

Executive Summary

Geographic information (spatial data) is a capital asset of the State of Maryland, as real and vital to continuation of government operations as physical properties or professional and technical personnel. It is utilized by federal, state and local government agencies as well as the private sector. Geographic information is also a costly asset, the value of which is realized by many, but not all, agencies that exploit it for making informed decisions.

Geographic Information Systems (GIS) are powerful analysis and decision-support tools that integrate diverse spatially referenced databases to help users understand relationships among social, economic, environmental and demographic factors. GIS is used to assist multi-disciplinary professionals in collectively applying their knowledge to solve complex program and policy issues.

Numerous Maryland State and local government agencies have successfully implemented GIS technology and built complex spatial databases. Informed decision-makers recognize that the information and analyses tools provided by GIS technology are essential to effectively address their required mandates and complex decisions. Examples of many recent Maryland GIS success stories are highlighted in the sidebars of the Executive Summary.

We are challenged to make these complex systems and data sets available and easy to use by an even wider variety of users. With the explosion of Internet usage, coupled with Maryland's commitment to e-government solutions and data availability, the demand for graphic representation of data will surely increase. A popular phrase among federal agencies is "*You can't have e-government without g-government*" meaning GIS.

While relatively few state and local government agencies use GIS, some have used it effectively for more than two decades. Virtually *all* agencies collect geographically referenced data and can benefit from its use. It is imperative to coordinate among agencies engaged in automated mapping, geographic data collection, and development of GIS.

GIS Success Stories

- The Baltimore City Collaborative, with assistance of numerous organizations and agencies, has mapped child and family socioeconomic and health risk indicators at the Census tract level. These data strategically target high-risk areas with preventive child program resources, and will allow future monitoring of program effectiveness for influencing risk factors.
- The State successfully partnered with the Mellon Foundation to acquire 58,000 acres of valuable natural resource lands from the Chesapeake Forest Products Company in a complex transaction that required rapid assessment of more than 600 Chesapeake tracts distributed over five counties on the lower eastern shore. The Department of Natural Resources used GIS to quickly identify significant resources on these lands and bring the negotiations to a successful conclusion.
- Montgomery County's GIS Team developed a land evaluation application that allows Agricultural Preservation staff to quickly obtain values of land parcels targeted for preservation, including soil type, topography, land use, etc. in less than 15 minutes. Previously, manual procedures required 8 or more hours per parcel. GIS was instrumental for Montgomery County to receive \$8.55 million in Rural Legacy funding during FY98-01.

State agencies recognized early the important benefits derived from coordinating GIS development efforts among programs and activities. For more than eight years the Maryland State Government Geographic Information Coordinating Committee (MSGIC) has provided an informal, voluntary, proactive and effective forum for coordinating the use and development of GIS technologies among State government agencies. Another group, the Maryland Local Government Geographic Information Coordinating Committee (MLOGIC), has provided local government jurisdictions the means for interchange of common ideas and interests related to GIS issues. While MLOGIC and MSGIC have begun working together on issues of common concern, it is now time for these two organizations, plus others, to come together to find innovative solutions to the ongoing challenges of program funding, constituent education, and policy development.

Strategic planning has provided MSGIC a valuable framework for actions and policies. In 1993, MSGIC organized a Strategic Planning Workshop to develop a shared vision of GIS development in State government. The 1993 Strategic Plan provided a framework for MSGIC actions and policies for the past eight years, including an effective structure and action plan to address its goals and forward its mission. Even with limited and all voluntary staff resources, the needs of its member agencies were resolved in coordinated and constructive efforts. Digital base map layers were completed and maintained; data standards were developed; MDPropertyView was developed; and coordinated outreach activities were an ongoing commitment.

Today MSGIC is faced with new challenges. Smart Growth and e-Maryland initiatives have raised new demands for spatial data analysis among agencies that are not familiar with GIS technology. The development of a web-based “portal” into the State’s data and processes elevates the expectation that spatial data will be available on the Internet in easily usable applications that parallel the federal Digital Earth Program. These initiatives inherently assume that data and technologies will be utilized not only by agency staff, but citizens as well. Citizens have a higher degree of technological capability and now, more so than ever before, are demanding that the State’s processes become open, accessible, and interactive at *their* convenience. The challenge of putting data and technology “out there” for this new array of users will demand that agencies focus on issues of data quality and system interoperability that were not previously a consideration.

GIS Success Stories

- On April 7, 2000 approximately 110,000 gallons of oil spilled into Swanson Creek and the Patuxent River when a pipeline supplying a major power plant ruptured. Field crews needed detailed maps of the area with inventories of natural and cultural features to do their jobs. DNR supplied aerial photography and maps showing wetlands and sensitive species locations, as well as maps of historic and archeological features and property ownership using data produced by the DHCD and the DSP.
- The Howard County Public Safety System begins with 911 calltakers and dispatchers using interactive map displays to verify calls and to route responses, and all calls are geographically located as they are received. The Police and Fire analysts use GIS tools for planning new facilities and analyzing crime trends.

The rapid change of information technology challenges state and local government to respond with innovative solutions in spite of limited resources. MSGIC members have experienced these increasing demands, and recognize that a renewed focus on foundational issues is needed. Activities must be stepped up to meet these expectations. Programs that have been envisioned, but not implemented, now need to become reality. Spatial data must be available, and it must be shared for better decisions to be made. For e-government to become a reality, all these things must occur.

In September 2000, MSGIC conducted a two-day Strategic Planning Workshop with participation by 74 representatives from 30 State agencies, 11 local agencies, and 10 others from federal agencies and the private sector. For many, this Workshop was their first exposure to MSGIC, and they learned about the benefits of GIS and spatial analysis to their programs and missions. More importantly, they provided valuable insights and contributions to the workshop process.

Workshop participants affirmed that it is time to broaden MSGIC's initiative, as well as its membership to become an inclusive organization statewide. The voluntary nature of the current organization cannot provide the cohesiveness and the energy required for responding to the significant array of tasks and issues that were defined in the workshop. Dedicated staff are needed to coordinate and support these initiatives which must be more openly embraced, recognized and directly supported by the IT organizational hierarchy within Maryland state and local government. It was generally felt that by remaining outside this structure, GIS growth and development have been limited, and initiatives have not been fully acknowledged or supported by management and IT decision makers.

MSGIC must determine how it can best structure the support resources necessary for this effort. Over the next year, it must move from its current situation, where various staff from the leadership agencies assume responsibilities for specific activities, to become a more formal body for program and project support. This is not to suggest that no voluntary support will be necessary. It *does* mean that future activities will require a support structure different from the current one.

GIS Success Stories

In Howard County:

- ? The Public Safety System begins with 911 calltakers and dispatchers using interactive map displays to verify calls and to route responses, and all calls are geographically located as they are received. The Police and Fire analysts use GIS tools for planning new facilities and analyzing crime trends.
- ? The Bureau of Highways uses GPS and GIS to coordinate snow removal efforts during a snow event. GPS units and sensors on snow plows provide real-time data to a map display showing roads plowed, and when they were plowed. The map and data are available to users through a web-based tool.
- ? The County's GIS Division provides data, mapping and information to GIS users through an Intranet web site that provides casual users a wide range of data and allows creation of simple maps. Sophisticated GIS users can download data for their own desktop analysis.
- ? Citizens of Howard County use GIS to view subdivision status in the County development approval process. Interactive maps are integrated into the County's public web site, www.co.ho.md.us, with an easy to use interface.

MSGIC must examine alternative organizational structures to effectively move GIS into the mainstream of Maryland information technology. In the short term, MSGIC must be the vehicle from which a new organization emerges. MSGIC must broaden its participation base and give thorough consideration to the range of organizational alternatives that might meet future needs. An Organizational Structures Subcommittee is recommended to focus on structure, staffing and support, and funding actions from both a short term and a long-term perspective.

MSGIC should consider establishing some level of secured funding to support its work and activities. The degree to which MSGIC centralizes responsibility for various projects, initiatives or activities will determine its overall budget requirement. The Organizational Structures Subcommittee should determine its budgetary requirements and a potential revenue stream that would meet these needs.

The mission and responsibilities of the subcommittees should be adjusted to meet ongoing and specific project needs. MSGIC should also explore the use of specific project-based working groups that have a limited focus and life cycle. These working groups should be empowered to fully explore issues, make recommendations to the standing subcommittees and decision-making body. As they resolve issues and institutionalize solutions, their life cycle should end, and others formed as issues and requirements change. This type of broader organizational structure will ensure that all groups have the opportunity to influence the direction and substance of future geographic information programs and policies.

Many of the issues woven through the workshop dialogue related to data development, data sharing, data standards, and data utilization. Much of MSGIC's attention in previous years has been on data, but an expanded agenda was presented, including:

- Increased cooperation between state and local partners in creating data at a mutually acceptable scale, and how to fund these efforts in a sound and equitable manner.
- A prioritized effort to focus on production and distribution of the Federal Geographic Data Committee's seven Framework base data layers (at a larger scale than is currently available).
- Emphasis on developing good premise addresses, and address ranges on the road centerline network.

GIS Success Stories

The Baltimore City Collaborative, with assistance of numerous organizations and agencies, has mapped child and family socioeconomic and health risk indicators at the Census tract level. These data strategically target high-risk areas with preventive child program resources, and will allow future monitoring of program effectiveness for influencing risk factors.

Framework Base Data Layers

1. Elevation and Bathymetry – elevation of land surfaces and water depths
2. Hydrography – surface water features
3. Geodetic Control – reference system for locating geographic position
4. Cadastral – property interests
5. Transportation – transportation networks and facilities
6. Government Units – national, state, local and tribal boundaries
7. Orthoimagery – map accurate aerial photograph

- Developing a routine data maintenance model where sustained maintenance is appropriately supported and funded.
- Requiring that published standards be followed and coupled with a renewed effort to define standards for the “base” layers.
- Implementing a Clearinghouse, where data can be centrally accessed over the Web is fundamental in making GIS a more functional tool for a broader array of users.

It was clear that the time has come for all levels of Maryland government to begin defining GIS data development and stewardship as a capital asset activity. In this way, these projects can be more appropriately funded as a capital expenditure instead of as an operational expense. Agencies should also be able to fund ongoing maintenance in this way.

As GIS technology becomes more broadly available to a wider array of users, demand for more training, and the need for a better understanding of the technology and issues related to it will be the driving forces in whether or not this technology becomes all it can be. Responding to the educational demands of a broad clientele will be a primary challenge for MSGIC. MSGIC does not need to provide all of the training for these groups, but it does need to serve as a coordinating body to ensure that affordable training becomes available for all of the different types of users.

The importance of developing appropriate programs (demonstrations, examples, “quick hits”) for top level leaders, directors and managers was by far the strongest point of consensus among workshop participants. Without a better understanding of the power and potential of GIS among these decision-makers, there is no way to achieve either financial or staffing support for future system and data development initiatives.

A significant challenge facing MSGIC is the need to prepare and assemble a training force to provide, through cooperation and coordination of players in the academic and education community, the appropriate array of services needed. Traditional methods of training and curriculum may need to be revamped to provide more “short courses” and specific job skills training in order to respond to the needs of this diverse audience. In addition, workshop participants focused on the particular need to strengthen GIS and GIS curriculum initiatives in K-12 education. Several examples of successful integration of GIS activities in school curriculum were identified.

GIS Success Stories

In Baltimore County:

? Comprehensive Rezoning uses a customized ArcView GIS interface to provide planners and decision-makers the ability to query, display and track zoning issues. Current zoning can be overlaid with parcel data, and the application permits analyses of current zoning, proposed zoning changes and tracking of zoning issues. Planners can also produce mass mailings to citizens, locate zoning signs, and digitize zoning changes.

? *LACquire* automates retrieval, query and reporting of assessment data for the Land Acquisition Unit. New capabilities include parcel selection, attribute query, data retrieval from assessment layers, creation of assessment forms, Titles and Appraisal forms, letters and mailings.

Throughout the Strategic Planning Workshop, common themes and interests for program coordination were raised. The issues of data sharing, and integrating GIS into business functions naturally led to discussions of how GIS can contribute to on-going statewide programmatic initiatives. These initiatives will provide many opportunities to coordinate multi-agency and multi-jurisdictional programs, identify data sharing opportunities, and demonstrate the application of GIS and spatial analyses that improve business practices and client services.

Major programmatic initiatives, were identified that require technical support and policy issues to clarify and demonstrate the benefit of GIS and spatial analyses to these programs:

- Mapping Indicators of Child Well-being
- Enhancing Maryland's Smart Growth Program
- Supporting the eMaryland Initiative

The role of MSGIC as a promoter, coordinator, facilitator, advisor (both technical and policy), and partner fits well in its overall mission and objectives, and provides opportunities for MSGIC members to work across department, agency, and jurisdiction boundaries. MSGIC is already positioned to coordinate data compilation and applications development to support several identified program efforts and initiatives.

In guiding the coordinated development of GIS activities in Maryland, it is important to characterize the current organizational and technical environments. Such characterization provides a focus, with both strengths and limitations, for MSGIC's planning and for meeting its goals and objectives.

Strengths are factors that both MSGIC and MLOGIC have in their favor for the effective coordination and development of GIS technology throughout the State. MSGIC should focus on these strengths and use them as a foundation to efficiently implement its plans and activities.

- Existence of trained and experienced staff
- Experience with multiple computer platforms, software and data formats
- A structured approach for information exchange and related data issues
- Digital base maps
- High-level support for MSGIC and State GIS initiatives

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

- Obstacles to proper staffing and classification
- The enormous diversity of un-prioritized GIS application needs
- Non-Participation by key agencies can have a severe impact on MSGIC's mission
- Structure for assignment of specific responsibilities and procedures for GIS development activities.
- Participation that varies with current workload and level of interest.

GIS in Maryland is at a crossroads and there are many issues and challenges to be solved before GIS in Maryland is the broad-based, widely accessible tool that it can be. MSGIC must achieve the defined objectives and fulfill activities reflected in this Strategic Plan. Actions must be taken in several critical areas. The completions of those actions may be evaluated in terms of **Critical Success Factors**, and all planning, design, and implementation activities should be accomplished with these critical success factors in mind.

- Are new challenges and opportunities approached proactively?
- Is GIS integrated with "main stream" IT technologies?
- Are Standards fully implemented?
- Is there a broader user base?
- Is GIS integrated into Agency Business Practices?
- Is GIS considered on the front end of projects and proposed legislation?
- Is GIS improving "customer service"?
- Does the public find data provided by GIS to be credible?
- Is there a raised level of awareness, appreciation, and demand for GIS within and among management levels of government?
- Has use of GIS increased as a fundamental part of people's jobs?

MSGIC's Executive Committee will make recommendations to the Office of Information Technology for implementation of a new state GIS strategy.

Section 1. Challenge and Vision for the Future of GIS in Maryland

1.1 Introduction

This document was prepared for the Maryland State Government Geographic Information Coordinating Committee (MSGIC) following their Strategic Planning Workshop held on September 13? 14, 2000. It defines a Strategic Plan to accomplish the shared vision of geographic information systems development in Maryland, essential for an effective response to today's complex issues and dynamically changing environment.

Geographic Information Systems (GIS) are powerful analysis and decision-support tools. GIS technology has demonstrated the capability to integrate diverse spatially referenced databases and to help users understand relationships among social, economic, environmental and demographic factors. GIS is used to assist multi-disciplinary professionals in collectively applying their knowledge to solve complex program and policy issues.

From many GIS "success" stories, both large and small, several recent examples are shown on the following page.

Geographic or spatial information is continually being applied in new and different ways. Numerous Maryland state and local government agencies have successfully implemented GIS technology and built complex spatial databases. These decision makers have recognized that the information and analyses tools provided by GIS technology are essential to effectively address their required mandates and complex decisions. But these systems remain expensive to build and difficult to use in our common, everyday environment.

As we move toward the future, the challenge will be to make these complex systems and data sets available, accessible and easy to use by a wide variety of users, many of whom we can only barely anticipate at this point in time. With the explosion of Internet usage, coupled with Maryland's commitment to *e-commerce* solutions and data availability, the demand for graphic representation of data will surely increase. Policy and decision makers need to effectively choose programmatic initiatives that further the development of data to support these ventures. These are the challenges that face us as we try to envision the future.

Examples of Maryland's GIS Success Stories

The State successfully partnered with the Mellon Foundation to acquire 58,000 acres of valuable natural resource lands from the Chesapeake Forest Products Company in a complex transaction that required rapid assessment of more than 600 Chesapeake tracts distributed over five counties on the lower eastern shore. The Department of Natural Resources used GIS to quickly identify significant resources on these lands and bring the negotiations to a successful conclusion.

On April 7, 2000 approximately 110,000 gallons of oil spilled into Swanson Creek and the Patuxent River when a pipeline supplying a major power plant ruptured. Field crews needed detailed maps of the area with inventories of natural and cultural features to do their jobs. DNR supplied aerial photography and maps showing wetlands and sensitive species locations, as well as maps of historic and archeological features and property ownership using data produced by the DHCD and the DSP.

In Howard County:

- ? The Public Safety System begins with 911 calltakers and dispatchers using interactive map displays to verify calls and to route responses, and all calls are geographically located as they are received. The Police and Fire analysts use GIS tools for planning new facilities and analyzing crime trends.
- ? The Bureau of Highways uses GPS and GIS to coordinate snow removal efforts during a snow event. GPS units and sensors on snow plows provide real-time data to a map display showing roads plowed, and when they were plowed. The map and data are available to users through a web-based tool.
- ? The County's GIS Division provides data, mapping and information to GIS users through an Intranet web site that provides casual users a wide range of data and allows creation of simple maps. Sophisticated GIS users can download data for their own desktop analysis.
- ? Citizens of Howard County use GIS to view subdivision status in the County development approval process. Interactive maps are integrated into the County's public web site, www.co.ho.md.us, with an easy to use interface.

The Baltimore City Collaborative, with assistance of numerous organizations and agencies, has mapped child and family socioeconomic and health risk indicators at the Census tract level. These data strategically target high-risk areas with preventive child program resources, and will allow future monitoring of program effectiveness for influencing risk factors.

In Baltimore County:

- ? Comprehensive Rezoning uses a customized ArcView GIS interface to provide planners and decision-makers the ability to query, display and track zoning issues. Current zoning can be overlaid with parcel data, and the application permits analyses of current zoning, proposed zoning changes and tracking of zoning issues. Planners can also produce mass mailings to citizens, locate zoning signs, and digitize zoning changes.

? *LACQuire* automates retrieval, query and reporting of assessment data for the Land Acquisition Unit. New capabilities include parcel selection, attribute query, data retrieval from assessment layers, creation of assessment forms, Titles and Appraisal forms, letters and mailings.

Montgomery County's GIS Team developed a land evaluation application that allows Agricultural Preservation staff to quickly obtain values of land parcels targeted for preservation, including soil type, topography, land use, etc. in less than 15 minutes. Previously, manual procedures required 8 or more hours per parcel. GIS was instrumental for Montgomery County to receive \$8.55 million in Rural Legacy funding during FY98-01.

1.2 Background

For more than eight years MSGIC has provided an informal, voluntary, proactive and effective forum for coordinating the use and development of GIS technologies among Maryland's state government agencies. The successful influence and continuing effort of MSGIC has been endorsed and recognized through the following achievements:

- Advanced integration of GIS technologies and applications into state government programs;
- Distribution and dissemination of spatial data products to GIS users throughout Maryland at all levels of government and the private sector through the Technology Toolbox; and
- Demonstrated benefits of geographic information for improved and efficient government decision making and problem solving.
- On-line access to GIS data through Merlin Online.

Maryland State government agencies of the Executive Branch recognized early that there were important benefits to be derived from coordinating GIS development efforts among state programs and activities. Since 1992, state agencies have met on a regular basis to coordinate the use of GIS technologies to meet their particular needs, assist other state agencies in understanding the established standards, applications and benefits of GIS technologies, and to avoid duplication of efforts. The activities and interests of MSGIC reflect recognition that the rapid expansion of GIS and related technologies affect every level of government.

MSGIC began as a voluntary committee. In developing a statement of mission and objectives, MSGIC recognized that while only a few state agencies were using GIS at the time, virtually *all* agencies collected geographically referenced data. It was imperative to coordinate among agencies engaged in automated mapping, geographic data collection, and development of GIS.

Even then, it was challenging for MSGIC to define an effective structure and establish an action plan that addressed its goals and forwarded its mission. Limited staff resources, identification of leadership, involvement at the subcommittee level and balancing the needs of its member agencies were difficult issues to resolve. Prior to 1993, GIS and spatial data development initiatives were proceeding without sufficient consensus on priority or benefit to State government.

In October 1993, MSGIC organized a Strategic Planning Workshop involving thirty participants from 19 state agencies to develop a shared vision for State geographic information systems development. The 1993 Workshop led to a Strategic Plan that

provided a framework for MSGIC actions and policies over the next several years. The 1993 Strategic Plan provided the State with a shared vision of information systems development and an organizational structure to support its mission and activities, which included:

- Concurrence on an organizational structure,
- Completion and continued maintenance of three digital base map layers (DNR's Digital Orthophoto Quarter Quads, SHA's Digital Infrastructure Base Maps, and DHCD's Digital USGS 7.5' Topographic Quadrangle Maps),
- Development of data standards, and
- A commitment to coordinated outreach activities.

MSGIC has successfully coordinated integration of non-redundant GIS activities, supported development of geographic data sets that are useful to multiple agency purposes, encouraged development and use of standards, and developed guidelines for facilitating GIS implementation and ensuring the preservation of permanently valuable GIS data.

Besides reconfirming their commitment to a voluntary organizational structure at a second strategic planning workshop in November 1996, MSGIC committed to:

- Increased coordination with local and federal government and state academia; and
- Data and product distribution mechanisms that include coordination through the Technology Toolbox, a group of private sector data distribution partners.

1.3 Today's Challenges

As it enters the new millennium, MSGIC again finds itself faced with many challenges. Smart Growth and eMaryland initiatives have raised new demands for spatial data analysis among agencies that are not familiar with GIS technology. The development of a web-based "portal" into the State's data and processes elevates the expectation that spatial data will be available on the Internet in easily usable applications. These initiatives inherently assume that data and technologies will be utilized not only by agency staff, but citizens as well. Citizens have a higher degree of technological capability and now, more so than ever before, they are demanding that the State's processes become open, accessible, and interactive at *their* convenience. The challenge of putting data and technology "out there" for this new array of users demands that agencies focus on issues of data quality and system interoperability that they really never before have had to attend to.

The rapid change of technology challenges state and local government to respond with innovative solutions to resource issues. MSGIC has felt these demands increase, and has

recognized that a renewed focus on foundational issues is needed. Activities must be stepped up to meet these expectations. Programs that have been envisioned but not implemented now need to become reality. Spatial data must be available; it must be shared for better decisions to be made, and for requests for information to have tangible meaning.

Effective partnerships must be created. For example, in April 1995 the Maryland Local Government Geographic Information Coordinating Committee (MLOGIC) was established to provide local government jurisdictions the means for the interchange of common ideas and interests related to GIS issues. MLOGIC has met quarterly, and since early 1997 the Chairperson of MLOGIC has participated as a member of MSGIC's Executive Subcommittee. During this time, MLOGIC and MSGIC have begun to work together on issues of common concern. But now these two organizations, plus others, need to come together to find innovative solutions to the ongoing challenges of program funding, constituent education, and policy development.

MSGIC has always recognized that coordination and cooperation are the keys to successful integration of GIS technology throughout State government. MSGIC has also recognized that strategic planning can be a valuable process that provides a framework for MSGIC actions and policies. The Strategic Planning Workshop was conducted on September 13 and 14, 2000, with participation by 74 representatives from 30 State agencies, 11 local agencies, and ten others, including academia, federal agencies, and the private sector, (see Appendix A.)

For many participants, this Workshop was their first exposure to MSGIC. The Workshop included participation from local counties through MLOGIC, which has encouraged MSGIC in recent years to coordinate, share and integrate GIS technology statewide. Also participating were newly appointed members to MSGIC from several State agencies. These representatives learned about the benefits of GIS and spatial analyses to their own programs and missions, and provided valuable insights and contributions to the workshop process.

1.4 A Vision for GIS in Maryland

“MSGIC was established to facilitate coordination of geographic information systems (GIS) and associated technologies within Maryland State government. The Committee seeks to minimize duplication of GIS efforts, support the development of data sets useful to multiple agencies, serve as a focal point for coordination of State agency GIS activities, and develop guidelines for GIS implementation in the State.”
1993 MSGIC Strategic Plan.

During the 1993 Strategic Planning Workshop, participants were well focused on goals and objectives that enable them to establish the above Mission statement. It has served MSGIC well and continues to provide a broadly accepted vision.

As MSGIC's 2000 Strategic Planning Workshop began, a much larger and more diverse group of participants were asked to consider the question, "What is your vision for GIS in Maryland's future?" Difficult as the question was, participants created a compelling vision of problem solving and decision-making as vital citizen and government GIS uses, and they set out earnest technical, financial, communication, and collaboration challenges for MSGIC to address to help achieve that vision.

Working in four breakout groups, participants described their vision of how citizens and government officials would use GIS to solve problems related to crime, health, drugs, environment, and many other public policy issues. Stakeholders from state, local, and federal government, universities, and the private sector talked about how GIS should appear "invisible" and "seamless" to users. They predicted GIS would become "essential" to the accomplishment of government's mission and citizen participation in democratic processes by becoming "commonplace" in schools, work, and on the Web.

These were neither new hopes for GIS nor new uses. Many participants described their own experiences using GIS to do their jobs better and make data and information more useful to the public. *What emerged with the commitment to join forces to realize GIS' capacity, was the recognition that GIS would need to re-define and re-position itself in the State of Maryland if it would succeed in the way participants knew it could.*

Participants observed that GIS was at a threshold between early, isolated and sporadic programmatic uses and more comprehensive, integrated, and strategic uses. They talked about how GIS needed to be regarded as a way of thinking and understanding, as an approach to making decisions and solving problems as much or more than it should be thought of as a technology or a tool. They described it as an investment in better decision-making, not merely as an information technology cost. They talked about GIS as the key to making prior state and local government investments in data pay off, especially data locked in legacy systems.

Participants also challenged state and local governments to reconsider MSGIC's role as GIS crosses this threshold. They agreed that MSGIC was well positioned to carry out the general activity coordination functions it has been doing and must to continue doing, such as state-wide data collection efforts among all levels of state and local governments, developing standards, fostering awareness and training, and facilitating communication with local jurisdictions.

But participants were less certain that MSGIC is, or should be, the right body to take on all the challenges of GIS as it crossed into new territory -- to elevate GIS in the state; to articulate a vision for all GIS users in the State of Maryland, not just a state government vision; to connect GIS to government business requirements and to hold government managers accountable for the quality and efficacy of its use; to change the way GIS is conceptualized and funded in the executive and legislative branches.

Participants observed that the success of MSGIC to-date has brought it to this threshold. They agreed that representatives from all the sectors present should work together, through MSGIC, to implement solutions to those challenges MSGIC is well placed to address. And they also agreed that they should work together, initially through MSGIC, to better articulate the threshold challenges, to continue defining MSGIC's role as GIS crosses this threshold, to identify appropriate options for addressing new and rising challenges to their vision of GIS in Maryland.

1.5 The Action Agenda

The workshop consisted of a series of four concurrently facilitated breakout sessions to directly involve the participants in dialogues designed to share views and experiences in order to assess future goals and objectives, strengths and weaknesses, future opportunities and constraints, and to determine priorities of focus and resource requirements. This series of facilitated discussions covered a core agenda, including:

- MSGIC relationships and organization
- Data distribution policies
- Activities and Services
- Products and Data
- Staffing, education and training
- Funding mechanisms
- Standards
- Programmatic opportunities to coordinate GIS statewide

Following most breakout sessions, plenary sessions provided an opportunity for each group to present its findings and conclusions and to broaden discussion before the larger forum. (See Appendix B for Workshop Agenda.)

MSGIC recognizes that coordination and cooperation are the keys to successful integration of GIS technology, and this continues to be its guiding principal. Workshop participants concluded their visioning exercise with this resulting diagram:

Communication and Coordination

Data/Information Exchange

- Includes broad standards for data, hardware, software, metadata and MORE
- Quality
- Uniformity

Access

- Between Government Agencies
- With the Public

Coordinated Data Development

- Information about who's doing what
- Central "Who's Doing What" knowledge base location
- Funding should be included

Education



- K-16
- Users, Producers, Managers

Discussions in the subsequent breakout sessions provided the substance for a series of recommendations prepared for consideration by MSGIC. Some of these recommendations propose further evaluation of significant issues, such as organization. The two-day workshop provided only a means to identify and enter into initial discussion on some of these topics. Other areas resulted in firm tasks and action items as an agenda for work over the next several years. The following sections present the results of these discussions.

Section 2. The Challenge of Forming a More Responsive Organization

GIS in Maryland is at a crossroads. It will not succeed in becoming the broad-based, widely accessible tool that it can be, if things continue as they are. While MSGIC has been lauded for its effectiveness in moving GIS forward in Maryland, this success has also served to keep GIS separate and isolated from recent IT initiatives state-wide.

It is time to broaden the initiative. The voluntary nature of the current organization cannot provide the cohesiveness and the energy required for responding to the significant array of tasks and issues that were defined in the workshop. Dedicated staff are needed to coordinate and support these initiatives which must be more openly embraced, recognized and directly supported by the IT organizational hierarchy within Maryland state and local government. It was generally felt that by remaining outside this structure, GIS growth and development have been limited, and initiatives have not been fully acknowledged or supported by management and IT decision makers.

Few, if any, State GIS initiatives have been funded by new information technology funding mechanisms. Partnerships for GIS system and data development among and between agencies at all levels of government remain minimal. Successes are generally not effectively communicated, and therefore, GIS is not recognized or promoted as a central tool in current initiatives by many senior managers. Major GIS resource allocation (project support) often goes to initiatives that provide a solution for a particular agency. The products or results may later meet the user needs of multiple agencies and thus becomes another piece of the complex GIS system development requirement. This often leaves system and data development fragmented or incomplete. This must change.

There is a distinct need for a broader forum to address this wide array of issues with a unifying, consolidating, and authoritative voice. This group must be recognized by the IT management hierarchy within the state, including the Information Technology Board (ITB), the Information Technology Advisory Council (ITAC) and other IT policy making entities at the state and local level. And it must have the cooperation and support of all significant players in the GIS community. Data development priorities, in particular, must take into consideration those solutions that meet not only state agency uses, but local and educational initiatives as well.

Therefore, there are both short-term and long-term strategies that must be addressed in terms of organizational structure. In the short term, MSGIC must be the vehicle from which a new organization emerges. It must serve as the incubator for whatever form the new organization takes. It may be this “new” organization or it may birth it. MSGIC must broaden its participant base in preparation for this work, and it must give thorough

consideration to the range of organizational alternatives that might meet future needs. Therefore, an **Organizational Structures Subcommittee** is recommended to focus on the following action items from both a short term and a long-term perspective:

- Organizational structure
- Staffing and support
- Funding

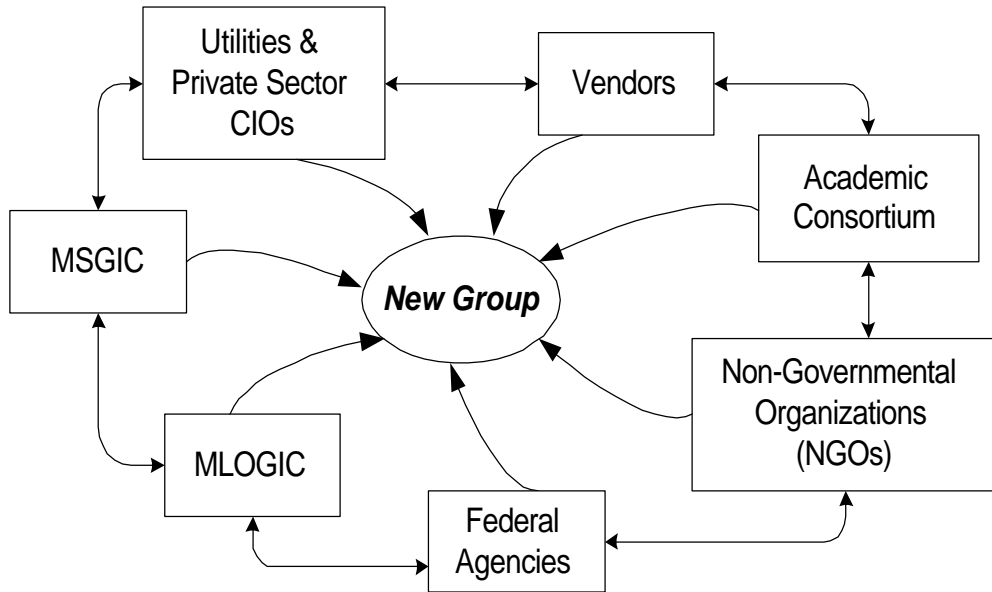
2.1 Organizational Structure

MSGIC must examine alternative organizational structures to effectively move GIS into the mainstream of Maryland information technology. Several key issues must be addressed in the context of long term growth regarding the appropriate type of structure to best meet the needs of the broader GIS community. Identification, full exploration and prioritization of these issues will be necessary. Some of these issues include:

- How can state agencies develop a successful and equitable working relationship with counties?
- How should MSGIC go about involving more state, local, and federal agencies, and GIS users from other sectors (utilities, academia)?
- Should MLOGIC and MSGIC formally merge into one entity?
- Can a single coordinating body address all existing issues?
- Should new structures be implemented?
- How can administrative support best be provided?
- Should MSGIC have its own funding stream (dues, line item budget, etc.)?

Several state GIS organizational structures were reviewed as options or as alternatives to current requirements in Maryland. State structures reviewed include: Pennsylvania, Nebraska, Ohio, Delaware, California, Arizona, Texas, Washington, Kentucky and Oregon. Two distinct models emerged for consideration, although participants in Maryland will need to determine a solution that best fits their needs.

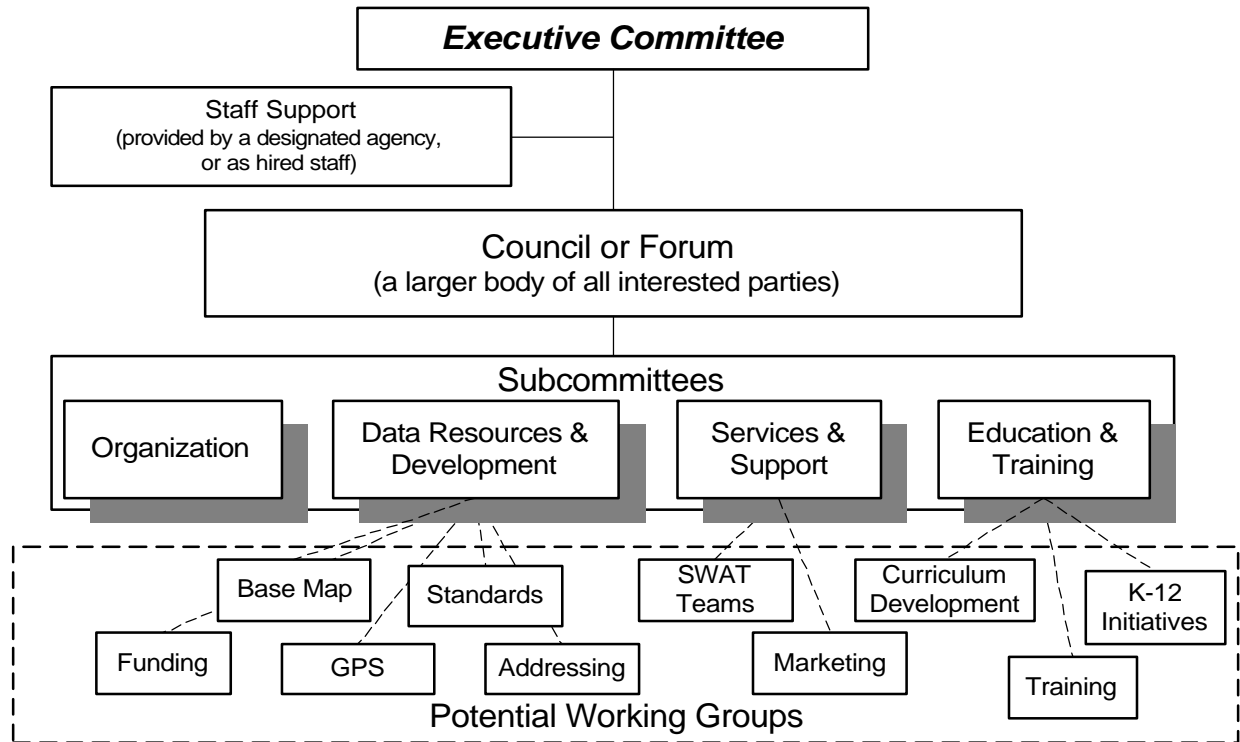
One option would be to keep the individual groups (MSGIC representing state government; MLOGIC representing local government; an academic consortium, etc.), bind them together for the purposes of synergy and create a kind of “coordinating committee” or forum at the center. The function of this new group might fundamentally be one of coordination, probably the strongest single action that workshop participants wanted. A structure might look something like this:



An alternative solution might be to develop one “merged” group to grow out of what MSGIC has become, keeping the strengths of the organization (recognition, longevity, influence, track record), but formally broadening its focus and participant base. Because of the significantly wider array of issues and participants, a multi-tiered structure would be necessary. One must assume the requirement of dedicated staff support of some kind. Formation of this group would probably require an executive order or empowering legislation. Participation would be spelled out in this formal enabling document. The group could be advisory in nature, but would provide a recognized forum for policy development. Or it could actually be responsible for managing projects determined to be in the best interest, or “for the good of” the broad array of represented participants.

There would still be ongoing issues related to participant involvement. As with any organization, the level of participant involvement is not always ideal. The organization would continue to struggle with issues related to representation and responsiveness. The issue of *who* provides the staff support would be critical. (Is this person/staff effective, responsive, able to get things done?) Many states with this type of formal organization remain mired in staffing and organizational issues. It is not a perfect solution.

An organizational structure might look like this:



Recommended Actions. In the short term, for the next 8 – 10 months, the overall organizational structure of MSGIC should remain basically the same, except for the following changes:

- 1) MSGIC should take steps to immediately broaden its participant base. MSGIC should issue an invitation for participation to all members, MLOGIC members, representatives of all academic institutions, and representatives of the utility and private sectors.
- 2) Should MSGIC choose not to pursue any more significant alteration of its structure than this, steps should be undertaken to modify existing bylaws to accommodate the full participation of these groups.
- 3) MSGIC should immediately formulate an Organizational Structure Subcommittee. This subcommittee should be charged with evaluating the issues and options presented in this section, and define a more broadly responsive structure. This group must be more representative of the issues and goals of all GIS users in the state, and must work more closely with the formal IT structure in Maryland, especially the State CIO and the Information Technology Board.

- 4) Determine the new organizational structure and move, by the end of this fiscal year (or sooner if budget cycles require), towards implementing a modified organizational solution.

2.2 Staffing and Support

Most of the initiatives proposed in this plan will take more than a volunteer effort to move forward effectively. MSGIC must determine how it can best structure the support resources necessary for this effort. Over the next year, it must move from its current situation, where various staff from the leadership agencies assume responsibilities for specific activities, to establish a more formal body for program and project support. This is not to suggest that no voluntary support will be necessary. It *does* mean that future activities will require a support structure different from the current one. Several possibilities exist, including:

- 1) Establishing a paid position specifically to support the activities of a GIS Advisory body. This person's sole responsibility is to manage and coordinate GIS activities within state agencies, as defined by the particular GIS Advisory body. This staff position can be housed within any agency, but it is recognized as the GIS Coordinator. In some states, a staff person within one specific agency is designated as the GIS Coordinator.
- 2) Funding a specific office that supports and coordinates GIS activities. Some states have a designated Office of Geographic Information Services, with an Executive Director aided by one to five staff members.
- 3) Designating staff from one or multiple agencies to provide support for specific efforts. In some states, one agency provides all staff support for a GIS Advisory body, whatever its form. In other states, this function is shared among agencies. When more than one agency provides this support, then specific tasks and activities are defined in detail.

Recommended Actions. MSGIC should pursue a more formal approach to staffing support, whether that is an actual designated position within a specific agency, or specific hired or contracted staff to support initiatives over the next 2-5 years.

2.3 Funding the Efforts

In addition to moving toward a more permanent structure for staff support, MSGIC should consider establishing some level of secured funding to support the work of the group. The degree to which MSGIC centralizes responsibility for various projects, initiatives or activities will determine its overall budget requirement. As part of its

deliberations over the next 8-10 months, the Organizational Structures Subcommittee should determine its budgetary requirements and a potential revenue stream that would meet these needs.

States utilize different methods to secure operational and project funding.

- Direct line item support in the state or primary supporting agency's general or capital budget.
- Member organizations pay between \$100 and \$5,000 annual dues to belong to a GIS Advisory body. States that have moved toward this solution have done so by recognizing that voluntary support in underwriting ongoing operational expenses does not establish a permanent ongoing structure.
- Several states utilize revenues from the sale of geographic data and monies collected from the provision of services (workshops, training, etc.) to fund operations of their Advisory body.

This funding for administrative support should not be confused with the financing needed for various system and data development initiatives.

Recommended Actions. MSGIC should evaluate various alternatives and establish within the next fiscal year a more formal budget requirement and funding structure for administrative and staff support.

2.4 Subcommittee Structure

The future activities of MSGIC will require the broad participation and ongoing involvement of representatives of the full array of organizations discussed in this section. For issues to be fully examined and appropriate solutions and programs identified, enthusiastic and complete participation in the subcommittee structure is required. In addition, this mission calls for a modified organizational and working subcommittee structure. The mission and responsibilities of the committees should be adjusted to meet ongoing and specific project needs. It is suggested that MSGIC explore the use of specific project-based working groups that have a limited focus and life cycle. These working groups should be empowered to fully explore issues, make recommendations to the standing subcommittees and decision-making body. As they resolve issues and institutionalize solutions, their life cycle should end, and others may form as issues and requirements change. This type of broader organizational structure will ensure that all groups have the opportunity to influence the direction and substance of future geographic information programs and policies.

Recommended Actions. MSGIC should reorganize its Subcommittee structure to reflect these changes:

- *Organizational Structure* — a new subcommittee, as discussed in Section 2.1.
- *Database and Resource Development* — a continuing subcommittee which should address new database development issues as well as data sharing, data funding, and database maintenance requirements. The Database and Resource Development Subcommittee should have the following working groups formed over the next year:
 - ✓ Base Map Development Working Group to work on issues as identified in Section 3.1, including developing a plan of action for development and implementation of the seven Framework data layers identified in the National Spatial Data Infrastructure.
 - ✓ Standards Working Group to work on issues as identified in Section 3.2, including ensuring the publications of standards for all base layers, and the development of programs and incentives for adoption and use of standards by user agencies.
 - ✓ Addressing Working Group to work on issues as identified in Section 3.3, including the development of a statewide premise address database, better data sharing procedures between existing state and local agencies to improve the ongoing quality of this database, and the conflation of address ranges onto the road centerline file.
 - ✓ GPS Working Group should take the place of the current subcommittee, and report its findings and activities on an ongoing basis to the full Database and Resource Development Subcommittee.
- *Coordination, Services and Technical Support* — similar to the existing Technical Assistance, Users and Applications subcommittee. Two specific working groups were identified as a part of the Strategic Planning Workshop. They include:
 - ✓ SWAT Teams, described more fully in Section 4, these groups would be composed of agency staff who could be assembled to provide assistance to end user agencies on a specific problem or for application definition assistance.
 - ✓ Geo-Coding Application Development Working Group, which would help to develop a geo-coding application for use by any state or local agency (potentially even citizens through the web portal)
- *Education and Training* — The workshop participants identified a number of specific needs that can be addressed by a refocusing of this existing subcommittee, more fully discussed in Section 5. This committee may choose to “hand off” its focus on marketing activities to the Coordination, Services and Technical Support Subcommittee, or to develop a specific working group to focus on these activities. Other working groups might focus on development and

tracking of curriculum offerings by all academic institutions and the private sector; K-12 programs and initiatives; and the development and dissemination of educational materials and training modules for prioritized groups such as executives, citizens, and managers.

The remainder of the report presents action agendas identified during the Workshop for each of these subcommittees. Programmatic Initiatives discussed in Section 6 involve tasks and activities that cross subcommittee lines.

Section 3. Development and Dissemination of Data Resources

Many of the issues woven through the workshop dialogue were related to data. Data development. Data sharing. Data standards. Data utilization. Much of MSGIC's attention in previous years has been on data, but expanded agenda presents itself, including:

- Increased cooperation between state and local partners in creating data at a mutually acceptable scale, and how to fund these efforts in a sound and equitable manner.
- A prioritized effort to focus on production and distribution, at a larger scale than is currently available, the Federal Geographic Data Committee's seven Framework base data layers:

? Elevation	? Hydrography
? Geodetic Control	? Cadastral
? Transportation	? Governmental Units
? Orthoimagery	

- Emphasis on developing good premise addresses, and address ranges on the road centerline network.
- Developing a data maintenance model where sustained maintenance appropriately supported and funded is a part of daily work.
- Requiring that published standards are followed, coupled with a renewed effort to define standards for the "base" layers.
- Implementing a Clearinghouse, where data can be centrally accessed over the Web is fundamental in making GIS a more functional tool for a broader array of users.

These issues are more completely addressed in the following sections.

3.1 Base Map Development

State agencies have worked hard to develop some core data layers, but their use is generally limited to a few State agencies and many users, both State and local, need a more robust foundation as was expressed in MSGIC's Study of Vertical Integration. There has been no focused effort, for example, to develop the seven FGDC Framework base layers to a scale that is useable at the county level. Efforts to discuss and evaluate a vertical integration model for database development built a good foundation but have not progressed to any identifiable initiatives. The issue of an appropriate development scale between state and local requirements has been around for some time. MSGIC must

develop a plan (in coordination with participant agencies) to develop and maintain the DOQQs, road centerlines, hydrography, digital elevation models, a vector cadastral layer, governmental units or political boundaries, and geodetic control at a scale that meets a broader array of end user requirements.

This does not imply that all layers must be developed at the largest possible scale. It does mean that MSGIC needs to continue to act as the forum for evaluating and developing overall data development goals and a plan for making them happen.

MSGIC needs to identify and articulate what funding and resources the state can reasonably afford to commit to in terms of base map development. As a practical matter, the state can probably only afford to continue to maintain a series of products at 1:12,000 and 1"=24,000 scales, but it must be acknowledged that this may not be adequate for local use. MSGIC should pursue a way to coordinate the development of the base layers at the county level at a larger scale, so that this goal can be achieved over time.

One of the most important developments in recent years has been MSGIC's outreach to local governments, academia, and the private sector. The joint MSGIC / MLOGIC study in 1997 of the "Vertical Integration of Spatial Data", for example, brought together representatives from Federal, Regional, State, County and Municipal agencies as well as private firms to discuss a wide range of data related issues. Vertical integration is the joint development of common themes of data by federal, state, local and regional partners. Based on a general belief that all levels of government will benefit from this data development approach, the group discussed benefits and impediments, the procedures and techniques required to integrate spatial data, and the technical feasibility of integrating spatial data to meet the needs of all participants.

Working under the assumption that this is possible, a methodology was outlined to document actual costs for developing spatial data. The resulting White Paper provides a comprehensive summary of the types of issues, positive and negative factors, and the results of subsequent cost studies. It is an on-going work; issues are neither conclusive nor resolved. In addition to the findings, it presents an important step towards greater coordination of organizations engaged in the creation, distribution, and analysis of geographic data in Maryland. Work that was begun with the Vertical Integration study should be continued. It laid a good foundation for developing the analysis to move forward.

The following table lists a set of spatial data that was prioritized by Workshop participants who felt that these data best meet both state and local needs and provide the framework for Maryland's Spatial Data Infrastructure:

Data Set	Standards* / Metadata	Development Status	Priority
Statewide Road Centerlines	Yes*	SHA;1:24,000 updated yearly	1
Hydrography	No	USGS, 1:24,000	2
Cadastral Vectors	No	Some at county level; 1:2,400 fitted to Orthophotoa & some to planimetrics	3
Government Units/Boundaries	No*	SHA; 1:24,000 periodic updates	2
Digital Orthophoto Quarter Quads	Yes	DNR; 1:12,000, no update	3
Digital Elevation Models	Yes	USGS	3
Geodetic Control	No		2
Soils	No	NRCS, 1:12,000	3
Land Use/Land Cover	No*	MDP,1:63,360; DNR, 1:12,000	3
Premise Addresses tied to Parcels	No	DAT data, MDP graphics; Points over raster parcels @ 1:24,000	1
Address Ranges tied to Road Centerlines	No*	SHA; Not Completed; on 1:24,000 centerlines	1
Social/Small Area Indicator Data	No	OCYF; preliminary design	1

* For the noted data sets, there are no published standards, but there are established procedures and protocols for data compilation. Federal standards exist for the FGDC framework layers; if MSGIC agencies accept Federal standards, they should be published and available to MSGIC membership.

Recommended Actions.

- Reaffirm and/or acknowledge what MSGIC considers to be the GIS base layers,
- Establish a MSGIC workgroup for each of the Framework (or prioritized) data layers.
- Determine what resources will be required to develop and maintain these prioritized layers.
- Continue the work begun with the vertical integration study and determine ways that state agencies and local governments can cooperatively develop core data layers.
- Reach consensus among the different levels of government regarding the scale to which each of the base layers will be developed and actively put in place programs that support this development.

3.2 Standards

MSGIC has published several standards over the last 3-4 years. But these standards do not help effectively guide state and local agencies in the core framework data elements required to develop data sets nor do they ensure that multiple data sets are compatible. Except for addressing there are no data content standards or spatial accuracy standards for any of the core base layers. Basic data standards should be defined for all recognized base map layers, especially if development is pursued on a partnership basis or if the State is considering implementing any type of vertical integration model.

Many new user agencies and local governments are beginning to work in GIS, and to develop data and applications. It would be very helpful if MSGIC developed guidelines, not only for data standards, but for general system and data development activities as well. Many agencies need a model to go by, or compare to, and it would help to put together or promote an existing “how to” guide. This would help ensure that new users understood aspects of the environment they were getting into and would assist them in not replicating previous mistakes.

Recommended Actions.

- Develop standards and/or guidelines for all base or prioritized data layers
- Work with the Office of Information Technology to ensure compliance with adopted standards at the agency level.
- Include all adopted standards in any RFP that deals with any type of data development activity.
- Develop a mechanism or guideline to ensure data integrity through some type of audited quality control or reliability factor.

3.3 Funding for Data Development and Maintenance

One of the biggest challenges faced by agencies at all levels of government in working with GIS technology is the high cost of developing and maintaining data. Participants had several suggestions for various initiatives that would help reduce the overall cost of data creation. Fundamentally, they wanted to see more opportunities for joint development, from flying aerial photography to more extensive thematic data layer development, such as utility lines or economic development sites.

Two major obstacles were identified, which participants felt could be overcome with better communication. One was the fundamental “go it alone” philosophy-- the perception that projects are less problematic if others are not involved. Competing or differing specifications of multiple partners such as data content, scale, ownership and use don't have to be considered. The second issue was overcoming a basic

communication difficulty. It is hard to know who else is considering a similar initiative or who might be interested in partnering. The effort to seek out partners is often more than any particular agency is willing to commit.

Several of the newer participants indicated that they could use guidance in accurately budgeting for data development and, more importantly, ongoing data maintenance. MSGIC could meet a distinct need by assisting newer user agencies through a workshop or focus meeting on lessons learned.

It was clear that the time has come for Maryland government at all levels to begin defining GIS data development and stewardship as a capital asset activity. In this way, these projects can be funded as a capital expenditure instead of as an operational expense. Agencies should also be able to fund ongoing maintenance in this way¹. Spatial data has become an essential part of Maryland's capital infrastructure, yet continues to be funded by annual appropriations or project related costs. If spatial data is an important part of Maryland's information infrastructure, it should be constructed, maintained, and budgeted over its long-term life cycle as any other critical capital asset.

Finally, the Information Technology Investment Fund is designed to provide funding to State agencies for innovative technology pilot programs, prototypes and projects that provide universal citizen access to information. This fund was created to act as an incentive for extraordinary, innovative technology projects that enhance citizen access and improve customer service. MSGIC should explore this funding option, especially as GIS moves forward in new applications and web-based service delivery.

Recommended Actions. The following ideas were presented as action items to further funding options among agencies engaged in data development and maintenance.

- Develop a web-based Project Board or Bid Board where agencies can post potential projects and solicit partners.
- Change procurement regulations that inhibit partnering or cost sharing among agencies from different levels of government or in projects with the private sector.
- Connect GIS and spatial analyses, including database development and maintenance, to projects related to an agency's mission that support management results and expectations.

¹ The Federal Office of Management and Budget (OMB) has noted that "Historically, government budget authorities treated spatial data and its supporting infrastructure as data processing expenses to be funded from current year operating budgets. However, as spatial applications began to extend into nearly every aspect of our lives, they began to cut across organizational lines and exceed the capacities of single department missions and budgets...No one agency or level of government can or should build or fund its spatial data and decision support needs alone."

- Develop standard language for cost sharing agreements that meet legal approval and that are accepted by procurement authorities in state and local government.
- Develop at least one proposal for using the Information Technology Investment Fund for a pilot data development project during the next fiscal year.
- Hold a workshop that examines funding requirements for data development and ongoing database maintenance, particularly focused towards newer user agencies.
- Review public policy issues regarding leasing of privately owned data.

3.4 Statewide Addressing

Workshop participants discussed the need for better premise address files and increased cooperation between local efforts to improve premise addresses and the Maryland Department of Assessment and Taxation. Past MSGIC initiatives have included development of addressing standards that included address components, abbreviations, and numbering schemes. But it has been difficult to get those who are developing data that requires geocoding to adhere to the standards and guidelines by. Further, there are multiple street base maps, with different coverage areas, levels of accuracy and detail. These include, among others, the enhanced Tiger files from the US Census Bureau, Baltimore Metropolitan Council address base, one maintained by Bell Atlantic and address ranges maintained by Geographic Data Technology.

Participants recommended that a Statewide Addressing initiative be undertaken. The goal of this initiative would be to represent, through geographic coordinates or descriptors, every street address in Maryland. This would be a complex project that would involve many different players and require agreement among the different standards. It would affect many diverse service providers, from E911 to postal delivery, tax assessment, utility connections and many others.

Recommended Actions. Developing and maintaining accurate and complete premise address data is an important programmatic opportunity. A statewide addressing initiative should be undertaken.

- The Maryland State Department of Assessments and Taxation (SDAT) should partner with local governments, E911 initiatives and others to ensure that the premise address information is accurate.
- The Department of Planning should provide technical support and assistance.
- SDAT should work with each jurisdiction in determining accuracy at an appropriate level to their functional operation in coordinating and enforcing standards.

In addition, MSGIC should create and maintain a geocoding engine, or application, that would serve agencies within state and local government, and possibly be used through the web portal, to work with legacy databases. Several options exist for the basis of this application. These options should be evaluated after a requirements document is developed.

- Update or enhance street centerline database with street address ranges, and conflate address ranges into the state road network maintained by SHA.
- Update and maintain the MD Property View application tied to the parcel address and its location.

3.5 Establishing a Clearinghouse.

Workshop participants repeatedly returned to the idea of an electronic clearinghouse for GIS data throughout the sessions, from the first discussion of the future of GIS in Maryland to the very last sessions on programmatic initiatives. Users want one location or repository for data to be stored, managed and accessed. It needs a simple, straightforward web interface that is usable by any end user.

At the core of these discussions were issues of broader access to data, and fundamentally, just knowing what data was available. Easier data access is seen as critical in creating a better utilization of GIS technology. Of course, this is a more complex issue than just creating a web site or a data directory. Issues dealing with equitable access, distribution, copyright, fees, and privacy underlie every discussion.

Everyone supports the idea of increased access to data. For the most part, everyone wants data to be easily available, to be free to access and use, and for all relevant contributors to be able to share the appropriate level of data they generate and maintain. A lingering perception that has caused problems between state and local governments related to the local government's obligations to report certain data to the state followed by the state's practice of distributing some data sets to local governments, as well as the general public, for fee. This issue will need to be resolved adequately as new policies and alternatives are put in place

Other significant issues, especially as data is distributed via the web, revolve around the public's right to know and issues of privacy. This discussion cannot be resolved in one short dialogue at a workshop. It needs to be addressed by state policy-makers as more and more data is made publicly available through the state's portal. Many agencies, new to GIS, have geographically referenced legacy data, With very legitimate concerns about client privacy they are reluctant to make the data available in an easily comprehensible picture for the public.. These issues are particularly relevant for many health, justice and human services agencies.

Recommended Actions.

- The Federal Geographic Data Committee (FDGC) has recently recognized three Maryland institutions, Towson University, University of Maryland Baltimore County, and Salisbury State University, as Metadata Nodes. MSGIC, working with each site, needs to establish a format and create a metadata directory of all publicly available data. Link this to other portal and *e*-Maryland initiatives, so that the metadata format establishes a “standard” for all publicly available data.
- Workshop participants expressed a clear desire that data content also be available through either the Towson University site or other portal, in addition to Metadata. MSGIC needs to re-evaluate fee policies in light of more open data sharing and custodianship alternatives. Data made available through the Towson University, or other portal, would thus become a data clearinghouse in addition to its Metadata status.

Section 4. Coordination, Services and Support

As Maryland's use of geographic information systems grows from early, isolated programmatic uses to more comprehensive and strategic uses statewide, users find themselves increasingly in need of new and different services. Key service needs emerged during workshop discussions:

- Coordination
- Technical Support
- Marketing/Promotion

4.1 Coordination

Perhaps the most urgent need for assistance expressed in the Strategic Planning Workshop was for increased communication and coordination among all players in the arena. Participants related many stories of lost opportunities, missed chances for partnering to share resources, influence policy, and build a stronger GIS base just because an aggressive mechanism for communication and coordination does not exist.

Recommended Actions. Participants looked to MSGIC to help meet this need and pointed to various means of electronic and automated communications as part of the solution. The following tasks are recommended:

- Develop shared web space where projects can be posted, calls for partners can be made, funding opportunities can be noted, RFPs can be pre-announced within the State so work can be shared and efforts not duplicated, etc.
- Formalize communication on a small number of key issues to ensure that agencies are informed of them, such as pre-release circulation of RFPs
- Develop an internal "want ad" for departments looking for certain data or expertise
- Maintain an updated list of GIS contacts in each Department or organizational unit?
- Add a GIS update section to senior management meeting agendas and reports for key information that needs to be shared at the top and flow down, thus ensuring that new laws or programs with a spatial data component identify and fund data production.
- Add a small number of key GIS questions to the list of issues that Departments check-off as senior officials concur on regulations, policies, budgets, etc.
- Build on the Vertical Integration study efforts related to data access and sharing

- Make continual efforts to engage and respond to the broadest possible membership of MSGIC, avoiding past concerns of limited participating agencies.
- Formulate with State CIO MSGIC's role in reviewing proposed GIS projects seeking funding.

4.2 Technical Support

While not every agency will need to build or be able to build a robust GIS capability, any agency could have significant GIS applications. This situation calls for agencies with better-developed GIS capacities to share expertise as a form of support. The State needs to think creatively about ways to tap technical staff resources without over-burdening them and to think explicitly about reciprocity in the support relationships.

The notion of a "SWAT Team" approach to technical support generated interest and enthusiasm in breakout groups where it was discussed. The approach would involve identifying state GIS experts who would assemble quickly and flexibly to assist agencies with technical issues, and then disassemble once the assistance had been provided. This type of support works best for episodic or short-term needs rather than continual or long-term assistance. The SWAT Team would not necessarily become an extended staff or "client" office. MSGIC should consider forming SWAT Teams with distinct roles so that different state personnel would be able to step in and out of team slots on an as-available basis.

Recommended Actions. Implementation of technical support requires more than identification and designation of qualified personnel. Policies and guidelines for implementation must also be developed. Among the recommended issues to be addressed are the needs to:

- MSGIC must distinguish between one-time projects that may qualify for technical assistance, and on-going office support needs that require qualified dedicated staffing.
- MSGIC must distinguish between small projects that may be easily supported and large project that may have extended support needs.
- The technical assistance concept is most applicable to the identification and work with agencies with limited resources and requirements. It will be useful for MSGIC to categorize or classify anticipated support needs to plan the staffing and management of "SWAT Teams".
- Swat Teams can supplement face-to-face technical assistance support with hard copy and Web-based material (e.g. guidance, standards, how-to guides, etc.) and newsgroups.

4.3 Marketing / Promotion

Consensus from the Workshop was that GIS marketing and promotion efforts needed some elevation and heightened awareness. It is recommended that these activities presently part of the Marketing and Education Subcommittee, be shifted to the Services Subcommittee. With an eye on growing services and support, the Services Committee will think strategically about where the spotlight can be put on GIS and to develop strategies for pursuing those opportunities.

A high-level official should lead MSGIC's efforts to elevate GIS statewide. MSGIC should identify this person as a GIS Champion—a person whose influence and position will further issues related to the use and development of the technology. This person can be from within State government, or from local government or the private sector. Whoever is identified, “GIS Champion” should be broadly recognized and respected by many sectors, be positively associated with GIS, and agree to be responsible for promoting GIS to fellow senior officials and for being accountable for the campaign's results.

Key State-wide programmatic (regulatory and non-regulatory) and budgetary decision processes should be identified into which a GIS component can be systematically and strategically introduced. Examples include programmatic and budgetary priority setting, statutory and regulatory development, speech writing, etc. to which the GIS champion or MSGIC members can appropriately add GIS language. Similar opportunities should be identified at the department level.

The Services Subcommittee should push for inclusion of a GIS component in decision mechanisms such as concurrence (signature) documents, decision memoranda, decision briefings, budget proposals and analyses, etc. . The addition of a GIS check box, signature box, etc. on such documents would require departments to verify that GIS was considered during the decision process of its project or proposal. This raises awareness and enlarges the circle of decision-makers and senior advisors who become familiar with GIS's relevance to their work.

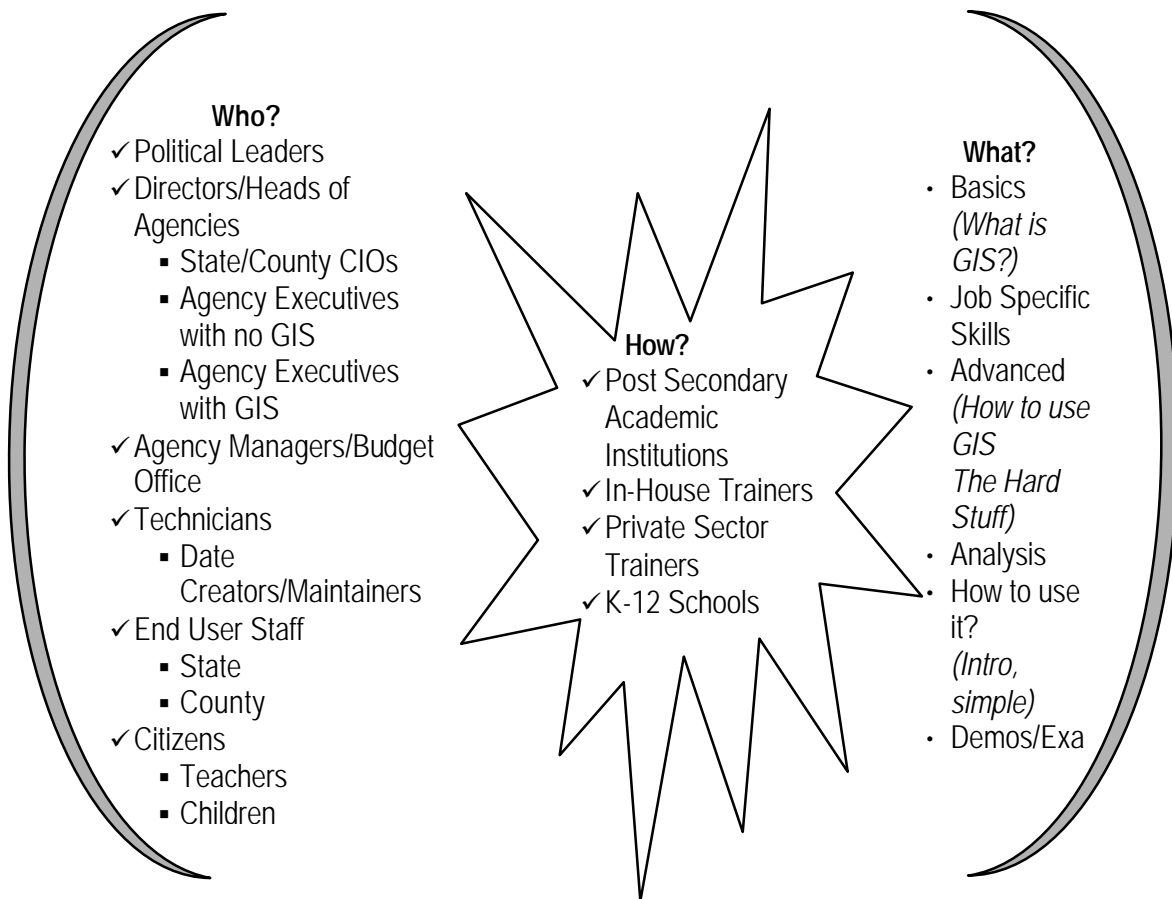
Recommended Actions.

- Identify a statewide GIS champion.
- Identify key decision processes into which GIS can be introduced.
- Amend key decision mechanisms to include GIS as a component.

Section 5. Education

As GIS technology becomes more broadly available to a wider array of users, demand for more training, and the need for a better understanding of the technology and issues related to it will be the driving forces in whether or not this technology becomes all it can be. Responding to the educational demands of the broad clientele will be a primary challenge for MSGIC. MSGIC does not need to provide all the training for all these groups, but it does need to serve as a coordinating body to ensure that all the types of training become available (and are affordable) for all of the different types of users.

Many different types of training/education are needed to meet the needs of this broad array of “users”, including basics, demos, job-specific, and advanced analysis. Workshop participants identified 6 target audiences for the Education/Training focuses/programs that are needed:



The importance of developing appropriate programs (demos, examples, “quick hits”) for top level leaders, directors and managers was by far the strongest point of consensus among workshop participants. Directors and managers do not need to know how to use GIS nor do they have time to learn the technology. They do need to understand basic concepts, including applications, uses and benefits, and to have staff supportive and responsive to their needs and who can interact and communicate effectively with GIS technical support staff. But without a better understanding of the power and potential of GIS among these decision makers, there will be no way to achieve either financial or staffing support for future system and data development initiatives.

With the importance that the state is placing on broader Internet access for citizens and web portal development, training for citizens occupied a significant focus for workshop participants. All felt that government had an obligation to make these technologies (GIS forefront among them) easily usable and understandable. Of significant concern was a fear of citizen “backlash” especially if the technologies were hard to use, or data was incomplete, inaccurate, or its limitations not commonly understood. Participants feared that the public would be much less supportive of future technology initiatives if initial offerings were complex, confusing, or inaccurate. Government has a role and obligation to extend their purview to this audience because of interaction and demand for data and analysis. In the context of GIS, MSGIC must take the forefront in providing this common understanding, and in ensuring that web applications are appropriate for citizen use.

Probably the most significant challenge facing MSGIC in response to this need is to prepare and assemble a training force to provide the appropriate array of services needed. Only through the cooperation and coordination of all players in the academic and education community can the resources be assembled to put together appropriate training initiatives. Traditional methods of training and curriculum may need to be revamped to provide more “short courses”, quick hits, and specific job skills training in order to respond to the needs of this diverse audience.

In particular, workshop participants focused on the need to strengthen GIS and GIS curriculum initiatives in K-12 education. By focusing on the skills and knowledge base of school children and by their learning the fundamental utility of GIS in decision-making, these issues will be circumvented in the future. Several examples of successful integration of GIS activities in school curriculum were identified.

- An 8th grade social studies class recently used MERLIN Online – an Internet-based GIS viewing tool - to explore colonial history in the Annapolis, Maryland area. They used the base maps and other thematic databases contained in MERLIN Online to explore where the Peggy Stewart was burned and sunk during the Revolutionary War period. Using the historical shoreline data, the students were able to explore the differences between the

shorelines position in the 1850's and in modern times and estimate where the ship probably went down. It was a great exercise in "visualizing" history.

- In Baltimore County, a GIS course was developed at the Western School for Technology in Environmental Science with the help of staff from Baltimore County Government. A class of ten students met in a dedicated computer lab learning ArcView and applying it in applications and exercises using locally developed data.
- Towson University's Center for Geographic Information Sciences (CGIS) has been working with Montgomery County on the Montgomery Atlas Project (Project Map). To promote the use of GIS in Montgomery County schools, the CGIS created 35 county-wide data sets and posted them to a website where they can be viewed using ArcExplorer, a free software package from ESRI. As a part of the project, CGIS was contracted to conduct a training workshop for teachers and students on the use of ArcView and Project Map data. Project Map is due to publish other counties and jurisdictions on the web by December 2000. Teachers are meanwhile developing instructional materials for use with the software and data sets as a model to be shared with other school systems as statewide data becomes available.

These types of cooperative efforts must be expanded. Specifically, teachers need additional training and curriculum development and data for use and analysis in educational initiatives.

Recommended Actions.

- Create dialogue among the relevant academic and government groups to focus on training needs and coordination of resources/offerings.
- Publish a training "schedule", disseminated broadly to reach many user groups. Ensure something is being offered each "period" for all targeted users.
- Address mismatch between demand and supply
- Develop a curriculum design and infrastructure for K-12 schools (highest priority), and for community colleges and post secondary institutions.
- Explore more effective curriculum and delivery mechanisms
- Integrate the technology and develop materials for K-12 curriculum
- Create "talking points" for GIS coordinators, so that every discussion is "training".
- Anticipate long term growth and needs
- Utilize ITAC Training Workshops through state government.
- Facilitate and support cooperative programs between government and schools.
- Develop specific data sets that are suitable for use in K-12 applications.
- Make data available to all schools at no cost.

Section 6. Programmatic Initiatives

Throughout the Strategic Planning Workshop, common themes and interests for program coordination, data sharing, and integrating GIS into business functions naturally led to discussions of how GIS can contribute to on-going statewide programmatic initiatives. Initiatives were discussed that provide opportunities to coordinate multi-agency and multi-jurisdictional programs, identify data developed by one agency or program as useful to another that presents opportunity for data sharing relationships, and demonstrate the application of GIS and spatial analyses to improve business practices and client services. MSGIC needs to identify and prioritize these initiatives and develop a participation plan.

As Programmatic Initiatives, several possible opportunities were discussed in the context of developing pilot, or prototype, projects that address technical as well as policy issues to clarify and demonstrate the benefit of GIS and spatial analyses to these programs. Within this context, the role of MSGIC as a promoter, coordinator, facilitator, advisor (both technical and policy), and partner fits well in its overall mission and objectives, and provides opportunities for MSGIC members to work across department, agency, and jurisdiction boundaries. MSGIC is already positioned to coordinate data compilation and applications development to support several identified program efforts and initiatives.

Several Pilot Projects and opportunities were identified. In each case, a lead office or agency was identified. Through a MSGIC subcommittee, a team should be organized to work with the lead agency to develop specific terms of reference for each pilot, identify required resources, and assist in the implementation of the work plan. The following sections summarize potential projects. As MSGIC may not be able to support all of these projects, MSGIC may first need to decide which projects warrant MSGIC's involvement.

6.1 Mapping Indicators of Child Well-being

The Governor's Office for Children, Youth and Families (OCYF), through its MIS Development for Planning workgroup, has proposed establishing an interagency data warehouse that gives authorized State and Local users easy access to geographically organized population-based data via a secure website with built-in mapping and reporting capabilities. While protecting the privacy and confidentiality of Maryland citizens, these maps will be used for planning, evaluation, budgeting and analysis.

To develop the proposed data warehouse and mapping capability, OCYF has expressed interest in mapping indicators of child well-being to demonstrate methodologies and benefits of geographic analyses to human services programs. OCYF has examined a variety of parameters that can provide general "Quality of Life Indicators", developed

preliminary surveys of indicators of child well-being, and identified potential data sets which may be geographically referenced.

The data sets that OCYF requires for its studies and analyses generally exist. However, they are maintained by other custodial agencies, often as part of administrative records whose access may be restricted due to confidentiality issues. Some data sets are maintained at levels of detail that limit their usefulness or compatibility with other levels of geographic aggregation.

A MSGIC Pilot Project could assist OCYF in raising the awareness and experience among human services professionals in mapping selected Quality of Life Indicators, and in developing a long-term work plan that will serve project outcomes at multiple levels. The Pilot Project would use data sets that identify indicators common to state, local and neighborhood interests and that contribute to on-going planning, monitoring and evaluation activities.

A Pilot Project would enable MSGIC and OCYF to address a range of current policy questions and challenges, including:

- Effectively manage and protect confidential or proprietary data sets that must be geocoded for georeferencing to aggregated levels of geography.
- Evaluate the utility of data aggregation,
- Demonstrate technology that enables appropriate levels of access of data to different users
- Demonstrate the utility of multiple data formats for data presentation, including tabular, charts, and maps, and how each can aid human services professionals in understanding and using data for their planning, monitoring and evaluation activities.
- Understand and test data base design, development and implementation issues; data entry and conversion methodologies;
- Evaluate data integration and develop GIS-based applications, analyses and user interfaces.

- Bring together agencies and programs in partnerships not previously conducted.

The project would improve understanding of long-term requirements for full-scale implementation of mapping indicators across the State and how the mapping of indicators may affect information gathering. By working closely with potential users, developing case study examples of mapping human services data and indicators at the state, local and neighborhood levels, OCYF and its partners would promote the use of GIS and spatial analyses to inform decision-makers and policy development. The Pilot Project would

provide the prototype demonstrations needed to develop a long-term strategic plan for MIS development for planning, monitoring and evaluation that includes full implementation of mapping indicators.

The OCYF Pilot Project requires the technical assistance of GIS expertise available through MSGIC's membership. It requires the support of the MIS Workgroup that is represented from each Sub-cabinet agency. The possibility of private sector support through provision of GIS hardware and software, and technical assistance, has been indicated, as well as possible grant funding, all of which is both encouraging and a unique opportunity for both OCYF and MSGIC.

6.2 Enhancing Maryland's Smart Growth Program

Maryland's Smart Growth Program consists of several specific legislated initiatives aimed at directing State resources to revitalize older developed areas, preserve some of Maryland's valuable resource and open space lands, and discourage sprawling development of rural lands. The Smart Growth legislation allows the State to direct its programs and funding to support locally-designated growth areas and protect rural areas.

The centerpiece of the Smart Growth Program is "Priority Funding Areas" which limits most State infrastructure funding and economic development, housing and other program monies to Smart Growth Areas that local governments designate as growth based. Other components facilitate the reuse of brownfields and provide tax credits to businesses creating jobs in a Priority Funding Area, as well as the Rural Legacy Program that provides financial resources for protection of farm and forestlands and the conservation of these rural resources from development. Priority Funding Areas have been designated and mapped for all Maryland counties and the City of Baltimore. These maps, maintained by the Maryland Department of Planning, serve as the basis for reviewing requests for State infrastructure funds.

While the Department of Planning is responsible for providing with the maps that illustrate the Priority Funding Areas, the individual counties are responsible for designating these areas, based on criteria established in the legislation. Several counties have developed GIS mapping and analysis capabilities and have encouraged State agencies to enhance their base mapping activities in terms of increased scale and content. Other counties have limited or no GIS mapping and analysis capabilities and are often dependent on available State base maps in hard copy format for preparing Priority Funding Area analyses and designations.

Basic Priority Funding Areas, as well as Rural Legacy Areas, have been established throughout the state, but are subject to periodic review and update. Both State agencies and local governments would benefit from a coordinated effort to enhance the base map

scale and content, both digital and hard copy, particularly within the priority funding areas. It has been suggested, for example, that within Priority Funding Areas, maps at higher accuracy levels that are presently available through the Technology Toolbox need to be developed, such as 1:2,400 scale for the basic framework data layers, and at 1:24,000 scale outside of the Priority Funding Areas.

Since the Smart Growth Program involve all State agencies and local governments, enhancing the base maps to support Smart Growth will involve the efforts of many agencies and will provide benefits to all. This program also provides opportunity for MSGIC to serve as a facilitator and coordinator to define and facilitate agency and interagency relationships and structures that are required to promote a coordinated approach to this GIS activity among a broad user community.

The key issues and tasks for MSGIC involve the coordination and mediation of the basic challenge to all of MSGIC's members, each of whom represents a different mission, to use GIS to manage growth and protect resources. Specifically,

- **Coordination** to identify technical issues and develop standards, specifications, and work plans for the enhanced data sets and schedules that provide incremental development and maintenance.
- **Facilitate communication** among both partners and participants in the processes and activities.
- **Promotion and Education** from the Cabinet to local managers to ensure that the GIS data analyses and products are central to their business planning and decision making processes
- **Structure** both formal and ad hoc to support the initiatives among both traditional and non-traditional participants who are all players in the Smart Growth Programs.

6.3 Supporting the eMaryland Initiative

eMaryland is not a new idea. Programs and projects that provide excellent customer service through use of advanced information technology already exist. But recent investments by the State in building a high-speed network and in developing a web portal to function as a front door into State government services have brought these efforts into the mainstream. State agencies are expected to have a plan in place by the end of this calendar year for putting their "business" onto the web in a phased approach over the next 2-5 years. Many of these initiatives will have many inherent GIS applications at their core, but unless an aggressive effort is made to utilize GIS as a vehicle for disseminating data, the GIS community will miss this opportunity to advance the use of GIS.

Already, several applications have been web-enabled. Three of these applications have direct relevance to existing GIS databases:

- ? PLATO is a web-based image reference and retrieval system for land survey records allows users to access survey, subdivision and land record plats.
- ? The Electronic Land Record On-Line Imagery (ELROI) system, also allows access to land records information through a dial up connection.
- ? MERLIN is a web-based browser, developed by the Department of Natural Resources, containing a wide range of georeferenced statewide databases and aerial photography.

It would be incredible, for example, the PLATO and ELROI systems were linked to property mapping data already available through MD Property View, so that citizens could not only see their property, but also the plat and record of it.

While this idea may present many technological hurdles, it serves as an example of the type of application that eMaryland is promoting. There are probably dozens of these potential applications just waiting for the right minds to get together in the same room.

Another idea which came up at the workshop identified using a geocoded point cover of day care center locations, tied to licensure data and another real-time data set that identified vacancies, specialized programs offered, and other relevant service information provided by the center. Citizens could look for day care centers in their area, or search by specialized program, retrieving contact information, a schedule of fees and a map of the location.

MSGIC should explore and support these types of initiatives as eMaryland progresses. It should engage agencies in brainstorming GIS applications utilizing their data, and help direct agencies to the appropriate resources to build these solutions. GIS could significantly influence the face of eMaryland to the public, and at the same time, greatly enhance its position as a viable tool of public service.

Section 7. Concluding Guidance

For more than eight years, MSGIC has provided an informal, voluntary, proactive and effective forum for coordinating the use and development of GIS technologies among Maryland state government agencies. MSGIC has demonstrated success in many areas, not the least of which has been the 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. Further, the activities and tasks laid out in the 1993 Strategic Plan have been successfully met in a timely manner.

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

7.1 MSGIC's Strengths

Strengths are factors that both MSGIC and MLOGIC have in their favor for the effective coordination of development and use of GIS technology throughout the State. Strengths can be considered advantages inherent in the existing State and local 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, and in most county planning agencies, has grown substantially in the past decade and today is quite high. This is an important resource for guiding and assisting new users, of which there are many. Continued training for the existing staffs and initial training for many new potential users are necessary to maintain a level of expertise in this changing technology.
- **Experience with multiple computer platforms and data formats** exists. Although there is an increasing consolidation to only a few software programs for automated mapping and GIS-related applications, there is still variety of both software and data formats in use by MSGIC and MLOGIC members, and the existing experience is valuable.
- **A structured approach** for information exchange, data standards, data sharing, database development and maintenance, system planning and implementation has been well established and must continue. Repeated cycles of general planning

proceeding to detailed design activities for the implementation of new activities, in a correct and timely fashion, will best address the needs of both present and potential users, and enhance coordination with IT and MIS working groups.

- **Digital spatial database maps** that meet the needs of the broad GIS user community provided a firm foundation for implementation of many common GIS applications. The current digital spatial data base maps developed principally by DNR, MDP, SHA, DAT and DHCD, and available through the Technology Toolbox, must be expanded in both content and accessibility. Investments by these agencies in database creation and maintenance have provided tremendous value to GIS development and broadening the community of GIS users.
- **High-level support for MSGIC and State GIS initiatives** has continued to be indicated by the level of support and commitment to MSGIC. The level of senior management support for GIS efforts also continues to vary among departments, including local governments, but a more important factor is the strong personal commitment shown by managers and potential GIS users from a broad array of State and local departments and agencies represented on MSGIC and MLOGIC. Although also noted as a continuing weakness, MSGIC's advisory role has also been a strength, albeit opportunistic, as it has been called upon to provide review and guidance.

7.2 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. It is noted that some limitations were presented in the 1993 Strategic Plan, and their presence below indicates that they continue.

- **Obstacles to proper staffing** continue to be an industry-wide problem because the demand for staff experienced in GIS technology greatly exceeds supply. In the past eight years the existing set of State job classifications and salaries may have limited effective recruitment and placement of all GIS management and technical support staff, although recent proposals may modify this situation in the future. In addition, although MSGIC is a voluntary organization, the efforts of leadership positions should have some recognition of this duty in 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, at state and local government levels, as well as the future demand, has increased,

and the concept of information management continues to be so abstract to many of MSGIC's member constituents that an overview theme is missing.

- **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 is broad and participatory, and that promotes and encourages cooperation and achievement of mutual benefits.
- **MSGIC's advisory role** continues, for the most part, to be 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, including standards, can be assigned and achieved. Participation on MSGIC varies with current workload and level of interest. MSGIC's role, responsibilities and powers, and those of the member units, must be reorganized and more formally defined. This requires expenditures of funds and allocation of personnel such that MSGIC can evolve as a policy advisory body, directly advising appropriate financial and administrative units.

7.3 Critical Success Factors

As pointed out in the Strategic Planning 2000 Workshop, GIS in Maryland is at a crossroads and there are many issues and challenges before GIS in Maryland is the broad-based, widely accessible tool that it could be and that the vision of the Workshop demands. To be successful in the coming decade, MSGIC must achieve defined objectives and fulfill activities reflected in this Strategic Plan. In addition, actions must be taken in several critical areas. The completions of those actions may be evaluated in terms of Critical Success Factors, and all planning, design, and implementation activities should be accomplished with these critical success factors in mind.

1) *Are new challenges and opportunities approached proactively?*

Anticipating challenges and opportunities permits MSGIC to choose those which, if addressed, would most advance its mission. A proactive stance also reduces the likelihood that potentially desirable challenges and opportunities are missed. A reactive stance tends to waste resources, raise opportunity costs, and discourage members.

2) *Is GIS integrated with IT technologies?*

Whether considered from functional, technical, budgetary, programmatic or other viewpoints, GIS must be openly embraced and directly supported by the IT hierarchy within state and local government agencies and departments.

3) *Are Standards fully implemented?*

Standardization facilitates consistent practices across the State and ensures GIS producers and consumers that agreed-upon conditions have been satisfied. Standardization lends credibility and confidence, and should be viewed as a sign of the level of GIS maturation in the State.

4) *Is there a broader user base?*

Extension of the user base is one indication of GIS acceptance and adoption. Various measures can be taken within the State (e.g. Department, sub-department organizational units, projects, numbers of individual users, etc.) and outside State government (numbers of local governments, permeation within local governments from original points of entry, numbers of projects, users, etc.)

5) *Is GIS integrated into Agency Business Practices?*

Connection of GIS to Agency Business Practices indicates sophisticated use and should be considered as a goal where GIS has been used for some time, or where extensive use is anticipated. Where GIS serves business practices it will have gone beyond meeting the functional and data requirements of projects to strategically serving business events, helping produce business deliverables, honoring business rules, and supporting business work scenarios.

6) *Is GIS considered on the front end of projects and business plan development?*

Early consideration increases the chances of early adoption and use. MSGIC should keep track of the number of projects and plans that consider GIS at early stages so that it can better market and serve potential users. Understanding where, when and why GIS was considered early but rejected would also be very valuable information. (See Sections 3.3 and 4.2 for related recommendations and tasks.)

7) *Is GIS improving “customer service”?*

GIS has the potential to improve customer service both from the perspective of customers (public, state and local officials, etc.), and from the perspective of state personnel responsible for serving customers. User reports that GIS helps them work with data more easily, understand problems and solutions more clearly, lower the transaction costs of accessing and analyzing data, etc. indicate that customers are being better served by geographic representations of data than they are by other representations. Staff and management reports that GIS helps them serve customers

more quickly, more completely, more satisfactorily, indicate that GIS is helping the State serve customers better.

8) *Does the public find data provided by GIS to be credible?*

In order to improve and maintain effective customer service, the public must believe the data provided by GIS to be credible. This credibility is essential to MSGIC's goals for GIS development and use. MSGIC should implement means for determining public users' perception of data credibility, such as standard questions on its Websites, follow-up questionnaires to Website visitors, direct follow-up with public and private sector users known to State departments, etc.

9) *Is there a raised level of awareness, appreciation, and demand for GIS within and among management levels of government?*

Top-down requests for GIS complement MSGIC's bottom-up efforts. Such requests demonstrate that GIS is on management's "radar screen" and indicate that marketing and promotion campaigns are working.

10) *Has use of GIS increased as a fundamental part of people's jobs?*

Increased use of GIS produced maps, analyses, and other visual representations in reports, briefings, displays, etc. indicate that GIS is finding its way into the elemental activities performed by State personnel each day. Some sense of where increases are occurring and what uses are in demand provides good tactical planning and user support information for MSGIC.