

# 1993 MSGIC STRATEGIC PLAN

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## Executive Summary

**Geographic information (spatial data) is a capital asset of the State of Maryland, as real and vital to continuation of State government operations as physical properties or professional and technical personnel.** It is also a costly asset, the value of which has not been fully recognized or exploited for State government decision making.

Geographic Information System (GIS) technology has developed at a remarkable pace over the past two decades. The rapid technological changes have been challenging and consume the focus of GIS users and managers. The Maryland State Government Geographic Information Coordinating Committee (MSGIC) recognizes that coordination and cooperation are essential keys to successful integration of GIS technology throughout State government. Consistent spatial data formats, data transfer standards and shared applications provide the leverage needed to establish cost-effective GIS implementations.

GIS systems that integrate spatial data from many user agencies are an asset in their own right when data is created to acknowledged standards and maintained to serve functions that benefit the State, its citizens and jurisdictions. Coordinated GIS development will allow linkage of State-produced data to other spatial information maintained by federal, regional, local, academic and private sector partners.

Although significant initiatives to implement GIS were undertaken in Maryland State government throughout the 1980's, most efforts were internal to the agencies. There was little interagency coordination beyond informal contacts. By the early 1990's, many departments were actively collecting, analyzing and distributing various forms of geographically referenced data. Interest in implementing basic GIS capabilities was rapidly growing among non-users, and several departmental GIS managers realized the need to coordinate multi-agency efforts. Led by the more established GIS users and managers from the Department of Natural Resources (DNR), Maryland Office of Planning (OP), State Highway Administration (SHA), Department of Housing and Community Development (DHCD), Department of the Environment (MDE), Department of Agriculture, Governor's Office and Maryland State Archives, an inaugural meeting of MSGIC was held in July 1992.

Despite initial efforts at organization, it has been difficult for MSGIC to define an effective structure and establish an action plan that will address its goals and forward its mission. Limited staff resources, identification of leadership, involvement at the subcommittee level and balancing the varying needs of its member agencies have been difficult issues to address. Meanwhile, GIS system and spatial data development initiatives have proceeded without sufficient consensus on priority or benefit to State government.

The Committee membership, and policy-makers, felt a strategic plan would set needed internal guidance and direction. A Strategic Planning Workshop of MSGIC, held June 23-24, 1993, resulted in concurrence on a new organizational structure, system integration, data quality standards and related issues presented in this Strategic Plan.

As part of the strategic planning process, MSGIC reaffirmed its goals to:

- Reduce costly duplication of GIS efforts with respect to data collection, data transfer and system implementation;
- Support development of geographic data sets that are useful to multiple agency purposes, recognizing that individual State agencies may be responsible for developing and maintaining specific data sets;
- Serve as a focal point to coordinate GIS activities among State agencies; and
- Develop guidelines for GIS implementation in the State and insure the preservation of permanently valuable GIS data.

The Committee reached several important consensus decisions at the workshop. They include:

- **Organizational Restructuring of MSGIC**

MSGIC will continue as a cooperative effort of State agencies while evolving to an increasingly formal authority. It will also create a new Executive Committee and restructure the subcommittees to address central institutional and technical issues with a clear focus and charter to enable strong leadership, partnership building and empowerment.

- **Digital Base Map Concurrence**

MSGIC supports the timely completion, and continued maintenance, of three Statewide digital base maps that are currently in development. These three digital base maps are the current foundation for GIS development in Maryland State agencies and shall be available to any interested State agency. They are:

- **Digital Orthophoto Quarter Quads**, in development by the Department of Natural Resources;
- **Digital Infrastructure Base Maps**, in development through cooperative agreement between the State Highway Administration, the Office of Planning, the Department of Assessments and Taxation and C&P Telephone;
- **Digital USGS 7.5' Topographic Quadrangle Maps**, in development by the Department of Housing and Community Development.
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- **Commitment to Coordinated Activity**

MSGIC reaffirmed its commitment to provide coordinated guidance and activity to member agencies for the strategic implementation of GIS technology. It also supports integration of GIS systems for improved government decision-making. MSGIC will develop a central clearinghouse function for information to serve new and existing GIS users in Maryland State government. It will also coordinate GIS implementation by developing and publishing standards, metadata, and directories; encouraging and developing cost-sharing mechanisms for cooperative data development; promoting the exchange and preservation of GIS records; and educating and training staff and decision-makers.

A new set of objectives represents an expanded role for MSGIC. They require increased involvement, recognition, and commitment of resources by member agencies to adequately address a more coordinated approach to GIS development within Maryland State government. These objectives support the broader goal of providing better service and improved decision-making opportunities at a reduced cost to State government and its constituents. **This type of coordination will require agencies to recognize and respond to multiple needs that may be beyond their expressed mission. It also requires new working relationships between agencies and new ways of sharing responsibilities and costs.** MSGIC is the mechanism to meet these requirements.

MSGIC will address coordinated development of GIS resources within Maryland State government agencies in five parallel, but related activity tracks: Database Requirements, Data Exchange and Preservation, Funding and Resource Development, Education and Training, and the general Organization of MSGIC. These activity tracks consist of closely related tasks that will proceed independently of each other and be addressed comprehensively over the next three to five years.

The goals of the **Database Requirements** activity track are to (1) establish and maintain a core database of geographic information as a common asset to State agencies, and (2) encourage the development, maintenance and distribution of thematic layers built on the core database foundation.

The goals of the **Data Exchange and Archival Preservation** activity track are to (1) make existing data more accessible to all users, (2) better define existing resources and requirements, (3) ensure the security and confidentiality of existing data, and (4) provide for preservation and accessibility of noncurrent spatial data.

The goals of the **Funding and Resource Development** activity track are to (1) develop adequate funding mechanisms for the continued development of spatial data resources, and (2) increase partnerships with external entities.

The goals of the **Education and Training** activity track are to (1) increase GIS knowledge and skills among professional staffs, (2) recruit and retain qualified staff and management, and (3) educate executives and policy makers on GIS concepts, applications, and benefits.

The goals of the **Organization** activity track are to (1) develop an increasingly viable role for MSGIC in GIS coordination and development within Maryland State agencies, and (2) develop a structure that is functionally responsive to the needs of the broad user community.

This Strategic Plan could not have been completed without the efforts, contributions and interests of the entire membership of MSGIC who gave generously of their time and expertise during the workshop and various interviews. The accomplishments of the workshop will serve to direct the role and activities of MSGIC. There is clearly an increased consensus by the participants to work with their respective State agencies in sharing these goals, objectives and guiding principles for State GIS development and coordination.

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## SECTION 1. MSGIC's Strategic Planning Process

### 1.1 Introduction

This document was prepared for the Maryland State Government Geographic Information Coordinating Committee (MSGIC). It provides a strategic plan for a shared vision of State geographic information systems development that is essential for planning, budgeting, implementation and applications development.

Geographic Information Systems (GIS) are a powerful analysis and decision-support tool. GIS technology offers a practical means to manage large and diverse spatial data bases and provides methods to understand relationships among diverse phenomena. GIS can analyze relationships among geographic aspects of social, economic, environmental and demographic data, and assist professionals from diverse fields in collectively applying their knowledge to solve complex program and policy issues.

Geographic or spatial information is assembled and applied in new ways using current GIS technology. An increasing number of decision-makers and managers in Maryland State government have recognized that GIS technology will be essential if they are to effectively address the expanded mandates and complex decisions they now face.

GIS technology has developed at a remarkable pace over the past two decades. The rapid technological changes have been challenging and consume the focus of GIS users and managers. MSGIC recognizes that coordination and cooperation are essential keys to successful integration of GIS technology throughout State government. Consistency in data format, data transfer, preservation standards and shared applications provide the leverage needed to establish cost-effective GIS implementations. In addition to the technical issues, GIS users and managers must deal with many managerial, legal and social issues that accompany the increasing use of this technology.

Strategic planning provides a framework for MSGIC actions and policies that bring together agencies with shared interests in the development, use and maintenance of geographic information and digital mapping systems serving Maryland, its jurisdictions and citizens. It represents a recognition that to advance the integration of GIS technologies and applications into State government agencies, and to enhance the benefits of geographic information for improved and efficient government decision making, a variety of issues and challenges must be addressed in a coordinated manner. A Strategic Planning Workshop of MSGIC was held June 23-24, 1993. It provided essential identification of, and concurrence on, organization, staffing, system

integration, data quality standards and related issues to identify the principal activities and responsibilities presented in the Strategic Plan.

Strategic planning is a continuous process that provides MSGIC with a broad overview of specific goals and objectives for State geographic information system development. The Strategic Plan constitutes a current view of MSGIC's mission to coordinate State government GIS initiatives and activities, providing a macro-plan for detailed objective and activity planning. The plan is the central mechanism for integrating committee and subcommittee actions without loss of perspective. It is the principal mechanism for meeting changing circumstances and fostering a new model for cooperative initiatives. This initial Strategic Plan presumes that the process that brought it about will continue as MSGIC pursues its mission. This process is essential to the long-term viability of MSGIC.

The process used by MSGIC in development of both the workshop and the Plan examined the current level of GIS development and activity between State agencies and identified common issues and challenges. The process will maximize the benefits of GIS and automated mapping technologies through new direction and coordination. It also creates a new vision for MSGIC, identifying the activities and responsibilities of its member agencies.

This Strategic Plan could not have been completed without the efforts, contributions, and interests of the entire membership of MSGIC who gave generously of their time and expertise during the workshop, plan review and various interviews. The Strategic Plan does not address the technically detailed plans that successful implementation will require. In this regard, the Plan is an essential first step requiring continued work by MSGIC and its member agencies to guide the long-term development of GIS in Maryland State government.

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## 1.2 The Strategic Planning Workshop

The MSGIC Strategic Planning Workshop was conducted on June 23-24, 1993, with participation by 30 representatives of 21 State agencies, listed in Appendix A. The workshop had a broad objective: to identify and discuss issues and recommendations on policies and goals for GIS development in Maryland State government and to lay the necessary groundwork for future committee and agency work plans and actions. A series of structured discussions covered the core agenda, including:

- Status, assessment and impact of current issues and activities;
- Goals and objectives for the MSGIC in furthering GIS development in Maryland State government;
- Major activities and detailed tasks for how to accomplish these goals; and
- Critical success factors by which to measure outcomes.

The accomplishments of the workshop will serve to direct the role and activities of MSGIC. There is clearly an increased consensus by the participants to work with their respective State agencies in sharing these goals, objectives and guiding principles for State GIS development and coordination.

Several important consensus decisions were reached at the workshop. These include:

- **Organizational Restructuring of MSGIC**

MSGIC will continue as a cooperative effort of State agencies while evolving to an increasingly formal authority. MSGIC will create a new Executive Committee and restructure the subcommittees to address central institutional and technical issues with a clear focus and charter to enable strong leadership, partnership building and empowerment.

- **Digital Base Map Concurrence**

The Committee supports the timely completion, and continued maintenance, of three Statewide digital base maps that are currently in development. These three digital base maps are the current foundation for GIS development in Maryland State agencies and shall be available to any interested State agency. They are:

**Digital Orthophoto Quarter Quads**, in development by the Department of Natural Resources (DNR);

**Digital Infrastructure Base Maps**, in development through cooperative agreement between the State Highway Administration (SHA), the Office of Planning (OP), the Department of Assessments and Taxation (DAT), and C&P Telephone;

**Digital USGS 7.5' Topographic Quadrangle Maps**, in development by the Department of Housing and Community Development (DHCD).

- **Commitment to Coordinated Activity**

MSGIC reaffirmed its commitment to provide coordinated guidance and activity to member agencies for the strategic implementation of GIS technology. It also supports integration of GIS systems for improved government decision-making. MSGIC will develop a central clearinghouse function for information to serve new and existing GIS users within Maryland State government. It will coordinate GIS implementation by developing and publishing standards, metadata and directories; encouraging and developing cost-sharing mechanisms for cooperative database development; promoting the exchange and preservation of spatial data; and educating and training staff and decision-makers.

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## SECTION 2. Background

### 2.1 Geographic Information Systems Development in Maryland

Geographic Information Systems (GIS) are computer-based systems used for capturing, storing, integrating, analyzing and displaying spatially referenced data about features of the Earth. Introduced in the late 1960's and early 1970's in rudimentary form, GIS technology has developed so rapidly in the past decade that it is now recognized as an essential tool for effective use of spatial data. A variety of factors have influenced an "explosive" increase in use of GIS in the 1990's: the technology improved, costs declined and users became more aware of capabilities and applications for particular interests.

Geographic information systems come in many forms, often as diverse as their applications. They are commonly defined, however, by four basic components: computer hardware, GIS software, spatial data and people. When initially introduced to GIS technologies, new users often focus on the hardware and software components, because they are easier to understand, assign costs to and evaluate. More important, however, is a focus directed to the data and personnel requirements.

The technology addresses any data that can be expressed as points, lines, polygons, or descriptors of such entities as they may exist in space. It is this reference of data to its real-world location that makes a system "geographic", but the technology is not limited to the treatment of a particular type of spatial data. GIS databases are created from many different and diverse sources. Some data elements are relevant to specific user applications while others are common to a wide range of applications.

Data are collected in two basic forms, graphic or spatial and tabular or relational. Spatial data includes, for example, lines representing a road network, parcel boundaries, wetland boundaries, or census tract areas. Relational data, commonly called attributes, may include the type of road pavement or the direction of travel, property ownership name or assessed value, vegetation type or habitat and census demographic characteristics.

Data in a GIS is organized into layers, each containing a similar theme. In addition to the many thematic layers used in diverse GIS applications, the base map provides a common foundation upon which information is incorporated into a GIS.

One of the earliest efforts to implement GIS capabilities in State government was in Maryland. In 1973, the Department of State Planning (now Office of Planning) developed MAGI, the Maryland Automated Geographic Information System. The MAGI database consisted of 88,000 grid cells, each 91.8 acres in area (2000' x 2000'), and each cross-referenced to a database containing factual and interpretive information on physical, environmental, cultural and administrative features of that area. The software and data resided on a mainframe computer at the University of Maryland, College Park, and were used to support land use planning and policy initiatives during the 1970's and 1980's.

### **The Office of Planning**

By the 1990's the Office of Planning's (OP) GIS capabilities had evolved to take advantage of the powerful PC hardware platforms and software such as PC ARC/INFO that manage digital map data in vector, point and line formats.

The Office of Planning's GIS capabilities were instrumental in recent congressional and legislative redistricting efforts following the 1990 Census of Population. Additionally, OP provides a variety of specialized small area computer mapping capabilities for both census data and other data from agency and jurisdiction administrative records. To meet its growth management mandate, OP maintains county land use, land cover and natural soil groups in vector form at 1:63,360 scale, and is developing comparable vector layers for county water and sewer plans, zoning and comprehensive plans.

The Office of Planning is engaging in three projects to improve its ability to monitor development activity and to geographically reference data to its location on an accurate base map. First, OP is working jointly with the Department of Assessments and Taxation (DAT) to digitally scan parcel maps registered to the State Highway Administration's (SHA) 1:24,000 scale grid maps, and to digitize parcel reference points linking the existing parcel records database to the parcel maps. Second, OP, SHA, and C&P Telephone, in a public/private sector partnership, are combining data resources to develop an enhanced digital base map with street name and address range information based on the SHA digital grid maps. Third, OP is exploring the use of satellite imagery for updating on a more timely basis its land use/land cover digital maps and improving their spatial accuracy.

### **Department of Natural Resources**

During the early and mid-1980's, several program initiatives related to an inventory of features was driving GIS development in the Department of Natural Resources (DNR). These included public lands, wildlife, wetlands, the 100-year floodplain, geology, fisheries, the Critical Area and other features under the purview of various regulatory programs. An internal and informal support system developed within DNR, and over a period of several years many divisions developed databases and began using GIS. The first GIS system at DNR was an ARC/INFO system for use with issues relating to public lands. In 1987, the Water Resources Administration acquired MIPS (Map and Image Processing System). All subsequent work by the Department has been performed using these two software systems.

In 1989, DNR created "SPOTLAS," a hyperindexed atlas of the State, using SPOT satellite imagery as the base. Several thematic data layers have been developed on this base. Others are being developed on sources such as Landsat TM, including the Forest Inventory. DNR has undertaken aggressive programs to convert its map inventories, (e.g., Historical Shoreline Maps and Oyster Bar Charts), to digital products to facilitate the recombination of data sets in response to management and planning issues.

In 1989, DNR initiated a state-of-the-art approach to natural resources management with the introduction of digital orthophotography. Production of color digital orthophoto base maps began in 1991 with support from federal, State and local government agencies. The current Digital Orthophoto Quarter Quad mapping program

meets national map accuracy standards at 1:12,000 and provides the largest scale base map for Statewide use. These maps will serve as the base map layer for many State government applications and is the base map for the newly proposed federal National Spatial Data Infrastructure program that seeks to coordinate the activities of all federal agencies involved in mapping and GIS.

DNR is currently working with the U.S. Fish and Wildlife Service to develop a comprehensive vegetation thematic layer as part of the national GAP Analysis Project. Using the DOQQ maps will assist in delineation of the vegetation layer to community level at 1:24,000 scale.

### **Department of Transportation**

In the 1980's, the State Highway Administration (SHA) automated its planning and design functions, converting to a CADD system supported principally by Intergraph hardware and software. At present, Preliminary Planning, Highway Design, Bridge Design, Right-of-Way Plats and Surveys, Environmental Design and Traffic Engineering use this coordinated CADD system.

In 1988 the Cartographic Section began to build a series of digital map bases that are linked to geo-referenced databases to form their GIS-T system. At this time, SHA has four basic products in production. They are Town Maps at various scales, County Maps, the Tourist Map at 1:253,440 scale and the State Grid Maps at 1:24,000 scale.

SHA is currently cooperating on development of the Infrastructure Base Map project with OP and C&P Telephone.

The Mass Transit Administration's (MTA) Planning Department is using TransCAD GIS in support of transit service, facility planning, multi-modal transportation planning, transportation database management, and to provide data analysis for marketing efforts. GIS layers for all MTA modes including bus, metro, light rail and MARC have been developed using TIGER as a geographic base. This allows a detailed bus and rail network and associated data to be overlaid on demographic data contained in census blocks, tracts, and Transportation Analysis Zones. Having this capability provides a powerful tool for analyzing spatial relationships between transit lines and demographics. Extensive geocoding of point attributes such as patron home origins have allowed service areas to be identified and provide for determinations of average driving distances to rail stations and park and ride lots.

MTA also employs a Westinghouse GPS called Automatic Vehicle Locator/Computer Aided Dispatch (AVL/CAD). Being developed in phases, it will eventually be used to track vehicle movement, passenger data and schedule data on all MTA buses and trains. Currently, there are a limited number of test routes in service. Eventually, data received from AVL will be able to be accessed directly by the GIS system, permitting real-time data analysis to be performed.

The Maryland Aviation Administration is developing procurement specifications for a GIS and database to assess and monitor development within the BWI airport noise impact zone.

### **Department of Assessments and Taxation**

In 1952, the General Assembly approved legislation and authorized funds to produce parcel maps to provide for a more equitable assessment of property in Maryland. Maps are considered an essential tool to the ongoing development of an assessment process. It is difficult to value a property unless you know its location, size, shape, topography and other characteristics.

The base for the existing property maps was compiled by enlarging existing U.S.G.S. quadrangles and using 1:7,200 scale aerial photography obtained from the U.S. Department of Agriculture. The quadrangle maps were cut into 5" by 7" frames that were placed in a projector and enlarged to 1:7,200 scale. Physical features like transportation routes, hydrologic systems and landscaping features were plotted into the maps from the

photography and used to locate deed descriptions on the base maps. The property lines for these maps were compiled by initially reading, deciphering and microfilming more than two million deed descriptions beginning in 1953.

As previously noted, the Department of Assessments and Taxation is working with the Office of Planning to convert the parcel maps to a digital system. The digital maps are binary rasters with vector nodes placed at the centroid of each parcel. The nodes will relate to individual parcel records in the assessment and taxation database.

### **Other Agency Efforts**

In response to specific programmatic needs, many other State agencies have independently developed automated mapping and GIS capabilities using different systems. The following systems are examples that meet particular needs:

- The Maryland State Police's Bureau of Drug Enforcement has implemented a network using the PC-based MAPINFO GIS to enhance their intelligence efforts.
- The Maryland Emergency Management Agency has implemented the EIS (Emergency Information System) GIS with several supporting modules to plan for and simulate emergency response operations.
- The Department of Housing and Community Development has developed a GIS to manage historic and archaeological resources in Maryland using MIPS. Development of a base map from scanned USGS topographic quadrangle maps is in progress.
- Within the General Services Administration, a hybrid application for property asset management using an Intergraph/CAD/INFORMIX system has been developed.
- The Department of Agriculture is using ATLAS Graphics, ATLAS Draw and IDRISI to monitor Gypsy Moth Spray Blocks and Defoliation areas.
- The Department of the Environment has several GIS efforts underway in support of program operations for the Tributary Strategies, water quality modeling, ground water concerns, the Stormwater Runoff Permitting Program and cooperative efforts with other State and federal agencies.

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## **2.2 Coordination of GIS Initiatives Among Maryland State Agencies**

Although significant initiatives to implement GIS were undertaken in Maryland State government throughout the 1980's, most efforts were internal to the agencies. There was little interagency coordination beyond informal contacts. By the early 1990's, many departments were actively collecting, analyzing and distributing some form of geographically referenced data. Interest in implementing basic GIS capabilities was rapidly growing among non-users, and several departmental GIS managers realized the need to coordinate multi-agency efforts.

Dr. John Morgan, of Towson State University, proposed an umbrella coordinating committee for all GIS users in Maryland during the Sixth Annual Towson GIS Conference. The idea was accepted and the resulting committee is known as the Maryland Geographic Information Systems Committee (MDGIS). There are separate subcommittees for State, local, federal, academic and business users.

An inaugural meeting of the State Subcommittee, now known as MSGIC, was held in July 1992. It was led by the more established GIS users and managers from the Department of Natural Resources (DNR), Maryland Office of Planning (OP), State Highway Administration (SHA), Department of Housing and Community Development (DHCD), Department of the Environment (MDE), Department of Agriculture, Governor's Office and Maryland State Archives. At that meeting, the Chair provided a justification for the committee, citing:

- The need for a more formal mechanism for GIS users and managers to address spatial data standards, data sharing, documentation and maintenance;
- The need to integrate disparate data sets for display or analysis and to avoid duplication of effort; and
- The need for compatibility and transferability of data between systems that can only be achieved by agreement to cooperate with potential users as they design or modify their data collection programs.

The Committee met four times between July and December 1992. During the December meeting MSGIC adopted a statement of mission and objectives, stating as its purpose: to facilitate communication and cooperation between State agencies involved in the collection and use of spatial data and GIS. The Governor sent a letter to each Department asking that a voting and an alternate member be appointed to the Committee, (See Appendix B for the current membership). MSGIC established five subcommittees and met three times before the Strategic Planning Workshop.

Despite these initial efforts at organization, it has been difficult for MSGIC to define an effective structure and establish an action plan that will address its goals and forward its mission. Limited staff resources, identification of leadership, involvement at the subcommittee level and balancing the varying needs of its member agencies have been difficult issues to address. Meanwhile, GIS system and database development initiatives have proceeded without sufficient consensus on their priority or benefit to State government. Membership, and policy-makers, felt a strategic plan would set needed internal guidance and direction.

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## SECTION 3: MSGIC's Mission and Goals

### 3.1 MSGIC's Goals and Objectives

**Geographic information is a capital asset of the State of Maryland, as real and vital to continuation of State government operations as physical properties or professional and technical personnel.** It is also a costly asset, the value of which has not been fully recognized or exploited for State government decision making. To date, most geographic information initiatives undertaken by various departments and agencies of the State government have been oriented toward particular functional and regulatory concerns or planning studies. While these efforts have built a solid foundation, the information assets involved are narrowly focused and valued only insofar as they serve particular projects or functions. They are often at risk, losing currency or use, when projects are completed or functions are redefined.

Geographic information systems (GIS) that integrate spatial data from many user agencies are an asset in their own right, when data are created to acknowledged standards and maintained to serve functions that benefit the State, its citizens and jurisdictions. Coordinated GIS development will allow linkage of State-produced data to other spatial data maintained by federal, regional, local, and private sector partners.

The Maryland State Government Geographic Information Coordinating Committee (MSGIC) is an organization of agencies established in recognition of the need to coordinate GIS activities within Maryland State government. Its purpose is to promote the coordinated development and efficient use of human and financial resources between and among State agencies involved in the collection and/or use of spatial data and GIS.

As a part of the strategic planning process, MSGIC reaffirmed its goals to:

- Reduce costly duplication of GIS efforts with respect to data collection, data transfer and system implementation;
- Support development of geographic data sets that are useful to multiple agency purposes, recognizing that individual State agencies may be responsible for developing and maintaining specific data sets;
- Serve as a focal point for coordination of GIS activities among State agencies; and

- Develop guidelines for GIS implementation in the State and insure the preservation of permanently valuable GIS data.

MSGIC recognizes that each State agency has unique requirements with respect to spatial data collection and GIS implementation. The MSGIC Strategic Plan also reaffirms the Committees' mission to provide coordination and guidance among individual agency members without establishing a centralized GIS serving all State government users.

In executing its mission as outlined in this Strategic Plan, MSGIC has identified the following set of objectives, incorporating new functions with those previously identified:

- Encourage the coordination of spatial data collection activities to reduce duplication and increase the usefulness of this resource;
- Facilitate cooperative agreements among State agencies for the development of GIS resources;
- Develop guidelines and standards for collection and use of geographically referenced data and encourage adoption of standards throughout State government;
- Initiate and maintain a digital spatial data catalog that is accessible to all State government GIS users;
- Provide technical assistance to new GIS users in the selection and use of GIS technology;
- Assist the Department of Budget and Fiscal Planning (DBFP) in evaluating budget requests for GIS and spatial data development initiatives;
- Develop guidelines and mechanisms for appropriate access and distribution of spatial data and GIS products that are consistent with current practices and existing State Law;
- Provide for the preservation of non-current GIS records which the creating agency, with the Maryland State Archives, deems to have permanent value;
- Coordinate training activities to enhance GIS skills and knowledge among users;
- Serve as a clearinghouse for exchange of information on GIS activities between federal, State, local, academic and private interests;
- Monitor activities of related groups, particularly the Federal Geographic Data Committee, the National States Geographic Information Council, the Maryland Geographic Information Systems Committee (MDGIS) and the State Mapping Committee (SMAC), and participate as appropriate.

This set of objectives represents an expanded role for MSGIC, requiring increased recognition, involvement and resources committed by member agencies to adequately address a more coordinated approach to GIS development within Maryland State government.

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### **3.2 Benefits of Coordinated GIS Development**

Fulfillment of MSGIC's mission will enable State government and other participants to realize a broad range of enhanced capabilities and benefits, including:

- Timely availability and exchange, maximum use and preservation of mapping and spatial data assets for agencies within State government;
- Integration of maps, spatial data and relational databases, regardless of where they are maintained;
- Coherent, ongoing development and maintenance of GIS systems and data resources based on acknowledged standards;
- Capability to perform higher-level analysis of facilities and physical or social environments that are not now readily feasible;
- More efficient allocation of human and financial resources by reducing redundancy and capitalizing on established GIS related efforts;
- Revenue generation through effective cost recovery strategies that can support and offset ongoing mapping needs.

These capabilities and benefits support the broader goal of providing better service and improved decision-making opportunities at a reduced cost to State government and its constituents. **This type of coordination will require agencies to recognize and respond to multiple needs that may be beyond their expressed mission. It also requires new working relationships between agencies and new ways of sharing responsibilities and costs.** MSGIC is the mechanism to meet these requirements.

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## SECTION 4: The MSGIC Strategic Plan: Tasks and Responsibilities

The Maryland State Geographic Information Coordinating Committee (MSGIC) will address coordinated development of GIS resources within Maryland State government agencies in five parallel, but related activity tracks: Database Requirements, Data Exchange and Preservation, Funding and Resource Development, Education and Training, and the general Organization of MSGIC. These activity tracks consist of closely related tasks which can proceed independently of one another, but must be addressed comprehensively over the next three to five years.

Development and implementation of MSGIC's activities and responsibilities will have a significant impact on personnel and budget resources of member agencies. As MSGIC moves forward with its activities at both committee and subcommittee levels, it will inevitably compete for limited resources of both kinds. These pressures favor a longer development schedule, potentially affecting database developments, application developments, exchange standards and other activities which may be departmental or interagency. On the other hand, a desire to achieve the benefits offered by MSGIC's mission and planned activities will favor a more ambitious schedule. It is necessary to balance such interests, recognizing the importance of advancing the organization and orchestrating a schedule which meets the requirements of the annual budgeting process.

MSGIC needs to demonstrate incremental progress toward long-term goals to generate and maintain momentum. This will be done by setting a planning focus on MSGIC activities, documentation, products and services.

This plan is conceptual in nature and does not define specific implementation requirements which must be addressed in more detail. Successful achievement of the goals is highly dependent on interagency cooperation and continued funding for the priority activities identified. The plan also presents detailed planning initiatives which must be executed as relevant issues are resolved and the approach to subsequent tasks becomes clear. Appendix C diagrams the relationship between the activity tracks and significant milestones, and the near-term, mid-term, and long-term planning increments.

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### 4.1 Database Requirements.

There are a host of issues that influence the design and implementation of GIS systems. Creation of databases, including the thematic map layers, requires a design that is responsive, not only to the individual agency's project needs but also developed in consideration of the needs of the broader user community.

The goals of the Database Requirements activity track are to (1) establish a core database of geographic information to be held and maintained as a common asset to State agencies, and (2) encourage the development, maintenance and dissemination of thematic layers built on the core database foundation.

To achieve these goals, five major tasks are defined:

- Secure commitment and continued funding to complete the three existing major base mapping projects in a timely fashion;
- Establish and fund an identified database maintenance cycle;

- Complete a User Requirements Analysis;
- Define the requirements and responsibilities for development of priority thematic layers; and
- Define and institute standards for database development.

**Task 1: Secure commitment and continued funding to complete the three existing base map projects.**

MSGIC supports the timely completion of the three base mapping efforts currently underway within Maryland State government agencies. If agencies are using the same base layer for collecting or geo-referencing data, they will be able to share data more reliably even if the hardware or software being used is different. Yet, it is unlikely that a single base map will meet the needs of all State agencies. Therefore, MSGIC concludes that continued support and development of these three mapping efforts are essential to providing a solid foundation for future mapping initiatives. This list is intended to be neither exclusive nor comprehensive, and additional standard base maps may be added upon approval by the Committee.

**Digital Orthophoto Quarter Quads.** The digital orthophoto quarter quad base is made up of rasterized, color infrared aerial photography meeting National Map Accuracy Standards at a scale of 1:12,000. This is the most accurate Statewide base under development at this time. It is recommended that this base map be used whenever possible to reference and develop thematic layers. This base map is currently 30% complete. The scheduled completion date is December 1995. DNR will remain the custodial agency for this database.

**Infrastructure Base Maps.** This layer is a marriage of SHA's Statewide road network grid maps and the TIGER file developed by the US Census Bureau. SHA, OP and C&P Telephone are working cooperatively on this project to improve address ranges and street names for the entire State. OP and DAT are also digitizing parcel centroids along the street segments. The data has an overall map accuracy of 1:24,000 and will provide locational reference capabilities for address databases in any State government agency. These mapping efforts are in their initial stages. The scheduled completion date is January 1995. SHA will be the custodial agency for the Statewide Grid maps, OP will be the custodial agency for the enhanced TIGER maps, and DAT will be the custodial agency for the parcel centroid maps.

**Digital USGS 7.5 Minute Quad Maps.** The Division of Historical and Cultural Programs within the Department of Housing and Community Development (DHCD) is currently creating a Statewide base map based on scanned images of the USGS 7.5 minute topographic quadrangle maps. These raster files will meet National Map Accuracy Standards at the 1:24,000 scale and will be available for use by December 1993. DHCD will remain the custodial agency for these maps.

Due to the near-term completion of the DHCD and SHA mapping efforts, it is recommended that these systems be used as interim base map products for theme layer development until more accurate alternatives are completed.

**Task 2: Establish and fund an identified spatial data maintenance cycle.**

It is vitally important that once these base map initiatives are complete, the data is updated and maintained within an identified cycle to ensure currency and accuracy. Just as ongoing maintenance is essential for a sound infrastructure, these same activities must be implemented to ensure the long-term value of this important information resource. Ongoing funds must be allocated to the custodial agency of the data for this activity.

**Task 3: Complete a User Requirements Analysis.**

Comprehensive information which defines and assesses current user needs related to data and applications does not exist for agencies of Maryland State government. This lack of information hinders coordination of data development and fosters isolation in planning, decision making and resource allocation. A MSGIC subcommittee will develop and complete a User Requirements Analysis which will help to define key data elements required by user agencies, and target their activities with planned and projected data development

initiatives. This information can be used as a foundation to justify an agency expending resources to develop spatial data which goes beyond their stated mission and can establish the basis for inter-agency cost sharing agreements.

#### **Task 4: Define requirements and responsibilities for development of priority thematic data layers.**

While the base mapping efforts will create the foundation upon which other spatial data will be developed, individual agencies will continue to request funding for thematic layer development. Many of these initiatives will require major financial support. It is important that these mapping initiatives be considered and executed within a comprehensive view of multi-agency needs. These efforts must be supported by a process and structure for generating the required financial resources in order to encourage and facilitate the benefits of this type of coordination. **Agencies must be granted the necessary leeway to respond to a broader set of requirements than may be defined by their particular mission statement.**

Several important thematic layers are under development which address data needs in multiple agencies. Currently these include: wetlands and floodplain mapping by DNR; land use inventories by OP; shoreline analysis by DNR; forest inventories by DNR; Archaeologic and Historic Sites by DHCD, Gypsy Moth Spray Blocks and Defoliation by Agriculture and others.

MSGIC will serve as a coordinating body to review and prioritize efforts, assist in defining requirements so that multi-agency needs are met, and institute a process for review and recommendation to the DBFP to ensure support and funding for identified priorities. This role is dependent upon the formalization of a relationship with DBFP and MSGIC obtaining the functional authority to define and set priorities. Guidelines for thematic layer development must be established and publicized. Custodial agencies must be able to secure adequate funding to provide for maintenance of data layers.

#### **Task 5: Define and institute standards for database development.**

To be useable across multiple hardware platforms and for multi-agency purposes, spatial data must be developed within a frame of reference defined by standard formats, procedures, and protocols. This complex area is currently receiving much national attention due to the development of the National Spatial Data Infrastructure and the National Spatial Data Transfer Standard.

Data is currently being developed in response to varying standards by Maryland State agencies. This procedure has resulted in problems with data translation and exchange. Other states and associations, such as Texas, Ohio, Minnesota, and the International Association of Assessment Officials (IAAO), have already successfully implemented standards for data development. These alternatives should be studied for their applicability to Maryland's needs. Costs and benefits of these various alternatives should be assessed.

The MSGIC will draft, adopt, and publicize State database development standards. These standards should be adopted and utilized by all agencies embarking on the development of geo-referenced data, whether spatial or relational. Organizations external to Maryland State government will be encouraged to follow these guidelines to ensure compatibility of the broader network of information resources and needs.

#### **4.2 Data Exchange and Archival Preservation.**

Data sharing is not restricted to "high tech" environments among participating State government agencies. Any State government agency will be able to access data, products, or services which fit its particular needs. MSGIC initiatives will support data sharing across a range of technical levels, including the following:

- Standard hard copy distribution by GIS data producers
- Media exchange among GIS users
- Batch data transfer among GIS users
- On-line data access among selected GIS user groups

Existing GIS applications use a variety of computer systems and data formats. Development of data sharing and transfer will require development and enforcement of GIS standards for:

- Data format, accuracy, and currency
- Computer hardware and software compatibility
- Communication methods and protocols
- System interfaces and translators.

The goals of the Data Exchange and Archival Preservation activity track are: to (1) make existing data more accessible to all users, (2) better define existing resources and requirements, (3) ensure the security and confidentiality of existing data, and (4) ensure the archival preservation and accessibility of non-current spatial data.

To achieve these goals, six tasks are defined.

- Define and institute standards/protocols for data exchange;
- Simplify user access through the development of a simple, user-friendly catalogue of existing resources, and a guide to spatial data products and applications;
- Develop application standards;
- Address security and confidentiality issues related to access;
- Monitor existing and upcoming legislation which impacts requirements for database development; and
- Provide for archival preservation of non-current spatial data.

#### **Task 1: Define and institute standards/protocols for data exchange.**

The term "standards" has become a byword in the computer industry and is a common concern throughout the GIS industry and user community. In the context of data sharing and data exchange, required standards apply to the structure of data stored in the computer system.

Data developers within the MSGIC have provided specific programs to translate formats directly from one vendor's structure to another, or referred users to outside third-party vendors who can provide translation services. Many problems have been experienced to-date, and file exchange has remained a costly, time-consuming and questionable task.

The federal government has recently adopted the Spatial Data Transfer Standard (SDTS). It is an intermediate structure through which information passes, and has evolved to address purely cartographic information. It has been developed in response to the identified need for a mechanism that will allow spatial data to be moved from one computer system to another, independent of make or operating system.

MSGIC will monitor implementation and adopt SDTS as it becomes available to State and local agencies in the next year. At the appropriate subcommittee level, MSGIC will develop and distribute protocols and instructions for implementation of digital data exchange capabilities among existing systems. MSGIC will recommend that all future procurements of GIS software be compatible with federally required SDTS capabilities. Development and implementation of file exchange activities will be separate, but coordinated, efforts undertaken with the cooperation of individual agency/departmental system staffs.

**Task 2: Simplify user access through the development of a user-friendly catalogue of existing resources, and a guide to spatial data products and applications.**

In order to allow users of the various base map and thematic layers to evaluate the usefulness of the data for particular applications, the data must be documented. This documentation should be designed as a reference tool to answer questions that users may be confronted with when involved in application projects.

Recent attempts to define existing resources have been good, but fragmented. The existing data documentation catalogue establishes a complete **metadata** standard. It is extensive, but hard for the non-technical user to decipher. It should be enhanced and maintained, but a second, more user-friendly guide to existing data should be developed.

This **simplified data dictionary** should contain the name of the data, when and by whom it was developed, the system it was developed on, its scale and accuracy, the geographic coverage area, map feature format, and a description of non-graphic data attributes.

For new users and those agencies exploring the potential of GIS for their programs, a **guide to software and applications** should be developed by a MSGIC subcommittee. While much information exists in the literature on vendor evaluations, this information should be consolidated based on Maryland State government priorities and planning objectives. MSGIC can further its role as a central clearinghouse by providing concise evaluations of the functionality of particular software in the context of potential applications.

**Task 3: Develop application standards.**

To expand the functional use of existing systems and assist new users in utilizing GIS technology for analysis and map-making, common applications will be defined and standard algorithms will be developed by existing user agencies. Application standards, or guidelines, will be developed so that applications can be utilized by more than one agency. Common libraries may be identified where these applications can be stored and accessed. "Applications" may be no more than commonly used system interface procedures, or display and output parameters, or they may be more involved analysis routines. These types of common applications can assist users by reducing development time and eliminating redundancy. Source libraries can also be a repository for thematic data approved for general use by State agencies.

**Task 4: Address security and confidentiality issues related to access.**

GIS data is a valuable resource and, when created by government, may be characterized by interested segments of the public as public records, subject to access on demand under open records laws. However, the data may contain proprietary or confidential information which is protected by law. For the general welfare, State government may foster wide dissemination of GIS databases, but allocating resources to meet data requests may detract from internal effectiveness. Before such conflicting pressures develop, MSGIC should develop and publish data sharing policies which meet these conflicting demands in accordance with State Government Article 10-901 through 10-905, inclusive.

**Task 5: Monitor existing and upcoming legislation which impacts requirements for database development.**

Many agencies, which are not currently GIS users, are developing spatial data products which may be used for GIS analysis. Special attention must be paid to mandated requirements or regulations impacting these information gathering activities. By defining data requirements and promoting and adhering to standards, resources can be better spent in developing products which will continue to be useful.

MSGIC will monitor and respond to any proposed legislation related to information sharing, open records and database development. These issues have special relevance to GIS resources, which exist within the overall parameters of information policy. Legislative initiatives may not be overtly concerned with these aspects of

spatial data's potential use, but the impact of legislation could be significant. Due to the quick turn-around time for Bill Reports during the legislative session, the members of the Executive Committee of MSGIC shall coordinate and respond on behalf of MSGIC when preparing their individual agency Bill Reports.

#### **Task 6: Archival Preservation of Non-current Data.**

Records of geographic information systems are highly fragile and not likely to survive unless care is taken to ensure their preservation. The huge investment that government has made in these systems requires that important spatial data products be preserved for future generations. State law defines the responsibilities of the Maryland State Archives and the rules and regulations for retention and disposition of records. Custodial agencies have a joint responsibility with the Maryland State Archives and the Records Management Division of the Department of General Services to determine which spatial data products have permanent historical, legal, fiscal, educational or administrative value. Those permanent records which the agency decides it no longer needs for current operations are called non-current records. These non-current records require a plan for their permanent preservation.

Procedures will be established by MSGIC for the description, appraisal, preparation and transfer of non-current spatial data products to the Maryland State Archives.

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#### **4.3 Funding and Resource Development.**

Currently, GIS initiatives are funded primarily from the budgets of individual agencies or as part of defined grants or externally-funded, project-specific efforts. This has served to create an insecure environment for ongoing development of GIS data. Other alternatives exist to supplement line-item budgeting, and should be explored.

The passage of HB 1538, (State Government Article 10-901 through 10-905, inclusive), in the 1992 legislative session laid a strong foundation for agency cost recovery for spatial data products and services. As spatial data resources become more available for public use, individual agency policies must exist within a coherent framework or fee structure. The demand for product and service delivery must be addressed with long term goals in mind.

The goals of the Funding and Resource Development activity track are to (1) develop adequate funding mechanisms for the continued development of spatial data resources, and (2) increase partnerships with external entities.

To achieve these goals, five tasks are defined.

- Standardize policies for cost recovery and fee structures;
- Develop opportunities for inter-agency cost sharing agreements;
- Develop a marketing strategy for State GIS products and services;
- Develop a mechanism for the distribution of products and services; and
- Seek partnerships among federal, State, local, private sector, and university entities

### **Task 1: Standardize policies for cost recovery and fee structures.**

State Government Article 10-901 through 10-905, inclusive, took positive steps in allowing State agencies to recover costs for GIS data. It allows each agency to define an appropriate fee schedule for the products and services they provide. This structure may foster dramatically different cost recovery strategies among State agencies. As spatial data becomes more prevalent, and is available from more agencies, it may be necessary to develop consistent cost recovery strategies.

This will not be an easy task. This issue is compounded by very different philosophies about public access and government responsibility in the context of the high cost of development and tight budgets. While individual agencies continue to pursue the development of appropriate fee structures, as currently defined by statute, MSGIC will assist policy makers and agencies in developing a more consistent policy framework for the structure of cost recovery mechanisms.

### **Task 2: Develop opportunities for inter-agency cost sharing agreements.**

**Agencies need to utilize mechanisms already in place for inter-agency cost sharing of data development.** Funding agreements must become more commonplace if agencies are to share in the development of data which have usefulness beyond specific project requirements. MSGIC must encourage full utilization of these mechanisms, educate budget and management staff on their viability, and enlist the support of DBFP in their use.

This issue impacts data exchange practices, in addition to the costs associated with spatial data development. It is not clear whether agencies will pay one another for access to data developed by a custodial agency. Different policies may exist for data defined as base maps and those defined as thematic layers.

### **Task 3: Develop a mechanism for the distribution of products and services.**

Many needs drive the consideration of a centralized distribution/service center. As data is developed and becomes available for use, agencies are experiencing a significant increase in the demand for access. This involves increased staff time and media resources to respond to these demands. Most agencies involved in data development (either base or thematic layers) do not have human or fiscal resources to respond adequately.

Many new users need a centralized place to find technical support and resources to assist them in system design and development. For potential user departments which have GIS application needs, but who will never have GIS departments or even systems, there is a need to provide application and map-making services for specific projects or presentations.

These wide-ranging needs can be met in the short term by identifying a pool of resources within existing user agencies that can be dedicated, at least partially, to meeting data requests and providing technical support services. This solution may not be feasible for the long term. Agencies barely have resources to meet internal requests for data at this time. MSGIC could provide an interim directory, identifying individuals with particular areas of expertise, and work to define the need and options for a distribution/service center.

A long term objective would be to develop mechanisms to distribute data for public access and provide technical support for system design and application development. A mid-term objective would be to identify an agency which would serve in the interim as a centralized source for most data, be responsible for responding to public requests, and be able to direct a request to the appropriate agency for specialized needs.

### **Task 4: Develop a marketing strategy for State GIS products and services.**

As products become available, and policies for their distribution are finalized, the MSGIC should develop a directory for products and services available from Maryland State agencies. This directory will serve to simplify access to data prior to the development of a distribution/service center.

#### **Task 5: Seek partnerships among federal, local, private sector, and university entities.**

In order to expand the potential for cost sharing, increase the number of data development initiatives, and increase expertise and services among State agencies, partnerships with federal, local, private sector, and university entities should be encouraged. These partnerships will enable the realization of projects and initiatives which otherwise would languish for lack of adequate support. These entities can provide human resources and expertise as well as financial partnerships on projects. Internship programs, data exchange agreements and joint development initiatives are all possible with these external entities.

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#### **4.4 Education and Training.**

GIS technology is changing so rapidly, and the potential for applications is so great within State agencies, that trained technical staff will always be at a premium. Recognition of this skill set, as well as professional development tracks within State government will help to reduce the outflow of trained professional staff from State agencies to the private sector.

While support for GIS development is apparent within management structures of existing user agencies, much work is necessary to inform potential new users, managers, and policy makers about GIS technology, its uses and applications within State government.

The goals of the Education and Training activity track are to (1) increase GIS knowledge and skills among professional staff, (2) recruit and retain qualified staff and management, and (3) educate executives and policy makers on GIS concepts, applications and benefits.

To achieve these goals, four tasks are defined.

- Enhance skills among resident staff by encouraging participation in technical user groups, membership in professional organizations; and working with the State training center to develop training curriculum;
- Develop job classifications and appropriate pay scales to enhance professional staff;
- Act as a clearinghouse for information/activities related to GIS in Maryland State government; and
- Hold a GIS symposium targeted to new users and policy makers.

#### **Task 1: Enhance skills among resident staff.**

Several activities can serve to enhance technical skills among resident staff. Simple policies encouraging participation in technical user groups and professional organizations will keep staff informed about current issues and changes in the technology. Professional organizations often offer basic skills development seminars, especially about GIS management, policy, and access issues.

A more aggressive approach to building skills among staff is to develop a technical curriculum in cooperation with a university or through the State training center. This curriculum could help define professional development tracks within departments, and could provide an excellent cooperative venture for both resident staff training and internships.

**Task 2: Develop job classifications and appropriate pay scales to enhance professional staff.**

GIS has grown in an ad hoc fashion within many agencies. Therefore, various existing staff members with an inclination towards the technology or an interest and understanding in the use of the tool, have become the resident experts and are given the responsibility for development of GIS and spatial data resources and applications within the agencies. This has resulted in a wide variety of job titles, pay scales, and skill levels among existing staff working on GIS.

To complicate the situation, there are no existing job classifications for GIS personnel. Therefore, neither appropriate compensation or adequate recognition exist on a uniform basis throughout State government. It also fosters staff turnover, as people seek higher paying, professional roles outside State government. Consistent and well-defined job classifications with appropriate pay scales should be developed in conjunction with the Department of Personnel.

**Task 3: Act as a clearinghouse for information/activities related to GIS in Maryland State government.**

Currently there is no central clearinghouse for information about GIS or GIS activities within Maryland State government. The MSGIC should provide a clearinghouse function for users, potential new users, and the public in order to simplify and centralize the coordination of activities.

This clearinghouse function could be supported by several types of activities including development of a central repository for books, publications and information; publicized bibliographies on source material; and a newsletter or bulletin on current activities or upcoming events, highlighting different agency applications.

This function will require the allocation of dedicated staff resources to accomplish these tasks on a routine basis, in addition to the recognition required for an agency to serve in this capacity. MSGIC should determine an appropriate agency location for the clearinghouse services, and adequate funding to compensate for this activity should be established.

**Task 4: Hold a GIS symposium targeted to new users and policy makers.**

By the summer of 1994, MSGIC member agencies which have systems and applications under development should hold a GIS symposium targeted to new users and policy makers. This symposium should be "hands-on" oriented and showcase State agency work currently in progress. It should serve to highlight applications, and educate policy makers and new users on the benefits of GIS technology.

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**4.5 MSGIC Organizational Structure.**

Geographic information systems seldom fail for technical reasons; the technology works. Outright failures, or much more frequently, failure to reach expected system potential, is attributable, in most cases, to failures of organization and management. If MSGIC is to be a success in its goals of coordination, data sharing, technical support and cooperative application development, both the committee and its individual members will be required to deal with management issues at various levels of State government with no less attention than is given technical issues.

The goals of the MSGIC Organizational Structure activity track are to (1) develop an increasingly viable role for MSGIC in GIS coordination and development within Maryland State agencies; and (2) to develop a structure which is functionally responsive to the needs of the broad user community.

To achieve these goals, four tasks are defined:

- Maintain MSGIC as a cooperative entity, but evolve with increased authority;
- Develop a MSGIC Executive Committee;
- Institute a new subcommittee structure; and
- Give the new subcommittees focus and charter to carry out activities.

**Task 1: Maintain MSGIC as a cooperative entity, but evolve with increased authority.**

MSGIC is strongly committed to its current cooperative structure and does not wish to seek a mandated authority at the present time. While acknowledging this commitment, it recognizes that to be an effective coordinating body, it must move to assume a more viable role in policy and decision making.

This will require a concerted effort on behalf of the leadership and membership of MSGIC. It will require more dedicated time and staff commitments to the tasks laid out in this plan. It will also require a more visible presence and established working relationships with the policy-making entities of Maryland State government, namely the Governor's Office, the Department of Budget and Fiscal Planning and the Legislature. This is the single most important task facing the committee.

**Task 2: Develop a MSGIC Executive Committee.**

In order to be more responsive to the ongoing decision making responsibilities outlined in this plan, MSGIC will institute an Executive Committee made up of the Chair, the Chair-Elect, the Secretary and the Chairs of the Subcommittees. This group will meet on a monthly basis to address recommendations and decisions required by the subcommittees, the membership at large or outside entities. It will meet in conjunction with the monthly meetings of the subcommittees at least once a quarter. Its meetings will be open to the MSGIC membership.

**Task 3: Institute new subcommittee structure.**

MSGIC will institute a new subcommittee structure more responsive to the breadth of the mission it has defined. Preliminary discussions at the Strategic Planning Workshop identified six new subcommittees that, through the review process, have been condensed to the following four new subcommittees:

- Database and Resource Development -- to oversee the progress and development of the three digital base maps and the prioritization of thematic map layers. This group will also develop continued commitment and ongoing support for database development initiatives and explore grants and partnerships with external entities.
- Technical Assistance, Uses and Applications-- to coordinate and provide technical assistance to users in the development of GIS resources within State agencies. This group will also conduct a User Requirements Analysis, coordinate development of a simplified resource catalog, assist in the coordinated development of applications and encourage the active preservation of data deemed permanently valuable.
- Marketing and Education -- to create the fees and products directory; develop product marketing strategies; promote the development of GIS staff through training and other information development activities; and coordinate the GIS Symposium.

- Standards -- to oversee creation of data development and exchange standards, their use and institutionalization within Maryland State agencies, and develop guidelines for the retirement of permanently valuable data to the Maryland State Archives.

The subcommittees will be composed of individuals from member agencies, as well as academic, private sector, local, federal and regional government representatives as needed to complete their work. They will meet once a month, and report their progress to the full committee at its quarterly meetings. One meeting will be on the same day as the quarterly MSGIC meeting.

**Task 4: Give subcommittees focus/charter.**

While these brief descriptions outline the general subject orientation of the subcommittees, it is recognized that they will need to develop more explicit mission statements of their own to identify issues and activities within their purview. Initial task assignments will be in accordance with Appendix D. Each subcommittee must develop a detailed workplan to address these issues and tasks. More importantly, the subcommittees must be given the trust and authority to develop initiatives and produce recommendations which will be supported by the full committee. Much of the burden for successful implementation of the MSGIC plan will rest with the activities of the subcommittees, where all of the detailed work will take place.

## SECTION 5: Conclusion

### 5.1 Critical Success Factors

The Maryland State Geographic Information Coordinating Committee (MSGIC) has many issues and challenges to address in the months and years ahead. To be successful, MSGIC must achieve its defined objectives and fulfill the activities identified in the Strategic Planning Workshop and reflected in this Plan. However, to achieve those objectives, MSGIC will need to take actions in several critical areas. The completion of those actions can be considered Critical Success Factors, and all planning, design, and implementation activities should be accomplished with these critical success factors in mind.

- **Reorganization of the committee structure** to redefine and expand subcommittee programs and activities is critical to the realization of the benefits desired. This means empowering the MSGIC Executive Committee to function as policy advisors with specific responsibilities and authority for coordination of GIS activities. In addition, assignment of roles and responsibilities of user agencies with a vehicle for effective financial coordination is needed.
- A **long-term financing strategy** must ensure funding for completion of the three endorsed base maps and their continued maintenance. Funding may come from a variety of traditional sources, including annual budget allocations, as well as federal, local and private sector partnerships.
- **Early and regular coordination success** must occur with incremental milestones as evidenced by tangible results in cooperative database development initiatives, data sharing, technical support, and related objectives and activities of MSGIC. This success factor can best be met through focused subcommittee initiatives. An indication of success will be an increase in requests to MSGIC and its member agencies for GIS products, services and policy direction from State policy makers. Tangible results will increase MSGIC's credibility within respective agencies and departments as well as the State Legislature. These successes at interagency coordination will lead MSGIC to a transition from its role as a consensus based clearinghouse towards an effective GIS policy advocacy role.
- **Establishment of technical standards for data format and coding** will create the ability to share geographic data among multiple agencies and organizations. These standards relate to consistent

coding and classification schemes, layering approaches, attribute data formats and other technical data specifications regardless of software and hardware platform variances.

- **Joint mapping efforts and the development of GIS analyses and products** will increase productivity through the sharing of geographic data and system resources among State agencies. Federal, regional, State, and local government agencies and the private sector are all viable partners for the exchange of data, technology transfer and improved methods of accomplishing joint projects.
- **Acceptance of roles and responsibilities for access and maintenance of data** will require procedural standards that guide access to GIS data bases. Issues to be resolved include setting access and security limitations on the data, procedures for updating the databases, quality control and enforcement of standards for data capture.

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## 5.2 Strengths and Limitations

In guiding the coordinated development of GIS activities in the State, it is important to characterize the current organizational and technical environment as it relates to GIS development and operation at the State agency level. Such characterization provides a focus, with both strengths and limitations, for MSGIC's planning and for meeting its goals.

### Strengths

Strengths are factors that MSGIC has in its favor for the efficient and effective coordination of development and use of GIS technology in the State. Strengths can be considered advantages inherent in the existing State GIS technology or environment that can help to ensure the successful fulfillment of MSGIC's mission. MSGIC should focus on these strengths and use them as a foundation to efficiently implement its plans and activities.

- **Existence of trained, experienced staff** and a knowledgeable user base in several State government departments and agencies is quite high and is an important resource for guiding and assisting new users. However, continued training for this group and initial training for others are necessary to maintain a level of expertise in this changing technology.
- **A structured approach** for information exchange, data standards, data sharing, data base development and maintenance, system planning and implementation has begun and will continue with increased focus through the reorganization of MSGIC's subcommittees. Proceeding from general planning steps to detailed design activities is a process planned over the next 6 to 12 months, and will help ensure that MSGIC is coordinated in implementing each activity, in a correct and timely fashion, and that it best addresses the needs of present and potential users.
- **The current digital spatial data base maps** developed principally by DNR, OP, SHA, DAT and DHCD provide a firm foundation for implementation of some GIS applications. The current investments by these agencies in database creation will be of tremendous value in long-term system development.
- **Experience with multiple computer platforms and data formats** already exists. MSGIC members now use a variety of computer software for automated mapping and GIS-related applications.
- **High-level support for MSGIC and State GIS initiatives** is indicated by the level of support and commitment to MSGIC generally and the Strategic Planning Workshop in particular. The level of senior management support for GIS efforts varies among departments, but a more important factor is the strong personal commitment shown by managers and potential GIS users from a broad array of State departments and agencies represented on MSGIC.

## Limitations

Limitations reflect specific technological or institutional factors or conditions that may inhibit the efficient implementation of MSGIC's mission. MSGIC should attempt to eliminate these limitations or reduce their impact to more efficiently implement its plans and activities.

- **MSGIC's advisory role has been limited** to a forum for discussion and review by participating departments and agencies. It has not been structured in such a way that specific responsibilities and procedures for GIS development activities can be assigned and enforced. Participation on MSGIC varies with current workload and level of interest. As a result of the Strategic Planning process, MSGIC recognizes that its role, responsibilities and powers, and those of the member units, must be reorganized and more formally defined. The planned reorganization requires expenditures of funds and allocation of personnel, at which point MSGIC should evolve as a policy advisory body, directly advising appropriate financial and administrative units.
- **Obstacles to proper staffing** are an industry-wide problem, because demand for staff experienced in GIS technology greatly exceeds supply. Also, in Maryland, the existing set of job classifications and salaries may not allow effective recruitment and placement of all GIS management and technical support staff. Descriptions for certain GIS specific job categories have not been completed. Every key position on MSGIC, including subcommittee chairs, should have some formal recognition of this duty worked into their job description, or otherwise formally added to their duties so that appropriate emphasis may be placed on that aspect of their work load.
- **The thematic diversity** in Maryland that GIS technology is presently addressing, as well as future demand, is so great, and the concept of information management is so abstract to many of MSGIC's member constituents, that an overview theme is missing.
- **The formats of existing digital spatial data limit its use.** While the amount of data is extensive, the incompatibility of the data with existing systems is a limitation. Data structure and transferability must be addressed. Translation of graphic data formats is technically feasible today, but it is not a trivial process and still requires significant processing time and post-transfer checking to ensure a clean transfer.
- **Non-participation by only one key member of MSGIC can have a severe negative impact on MSGIC's mission.** This risk underscores the need to develop an organizational structure that promotes and encourages cooperation and achievement of mutual benefits.

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### 5.3 Issues and Challenges for MSGIC: A summary for Strategic Planning

Initial considerations by MSGIC focused on coordination of technical issues confronting each user agency, including documentation and cataloging of spatial data bases, compatibility of different systems, the need for solutions to transfer digital spatial data between systems with minimum data loss, and the need for standards applicable to scale, accuracy, formats and other characteristics. As MSGIC has begun to address these issues, additional issues and challenges have emerged. Today, the principal issues and challenges for MSGIC are:

#### Rapidly changing technologies

Dynamic changes in both computer hardware and GIS software functions and capabilities observed in recent years will continue at an increased pace, challenging the State's abilities to stay abreast of "state-of-the-art" developments. Much of the present hardware is "obsolete" by current market standards, and software revisions often require updated hardware capabilities.

Different GIS systems will continue to exist among different agencies. This presents a continuing need for data transfer standards and protocol developments, as well as the resolution of many issues related to the integration of diverse systems.

### **Broad potential user base with varying levels of expertise**

Many potential users are actively participating on MSGIC. Their interest and needs, as well as those of potential new users, may exceed the level of existing user activities and expertise. The needed guidance and orientation by experienced GIS users and managers to this category of users is both an urgent and major challenge to MSGIC.

MSGIC must move beyond its present scope and establish a grasp of the many ongoing efforts and activities at all levels across the State, including local, regional, and federal activities, and on the constraints to effective coordination among these entities and activities.

### **Data Access and Archival Preservation**

MSGIC as an entity and its individual agency members have significant growth potential because the existing GIS users and applications are a small percentage of the total potential users and applications of this technology within Maryland State government. As MSGIC and its members expand to accommodate these new users, issues of which data and applications are central (unrestricted) and which are departmental (restricted) will arise and must be resolved. As future department GIS's are proposed, their compatibility with State GIS standards must be enforced.

Although the newness of geographic information systems and other kinds of electronic records makes them seem different from other record-keeping systems, they are, in fact, records of government. As such, they are governed by certain legal mandates. State law defines the responsibilities of the Maryland State Archives and the rules and regulations for retention and disposition of records that apply to all government records regardless of format.

Policies that adequately address records issues must be developed. Currently, MSGIC is the central point for discussion and resolution of these issues.

### **Organization and Resources**

As previously stated, the single most important challenge to MSGIC will be to facilitate its own transition from a committee of agencies with a common interest in GIS development to an effective policy group working to coordinate GIS development in Maryland State agencies. This will require time, resources and a commitment on behalf of the members to assume roles and responsibilities beyond their agency missions. For coordinated GIS development to take place, this transition is vitally necessary.

Funding and budget constraints will continue to impose limitations on development that will force agencies to work together if systems and data resources are to be developed. MSGIC can serve as a conflict resolution body, a forum for airing different strategies and options while searching for appropriate solutions. This will require open minds and a willingness to adjust expectations and agency needs based on a broader definition of goals and priorities.

To ensure success, MSGIC will structure its activities to recognize and respond to the needs of policy makers and users. It will also provide a commitment and organized approach to long term implementation of GIS in Maryland State government.

## APPENDIX A: Strategic Planning Workshop Participants

### **Executive Department, Programs Office**

Stacy Siedlitz, Governor's Policy Fellow

### **State Comptroller's Office**

Marvin Bond, Assistant State Comptroller

### **Emergency Management Agency**

Sharon Osborne, Administrative Assistant

### **Office for Children, Youth and Families**

Virginia Ives, Project Manager

### **Office of Planning**

Ronald Kreitner, Director

Mike Lettre, Assistant Director, Planning Data Services

Tom Nasuta, Geographic Information Systems

### **Department of Agriculture**

Royden Powell, Chief, Resource Conservation Operations

Rowland Agbede, Natural Resources Planner

### **Department of Assessments and Taxation**

W. Henry Riley, Assistant Director

### **Department of Budget and Fiscal Planning**

Michael Langrehr, Director, Financial Management Information Systems

### **Department of Economic and Employment Development**

Pradeep Ganguly, Associate Director, Research

### **Department of the Environment**

Larry Priebe, Director, Management Information Systems

Karl Weaver, Natural Resources Manager

### **Department of General Services**

Mark Pleskow, Master Planner

Paul Kozlovsky, Architectural Technician

### **Department of Health and Mental Hygiene**

Daniel Hughes, Director, DHMH General Services Administration

### **Department of Housing and Community Development**

Maureen Kavanagh, Archeologist, Maryland Historical Trust

### **Department of Human Resources**

Pete Hannan, Office of Information Management

### **Department of Juvenile Services**

Thomas Murphy, Administrative Officer

### **Department of Natural Resources**

Bill Burgess, Director, Enforcement and Services Program, WRA

Lamere Hennessee, Geologist, Coastal and Estuarine Geology, MGS

Sandra Johnson, Director, Management Information Systems Unit

### **Department of Personnel**

George Lotterer, Director, Data Management

### **Department of Public Safety and Correctional Services**

Lt. Thomas Bailey, MSP Data Processing, Liaison Officer

Chris Hesford, Assistant Project Director, Maryland Incident-Based Reporting System

### **Department of Transportation**

Tom Neukam, Chief, Highway Information Services Division, SHA

Alisoun Moore, Geographic Information Systems Coordinator, SHA

Stuart Sirota, Mass Transit Administration

Susan Prosser, Aviation Noise Analyst, Maryland Aviation Administration

## APPENDIX B: General Membership of MSGIC

MICHEL LETTRE (VOTING)	TOM NASUTA	BOB DADD
MARYLAND OFFICE OF PLANNING	MARYLAND OFFICE OF PLANNING	MARYLAND OFFICE OF PLANNING
301 W PRESTON ST	301 W PRESTON ST	301 W PRESTON ST
BALTIMORE MD 21201	BALTIMORE MD 21201	BALTIMORE MD 21201
JOHN GARBER	DAWN DISTEFANO	STACEY SEIDLITZ (VOTING)
MARYLAND OFFICE OF PLANNING	MARYLAND OFFICE OF PLANNING	GOVERNORS OFFICE
301 W PRESTON ST	301 W PRESTON ST	STATE HOUSE
BALTIMORE MD 21201	BALTIMORE MD 21201	ANNAPOLIS MD 21401
LAWRENCE PRIEBE (VOTING)	ROBERT WILKINSON (VOTING)	MARK MOODY (VOTING)
MDE/MGMT & INFORMATION SYSTEMS	ASSESSMENTS & TAXATION	MD STATE DEPT OF EDUCATION
2500 BROENING HWY	301 W PRESTON ST, RM 902	200 W BALTIMORE ST
BALTIMORE MD 21224	BALTIMORE MD 21201-2305	BALTIMORE MD 21201
EDWARD PAPPENFUS (VOTING)	MAUREEN KAVANAGH (VOTING)	LARRY SWIFT (VOTING)
MARYLAND STATE ARCHIVES	MARYLAND HISTORICAL TRUST	STATE HIGHWAY ADMIN, GIS
350 ROWE BLVD	100 COMMUNITY PL	2323 W JOPPA RD
ANNAPOLIS MD 21401	CROWNSVILLE MD 21032	BROOKLANDVILLE MD 21022
ROSE DAVIS	J VINCENT MCCANN (VOTING)	ROWLAND AGBEDE (VOTING)
STATE HIGHWAY ADMIN, GIS	OFFICE OF STATE TREASURER	RESOURCE CONSERVATION, DOA
2323 W JOPPA RD	LOUIS L GOLSTEIN BLDG	50 HARRY S TRUMAN PKY
BROOKLANDVILLE MD 21022	ANNAPOLIS MD 21401	ANNAPOLIS MD 21401
DIANE FRESE	LAMERE HENNESSEE (SECRETARY)	MIKE LANGREHR (VOTING)
MARYLAND STATE ARCHIVES	MD GEOLOGICAL SURVEY DNR	DEPT OF BUDGET & FISCAL PLAN
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ANNAPOLIS MD 21401	BALTIMORE MD 21218	ANNAPOLIS MD 21401
ELIZABETH BARNARD (VOTING)	JANICE BREZINSKI (VOTING)	LT THOMAS BAILEY (VOTING)
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DEPT OF GENERAL SERVICES	DEPT OF HUMAN RESOURCES	MD HIGHER EDUCATION COMM
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THOMAS MURPHY (VOTING)	SHELLEY WASSERMAN (VOTING)	MARK PLESKOW
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THOMAS J. NEUKAM	RICHARD HUGHES	CHRISTOPHER BELL
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ANN RASBERRY	RICKA MARKOWITZ	ROBERT RICHTER
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TAWES STATE OFFICE BLDG E-1	200 W BALTIMORE ST	LOUIS L GOLDSTEIN BLDG
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MARYLAND EMERGENCY MGMT AGENCY	OFFICE FOR CHILDREN, YOUTH & FAM.	DEPT OF NATURAL RESOURCES
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PIKESVILLE MD21208	BALTIMORE MD 21201	ANNAPOLIS MARYLAND 21401
ALISOUN MOORE	EARL BRADLEY	W. HENRY RILEY
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ROYDEN POWELL	PETE HANNAN	MIKE GRIFFEN
DEPT OF AGRICULTURE	DEPT OF HUMAN RESOURCES	MDE/MGMT INFORMATION SYS.
50 HARRY S TRUMAN PKWY	311 W SARATOGA ST	2500 BROENING HWY.
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## APPENDIX C: Timelines for Task Completion

ACTIVITY TRACK	TIME FRAME
<b>4.1 Database Requirements</b>	
Task 1. Complete Major Base Mapping Projects	
Digital Ortho Quads	1993 through 1995
Infrastructure Base Maps	1994 through 1995
USGS Quad Map	1993
Task 2. Establish database maintenance cycle	1993 through 1994
Allocate resources for ongoing maintenance	
Five Year Cycle and Responsibilities Assigned	
Task 3. Complete User Requirements Analysis	1993 through 1994
Task 4. Theme layer definition	1993 through 1998
MSGIC reviews & prioritizes development	
MSGIC confers on priorities	
MSGIC adopts accuracy standard	
Establish/fund/publish maintenance schedule	
Task 5. Institute Standards for Database Development	1994 through 1995
Identify and examine existing standards	
Determine costs and benefits for options	
Draft state database development standards	
MSGIC adopts & recommends standards to Governor	
<b>4.2 Data Exchange and Archival Preservation</b>	
Task 1. Institute standards/protocols for data exchange	1994 through 1996
Identify and educate users re:SDTS	

Develop state data exchange standards/protocols MSGIC publish exchange standards for users	
Task 2. Simplify user access to GIS resources Develop user-friendly catalogue of data Develop guide to software/applications	1993 through 1998
Task 3. Develop application standards Identify standard algorithms Set up source libraries	1994 through 1995
Task 4. Address security & confidentiality issues Develop Access and Licensing Agreements	1993 through 1998
Task 5. Monitor legislative initiatives	1993 through 1998
Task 6. Archival Preservation of Non-current Data	1994 through 1998

#### **4.3 Funding and Resource Development**

Task 1. Standardize cost recovery and fee structures Seek advice of AG on differential fee structure Determine cost recovery of value-added services Gather pricing policies of different agencies	1994
Task 2. Develop marketing strategy for GIS products/services Publish products/services/fees directory	1995 through 1997
Task 3. Develop opportunities for intra-agency cost sharing	1994 through 1998
Task 4. Develop Service/Distribution Centers Establish pool of expertise among agencies Identify responsible agencies or create center	1994 through 1996
Task 5. Seek partnerships with external entities	1994 through 1998

#### **4.4 Education and Training**

Task 1. Enhance skills among resident staff	1993 through 1998
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Foster participation in technical user groups  
 Encourage membership in GIS organizations  
 Develop formal training curriculum

Task 2. Develop job classifications and appropriate pay scales 1994 through 1995

Task 3. Act as a clearinghouse on GIS information/activities 1994 through 1998

Task 4. Hold GIS symposium 1994

#### 4.5 MSGIC Organization

Task 1. Maintain cooperative structure; evolve authority 1993 through 1998

Task 2. Develop an Executive Committee of MSGIC 1993

Task 3. Institute new subcommittee structure 1993

Task 4. Give subcommittees focus/charter 1993

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### APPENDIX D: Subcommittee Task Assignments

TASK		SUBCOMMITTEES				
		Database & Resources	Technical Assistance	Marketing & Education	Standards	Exec.
<b>4.1</b>	<b>DATABASE REQUIREMENTS</b>					
Task 1	Base Maps and Funding Support	X (1)				
Task 2	Establish and Fund Maintenance Cycles	X (2)				
Task 3	User Requirements Analysis		X (3)			
Task 4	Thematic Data Layers	X (4)				
Task 5	Standards for Data Development					X (5)

**4.2 DATA EXCHANGE AND ARCHIVAL PRESERVATION**

Task 1	Standards for Data Exchange				X (1)
Task 2	Catalog and Guide to Products		X (2)		X (2)
Task 3	Application Standards	X (3)			X (3)
Task 4	Security and Confidentiality	X (4)			
Task 5	Monitor Legislation				X (5)
Task 6	Archival Preservation	X (6)			X (6)

**Database & Resources      Technical Assistance      Marketing & Education      Standards      Exec.**

**4.3 FUNDING AND RESOURCE DEVELOPMENT**

Task 1	Cost Recovery and Fee Structure				X (1)
Task 2	Inter-agency Agreements	X (2)			
Task 3	Product Distribution and Service		X (3)		
Task 4	Marketing Strategy				X (4)
Task 5	Partnerships	X (5)			

**4.4 EDUCATION AND TRAINING**

Task 1	Enhance Skills of Staff				X (1)
Task 2	Job Classifications				X (2)
Task 3	Clearinghouse for Information				X (3)
Task 4	GIS Symposium				X (4)

**4.5 MSGIC ORGANIZATIONAL STRUCTURE**

All Tasks Instituted by Vote of the Committee Membership