ 5,288,926
Avoidance of New Costs	\$ 45,111	\$ 3,744,213
Savings in Capital Project Design	\$ 76,250	\$ 6,328,750
Savings in Infrastructure Maintenance and Design	\$ 37,125	\$ 3,081,375
More Effective Management/Allocation of Field Services	\$ 39,808	\$ 3,304,064
<b>Totals</b>	<b>\$2,032,600</b>	<b>\$ 66,873,017</b>

### 3.5 EXAMPLES OF TANGIBLE BENEFITS TO CITIZENS

#### PREDICTIVE ASSET MANAGEMENT

While the above data clearly demonstrates that there are benefits at the local level of government there are clearly tangible benefits to state taxpayers beyond those identified above. Anecdotal evidence presented during listening sessions identified significant savings from improved maintenance using the MGF and the RoadSoft system to facilitate repair of pavement through re-sealing and re-surfacing prior to the conditions degrading to the point where a total reconstruction of the roadway is necessary. Complete reconstruction of a roadway is 75 times more expensive than preventative crack sealing, representing significant savings realized if maintenance can be accomplished before total failure. In fiscal year

2009-2010 the Michigan budget for construction and maintenance from state and federal sources was \$1.9 billion. If a savings of only 1% on road maintenance can be generated through having spatial data and applications to support predictive maintenance, and the savings based on information reported by the GIS community is likely to be significantly more, the value in replacement avoidance would be \$19 million per year.

This represents just a single class of assets that can be management through a predictive versus reactive process when sound spatial data are available. Drains, water and sewer utilities, electrical services, street trees, and signs can all see significant increases in maintenance efficiencies through the application of spatial data and systems.

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## TRANSPORTATION COSTS

School bus services cost the 550 school districts in Michigan \$802 million in the 2006-07 school year (the last year where we were able to locate statistics). State support for public transportation operations in 2009-10 was \$295 million. Several studies on the implementation of GIS for routing vehicles such as school buses, code enforcement inspectors, social service and child protective services employees, snow plows and garbage trucks have demonstrated that a 20-30% reduction in the total miles driven to perform these functions can be obtained. While it is not clear what percentage of the budgets cited for school buses and public transportation are to spent on fuel and maintenance related to miles driven, it can be reasonably expected that a 5% reduction in the costs of these services can be expected, netting a potential \$54.9 million in annual savings on those two specific elements. When factoring in other business functions that require extensive driving the annual savings potential is significant.

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## INSURANCE SAVINGS

Another area that was cited during project outreach as generating significant savings for citizens through the application of GIS has been in the reduction in fire insurance costs. The ISO rating system for fire insurance is a scale that rates the ability of a fire department to respond to a particular location along with its ability to deliver a high volume of water for fire suppression to that site. The scale ranges from a 10 to a 1 with 10 having the highest fire insurance premium based on a long distance to a fire station or poor proximity to a hydrant.

A community with an ISO rating of Class 7 pays 32% lower fire insurance premiums than a Class 10 location.

The application of GIS to support selection of locations for fire stations and hydrants can result in potentially significant savings for homeowners.

The average annual fire insurance premium in Michigan is \$715 and the 2000 census recorded just over 4.5 million housing units in the state. If 10% of the residents in Michigan enjoy a fairly modest reduction in their ISO classification from 8 to 6 they will enjoy a 7% annual savings in fire insurance costs, \$50.05. While this savings may seem fairly small when considered across the potential of all housing units affected and an annual savings over 5 years the numbers are significant. Using the 10% of housing units enjoying the ISO reduction yields \$22.6 million per year in reduced fire insurance premiums or \$113.4 million over 5 years. This does not take into account the intangible benefits from having improved first responder times and the probability of saving additional lives and property through quicker response times.

Further intangible benefits from improved ISO ratings are seen in economic development potential. Major industrial and commercial developments are unwilling to locate where sufficient fire protection is unavailable. Targeting likely industrial or commercial properties for improvements in fire suppression services will further benefit the community.

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## IMPROVED EMERGENCY RESPONSE TIMES

The now nearly ubiquitous use of 911 systems has resulted in first responder dispatch and arrival times being significantly reduced. The application of transportation data to planning the locations of first responder dispatch location (fire stations, ambulance facilities, police stations, etc.) and to planning patrol routes to maximize the ability to serve citizens is a fundamental advantage of the application of transportation and address data. With the upcoming migration of E-911 to NG911 systems the need for up to date and reliable transportation data is clear.

Faster ability to dispatch the necessary services to an automobile crash, fire, or health emergency will save lives and property. A study by the Center for Evaluation of Emergency Medical Services for the City of Seattle ([/www.ncbi.nlm.nih.gov/pubmed/8214853](http://www.ncbi.nlm.nih.gov/pubmed/8214853)) found that for persons having an out-of-hospital cardiac arrest, survival rates declined 5.5% per minute from collapse to beginning advance cardiac life support (CPR, defibrillator shock). Another study, this one published in the Emergency Medicine Journal (<http://emj.bmj.com/content/21/5/619.abstract>) found that survival to admission at the hospital was 5.4% greater in urban areas where response time for EMS was less than 10 minutes. While these findings are not as dramatic they still point to a significant increase in saving lives by improved response times.

What do these numbers suggest? Using only out of hospital cardiac arrest as an example for the value of improved 911 systems, a reduction the average response time from 10 minutes to 5 will save 129 lives per year in Michigan. Speeding response times from 10 to 9 minutes will save 23 Michigan cardiac arrest patients a year. [Note these numbers are based on an assumed 980 episodes per year which would be expected if the rate of cardiac arrest in Michigan matches national figures.]

Cardiac arrest, fortunately, is not a common event. Automobile crashes, fire, and other medical emergencies all have increased survival rates with faster responses and are all more common. While not specifically quantified, it is clear that lives will be saved with the implementation of a statewide transportation geospatial database and the NG911 system.

### 3.6 RETURN ON INVESTMENT

The examples cited above are only a small fraction of the potential return on the investment in a fully developed spatial data infrastructure for Michigan. These returns will be maximized through the sharing of data with public and private entities.

*The Michigan Statewide GIS Business Plan* has estimated that over five years a total state fund investment of \$16 million with investment by other partners (county government, local government, federal government, and the private sector) of \$34.7 million. While the investment requirements for partners is large it should be noted that in a 2008 MiCAMP study the total investment in ongoing GIS related activities was \$4.48 million a year, or \$22.4 million over five years if we continue at the same level of investment. Another \$4.62 million was being spent on on-time GIS related project to include data development and hardware/software purchases. Stewardship partners must identify approximately \$2.46 million dollars in additional funding per year to fully develop and maintain the MGF.

Table 3. Estimated Investment and Benefits for MGF Stewardship Participation

Total 5 Year Investment	State Share	Partner Share	Total
MGF System and Staff Support <sup>1</sup>	\$ 6,000,000	\$ -	\$ 6,000,000
Ortho Imagery <sup>2</sup>	\$ 1,323,286	\$ 2,918,994	\$ 4,242,280
Parcels <sup>2</sup>	\$ 6,296,737	\$ 29,230,013	\$ 35,526,750
Address Points <sup>2</sup>	\$ 2,414,985	\$ 2,525,000	\$ 4,939,985
<b>Total Investments</b>	<b>\$ 16,035,008</b>	<b>\$ 34,674,007</b>	<b>\$ 50,709,015</b>
<b>BENEFITS over 5 Years</b>			
Benefits as reported in survey			\$ 66,873,017
Road Maintenance			\$ 95,000,000
Transportation Costs			\$ 274,500,000
Fire Insurance Cost Reductions			\$ 113,000,000
<b>Potential Benefits</b>			<b>\$ 549,373,017</b>
<b>Cost/Benefit</b>		<b>1:</b>	<b>10.83</b>

<sup>1</sup> Assumes current level of expenditure in the CSSTP to support the MGF continues for the 5 year period

<sup>2</sup> Based on cost estimates as outlined in the *Michigan Statewide GIS Business Plan*

## 4.0 STEWARDSHIP ROLES AND RESPONSIBILITIES

### 4.1 ROLES AND COMPONENTS OF A SUCCESSFUL STEWARDSHIP PROGRAM

Larry English, a well-known consultant in knowledge management, defines data stewardship as “the willingness to be accountable for a set of business information for the well-being of the larger organization, by operating in service, rather than in control, of those around us.” (English, 2006.) In the context of the MGF, data stewardship includes all technical and organizational practices and tools for maintaining and providing access to high-quality geographic data. An improved MGF program includes the following components, some of which are already in place and others which need to be developed:

- Clear explanation of the MGF program, its data content, and how to access the data. This should use a variety of outreach and promotion channels described in this plan.
- Well-documented data standards for data content, data format, metadata, and “mapping rules” that support data compilation, update, and use.
- A formal program for recruiting and getting commitments from MGF participants and for tracking their use of and contributions to the MGF.
- Improved activities and tools for outreach, education, and technical support to increase and improve MGF participation.
- Definition of stewardship roles and clear identification of people and organizations to which stewardship roles are assigned.
- Clear, effective procedures and tools for contributing data to the MGF (by source stewards) and for quality assurance and posting of the updated data for access.

### STEWARDSHIP RELATIONSHIP TO GOVERNANCE STRUCTURE

The *Statewide GIS Business Plan* recommends a governance structure designed to create a mechanism and environment in which all GIS stakeholder organizations (particularly local governments) have an effective way to provide input on GIS program operations at the DTMB. Clearly a significant GIS operation at DTMB is the on-going growth and development of the MGF in the Center for Shared Solutions and Technology Partnerships. The recommended organizational structure includes the following components:

- **Enabling Mandate:** A documented, officially recognized, legal or administrative action that enables, establishes, and sanctions the SDI program. The mandate may be from legislative action, an executive order (Governor), or an administrative action by an agency.
- **GIS Coordination Body:** A formally designated body that play a high-level oversight and/or advisory role for the MGF program and the GIS management office. This body provides guidance on major GIS program planning, policy development, and regarding business plan implementation.
- **GIS Management Office:** The main office, located in an executive branch department, that has the main responsibility for implementing the statewide GIS program, working with statewide stakeholders to deliver data and services, enabling and supporting partnerships and projects, and all operational aspects of the statewide GIS program

- **Technical Support Bodies:** Formal bodies established to leverage participation and input from statewide GIS program stakeholders to provide information on a range of operational issues or support on key decisions and projects. The governance model recommended by the *Business Plan* anticipated creation of Standing Sub-Committees and Technical Working Groups. These entities support and work closely with existing coordination bodies and the GIS management office.
- **Policies and Rules of Operation:** Written rules, policies, bylaws, formal agreements, etc., that provide the structure for clear, consistent operations, communications, allocation of resources, and performance of SDI work and statewide coordination. There may be multiple sources of these rules and policies.

Each of these components has a role in data stewardship as envisions in the expansion of the MGF. The enabling mandate sets the expectation and operational framework for the coordination body. A formally designated coordination body serves to provide guidance to the stewardship partners through program planning, policy development, and stewardship program implementation. The coordination body and stewardship effort will be supported by the GIS Management Office through working with statewide stewards, enabling and supporting partnerships and projects, and providing the technical support necessary to support potential stewardship partners of all capability levels. The *Business Plan* recommends the creation of an expanded outreach function in the CSSTP to support necessary communications and partnership building.

Technical support bodies are expected to serve as the technical committees and working groups required to support stewardship through the development of theme data standards and providing important direction into the development of policies and rules of operation for the MGF. For example, the *Business Plan* identified the need for a Standing Subcommittee on data standards (charged mainly with approval of data standards) and individual Working Groups/Task Forces for doing the detailed work on standards, and the work of the “outreach unit” in CSSTP that we identified in the Business Plan.

Empowered working groups will need to be identified for each MGF theme to determine the standards for operational stewardship and maintenance, timing and triggers for updates, and building detailed workflows for each of the stewardship capability groups. The working groups will also have a role in defining how users are notified of changes and how submission of corrections and updates will be tracked and communicated to users.

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## STEWARDSHIP ROLES AND RESPONSIBILITIES

A successful stewardship program must include a clear definition of roles and responsibilities for each participant. Specific roles and responsibilities include:

- **Coordination and Management:** The Michigan Department of Technology, Management and Budget’s Center for Shared Solutions and Technology Partnerships (CSSTP) will facilitate framework stewardship in general and facilitate stewardship education, track stewardship charters and plans, brings issues to the CBTSC when appropriate, and suggests modifications to the model documents. A staff person at the CSSTP must be given the responsibility to see that stewardship programs are advancing so that data within the MGF will be as up to data and as consistent as possible. This staff member, the Stewardship Coordinator, should be technically competent to explain the subtle technical nuances of the program and possess excellent written and verbal skills. This combination will be necessary since this individual will become the “face” of the stewardship program for the State of Michigan.
- **Source Stewards:** Source Stewards create the data at the local level and thus are the best source of data for any particular locale. In most cases, they develop and maintain the data as part of meeting their organizational

mission. Most Framework elements involve more than one source steward, such as the assessors responsible for mapping parcels within their county. Source stewards are accountable for the data contributed and serve as the official custodians of the data. These Source Stewards may be any organization or individual that updates or creates framework geographic data.

- Framework Theme Working Groups: These will be working groups constituted under the management structure recommended in the *Statewide GIS Business Plan* to allow the Source Stewards to articulate the vision, scope, roles, and business rules will be required to establish and maintain a specific MGF data theme. The Working Group members will develop procedures for data management, resolve technical issues and generally communicate on issues and solutions. Working Groups may identify and champion modifications or extensions to an existing standard in order to enhance any aspect of its stewardship responsibilities. To assure alignment with business needs, the steward group will remain in regular contact with business purpose experts and will include representatives from the continuum of stewardship participant groups defined in Section 2.
- A Framework Theme Coordinator: will serve on the staff of the CSSTP and will serve as a central point of contact for a particular framework theme. The Framework Theme Coordinator is responsible for maintaining a statewide perspective on the development and maintenance of the themes they coordinate. The Framework Coordinator may be assigned to one or many specific themes and is responsible for assuring that data provided by local source stewards meets standards. When data is contributed by multiple sources, for example parcels that are potentially submitted by 83 counties and multiple cities, the Framework Theme Coordinator is responsible for any transformation necessary to assure the MGF theme is seamless across Michigan. The framework coordinator maintains open communications with the Source Stewards throughout the state and is the “go to” person for any questions related to the specific theme.

Additional duties of the Framework Theme Coordinator include: developing efficient and partner friendly methods for data maintenance, developing effective methods for integration of multi-source data into a single statewide theme, maintain metadata and assist source stewards with creating metadata for their contribution, and providing technical support and guidance to source stewards as requested.

## 4.2 CHALLENGES

A healthy and effective stewardship program must be based on a philosophy of “shared responsibility, shared costs, shared benefits, and shared control.” The structural framework outlined in Section 4.1 provides a potential structure with the context of existing State government institutions and proposed GIS governance structure to successfully build this kind of environment in Michigan. Even so, implementing a stable framework stewardship plan will require overcoming several challenges:

- Commitments from Source Stewards will be an important hurdle in the early stages of this process. Within the context of Michigan’s enhanced access policies where data ownership and sale rights are held by the organization that creates the data it may be difficult to establish source steward relationships with organizations found in Stewardship Group I, organizations with active enterprise GIS. Participants from each of the four Stewardship Groupings should be identified and systems established to demonstrate and successes to the broader GIS community.

For the most part, duties and responsibilities required for Framework stewardship will be performed by personnel

employed by individual organizations. In many cases, these activities will extend beyond the needs of the agency. Therefore, incorporating stewardship into agency planning and budgeting, and incorporating stewardship responsibilities into position descriptions for Framework Stewards are necessary steps to achieving long-term stability for MGF and realizing its statewide benefits.

- Funding: In order to assure stability over time of a stewardship program it will be important to identify a mechanism that will make available sustainable funding to support data development and maintenance in a collaborative environment.
- Data Integration: There will be technical challenges associated with receiving data sets from multiple source stewards. For organizations in Stewardship Group I challenges may be technical in nature related to the ability to match well established enterprise databases into a statewide theme. Organizations in each capability cell will have unique challenges that will need to be overcome through provision of customized ETL tools, no-line data creation and editing tools, or basic GIS education of decision makers and professionals in the possible stewardship partner.
- Liability: Some potential stewardship partners may have concerns related to their potential liability from providing a component of a larger dataset made available for unrestricted public use. Ultimately this issue may require the Michigan Legislature to address this issue. In the immediate term an opinion from the Attorney General and standard disclaimers and acceptable use statements may be sufficient to eliminate these concerns.
- Adoption and Enforcement of Standards: Essential to the stewardship process is agreement among the user community of the standards to be implemented for that theme. These standards must take into account the broad range of user requirements while being respectful of the potential demands on Source Steward organizations. Standards should be adopted by each theme working group and validated through a formal process by the CBTSC.
- Distribution and Access: A formal mechanism for controlling distribution and access to framework data must be developed. There are clear and valid concerns on the part of many members of the GIS community that data provided to the state will be freely distributed thus jeopardizing their ability to re-sell these data to private users. Additional concerns have been expressed regarding the sensitive nature of some data that may be part of the MGF including features critical to homeland security and utility networks.

## 5. TRANSPORTATION DATA STEWARDSHIP PROGRAM

The current transportation focused MGF is a highly developed statewide data set and there are clear indications from the State's GIS user community that the data are valuable and are in wide use. The transportation related MGF data have the potential to serve as an ideal pilot project for developing a data stewardship framework. Nearly all GIS users in the state (99% as reported in the on-line survey during the outreach portion of this project) use road centerline and transportation data, 90% use address range data. Meanwhile, 35.9% of organizations reported they produce their own transportation features and another 23.4% of users reported that although they acquire transportation features from an outside source they edit those data to make them useful to support their internal business drivers. With almost universal use of transportation data and over 58% of users devoting effort to either create or modify transportation features these data have the largest potential return to the user community.

Funding by the MDTMB is estimated to budget of \$1.2 million annually on the maintenance of the transportation framework. If the 58% of the other users are spending a similar amount it is clear that there are significant opportunities for efficiencies that can be obtained through an active stewardship program.

Within the context of the recommended changes to the governance structure for GIS, as identified in the *Statewide GIS Business Plan*, a number of activities must be undertaken to design, implement, monitor, and modify a stewardship program for transportation framework data. The work structuring this program would then be expanded to additional framework themes with the goal of ultimately providing

Once the stewardship program for transportation data has been successfully developed and implemented it will then become a model for additional framework themes. Many of the documents, procedures, and processes that will be required to establish the transportation stewardship process will transfer directly to other thematic elements.

Specific actions that will be required to implement a transportation stewardship program include:

- Complete Cross Boundary Technology Steering Committee (CBTSC) recommendations outlined in the *Statewide GIS Business Plan*
- CBTSC create and empower a Technical Working Group (TWG) to develop Stewardship Charter that outlines the responsibilities and privileges associated with participation in the stewardship program
- CBTSC must approve the draft Stewardship Charter presented by the TWG
- CBTSC create and empower a Standing Sub-Committee on Transportation Stewardship to develop the structure of the stewardship program within the framework of the approved Stewardship Charter
- CBTSC create and empower a Standing Sub-Committee on Data Distribution Policies to review the legal and ownership issues associated with distribution of digital spatial data to stewardship partners
- Sub-Committee on Transportation Stewardship should establish a TWG on transportation standards to draft standards on attribution, spatial accuracy, and geometry
- Sub-Committee on Transportation Stewardship should establish a TWG to design the stewardship program to include specific support activities for organizations at all levels of the stewardship participation continuum
- CBTSC to approve the transportation data standards and the transportation stewardship program as recommended by the appropriate TWG
- The staff of the MDTMB, specifically the Center for Shared Solutions and Technology Partnerships (CSSTP) will then implement the Transportation Stewardship Pilot Program
- The staff of the MDTMB should complete an evaluation of the transportation stewardship program and report to the CBTSC and appropriate sub-committees with recommendations for improvement or refinements to the process
- The staff of the MDTMB should continue to monitor, report on progress or implementation issues, and incrementally improve the transportation stewardship program on an on-going basis

**TABLE 4. STEWARDSHIP PROGRAM TASKS AND PRIORITY**

	Description	Priority/Timing	Stewardship Groups Implementation Notes
Complete CBTSC Governance Recommendations	The <i>Michigan Statewide GIS Business Plan</i> recommends a complete review of the mission and membership structure of the CBTSC to be more reflective of the needs of the GIS Community. This should be accomplished immediately as the CBTSC must empower the committees and working groups to perform other steps in the process.	Initiate immediately. Estimate 8 weeks to complete	This restructuring should offer a formal process with an opportunity for involvement from a wide variety of representatives of each of the potential Stewardship Groups. Representatives should be appointed by all professional associations in Michigan to represent their constituencies.
CBTSC to empower TWG to develop Stewardship Charter	A Technical Working Group (TWG) should be empowered to develop a template stewardship charter. The charter would spell out specific roles and responsibilities for all participants in a stewardship agreement. This template will serve as the basic agreement for each framework theme moving forward and will immediately be applied to the Transportation Framework Stewardship Pilot Program	Current CBTSC to initiate with the post-restructuring CBTSC to approve document	The needs of all Stewardship Groups should be considered during the drafting of a charter. The charter may specifically identify the responsibilities and roles of participants by their role as a contributor or user of the framework data.
CBTSC approve Stewardship Charter	Once the TWG has completed the Stewardship Charter is should be submitted for approval by the CBTSC	Completed in short term, perhaps the first order of business of re-constituted CBTSC	The charter should consider the needs of potential stewardship participants in each of the stewardship participation groups. Clearly the focus should be on those organizations contributing data to the framework
CBTSC empower Standing Sub-Committee on Transportation Stewardship	This Standing Sub-Committee will serve as an essentially permanent organization to provide input and direction for the transportation stewardship program. While the size and composition of the Sub-Committee will be determined by the re-constituted CBTSC, it should be representative of all key constituencies for transportation data.	High priority action item for CBTSC	

**TABLE 4. STEWARDSHIP PROGRAM TASKS AND PRIORITY (CONTINUED)**

	Description	Priority/Timing	Stewardship Groups Implementation Notes
CBTSC empower Standing Sub-Committee on Data Distribution Policies	This Standing Sub-Committee will serve as an essentially permanent organization to provide input and direction for issues associated with distribution of framework data. Its initial responsibility will be to review issues associated with transportation data, but as additional framework theme stewardship programs are initiated these responsibilities will expand. While the size and composition of the Sub-Committee will be determined by the re-constituted CBTSC,	High priority action item for CBTSC	All stewardship participation groups should be included in these discussions. Liability and other legal issues associated with the contribution of data to the framework must be resolved to the satisfaction of stewardship participants. Disclaimers, waivers, and acceptable use policies should take in account the concerns of users at all levels of stewardship participation. If legislation is deemed to be required this group should provide draft legislation to the CBTSC for approval and presentation to legislative authorities.
Sub-Committee on Transportation Stewardship establish Transportation Standards Working Group	It will be essential to establish specific standards for positional accuracy, geometry (treatment of nodes, intersections, overpasses, etc.), attribution, and file formats.	High priority action items for CBTSC	Standards should be driven to meet the maximum possible business drivers of organizations at all levels of stewardship participation. Organizations at are emerging as potential contributing to the stewardship process may be .possible a data standards for contribution and another for distribution to protect the data rights of stewardship group one?
Sub-Committee on Transportation Stewardship establish Transportation Stewardship Program Design Working Group	This working group will design the initial framework stewardship program with the goal of establishing a long term sustainable environment of shared responsibility, shared costs, shared benefits, and shared control.	High priority action item for Transportation Framework Sub-Committee	Representatives from each of the stewardship participation groups (I through IV) must be included in the development of the stewardship program. Initial members should be chosen to represent all appropriate constituencies and to potentially serve as the initial participants in the program.

**TABLE 4. STEWARDSHIP PROGRAM TASKS AND PRIORITY (CONTINUED)**

	Description	Priority/Timing	Stewardship Groups Implementation Notes
Implement the Transportation Stewardship Pilot Program	The staff of the MDTMB, primarily the CSSTP should work with key organizations to implement this initial program. At least two representatives of each stewardship partnership group should be identified for initial participation. Care should be taken to make sure that those selected represent a broad set of potential participants but also present a significant likelihood for early success	A joint action between the Sub-Committee and the staff of the CSSTP.	At least two organizations at each level of the stewardship participant continue (Groups I through IV) should be identified for initial participation. This will assure that the technical aspects of the program are sufficient to meet requirement of Group I participants and standard data products meet the needs of Group IV. On-line tools to enable updates from Group II should be prototyped and fully tested/implements during this phase of the pilot project.
Evaluation Transportation Stewardship Pilot	The staff of the MDTMB should complete an evaluation of the transportation stewardship program and report to the CBTSC and appropriate sub-committees with recommendations for improvement or refinements to the process	This needs to continue to be a high priority activity of the CSSTP staff. It should be accomplished on an annual basis and include clear success metrics related to participation by members of each stewardship participation group, cost savings from participation for the State and other stewardship participants, and data downloads	The evaluation will be largely a staff function out of the CSSTP. However, contacts should be maintained with all stewardship participants to get on-going feedback on the successes and failures of the program.
Monitor, Report, and Improve Transportation Stewardship Program	Once the stewardship program has been implemented continue to monitor its progress, report to the leadership of the MDTMB and the CBTSC, and make recommendations for modifications to the stewardship process	On-going activity on at least an annual basis to assure that the program remains in sync with the needs of the stewardship participants.	All stewardship partnership participants, without regard to Group, should remain involved in the process evaluation to recommend potential improvements and enhancements.

## 6. COMMUNICATIONS, OUTREACH, AND EDUCATION

### 6.1 OVERVIEW OF OUTREACH AND COMMUNICATIONS

The *Statewide GIS Business Plan* implementation initiatives include the completion of a communications and marketing plan for the state spatial data infrastructure, or MGF. This initiative expressly identifies the dependence of a successfully statewide GIS coordination effort to be built upon a strategic and focused communication and marketing effort. By extension it is only through focused communications and marketing that the stewardship programs necessary to build and maintain that MGF can be expanded.

This section will address a number of communication vehicles and actions that should be taken over time to educate and inform potential stewardship participants—to include potential source stewards and data users—of the value of the MGF and the return from participation in the stewardship process. The communication with the goal of increasing awareness, understanding, and support for geographic data stewardship to be successful must be synchronized with the unique expectations, understanding, and situations of the four broad capability groups presented in Section 2.

Successful communication with the large MGF audience is dependent on selecting and using effective channels and delivery mechanisms. It is important to continue to promote and educate the state agency GIS community about the MGF program. We cannot assume that employees of state agencies are familiar with MGF. Nor can it be assumed the GIS professionals in local government, regional agencies, and the private sector are aware of the MGF, available stewardship programs, and available data. The Stewardship Coordinator should take all opportunities to conduct briefings and education programs to state government and other potentially interested groups.

This *Plan* gives recommendations on approaches, mechanisms, and tools to use and identifies specific actions to take over the next two years and beyond to accomplish the goal of increasing awareness, understanding, and support. Before discussing specific approaches, it is important to define, at a high-level, what is meant by “communications and outreach.” The main categories of communication and outreach include:

- **Descriptive Information and Links**: Information that describes and explains MGF at summary and detailed levels. This includes various text and presentation pieces, as well as important information about data and services provided through MGF and how to get access to these.
- **News and Status**: Continuing information about the MGF program and about the GIS community as a whole which is pertinent to the user community in Michigan. This includes the need to post information about major events, milestones, and the accomplishment of key MGF objectives.
- **Professional Development**: Education and training opportunities sponsored or coordinated by the MGF program or by other organizations working with MGF and resources that support overall professional development.
- **Directory**: Contact and profile information about the user community in Michigan supporting professional networking and the coordination of participants and parties interested in MGF.
- **User Support**: How-to information and specific user technical assistance and help relating to participating in the MGF initiative and in user resources and services.
- **Project Information and Support**: Detailed information about specific projects sponsored or coordinated by MGF and tools supporting coordination and group collaboration for project work.

- Vendor/Contractor Opportunities: Information about business opportunities for product and service vendors about competitive procurements for work supporting MGF. Announcements and formal communications about RFPs, RFQs, etc., would need to be handled through appropriate procurement offices, but a MGF service could provide summary information and links to announcements and detailed information on procurement opportunities.

There are a number of methods to communicate the messages necessary to potential stewardship partners. It will be important that a consistent theme of “shared responsibility, shared costs, shared benefits, shared control” be presented at every opportunity. The outreach and business planning portion of this project clearly illustrated there are deep divisions in the GIS user community much of it apparently rooted in a perceived historical lack of desire to build collaborative and cooperative relationships on the part of state organizations. These divisions are not insurmountable but they do represent a challenge to building a sustainable stewardship culture.

The MGF should employ a number of channels and mechanisms to build the case for participation from organizations:

- Presentations and briefings at agency meetings
- Presentations at GIS and professional association events, state and regional user group meetings, and any other opportunity where the message can be delivered to a potentially receptive audience
- MFG focused training and education sessions provided to technical and non-technical users of spatial data and applications
- Stewardship and introductory GIS training and educational sessions delivered to elected officials, city/county managers, and others with budget and decision making authority
- Web presence modifications to better meet the needs of all levels of users
- “New media” (Twitter, RSS, Wiki) to deliver timely information to stewardship partners and potential participants
- Article placement in selected publications
- Sponsorship of or participation in special events and professional association meetings
- Press/Media Releases

Each of these channels and how they should be approached for each of the Stewardship Partnership Groups are discussed in Table 5.

**TABLE 5: PRIMARY MGF COMMUNICATION CHANNELS AND MECHANISMS**

Communication Channel/ Mechanisms	Description	Specific Examples/Opportunities	Stewardship Partnership Group Implementation Notes
<p><b>Presentations and Briefings at Agency Meetings</b></p>	<p>Planned presentations or formal reports by a person knowledgeable about MGF at meetings of government agencies or other organizations. These venues generally include a focused, well-defined audience. They may include formal status reports and briefings to senior management or officials or informal information sessions to mid-level managers or users.</p>	<ul style="list-style-type: none"> <li>▪ Briefings at Legislative committee hearings</li> <li>▪ CIO Council briefings</li> <li>▪ Selected management or technical briefings at meetings of regional and local government agencies, board/committee meetings of professional associations</li> </ul>	<ul style="list-style-type: none"> <li>▪ Group I—focus presentation on benefits and technical aspect of MGF</li> <li>▪ Group II—focus on value of stewardship to provide reliable and trustworthy data critical to decision making</li> <li>▪ Group III—Stress value of participation and migration toward a digital workflow for improved benefits for all</li> <li>▪ Group IV—Explore specific needs and the value of stewardship participation to build capabilities even in low resources areas.</li> </ul>
<p><b>Presentations at GIS and Related Professional Events</b></p>	<p>Formal presentations/reports by a person knowledgeable about MGF and reports at special events that may include conferences, user group meetings, meetings of professional industry groups, etc.</p>	<ul style="list-style-type: none"> <li>▪ IMAGIN and MiCAMP annual conferences</li> <li>▪ Regional GIS User Groups</li> <li>▪ Vendor-sponsored user groups</li> <li>▪ Michigan Emergency Management Association</li> <li>▪ Michigan Association of Counties</li> <li>▪ Michigan Municipal League</li> <li>▪ Michigan Association of Regions</li> <li>▪ Michigan Association of County Drain Commissioners</li> <li>▪ County Road Association of Michigan</li> <li>▪ Michigan Electric &amp; Gas Association</li> <li>▪ Michigan Society of Professional Surveyors</li> <li>▪ Michigan Assessors Association</li> <li>▪ Michigan Association of Equalization Directors</li> <li>▪ Others?</li> </ul>	<ul style="list-style-type: none"> <li>▪ Group I—When audience is a GIS professional organization focus presentation on specific benefits to all from participation and the structured governance to assure involvement from all interested parties in standards, distribution policies, etc.</li> <li>▪ Group II—Focus presentation on issues associated with access to data and the value of MGF to all user communities</li> <li>▪ Group III—Audience should be presented with business case for migrating to spatially enabled systems. Review various methods of participation as a source steward and the advantages to being fully digital</li> <li>▪ Group IV—Promotional materials should focus on advantages to be gained from implementing technology and appropriate data management systems.</li> </ul>

**TABLE 5: PRIMARY MGF COMMUNICATION CHANNELS AND MECHANISMS (CONTINUED)**

Communication Channel/ Mechanisms	Description	Specific Examples/Opportunities	Stewardship Partnership Group Implementation Notes
<b>MGF Focused Training and Education Sessions</b>	Any type of structured session providing specific training about GIS technology or MGF use. This implies the use of instructional materials, exercises, live or canned demos, etc. Training sessions could be provided by any party or organization in government, academic, or private sectors. This may include training provided through the MGF program or other training opportunities sponsored or endorsed by MGF and provided by private training sources or Universities.	<ul style="list-style-type: none"> <li>▪ Spatial data accuracy assessment &amp; reporting</li> <li>▪ Emerging technologies – e.g., LiDAR, LBS, Web services</li> <li>▪ MGF: showcasing new or imminent MGF services, for example on-line database editing</li> <li>▪ User support and organization services for training sessions hosted by vendors or academic institutions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Group I—Highly skilled and competent technical staff so session should be focused on provided cutting edge solutions and ROI advantages of stewardship</li> <li>▪ Group II—Technically competent organizations so focus should be on presenting information on MGF access, metadata, and update/correction processes</li> <li>▪ Group III—These are significant potential data providers where incremental improvements toward seamless digital submissions will yield high results. Materials presented should focus on technology implementation.</li> <li>▪ Group IV—Fundamental training in basic access to MGF, basic technology concepts and terms, and how to access and use data.</li> </ul>
<b>Stewardship and GIS training for Elected Officials, etc.</b>	Many local elected officials have no experience in government prior to election. These individuals are immediately called upon to make decisions related to budgets for spatial initiatives such as data purchased, GIS departmental expenditures, and potential data distribution policies. Educational programs should be developed to provide elected officials at all levels a fundamental understanding of the MGF and the importance of spatial technologies to efficient provision of public services.	<ul style="list-style-type: none"> <li>▪ Establish a “webinar” series to educated elected officials of the value of GIS, the MGF, and data stewardship</li> <li>▪ Explore the potential for including an introductory session as part of the Michigan Municipal League’s (MML) Elected Official Webinar Series—Webinars for Local Government Leaders.</li> <li>▪ Secure a session on the agenda of the MML, the MAC (Michigan Association of Counties), the Michigan Local Government Management Association (MLGMA), the Michigan Association of Planning (MAP) and the Michigan Association of Regions (MAR) for an educational seminar.</li> <li>▪ Offer program content to any elected official at any jurisdictional level in Michigan.</li> <li>▪ Podcasts and YouTube can be used to provide educational material on demand</li> </ul>	<ul style="list-style-type: none"> <li>▪ These sessions should anticipate that attendees are equivalent to Group IV professional staff. Since they will typically be offered to and attended by newly elected officials the subject matter must be kept non-technical and tightly focuses on the benefits to participation in the MGF Stewardship program.</li> </ul>

**TABLE 5: PRIMARY MGF COMMUNICATION CHANNELS AND MECHANISMS (CONTINUED)**

Communication Channel/ Mechanisms	Description	Specific Examples/Opportunities	Stewardship Partnership Group Implementation Notes
<b>Web Enhancements and Services</b>	Review the current web presence of the MGF to make certain that all participants in the GIS community are fully enabled to participate in stewardship programs. Make promotional and educational content easy to locate and consume. Provide web services to enable access to data and applications.	<ul style="list-style-type: none"> <li>▪ Simplify access to the MGF through the Michigan Digital Geographic Library</li> <li>▪ Develop and deploy a Michigan Web Map Service that will allow sophisticated users full access to up to date MGF data.</li> <li>▪ Implement a web enabled tool to allow trained users to update the MGF</li> <li>▪ Deploy a system that provides on-line access to status reports on pending corrections and data additions to improve communication with source stewards.</li> <li>▪ Implement other high value added or high ROI applications (identified in the <i>Statewide GIS Business Plan</i>) to encourage participation in MGF stewardship programs</li> </ul>	<ul style="list-style-type: none"> <li>▪ Group I—Develop web services that provide real return for their participation. These may include applications such as those identified in the <i>Business Plan</i> to facilitate savings from routing, encourage economic development, or provide dashboard functionalities</li> <li>▪ Group II—Focus efforts on simplifying access to data these users need. Engage them in stewardship to determine the value they place on having the data made available to support their business drivers</li> <li>▪ Group III—Provide the services necessary to facilitate these organizations migration to more advanced applications of spatial technologies to enable improved workflows and higher ROI.</li> <li>▪ Group IV—Wherever possible, expand the availability of web services and data to support these low resources communities. Demonstrate early returns on investment through leveraging applications developed for other jurisdictions.</li> </ul>
<b>Implement “New media” to provide information to stewardship partners</b>	This encompasses a number of capabilities for delivering and managing information delivery and access via the Internet. Rather than relying on action by participants in the stewardship program these technologies enable communication with passive audiences. These technologies can “automatically” deliver information to selected people (ideally specific information content to specific groups who want it). In some cases, information recipients may also be able to post information. At a simple level, the use of email to send messages to large groups of people (e.g., reminders about meetings) will be used for MGF on a regular basis. Also included are Listservs, location sensitive RSS (syndicated news feeds), and Twitter to provides more sophisticated tools for organizing and delivering content with the ability for users to submit information and to follow discussion strings.	<ul style="list-style-type: none"> <li>▪ Multiple listservs and Web-based GIS discussion groups are used by GIS people in Michigan today. These are valuable but raise the concern about “too much content” and the problems with information overload. MGF can consolidate and filter content delivered through push technology and help to get relevant information into the hands of users in a readily accessible and usable form.</li> <li>▪ Opt-in such as RSS, Twitter, and LinkedIn groups should be added to facilitate more active communication with the GIS community</li> <li>▪ Routine user interactions via WebEx or some other web conferencing service should be scheduled regularly to allow for interaction with partners without</li> <li>▪ Create Wiki style forums to support each framework theme working group.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Group I—create a technical forum for sharing tips and tricks for sophisticated data creator and users. Provide an opportunity to on-line support from framework data coordinators and the MGF stewardship coordinator.</li> <li>▪ Group II—Establish forums to provide necessary communications to this group that is primarily sophisticated data users. Use these mechanisms to inform them of changes in data content, corrections to base data, and pending changes in web based services.</li> <li>▪ Group III—Maintain connections through these methods to facilitate this group’s increasing technical needs</li> <li>▪ Group IV—This group will be difficult to reach using any non-traditional digital communications. Since they have low levels of technology available this is a group where quarterly newsletters and regular e-mail communications will be of the largest benefit.</li> </ul>

**TABLE 5: PRIMARY MGF COMMUNICATION CHANNELS AND MECHANISMS (CONTINUED)**

Communication Channel/ Mechanisms	Description	Specific Examples/Opportunities	Stewardship Partnership Group Implementation Notes
<b>Article Placement in Trade and Other Publications</b>	Trade journals area always seeking articles for publication in print and electronic publications (professional journals, trade journals and industry publications, conference paper compendiums, etc.). Many of these have local, statewide, or national readership and can serve as a conduit for information about MGF or GIS projects, activities, to potential data stewards and the people in Michigan. This includes on-line GIS “newsletters.” Preparing publications and conference papers is also a form of professional advancement and involvement which can be encouraged by MGF as an incentive to get people to participate in GIS and in MGF-sponsored stewardship activities.	<ul style="list-style-type: none"> <li>▪ ArcNews (<a href="http://www.esri.com/news/arcnews">www.esri.com/news/arcnews</a>)</li> <li>▪ Geospatial Solutions (<a href="http://www.geospatial-on-line.com">www.geospatial-on-line.com</a>)</li> <li>▪ Directions Magazine (<a href="http://www.directionsmag.com">www.directionsmag.com</a>)</li> <li>▪ Earth Observation Magazine (<a href="http://www.eom.com">www.eom.com</a>)</li> <li>▪ Government Technology Magazine (<a href="http://www.govtech.com">www.govtech.com</a>)</li> <li>▪ GeoWorld Magazine and Geoplace on-line (<a href="http://www.geoplace.com">www.geoplace.com</a>)</li> <li>▪ Publications and journals of specific professional disciplines that use GIS (e.g., forestry, public health, public safety, engineering and surveying, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Group I—focus on high end technical publications to reach this audience. Articles on implementation issues with Oracle and ESRI products will be well received.</li> <li>▪ Group II—These organizations are focused on business drivers that do not include data creation so articles which focus on unique applications of MGF data will resonate with this group.</li> <li>▪ Group III—This group has not yet realized the advantages of workflow automation to include spatial data updates. Articles which are case studies of success stories in the digital conversion process will reach this group.</li> <li>▪ Group IV—Much like Group III articles that show the benefits of participation and detail the hurdles associated with implementation from a budget and internal politics perspective will be beneficial.</li> </ul>
<b>Sponsorship of or Participation in Special Events</b>	This is a form of promotion or “advertising” of MGF through support for special events related to GIS. From a communication standpoint, this means an opportunity to raise awareness of MGF through projection of its “brand” and distribution of information on event literature, signage, Web sites, handouts, exhibiting, etc. These sponsorships are often offered as a quid pro quo for receiving a space on a program agenda.	<ul style="list-style-type: none"> <li>▪ GIS Day participation and sponsorship</li> <li>▪ Exhibiting or sponsorship of activities at state GIS conferences such as IMAGIN and MiCAMP</li> <li>▪ Exhibiting or sponsorship of activities at organizations such as MML, MAC, MAR, MAP, etc.</li> <li>▪ NSGIC annual or semi-annual conference (<a href="http://www.nsgic.org">www.nsgic.org</a>)</li> <li>▪ USGS partners biennial meeting</li> </ul>	<ul style="list-style-type: none"> <li>▪ These activities are intended to build awareness of the MGF. Generally they will offer an opportunity to deliver the appropriate messages to members of any of the capability groups. If opportunities are available to present educational or promotional content refer to the section on <b>Presentations at GIS and Related Professional Events</b></li> </ul>

**TABLE 5: PRIMARY MGF COMMUNICATION CHANNELS AND MECHANISMS (CONTINUED)**

Communication Channel/ Mechanisms	Description	Specific Examples/Opportunities	Stewardship Partnership Group Implementation Notes
<p><b>Press/Media Releases</b></p>	<p>Submittal and distribution of announcements and information about MGF through regular mass media outlets (newsletters, newspapers, trade journals, broadcast media, Web-based news services). Press and media releases would be appropriate for announcement of the accomplishment of key objectives, MGF events, and important milestones. It would be a good idea to compile a list of all outlets and procedures for submittal to them and to have documented internal practices for regular submittal to the press and media outlets.</p>	<ul style="list-style-type: none"> <li>▪ Newsletters (print and on-line) of state government organizations</li> <li>▪ Newsletters (print and on-line) of professional associations representing disciplines of GIS users</li> <li>▪ Vendor newsletters and services (e.g., ESRI.com/news)</li> <li>▪ GISUser.com</li> <li>▪ DTMB newsletters (internal)</li> <li>▪ DTMB Web site</li> <li>▪ Michigan.gov</li> <li>▪ GIS Monitor on-line news (<a href="http://www.gismonitor.com">www.gismonitor.com</a>)</li> <li>▪ GIS Café on-line news and info (<a href="http://www.giscafe.com">www.giscafe.com</a>)</li> <li>▪ GIS trade publications (see "Publications" above)</li> <li>▪ GIS Monitor (<a href="http://www.gismonitor.com">www.gismonitor.com</a>)</li> <li>▪ E-government newsletters</li> <li>▪ URISA News and URISA Digest (<a href="http://www.urisa.org">www.urisa.org</a>)</li> <li>▪ GITA news (<a href="http://www.gita.org">www.gita.org</a>)</li> <li>▪ National States Geographic Information Council (<a href="http://www.nsgic.org">www.nsgic.org</a>)</li> <li>▪ Other DTMB-approved media outlets</li> </ul>	<ul style="list-style-type: none"> <li>▪ Media releases offer an opportunity to make information available to potential stewardship participants that may not be otherwise connected to the MGF community. These offer the opportunity to address specific communities based on the media outlet the release is provide.</li> </ul>

## 7.0 STEWARDSHIP ENHANCEMENT INITIATIVES

The *Statewide GIS Business Plan* cites a number of initiatives that will contribute directly to enhancing the MGF data stewardship process. Those initiatives will require consideration of and involvement by the entire continuum of stewardship partners. Organizations from each capability group (CG) should be involved in all anticipated working groups and outreach activities.

Table 6 reviews each of the *Business Plan* initiatives that contribute to stewardship enhancement and provides commentary on the necessary consideration of capability groups.

**TABLE 6: MGF STEWARDSHIP ENHANCEMENT INITIATIVES AND TIMING**

Implementation Initiative	Description	Priority	Stewardship Partnership Group Implementation Notes
<b>Very High Priority Initiatives Supporting Data Stewardship</b>			
O7: Establish and assign resources for a GIS program outreach and communication business function in CSSTP	Formalize and expand current activities lead by CSSTP for external outreach and communications with the full GIS user community in Michigan. A new program or section would be established with CSSTP staff responsibilities. This group would have a lead role in many of the Implementation Initiatives in Category D. It would coordinate closely with the rest of CSSTP, other statewide GIS bodies (State User Forum, IMAGIN, MiCAMP, and regional GIS user groups), and other professional associations. This group would have an important focus on building/sustaining state-local partnerships but would be help identify and establish other partnerships with federal agencies, universities, and private companies.	VH	The staff formally assigned of the responsibilities for the outreach and communications function within the CSSTP will be the primary implementer of the communications activities identified in Section 5 of this document.
O15: Create a Stewardship and Outreach Coordination position within the CSSTP to support implementation of this Business Plan	A staff position with primary responsibilities for facilitation of the spatial data infrastructure outreach and stewardship program should be created. The individual in this role would be responsible for implementing many of the key implementation initiatives in this business plan. Position would provide staff support to the CBTSC and all associated standing subcommittees and working groups. Support would also be provided to regional user groups and professional organizations through assistance with meeting logistics and conference planning.	VH	The stewardship coordinator is a key role in the ultimate success of the program. See discussion of roles and responsibilities in Section 4 of this document.
D1: Complete version 11 of the MGF and make it available to users	Complete the changes and enhancements currently in progress for the delivery of Version 10 of the MGF and inform users that it is available for use. Complete implementation of Oracle Spatial model and the on-line editing toolkit.	VH On-going	This is largely on on-going activity, the continuous improvement and re-release of updated MGF versions. The on-line editing functionality for key data themes will generally target organization in capability groups III and IV and will require training for those partners that agree to update data using those tools.

\*Specific dates are not identified. A general timing is indicated using the following codes:

- **VH = Very Short Term:** Work should begin immediately and be completed within the next 3 to 6 months.
- **H = Short Term:** Work should begin within the next 4 to 8 months and be completed within the next 8 to 12 months.
- **M = Medium Term:** Work should begin within the next 8 to 12 months and be completed within the next 12 to 20 months.
- **On-going = Ongoing:** Activity continues for the foreseeable future from the point when initiated.

**TABLE 6: MGF STEWARDSHIP ENHANCEMENT INITIATIVES AND TIMING (CONTINUED)**

Implementation Initiative	Description	Priority	Stewardship Partnership Group Implementation Notes
<b>Very High Priority Initiatives Supporting Data Stewardship</b>			
D2: Prepare high-level logical GIS database design and source matrix	The high-level logical model is an identification of “data entities” (data “themes” or “layers”), summary of data content and structure, and the logical relationship between the entities. It may be presented in the form of an entity-relationship model and/or descriptive table. This logical design would include all GIS data entities needed by GIS stakeholder organizations. The purpose is to provide a comprehensive picture and context to support decisions on the future enhancement or development of GIS databases. In addition to a description of data content and relationships, information on the source(s) and development status of the data entities would be provided. The logical design would also include an identification of Framework data layers (current data in the MGF or future data layers considered to be high priority for multiple stakeholders) and Non-Framework (important GIS data but not needed by a majority of GIS stakeholder organizations).	H	This high level logical model is an important step to building the community of MGF users. There is wide variability of understanding in the GIS community about what is contained in the MGF as it is currently constituted and what it will ultimately become. This model will go a long way to filling in the gaps. It will also provide a blue-print for organizations in capability groups (CG) III and IV upon which to build their framework themes. For capability groups I and II it will facilitate additional use of MGF data since more technologically advanced users will fully understand the nuances of the data and expand the utility of the data for their business needs.
D4: Design and put in place a data stewardship model and practices applicable to all GIS data	Prepare an overall model for stewardship (applicable to all data layers) that defines various steward management, and operational roles and a process for data update and posting for access. Designate responsibilities for maintenance of each Framework data theme and define workflows for ongoing data maintenance. Build and deploy effective applications for data update, quality control/quality assurance, posting of data for wide access.	VH	The developed model must anticipate the needs of organizations at all capability levels. The working group assigned this task must include representation from each capability group to assure involvement and long term support from the GIS community.
D7: Recruit MGF stewardship participants	As an ongoing activity, the CSSTP in coordination with professional associations and regional GIS user groups will actively recruit local government (City/Villages/Townships—CVT) partners and applicable state agencies to play a stewardship role in MGF data maintenance. The ultimate goal is to have all counties, with active GIS programs, become active stewardship participants. In cases where appropriate a regional stewardship coordinator at the State Planning and Development District should be identified to serve as an initial point of contact for MGF issues. This regional stewardship coordinator could play a very significant role in expanding the MGF in rural areas.	VH On-going	This is addressed in Section 5. Carefully selected organizations from each capability group should be initially targeted for recruitment to allow for demonstrate early success. Stewardship participants in the early stages of this process will serve as models for other organizations so they must be fully committed to working with the CSSTP and be otherwise positioned internally for success.

**TABLE 6: MGF STEWARDSHIP ENHANCEMENT INITIATIVES AND TIMING (CONTINUED)**

Implementation Initiative	Description	Priority	Stewardship Partnership Group Implementation Notes
<b>Very High Priority Initiatives Supporting Data Stewardship</b>			
D10: Make enhancements in content and quality to existing MGF data	Using results of the review (see D5) make quality improvements in existing MGF data. Quality improvement is particularly important for transportation centerlines (positional accuracy and update timing) and related transportation attribute and LRS. Quality improvements also impact other MGF data including political and administrative boundaries. This is a planned, ongoing activity that takes into account user needs, resource availability, and level of MGF stewardship participation.	VH On-going	Improvements and expansion to the MGF are among the fundamental drivers for the stewardship process.
D11: Establish program and process for ongoing repeatable statewide coverage of ortho image data	Continue to administer the current NAIP partnership program and recently ratified agreement with Microsoft. Plan and actively solicit support for ongoing ortho image acquisition program. Prepare terms and agreements for cost sharing and access for imagery (see F6) and technical specifications for ortho image development. Get support and commitments for cost contributions (federal, state, local, private) and prepare/ratify cost sharing agreement. Establish group and practices for long-term management of the ortho program.	VH On-going	Review <i>Statewide GIS Business Plan</i> for details. This data element is required for all capability groups as a foundational data element. Each capability group will require a slightly different approach to be 'sold' on participation.
D14: Design, develop, and deploy statewide parcel database and establish ongoing stewardship	Complete database design, build, and maintain a statewide parcel database consisting of parcel boundaries and a minimal set of parcel attributes. Data would be contributed by local governments (county, city, village, township) and would be carried out in partnership with BS&A (contractor which has already automated data for large number of Michigan government jurisdictions). Data from multiple sources would be contributed to create a seamless statewide parcel fabric. Initially, data stewardship would call for updates on an annual basis (corresponding to the real property taxation cycle) but in the future, updates may occur more frequently with new subdivisions and parcel splits/mergers. This database development initiative to identify publicly owned parcels or parcels for which a public agency has right-of-way or easement rights. Identifying these public parcels and easements would provide data to support a "public land inventory and tracking" application (see S2 Part of this effort would involve reaching an agreement for contributions of parcel data from jurisdictions that are now generating revenue from parcel data sales.	VH	Reference the <i>Statewide GIS Business Plan</i> for details of this initiative. The working group assigned to establishing standards and structuring the cooperative program required will need to specifically address the needs of CG III for modernization of local parcel maintenance workflows. CG I and II will require a technological solution since any parcel maintenance currently in place is unlikely to be modified to meet the specific data structure and standards developed.

**TABLE 6: MGF STEWARDSHIP ENHANCEMENT INITIATIVES AND TIMING (CONTINUED)**

Implementation Initiative	Description	Priority	Stewardship Partnership Group Implementation Notes
<b>Very High Priority Initiatives Supporting Data Stewardship</b>			
D15: Design and develop addressable structures database	Structures data include specific buildings or other facilities with a fixed location (for which a site address may be assigned) and which are deemed important for public safety planning and response and other applications. Structures data is generally consistent with feature types included in the federal Homeland Security Infrastructure Program (HSIP): schools, hospitals and other medical facilities, police/law enforcement stations, fire/EMS stations, emergency operations centers, jails/prisons. Additional important features may be included—for example, it may be expanded to include all governmental buildings and facilities to support a “public land inventory and tracking” application. Building the database will involve work with source agencies: HSIP, state agencies, and local governments. This initiative includes preparation of a database design, data loading and quality control checks, and creation of a statewide database. Building this database is followed by the establishment of a stewardship process resulting in data update at least on an annual basis.	VH On-going	Review <i>Statewide GIS Business Plan</i> for details. Each capability group will require a slightly different approach to be ‘sold’ on participation and will require a customized approach to technology for active participation on data development and maintenance. CG I and II will require ETL development or other easy method for direct digital submission. CG III and IV may require on-line editing tools.
D16: Design database and specifications for site addresses and put in place process for data population and maintenance	As an extension to the “addressable structures” database described in D15, a comprehensive site address database includes point locations and attribute data for all parcels and/or buildings and facilities for which addresses can be assigned. This initiative includes the agreement of a data content and format standard, development of a database design and database development specifications to support capture of site addresses. Local governments (or contractors retained by them) would be primarily responsible for database development but technical support, and possibly financial assistance could be provided by CSSTP.	VH On-going	Review <i>Statewide GIS Business Plan</i> for details. Each capability group will require a slightly different approach to be ‘sold’ on participation and will require a customized approach to technology for active participation on data development and maintenance. CG I and II will require ETL development or other easy method for direct digital submission. CG III and IV may require on-line editing tools.
C1: Complete a communications and marketing plan for the state spatial data infrastructure.	An effective statewide GIS coordination effort is built upon a strategic and focused communication and marketing effort. Completion of an initial plan focused on outreach communications and marketing of the state spatial data infrastructure (specifically the MGF).	VH	This document includes the elements of a communication and marketing plan required for this initiative.

**TABLE 6: MGF STEWARDSHIP ENHANCEMENT INITIATIVES AND TIMING (CONTINUED)**

Implementation Initiative	Description	Priority	Stewardship Partnership Group Implementation Notes
C2: Actively pursue outreach with and support from professional and industry associations	Build better communication with professional and industry associations that represent organizations and people that have an interest in GIS technology and data. This would include participation in meetings and conferences hosted by these groups, providing promotional and educational materials, and soliciting their support for GIS program initiatives. Groups might include County Road Association of Michigan, Michigan Emergency Management Association, Land Information Access Association, Michigan Assessors Association, Michigan Association of Chamber Professionals, Michigan Association of Counties, Michigan Association of County Administrative Officers, Michigan Association of County Drain Commissioners, Michigan Association of Equalization Directors, Michigan Association of Insurance Agents, Michigan Association of Planning, Michigan Association of Public-Safety Communications Officials, Michigan Association of Realtors, Michigan Association of Regions, Michigan Association of School Administrators, Michigan Association of United Ways, Michigan Cable Telecommunications Association, Michigan Education Association, Michigan Electric and Gas Association, Michigan Government Finance Officers Association, Michigan Municipal League, Michigan Railroads Association, Michigan Society of Professional Engineers, Michigan Society of Professional Surveyors, Michigan Township Association, Roadsoft User Group, Telecommunications Association of Michigan, Transportation Asset Management Council, and United Tribes of Michigan.	VH	Reference Section 5 of this document.
C6: Design and create promotional materials for statewide GIS program	This activity is carried out in coordination with other outreach initiatives (E1, E2). This involves the design and development of materials using a variety of media and distribution channels to provide information focused on potential users and partners in the statewide GIS program. This may include brochures, web site pages, and other materials which would be distributed to users and potential users. This could be a role taken on by a Standing Subcommittee or Working Group of the CBTSC. All statewide GIS stakeholders would have access to these materials and use them in connection with events, meetings, and other outreach activities.	VH	Reference Section 5 of this document

**TABLE 6: MGF STEWARDSHIP ENHANCEMENT INITIATIVES AND TIMING (CONTINUED)**

Implementation Initiative	Description	Priority	Stewardship Partnership Group Implementation Notes
<b>Very High Priority Initiatives Supporting Data Stewardship</b>			
S1: Prepare specifications and develop export tools for easy MGF data extract from Oracle Spatial to other common GIS formats	The MGF database is in the process of migration from a legacy GIS proprietary format (ArcGIS coverages) to an Oracle Spatial format (for storage of map features and attributes). This provides a number of advantages for spatial data management including its ability to maintain a statewide database and ability to use robust data management tools in Oracle. It is vital however that there be flexible and easy to use tools and processes to extract selected data from Oracle and provide it to users in a form that it can used with minimal restructuring or format translations. This initiative includes the development, testing, and deployment of extract and export routines suitable for users needed Shape Files, ESRI geodatabases, AutoCAD DWG files, and possibly other formats. There may also be a need for Oracle Spatial data to be viewed directly by users with different GIS software environments.	VH	Each CG will require a different approach to understand and implement these tools. CG I and II, with high technology availability and use, will require tools that allow for flexible export of data so they can best utilize what is available. CB III and IV will have less robust needs for export tools since their level of application of technology is less demanding.
S3: Examine and develop effective tools for on-line update of MGF data	The CSSTP, with input from MGF users (and potential future users) creates easy-to-use tools for update and submittal of data for import into MGF datasets and an application that allows on-line interactive update of MGF data (e.g., new road segments). These tools would incorporate basic quality control features and deliver data changes in a way that could undergo final quality checks and MGF posting by CSSTP personnel.	VH	Each CG will have different requirements for the functionality of these tools. CG III and IV may be wholly dependent on on-line editing tools to submit any updates and additions. CB I and II may require tools for depositing their internally generated data for review, modification to fit standard statewide data structures, quality control check and placement in the statewide data set.

**TABLE 6: MGF STEWARDSHIP ENHANCEMENT INITIATIVES AND TIMING (CONTINUED)**

Implementation Initiative	Description	Priority	Stewardship Partnership Group Implementation Notes
<b>High Priority Initiatives Supporting Data Stewardship</b>			
O8: Define/document process for GIS standards and policy development and approval	Create a Working Group under the CBTSC charged with the responsibility for defining a process and workflow for the submittal of a proposed standard or policy and its evaluation and ultimate of approval as an IT and/or GIS standard or policy. Standards and policies may address any technical, operational, or administrative area including software, data architecture, database content and format, network protocols and management, system administration tools and practices, standard methodologies for GIS and IT development, organizational relationships, information distribution, etc. The standards and policy review and approval would follow a comment and consensus process with formal approval by the CBTSC. Standards compliance would be required by state agencies (with a provision for approved deviation from the standard if a business case could be made). For non-state agencies, standards compliance would be recommended and encouraged but not mandatory. Note: Short of formal standards that carry specific requirements for compliance, some topics may result in the approval of a “guideline” which is recommended for adherence for specific circumstances but which are not mandatory.	H	The working group created <u>must</u> include representation from organization in each of the four capability groupings identified. This will assure that the results ultimately meet the needs of all potential participants in the stewardship program.
D5: Evaluate current quality of Framework data and define actions for quality improvement for next MGF version.	As a basis for planning future enhancements and improvements of existing MGF data, perform a detailed assessment of current data quality. This would include the creation and/or update of metadata and would address multiple quality criteria: completeness, map accuracy, attribute accuracy, graphic integrity, etc. The results of the data quality assessment would be compared with needs expressed by MGF users to identify realistic improvements. The survey conducted as part of the NSDI CAP grant planning project is one source for this work.	H	This will largely be a staff function under the direction of the appropriate working group. This document along with the <i>Statewide GIS Business Plan</i> provides initial direction for quality improvements.
D6: Develop, approve, and support the use of GIS database standards	Accelerate activities for developing and approving data standards for GIS data—to support development of consistent statewide data. Communicate information on the standards and provide guidance on their use to GIS stakeholders in Michigan. This initiative would begin by a focus on high-priority data standards that apply to all or most data layers (metadata, projections/coordinate systems, and data distribution licenses). Ongoing work would under this initiative would include the preparation and approval of more specific standards on data content, quality, coding/classification, attribute data schemas, etc.	H On-going	Section 5 of this document addresses the need and mechanisms for communicating the standards and their value to each of the capability groups. Standard development for each framework theme should be accomplished under the direction of an appropriate working group that represents organizations from each capability group.

**TABLE 6: MGF STEWARDSHIP ENHANCEMENT INITIATIVES AND TIMING (CONTINUED)**

Implementation Initiative	Description	Priority	Stewardship Partnership Group Implementation Notes
D12: Accelerate and establish better access to digital data from the REMON initiative	Evaluate current management of REMON project and identify potential changes and improvements to make coordinates available to the GIS community. Help accelerate data compilation and make improved monumentation data more accessible via the Web.	H	Capability groups I and III will largely benefit from the ability to improve the spatial accuracy of these points. CG II and IV will need to be informed of the value of this initiative to develop needed support in the GIS community for this project.
D13: Load and make available GIS data layer with Census Geography and 2010 Census data	Take delivery and load current census geography boundary files and data from 2010 Decennial Census. Evaluate correspondence of boundary files with MGF data layers and make necessary adjustments to TIGER to improve match MGF or local government GIS data (parcel and centerlines). Make this data available for query, viewing, and download.	H	CG I and II will see immediate benefits from this action. CG III and IV will need additional information to be provided to understand the potential value of these data.
D17: Enhance accuracy/ completeness of administrative boundaries (city, townships, school districts, election districts, and other special purpose districts)	Administrative boundaries area foundational element of any statewide GIS and in Michigan that dataset is used by over 97% of all GIS users. To be most useful administrative boundary data should coincide with parcels, road centerline, and hydrology databases wherever possible. Boundary data for every type of taxing and public service authority in Michigan should be collected and maintained under a stewardship partnership relationship with local data custodians. These data are important to a variety of business drivers including economic development, revenue and taxation, emergency response, and asset management.	H On-going	Each capability group will require a slightly different approach to be 'sold' on participation and will require a customized approach to technology for active participation on data development and maintenance. CG I and II will require ETL development or other easy method for direct digital submission. CG III and IV may require on-line editing tools.
D18: National Hydrology Dataset (NHD) completion and enhancement	The NHD data should be completed and enhanced to fully support business drivers for asset management for drain commissions, flood management, and environmental protection. Surface hydrology was reported to be needed by over 96% of all GIS users in Michigan during the outreach portion of this project.	H On-going	All capability groups will require these data. CG I and III may have superior data that can be included in this data set. Tools will need to be structured to allow for appropriate maintenance for each of the CGs.
D22. Create statewide current elevation data	Elevation data, specifically contours, was identified by over 90% of GIS users as data needed to support their enterprise application of GIS. Additional elevation data in the form of DEMs if improved will result in better spatial accuracy of ortho photos. These data are important to production of quality National Flood Insurance Rate Maps (FIRM), to modeling and responding to wildfire, determination of road centerline mileage, wireless broadband and other tower location decisions, and site selection for wind power generation locations.	H On-going	Each capability group will require a slightly different approach to be 'sold' on participation and will require a customized approach to technology for active participation on data development and maintenance. CG I and II will require ETL development or other easy method for direct digital submission. CG III and IV may require on-line editing tools.

**TABLE 6: MGF STEWARDSHIP ENHANCEMENT INITIATIVES AND TIMING (CONTINUED)**

Implementation Initiative	Description	Priority	Stewardship Partnership Group Implementation Notes
C3: Prepare materials and hold briefings to sustain support from senior officials	Prepare a number of explanatory and promotional materials that provides information about the needs, applications, and benefits of the GIS program and work to stimulate partnerships between state, local, and private organizations and which are aimed at senior managers and elected officials at the state and local level. Materials may include brochures and presentation materials. The CBTSC and CSSTP staff will seek opportunities to provide information and conduct executive briefings with senior officials.	H	Reference Section 5 of this document.
C9: Support and encourage expanded participation in GIS events and professional associations	As part of statewide GIS program communications and promotion, this initiative will encourage broader participation in GIS events and related professional associations—including Michigan-based organizations and programs as well as out-of-state GIS events and organizations (URISA, GITA, ASPRS, NSGIC). This initiative is supported by a Web-based resource with information on professional organizations and upcoming events (conferences, workshops, special meetings). Membership and participation in these professional organizations and events supports professional development, networking, and overall advancing of GIS programs. The State GIS User Forum (see O3), IMAGIN, and MiCAMP organizations (see O4) would have key roles in this initiative.	H	Refer to Section 5 of this document.
C10: Create and maintain central, web-accessible repository for GIS and related IT standards and policies	This initiative supports Objective 2.2 of the CBTSC. In connection with the development and approval of standards (see O8, D6, S10), this initiative includes the design and deployment of a searchable Web-based catalog of pending and approved IT and GIS standards and policies.	H	Refer to Section 5 of this document
C12: Design and organize training programs for use of MGF resources and other CSSTP GIS services	This initiative directly supports initiative E4—expansion of MGF program participation and data stewards. The CSSTP would take a lead role in designing and distribution of information about the MGF and training programs aimed at potential new stewards for MGF data maintenance. The CSSTP will prepare training materials which could be provided on-line (without the need for a trainer) and, as needed, training sessions by a CSSTP staff person or other qualified statewide GIS stakeholder.	H	Refer to Section 5 of this document

**TABLE 6: MGF STEWARDSHIP ENHANCEMENT INITIATIVES AND TIMING (CONTINUED)**

Implementation Initiative	Description	Priority	Stewardship Partnership Group Implementation Notes
C15: Explore and define options for providing GIS services to low-resourced jurisdictions	Examine the options for providing outsourced GIS services or partnerships that may allow contracted GIS services or support from CSSTP or a local government (e.g. support from a County government GIS program to a neighboring county or to CVTs in the County. The focus is finding appropriate avenues to provide GIS data and services to local governments without sufficient resources or technical expertise to support a full GIS program.	H	This initiative is directly focused on CG III and IV, those organizations that have some framework data production business drivers but lack the technology to become active participants in the stewardship efforts.
S2: Identify, design, and develop several enterprise GIS applications	While GIS data is the fuel upon which GIS programs operate, applications comprise the engine which delivers needed products and results to users. This initiative has an objective of delivering a richer set of GIS applications and services that can deliver business benefits to large portions of the GIS community in Michigan, through a Web-based portal. High-priority applications, which may use off the shelf tools in GIS software packages or may require additional design (map templates) or more complex programming or configuration, will provide users with needed tools in an easy to access environment. This initiative includes the design and development of several important GIS applications. This development and hosting could be the responsibility of the CSSTP or another organization in a position to host GIS applications. Selecting and designing the applications would benefit from involvement of the full statewide GIS community—possibly through a Working Group assigned by the CBTSC.	H	Enterprise GIS applications may serve to encourage organizations in CG III and IV to improve their use of the technology and become active participants in the stewardship process. There are likely enterprise applications that would provide additional value to CG I and II that may encourage their contributions of data that would otherwise not be provided to the MGF.  Each CG will have a different perceived benefit from the application of an enterprise application. CG I and II that understand the costs associated with the care and feeding of an enterprise application will be driven by reduction in total cost of operation. CG III and IV lacking internal technical resources will view the applications as the only way for them to benefit from improved technology.
S4: Move toward statewide 'virtual portal' for Web-based access to spatial data and services from distributed government and commercial sources	Design and build an enhanced Web-based tool for geographic data and services that acts as a "virtual portal"--a Web application that can combine centrally-stored data, direct access to and integration of data on other Web sites, and a range of GIS services. This should include a tight connection and functional relationship with the MGF but also allow for access to other data sources maintained by local governments, state and federal agencies, and commercial sources (e.g., mashups with data from commercial providers like Microsoft Bing Maps and Google Earth).	H	Participation will vary widely with the technology level of the stewardship partner. Initially CB I and II will be primary beneficiaries. Ultimately as enterprise applications are built to leverage these services CG III and IV will benefit at well.

**TABLE 6: MGF STEWARDSHIP ENHANCEMENT INITIATIVES AND TIMING (CONTINUED)**

Implementation Initiative	Description	Priority	Stewardship Partnership Group Implementation Notes
F1: Research and secure additional grant funding to support state and local GIS development	This initiative is part of Goal 3 of the CBTSC. The purpose is to establish a well organized and resourced effort to identify, apply for, and secure grant funding, from government, private, and non-profit foundation sources that will deliver funding for GIS related projects that help advance IT strategic goals and GIS business plan objectives. Grants may be directly related to IT and GIS programs (e.g., FGDC CAP program, NTIA broadband mapping). Other grants may address other program areas, not specifically citing IT and GIS topics but which can be supported by GIS technology data. The grant research and funding function may be lead by a CBTSC Subcommittee but the “legwork” would require time from CSSTP personnel and other GIS stakeholder organizations.	H	Stable funding is critical to the long term sustainability of the stewardship effort.
F2: Explore and pursue new funding sources for GIS development support through local land transaction registration fees	Establish a Working Group under the CBTSC to explore the possibility of establishing a new revenue stream for GIS development— establishment of a special fee for County Register of Deeds transactions. Fees would go to a special fund administered by a state agency. The majority of the funds would be used to support GIS development and operations at the local level (County, City, Village, Township) based on an agreed formula and a clear accounting process. This type of funding mechanism is being used by a number of states including Wisconsin, Illinois, Minnesota, and Oregon. Establishing this funding mechanism would require legislative action. This initiative begins with research on the approach taken by other states and a polling of interest by local governments. This would be followed by contact with appropriate committees in the state legislature culminating in a proposed bill and vote.	H	The <i>Statewide GIS Business Plan</i> anticipates significant investment in improvements and expansions to the MGF over time. Funding these investments will require identifying a dedicated stream of revenue.
F3: Research and identify other funding sources or financing strategies for GIS programs	A standing Subcommittee on GIS financing strategies would be created to examine a variety of funding sources and financing strategies to support GIS initiatives at the state and local level. This Business Plan identifies in Appendix C possible financing approaches (most of which have been successfully used for GIS programs in other states). The Subcommittee would conduct research on new funding alternatives and take action to put in place new funding/financing strategies based on the results of this research.	H	The <i>Statewide GIS Business Plan</i> anticipates significant investment in improvements and expansions to the MGF over time. Funding these investments will require identifying a dedicated stream of revenue.

**TABLE 6: MGF STEWARDSHIP ENHANCEMENT INITIATIVES AND TIMING (CONTINUED)**

Implementation Initiative	Description	Priority	Stewardship Partnership Group Implementation Notes
F7: Establish state-run GIS grant program for local governments to support MGF participation	Identify a source of funds, administered by CSSTP, or another state body, which could allocate grants to support GIS development for the “have not” areas of the state based on some formula/criteria. Funds would serve as the driving element for expansion of GIS into areas where none currently exists.	H	Although largely envisioned as a method to assist organizations in CG to modernize their workflows to include digital spatial data, this initiative would also provide funding to organizations to encourage participation in the MGF.
<b>Moderate Priority Initiatives Supporting Data Stewardship</b>			
D3: Expand on the Geographic Data Library to maintain Web-based catalog of sources of geographic data	Compile an index with descriptive information and links to Web sites maintained by public sector (federal, state, local) and other organizations that provide access to geographic data. This would include applicable metadata to provide prospective users with sufficient information about data content, data quality, access provisions, etc. for users to determine “fitness for use”.	M	Expansion of the MGDL will facilitate additional use of the data. Generally this will benefit all users of the technology (capability groups I through IV).
D19: Enhance database in support of emergency dispatch and response	This initiative is related to the Structures initiative in D13. It involves the improvement of data that supports local and state public safety and emergency planning and response agencies. The objective is to build and maintain a statewide database with critical public safety and emergency management data that includes (in addition to Structures), emergency service zone (ESZ) boundaries, selected “critical infrastructure” features, improved address ranges, and possibly other data. This project could be lead by CSSTP or a Working Group of the CBTSC. It would require a close partnership with local governments and appropriate state agencies (e.g., State Police).	M On-going	Each capability group will require a slightly different approach to be ‘sold’ on participation and will require a customized approach to technology for active participation on data development and maintenance. CG I and II will require ETL development or other easy method for direct digital submission. CG III and IV may require on-line editing tools.
D20: Design and develop water and sanitary sewer service area database	Water and sewer utility service data was identified as being important unavailable data elements for over 30% of survey respondents. While these data are not critical for many GIS applications they are important for several high profile business drivers: land use planning, economic development, emergency response. These data should be developed in partnership with regional or local governmental entities and include pertinent information on system capabilities, sources, etc.	M On-going	Each capability group will require a slightly different approach to be ‘sold’ on participation and will require a customized approach to technology for active participation on data development and maintenance. CG I and II will require ETL development or other easy method for direct digital submission. CG III and IV may require on-line editing tools.
D21: Other utility service areas—gas transmission, electric transmission, pipelines	These data were all highly ranked as desired but unavailable. Since the vast majority of these data are related to investor owned companies it is likely that obtaining them for use in the public domain will be difficult. However, partnerships should be explored with the leading providers of these services since in most cases these data exist for their own internal asset management and planning functions. These data can be critical to economic development, land use planning, and homeland security business functions.	M On-going	Each capability group will require a slightly different approach to be ‘sold’ on participation and will require a customized approach to technology for active participation on data development and maintenance. CG I and II will require ETL development or other easy method for direct digital submission. CG III and IV may require on-line editing tools.

**TABLE 6: MGF STEWARDSHIP ENHANCEMENT INITIATIVES AND TIMING (CONTINUED)**

Implementation Initiative	Description	Priority	Stewardship Partnership Group Implementation Notes
C5: Prepare and establish formal terms for MGF partnership program	This initiative is to encourage expansion in MGF program participation, including Stewardship roles for local governments and other organizations that will provide data updates for statewide data coverage. This initiative involves several major tasks including: a) clarifying the terms of participation and putting in place a formal process for enlisting data Stewards and b) active promotion and recruitment of data stewards by CSSTP, the CBTSC, the professional GIS associations, and regional GIS user groups. These steps are followed with establishment of specific procedures to provide data for import to the MGF.	M	This initiative is the specific focus of this <i>Stewardship Enhancement Plan</i> .
C7: Review and improve CSSTP Website design and navigation for improved access to information, services, and resources	The objective of this initiative is to improve the CSSTP web site which will serve as a primary communication channel for statewide GIS users or potential users to easily find information about the statewide GIS program and also to access data and services. This initiative would involve a full Web site redesign after getting input from current users, followed by a rebuilding of Web pages and improved navigation. This is an important aspect of GIS program promotion and supports most outreach and education initiatives as well as those focused on delivery of GIS data and services.	M	Reference Section 5 of this document
C8: Prepare and maintain single Web-based GIS contact directory	Compile a directory of people and organizations--principally users and technical staff with GIS expertise who may serve as a resource for information and technical support to other GIS programs. Provide contact information to facilitate networking and build an application to GIS-enable the directory to easily identify the location of the contact.	M	This is an important tool to building stewardship and enabling interaction within the community. The importance of this resource is addressed in Section 5 of this document.

**\*Specific dates are not identified. A general timing is indicated using the following codes:**

- **VH = Very Short Term:** Work should begin immediately and be completed within the next 3 to 6 months.
- **H = Short Term:** Work should begin within the next 4 to 8 months and be completed within the next 8 to 12 months.
- **M = Medium Term:** Work should begin within the next 8 to 12 months and be completed within the next 12 to 20 months.
- **On-going = Ongoing:** Activity continues for the foreseeable future from the point when initiated.