Strategic Plan for Statewide Geospatial Coordination

For Michigan Department of Technology, Management and Budget, Center for Shared Solutions

Maps | Geographic Information Systems (GIS)

DTMB

April 7, 2023

by

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Table of Contents

Executive Summary

The Strategic Plan for Statewide Geospatial Coordination furthers the work of the Department of Technology, Management and Budget Center for Shared Solutions (DTMB CSS, or CSS) geospatial office. Prior work includes thirty years of actions to integrate geospatial data and services within state government and other sectors, providing one of the few statewide enterprise GIS infrastructures within the nation. Geospatial data is expensive to collect and maintain; doing so efficiently demands coordination, so this is the plan's focus.

Through a process of in-depth information gathering, an analysis of strengths, weaknesses, opportunities, and threats, as well as a consensus building stakeholder workshop, strategic goals and recommendations for statewide geospatial coordination were defined. Five coordination goals are identified in the plan and briefly described here.

Continue using DTMB CSS leadership to strengthen statewide geospatial coordination. CSS is a long-time leader in bringing Michigan geospatial interests together. However, there are always new organizations, new kinds of data, new uses of geospatial data, and new issues. CSS coordination is an ongoing need, minimizing duplicative effort and maximizing creation and sharing of authoritative data.

Increase the free and open sharing of data throughout Michigan. CSS is uniquely suited to compile and publish data. The importance of this was made clear in surveys and interviews. Data providers are the best source of authoritative datasets; making it easy for them to share data freely is the most efficient way to build statewide datasets. CSS is in a good position to work with stakeholders to help create an environment in which up to date datasets are openly available for compilation and publication.

Keep stakeholders and partners informed about geospatial coordination. Coordination relies upon communication. CSS must continue to inform the ever-expanding geospatial profession, partners, and other stakeholders of coordinating actions, initiatives, and opportunities for collaboration and sharing.

Offer a modern clearinghouse for geospatial resources. Michigan's GIS Open Data Portal is a statewide data repository maintained by CSS. With expanding expectations of its users, the Portal should better support authoritative data sharing, provide more geospatial data services and tools, and support communication and coordination through a contemporary platform.

Operate efficiently. CSS supports the State's enterprise GIS, is a statewide coordinating office, and is a key partner in many federal, state, regional, and local initiatives and programs. The geospatial team within CSS must have the priorities, direction, and predictable resources to be most effective within state government. Continuously improving how the State uses GIS will benefit every level of Michigan government and its citizens.

The plan proposes recommended actions for each goal and a five-year implementation timeline.

Introduction & Background

Purpose of the Plan

This plan, the *Michigan Strategic Plan for Statewide Geospatial Coordination*, defines strategies, phrased as goals, for improving geospatial data, services, and systems (GIS) at a statewide level. An underlying viewpoint of this plan is that a statewide approach to geospatial data and services is beneficial to government functions, professional needs, and to the public as a whole. This assertion was examined in some of the research conducted for this plan in surveys and interviews. The importance of a statewide approach was supported in this research, as it has been in earlier studies conducted by the State of Michigan ("SOM" or "the State"), including the *Michigan Statewide GIS Business Plan* (2010), and GIS stakeholder surveys on specific topics conducted in 2018 and 2019. Many states have demonstrated the value of statewide collaboration; for instance see *Best Practices for State Geospatial Maturity – Coordination* (2020; National States Geographic Information Council). The Department of Technology, Management and Budget (DTMB) sponsored the plan's development because DTMB and its Center for Shared Solutions (CSS) are responsible for coordinating GIS throughout state agencies and as a resource for the people of Michigan. Early on in using GIS, Michigan chose to house GIS coordination and support inside of the state government information technology (IT) department, recognizing that GIS is facilitated by close collaboration with IT and that information systems will evolve to include geographic data and technologies. Many states are now moving toward this arrangement.

The embedding of GIS within IT helps Michigan state government have a pan-agency approach to geospatial data and services. For example, the Michigan Geographic Framework for statewide geospatial data themes is an outcome of this. CSS was able to envision and design the framework and then, because GIS is a part of state government IT, the framework was implemented as an embedded part of state government IT, available to all agencies and with sufficient resources to ensure its long-term support. Other geospatial data services, data repositories, and GIS hosting efforts have also been successful because of Michigan's embedded enterprise approach to GIS.

Government at every level is a stakeholder in the State's GIS activities because GIS touches every level of government operations. Furthermore, almost every level of government contributes spatial data to state operations. This mutual dependency is a long-standing foundation upon which Michigan's GIS community is built. Coordination helps all stakeholders in the GIS community by eliminating duplication of effort, ensuring that the effort of creating and maintaining information yields the greatest utility for all, and facilitating mutual aid and assistance between stakeholders. Although this strategic plan is intended for action by the State, the benefits of those actions are for all GIS users, statewide.

Approach and Methods

GIS is no longer a new technology within information systems. GIS has been part of Michigan's government systems for more than 30 years. Spurred by federal government initiatives in the mid-1990s

and funding from the USGS over the next 15 years, states developed first-generation strategic and business plans for geospatial data. Michigan developed several business plans that, while focused on implementation guidance, involve some form of strategic goal statements.

This strategic plan is therefore a second-generation strategic plan that builds upon Michigan's earlier planning. The plan's development began by studying earlier business plans and strategic statements that concerned geospatial data needs, data sharing, GIS systems, and data development. Ancillary documents created as part of the research for these plans were also examined. These included meeting notes, online survey summaries, and research papers.

Because the purpose of the plan is to improve coordination between stakeholders, determining stakeholder needs was a key first step. This was done through an online survey, interviews with groups of individuals representing stakeholder constituencies, and multiple discussions with CSS. As one might expect, some of the needs expressed from stakeholders are outside of the realm of statewide coordination, cannot be addressed by actions of the State, or are project wish lists rather than strategic-level needs. The Survey Summary is provided as Appendix A.

An analysis of findings, need statements, satisfaction statements, and DTMB's own ideas followed the stakeholder survey and interviews. This analysis took the form of a SWOT (strengths, weaknesses, opportunities, threats) compilation. The SWOT statements were generalized into strategic themes. These in turn became strategic goals for GIS coordination. High-level implementation ideas, stated as recommendations, were devised by the project team as steps leading toward achieving each goal.

Strategic goals and recommendations were then provided to the Consensus Workshop participants for review and each goal was discussed in breakout sessions and as a whole group, at the workshop. Workgroup feedback on the goals were then incorporated into the narratives that follow in the later Strategic Goals and Recommendations section. Figure 1 is an overview of the strategic planning process, showing how actions taken in developing this plan fit with the general process.
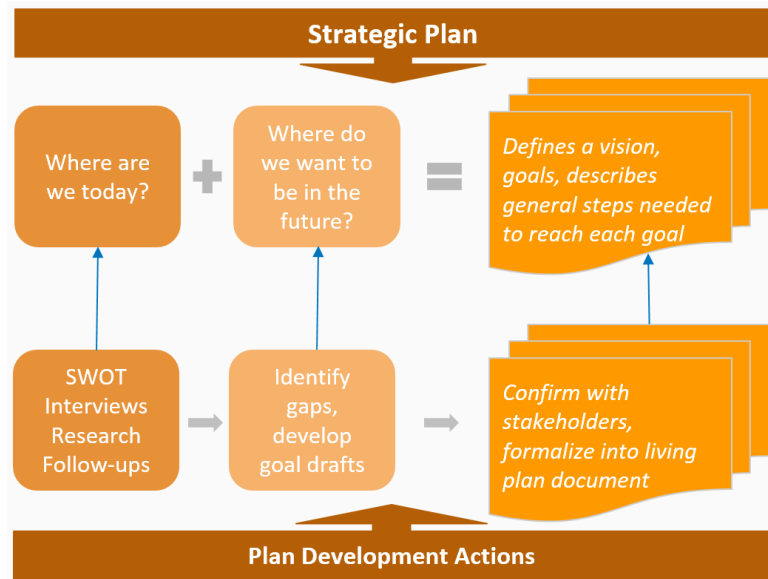
Figure 1. Schematic diagram of the general strategic planning process and activities undertaken as part of Michigan DTMB strategic plan development.

Some strategic goals are persistent; in essence, they are part of the organization's perpetual mission. Some of the goals described in this plan continue goals identified as early as 2010. Whether one considers goals that are ongoing as achieved goals now in maintenance mode or as goals yet to be achieved is a matter of some debate in the strategic planning community. This plan takes the approach that ongoing goals should be considered unfinished since they still require effort. Consequently, it is helpful to keep these in the "unachieved" category.

In summary, the creation of this strategic plan involved several months of study, and the work leading to this plan included:

- Multiple discussions with CSS about current and future challenges, current status of statewide GIS coordination, and strategic ideas
- Review of earlier business plans, strategic plans, and study findings
- Collecting a wide range of information from all sectors of the Michigan GIS community through an on-line survey
- In-person interviews with a cross-section of the Michigan GIS community
- Follow-up interviews conducted remotely
- The compilation of a wish list of projects and ideas gathered from the GIS community interviewed
- An analysis of strengths, weaknesses, opportunities, and threats (SWOT) concerning GIS within the State of Michigan
- Formulation of draft strategic goals and recommendations including preliminary review by the State's project team and DTMB management

- Revision of the draft strategic goals to address comments from the preliminary review
- A half-day workshop in which representatives from the geospatial community were asked to provide comments and offer suggestions concerning the proposed goals and recommendations, and provide a sense of their priorities. Appendices A through D contain reports and summaries of the study activities.

The Current Situation

Earlier Strategic Planning Activities

GIS has a long history in Michigan. Rather than recap the lengthy evolution of GIS within state government, the interested reader is referred to the 2010 study *Michigan Statewide GIS Business Plan*. Here we summarize major plans, studies, and achievements from 2010 to the present.

Table 1. Plans, studies, and achievements related to strategic planning.

Year	Plan / Study / Action Title	Description
2010	Michigan Statewide GIS Business Plan	FGDC-sponsored study of GIS in Michigan state government, identifying key initiatives to move GIS forward and to align the State's effort with the federal NSDI framework.
2010	Building Data Stewardship for the National Map and the NSDI	FGDC-sponsored companion study to the Statewide GIS business plan, identifying roles and responsibilities within Michigan for data stewardship of NSDI themes.
2010	Michigan Statewide GIS Program Transportation Data Stewardship Enhancement Plan	FGDC-sponsored plan for roles and responsibilities pertaining to transportation theme of the NSDI, identifying key SOM agency responsibilities for different datasets within the transportation theme.
2012	Statewide GIS User Group	DTMB CSS hosts this user group which evolved from the less formal "Framework" meetings that took place from 2001-2011. The group meets for open discussion, exchange of news, and presentations on selected topics. Initially, this statewide group (open to all) met every other month. This changed to quarterly in 2018.
2017	DTMB CSS GIS User Group Survey	This online survey sought input from stakeholders on the format, content, and

Year	Plan / Study / Action Title	Description
		frequency of the Statewide GIS User Group meetings. Subsequent to the survey, the meetings were changed to quarterly events.
2018	DTMB CSS Hydrography Data Needs Survey	This online survey was conducted to determine stakeholder needs and business requirements for statewide hydrography data. The results were incorporated into planning for an improved MGF dataset. The survey also led to the formation of a hydrography advisory group, and ultimately the 2021 3DHP project.
2018	Center for Shared Solutions Enterprise GIS Architecture Review and Recommendations	This study was conducted by Esri for DTMB CSS. It discusses the current enterprise architecture and makes recommendations for future improvements and changes to it, to better serve the then-expanding customer base of DTMB CSS.
2019	2019 9-1-1 Address Data Availability Survey	This survey was conducted by a partnership consisting of the State 911 Office, the 911 technical advisory group, and DTMB to determine the availability of address data suitable for current and Next Generation 911 system use. It includes questions on data availability, formats, and business needs for the data themselves. This led to leveraging National 911 program funding to develop address points for 13 counties in 2020.
2019-2020	MiSAIL Surveys	Three surveys were conducted by the MiSAIL office: 1. Statewide and nationwide survey to all federal agency imagery program leaders focused on gleaning the value and cost of other imagery programs; 2. Internal survey about the MiSAIL program with State agency power users to ascertain the return on investment; 3. Internal survey about the Parcel Repository with State agency power users to ascertain the return on investment of CSS's effort to collect the data and serve it to the State employees.

Where Are We Now?

This strategic plan starts from the current status quo, looking to the future. DTMB geospatial services include:

- Coordination of GIS activities between state agencies and other geospatial stakeholders, including local governments, federal agencies, and private sector organizations
- Maintaining and administering a sophisticated ArcGIS Enterprise server environment for the State with many features
  - Spatial data storage
  - Open data portal
  - Data management for applications
  - Application hosting
  - Multi-user editing and data management
  - Server connectivity to ArcGIS Online
- Maintaining and hosting the Michigan Geographic Framework (MGF) data hub for statewide data built, in part, with stakeholders
- Managing and administering the MiSAIL (Michigan Statewide Authoritative Imagery and Lidar) program
- GIS consulting and technical support for state agencies and other geospatial stakeholders within Michigan's local governments for shared initiatives
- Enterprise geospatial data management for state agencies
- Warehousing spatial data as an archival data repository
- Geocoding services for multiple agencies through a variety of interfaces
- Hosting Lidar data and providing expertise on its use
- Michigan Statewide NG911 GIS Repository
- Representing the State as a liaison office to federal geospatial programs within agencies and in various initiatives such as the Geospatial Data Act
- Representing the State in national geospatial forums such as the National States Geographic Information Council (NSGIC)
- Hosting quarterly Statewide GIS User Group meetings on topics of general interest to geospatial stakeholders and organizations
- Hosting bi-monthly State Agency GIS User Group meetings for state government employees to share project information, uses of geospatial technology, share lessons learned, request input on projects. This group meets every November for a State Agency GIS Day event highlighting GIS projects for all state employees to attend.
- Convening state agencies in a monthly GIS Steering Committee to facilitate technology use, policies, and collaboration
- Actively participating in the Michigan geospatial professional organizations, IMAGIN and MiCAMP, by attending meetings, giving presentations, and providing other forms of assistance

DTBM CSS has achieved notable successes through partnering and coordination, resulting in efficiencies at all levels of government. The MiSAIL program makes imagery and Lidar data available statewide through a stable, long-term, program. The Michigan Statewide NG911 GIS Repository is a partnership founded in 2012 that standardizes emergency response datasets to a national schema, makes possible data maintenance, and serves data back out to local and state partners for 911 systems and Next Generation geo-routing. The Statewide Hydrography GIS Program is a multi-agency partnership that is now evolving toward new products with the USGS-supported 3DHP program. CSS is a core partner in the State's broadband study and actions to bring broadband to all Michigan citizens. CSS is a non-voting partner and maintains the data repository for the statewide multi-agency Transportation Asset Management Council. As these major partnerships and coordinating activities show, CSS is a very important force in coordinating and enabling the use of geospatial technologies by a wide range of public agencies.

The CSS geospatial support team has 18 positions, including a manager, three positions in GIS Business Support, 5 positions in GIS Server Administration, an ArcGIS Online, Open Data, and Geocoding position, a Geospatial Data Manager, 5 analysts, and 2 positions that perform outreach to the GIS community. One of the ways in which CSS coordinates GIS within the State is by providing GIS expertise to DTMB IT professionals, who are not GIS professionals, but support state agency IT systems that may leverage GIS technology.

As the list of activities and staff above show, CSS has many responsibilities and an impressive staff with which to accomplish them. However, GIS and geospatial data have evolved rapidly and will no doubt continue to do so in the future. The list of responsibilities and services will lengthen. Coordination is an essential part of managing the growth of these responsibilities. As geospatial technologies and data become ever more pervasive throughout Michigan governments, and as the public's demands for access to data upon which decisions are made grows accordingly, consistency, timeliness, and accuracy of data are essential to good government. Because geospatial data is created and managed by stakeholders themselves (in most cases), coordination is one of the most important ways to create consistent statewide data efficiently (i.e., without duplication of effort, in a timely fashion, and of consistent accuracy). So, today, CSS faces a need to define how it can help coordinate the work of many

stakeholders to meet the growing challenges of helping governments in Michigan work well together on geospatial data.

Strategic Research Findings

Several key research findings informed the planning process. At a high level, it is interesting that the stakeholder survey received so many responses (n=392). This, alone, indicates a high level of stakeholder engagement with CSS. Interviews and follow-up discussions showed the GIS stakeholder community places a high value on what CSS does even if, at times, they are not fully aware of *all* that the geospatial office accomplishes. This is understandable - any given stakeholder interacts with the State for a specific reason and so may be unaware of the scope of CSS work. More to the point, the trust that has been built by CSS is a great base upon which coordination can further collaborative activities.

The SWOT analysis performed as part of the planning process is helpful in understanding the strategic plan. SWOT analysis is a study in contrasts, as one examines opportunities and strengths versus weaknesses and threats. Strengths and opportunities are discussed first since they are pathways to the future by seizing opportunities and maintaining strengths. Weaknesses and threats are discussed together because they can hamper, or even prevent,

Four Key Research Findings

DTMB CSS is **well-respected** in the GIS community

Stakeholders most often focus on **data availability** and **data quality**

The **demand** for high-quality, statewide, geospatial data **is incessant**

Few realize how much **DTMB CSS activities support their work**

moving forward along those pathways to the future by hobbling the work of the organization or by blocking change entirely.

Strengths and Opportunities

Through the long history of State involvement with geospatial technologies and GIS that led to CSS today, many strengths have been built. These include great relationships with sister agencies and the GIS community as a whole. Strengths include trustworthiness, a sense of not only "can do" but "can help" and the creation of internal State technical resources that are extremely valuable to SOM as well as providing all stakeholders with statewide data and service opportunities. Many of these successes stem from the early integration of GIS and state IT.

Opportunities abound for CSS. As discussed above, spatial data and technologies are becoming embedded in almost every aspect of government and commerce. CSS will have new domains and programs in the State that demand its expertise and assistance. As well, at a more general

statewide level, as local governments become increasingly GIS-aware and even GIS-driven, their need for better local data, better regional data, and better statewide and supra-regional data grows. Beyond data, though, there are also ways in which CSS can help local governments become better partners with the State (as well as each other) through leadership regarding standards, education on data-sharing benefits and methods, and tying local and regional governments into state, supra-regional, and federal opportunities to develop and use geospatial data.

Weaknesses and Threats

Weaknesses can be thought of as areas needing improvement. Sometimes, the changes needed to affect that improvement are simple, such as making a change to an information system that exposes metadata about when a dataset was last updated. More often though, it is not apparent or easy to remedy the problem. For CSS, most of the weaknesses are of this latter sort. The area that many of the weakness statements touch on is in guiding data users to authoritative datasets and displaying the authoritative (or non-authoritative) status of data so they know whether it is suitable for their needs.

Threats are problems that could halt progress toward achieving strategic goals. Unlike weaknesses, threats might completely prevent CSS from taking some recommended action and thus achieving an associated goal. There are relatively few threats identified in the SWOT analysis. However, several threats revolve around CSS being unable to meet ever-increasing needs for geospatial support, services, and data management. Another threat recognized in the stakeholder feedback is that organizational and legal barriers, such as the enhanced data access policy, could prevent agencies from collaborating in the creation of statewide authoritative datasets. This would make coordinating activities far less fruitful, at least insofar as coordination seeks to improve geospatial data holdings. Changes in state government operations and processes could impact CSS by diverting effort from long-term programs. These kinds of threats are addressed in this strategic plan.

Vision

The organizational tenets, which include the mission and vision statements as well as the core values of CSS, have not changed from those presented in the *"GEOSPATIAL SERVICES STRATEGIC PLAN FY18-FY20"* document. Therefore, those statements are repeated below, and have only been slightly modified to reflect the current situation.

Organizational Tenets

The State of Michigan has been a leader in GIS over the years and the Center for Shared Solutions wants to continue this geospatial leadership at a national level through collaboration with state agency, local, regional, and federal partners. The Michigan Geographic Framework has been a model for a state spatial data infrastructure (SDI). The geospatial services team within CSS and its partners are committed

to providing the technology, collaboration, and communication to keep the State of Michigan as a leading organization in GIS technology and data management over the next decade and beyond.

Mission Statement

To provide Enterprise GIS coordination, technologies, and statewide data management to enable and support State agencies and the statewide geospatial community in meeting and succeeding with their geospatial needs in service to the citizens of Michigan.

Vision Statement

We will make the State of Michigan one of the leading government organizations in geospatial technologies in the world.

Core Values

- ***Teamwork*** *– We create and support a diverse, yet unified team and we work together to meet our common goals.*
- ***Integrity*** *- Always do what is right.*
- ***Leadership*** *– Provide a clear vision, have a positive influence, and advocate for the organization.*
- ***Excellence*** *– Provide our services to the best of our abilities every day, every time.*

Strategic Goals and Recommendations

Each of the following goals is described in a single sentence title, followed by a description of the goal and rationale for its importance. Recommendations follow each goal. Recommendations are not intended to be implementation plans or prescriptions as to exactly what must be done in working toward the goal. Instead, they are avenues CSS might explore because each moves the current status quo toward the desired goal. The general purpose of recommendations is to state a desired activity outcome, not to describe exactly how to realize that outcome. As is often so with strategic goals, many of the activities of CSS that began years ago are still important, so some of the goals in this plan emphasize continuing work in which the office is already engaged.

Goal 1. Further strengthen statewide geospatial coordination by expanding DTMB CSS leadership.

Goal Description

Survey respondents as well as interview participants expressed strong appreciation and support for the leadership efforts of CSS and encouraged that leadership to continue and expand in terms of breadth, depth, and recognition. In addition, workshop participants noted that CSS is recognized as the statewide leader of geospatial efforts. The following recommendations describe ways to achieve this goal.

Recommendations

1.1 Continue to lead statewide geospatial coordination activities.

Survey results support that coordination is a very important activity for CSS. This was confirmed by consensus workshop participants who noted that the Michigan geospatial community sees CSS as the de facto Geographic Information Office by virtue of its ability and success in coordinating with partners around the state, creating workable solutions, manage statewide programs and initiatives, and enabling activities that improve the use and availability of open geospatial data, technologies, and knowledge across the state.

Michigan Statewide Authoritative Imagery & Lidar (MiSAIL) is an excellent example of the impact of the leadership that comes from CSS. It provides cost and time-saving opportunities to all levels of government in Michigan, while promoting standard data specifications, and ultimately shaping a collaborative statewide geospatial community. It should continue to evolve to support stakeholders and partners.

Continued statewide coordination led by CSS is recommended, including:

- Coordination to determine where and how geospatial data access exists across the state and how to facilitate the state geospatial community to expand access points.
- Ensuring that the state geospatial community is "data ready" for opportunities related to Broadband planning, Federally-led initiatives for aerial imagery, elevation and hydrologic data, and other federal funding opportunities.
- Facilitating the coordination of technology that supports data streams and how data can flow from data steward to the statewide community.
- The improved roll-out and adoption of geospatial applications and technologies using partners and stakeholders to communicate with the users of those applications and technologies across the state. This sort of communication and coordination should seek to alleviate the building of "one-off", isolated, applications when a more universal solution could be created to benefit many.
- Working together to find funding and promote aggregated funding (a little funding from many partners) for shared needs, thus decreasing the risk of relying heavily upon only a few funding sources.
- Coordinating with the statewide community to be flexible to quickly change priorities to take advantage of new conditions as they arise.

1.2 Use a formal advisory group to support the work of statewide GIS coordination.

Statewide GIS coordination involves a large number of diverse stakeholders. Statewide user group meetings, professional association conferences, project-specific advisory committees, and other meetings are forums in which CSS interacts with all stakeholders. These are events at which education

and networking occur. A formal advisory group, composed of geospatial leaders representing stakeholders could work efficiently with CSS to provide ideas or opinions and to advocate for statewide GIS coordination.   The mission of the advisory group would be to further GIS coordination through specific actionable tasks, advice, and evangelism. The work of the advisory group would not be binding on CSS but would provide a valuable perspective and connection with the statewide GIS community. With the expected continued growth of GIS technology and data, an advisory group can provide additional support for the development of standards, education, and rollout of programs. A potential configuration of the Advisory Group's membership and its relationship to existing committees and associations is described in Figure 2.
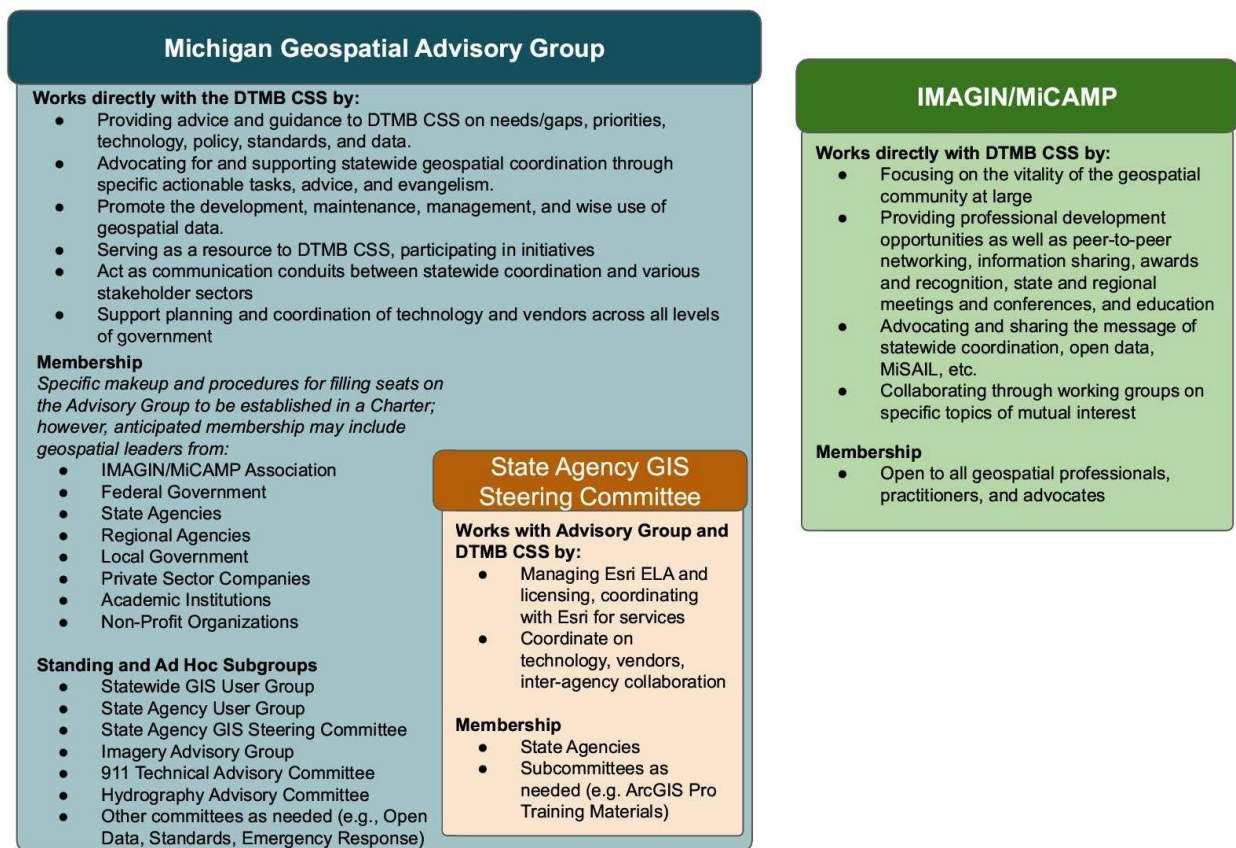
Figure 2. A potential configuration of the Advisory Group's membership and its relationship to existing committees and associations.

This recommendation borrows from a proven practice used by several states. These states convene a group of trusted representatives of the geospatial community to act as advisors to the geographic information office. The advisory groups are communication conduits between statewide coordination offices and stakeholder sectors.

For Michigan, an advisory group could be very helpful, allowing CSS to facilitate and move priorities forward without necessarily having to take on all the work each priority entails. Based on the experience of other states with similar advisory groups, benefits would include:

- Increased coordination across a greater range of stakeholder sectors
- More efficient communication and coordination by using stakeholder representatives
- Early development of consensus about initiatives, policies, and strategies, resulting in less controversy and more participation
- Initiatives can be accomplished more effectively because
  - Initiatives can be taken up proactively by timely actions of the advisory group.
  - Support can be gained early on because of better communication and coordination.
  - The advisory group can bring in sectors that are not typically involved with GIS directly but benefit from it.
  - Stakeholders have a direct interest through the advisory group.
  - The advisory group, and its sectors, can take on tasks needed to accomplish an initiative.
  - CSS can take a facilitating role and not bear sole responsibility for moving the initiative forward.

Advisory groups can have drawbacks too. Consensus building can take more time because more interests must be involved. Members of the advisory group must be active participants for the group to get meaningful work done. These drawbacks can be mitigated by having a well-defined structure.

An advisory group must be more than a "think-tank" to be successful. It must operate in a way that results in practical action and change that improves the geospatial capacity of the user base across Michigan. The work of an advisory group may include organizing working groups that focus on very specific topics such as orthoimagery and Lidar acquisition. However it is organized, the advisory group should avoid operating in a way that merely provides a long list of expectations of CSS, but must instead share in the creation and implementation of solutions, including those that require political and financial resources beyond CSS. It is therefore essential for CSS to invite members to the group who have a collaborative mindset, the wherewithal to cause change, and the willingness to work for results.

Advisory groups are usually governed by a charter that includes, among other things, expectations, qualifications, and terms of its members as well as a clear statement of purpose. Examples of tasks that would be suitable for a Michigan advisory group include:

- Coordinating with CSS, the state geospatial community, and vendors such as ESRI to improve efficiency, lower costs, locate funding, and improve planning across all levels of government, partners, and stakeholders.
- Communicate with member constituents to discover impediments to sharing data in support of open data and create and implement actions to increase data sharing. Because their memberships make up a large portion of stakeholders across the GIS community, this task, among others, can benefit from the participation of representatives in the advisory group from MiCAMP (Michigan Community Association of Mapping Professionals) and IMAGIN (Improving Michigan's Access to Geographic Information Networks), or if they merge from a representative of the new organization.
- Improve relations with tribal governments by including tribal government in the group
- Establish data sharing programs between the State and local governments

- Determine applications, technologies, and data needs of the statewide community that could realistically be provided for the greater good, and how those improvements should be funded.
- Help expand the statewide imagery program
- An advisory group could be invaluable to collect perspectives from across the state about potential public/private partnerships as well as regional and university-based partnerships.
- Coordinate resources/programs to support smaller, rural communities to leverage GIS
- Identify funding opportunities and where applicable support the writing of grants or grant templates. Also provide letters of support for grant applications as necessary
- Determine how the statewide geospatial community could increase GIS coordination with Emergency Management officials dealing with large-scale emergencies.
- Help agencies prepare for opportunities like the Broadband grants – this group could have provided MiHi a channel for communicating with the GIS community directly
- Creating and reinforcing statewide data standards, such as those that were needed for 911
- Support uniform approaches and information sharing for emergency management planning and coordinated responses to emergencies
- Prioritizing and supporting data creation needs, with data development and quality control support depending on the data
- Coordination to evolve to one statewide geometrically interconnected road centerline data set where today there is a MDOT road centerline and individual local road centerlines for multiple business purposes
- Collaborate and support decisions on boundaries, including shorelines, boundary review, working with stakeholders like school district, county clerks, etc. on boundary development or review
- Provide a focal point for coordination with federal agencies (Census, USGS, USFS, NOAA, Army Corps of Engineers). For example, work on boundary improvements with US Census Bureau for their boundary maintenance programs and 2030 Redistricting.
- Work with constituents to improve remonumentation efforts
- Work on reports like the Geospatial Maturity Assessment and resolve gaps in the results
- Identify, create, and support working groups for specific activities like data development, data review, standards creation or updates

1.3 Use IMAGIN and MiCAMP as a means to advance statewide GIS coordination.

IMAGIN and MiCAMP can be effective allies in statewide GIS coordination, providing communication with stakeholders, education, networking, and conferencing opportunities. All of these are important aspects of coordination. Because the professional associations bring together diverse sectors of GIS in the state, they can also advocate coordination and fill in missing parts of coordination between state and local governments.

Both survey respondents and interview participants confirmed the value of statewide professional organizations, specifically IMAGIN and MiCAMP, and strongly favored the concept of a merger of these two groups into one. In either case, two organizations or one organization, CSS should maintain its strong partnership with the professional organization(s). These organizations and CSS have

complementary abilities, spheres of influence, and missions. The organizations are a means for advancing statewide coordination on important issues like aerial imagery, Lidar, data standards and open data, and maintaining topic-specific partnerships.

1.4 Continue statewide user group meetings, advocating for them to be as inclusive as possible.

The statewide user group meetings provide value to the statewide geospatial community and are seen as complementary, not competitive, to other networking and educational events (such as the conferences hosted by IMAGIN and MiCAMP) across the State. The centralized location, one-day, quarterly, no-cost format works for participants. Consensus workshop participants recognized the value of the information provided at the user group meetings. Some felt that the user group meetings could benefit from creating "sub-tracks" at the meetings to better address issues that were similar enough to be combined into a session or group of sessions.

1.5 Publicize and promote training opportunities throughout the stakeholder community and, when possible, provide training.

Opportunities to increase skills, especially through training events, were identified as having value, especially for local governments with funding limitations that constrains the ability to purchase training. One way to increase participation in training activities is to make sure that the geospatial community is aware of training opportunities. Therefore, alerting the community to training opportunities is important, as is being deliberate about where and how training can be planned to increase participation. Workshop participants noted that CSS has an important role in disseminating this information.

Goal 2. Incrementally increase sharing of data across the state to support an open data model.

Goal Description

Open data is an approach to publishing data for general use without restriction or cost. Open data, especially open spatial framework data, contributes to higher levels of efficiency and effectiveness of governmental bodies, promotes economic development, and supports public safety. An open data model provides values that are financially quantitative as well as qualitative (improved customer service, better decision-making support, etc.). These values serve the interests of the jurisdiction creating and maintaining the data, such as a county, but also to the county's neighbors, region, state, and country. Study after study confirms the financial benefits of GIS and/or open data.   For example, Richard Zerbe and Associates in 2012 examined the net benefits of the use of GIS in King County, Washington, and concluded that the use of GIS produced about $775 million in net benefits over the 18-year study period. In 2007 and 2008, the State of Iowa considered the net present value of its GIS program to 99 counties, 11 state agencies, three utilities, and others, and calculated a 20-year net present value of $271 million. A 2020 landmark study of The Economic Impact of Open Data Opportunities for Value Creation in Europe found that:

Open data can bring benefits in various fields, such as health, food security, education, climate, intelligent transport systems, and smart cities - and is considered 'an essential resource for economic growth, job creation and societal progress'.

The same study also stated:

Open data does not only increase the performance and transparency of public sector organisations, it is also seen as a driver for economic growth. Open data can contribute to the development of innovative services and the creation of new business models. Moreover, it can help organisations make more informed decisions and better use of existing resources. Businesses re-use open data to gather meaningful insights, to develop applications, or to enhance existing products or services.... Several economic benefits of the re-use of open data can be identified - both direct and indirect benefits. Direct benefits are monetised benefits that are realised in market transactions in the form of revenues and gross value added, the number of jobs involved in producing a service or product and cost savings. Indirect economic benefits are, for example, new goods and services, time savings for users of applications using open data, knowledge economy growth, increased efficiency in public services, and growth of related markets.

Michigan stands to benefit in ways that are similar to the cases above. However, it is important to note that this goal is about making incremental progress toward statewide open data. Educating organizations that create and maintain data about open data will take time. Because Michigan law allows for cost-recovery of GIS data, demonstrating the benefits of open data will be an important part of achieving this goal. The effort is worthwhile because, if it succeeds government data holdings will be more accessible. The following are recommendations that will result in a higher level of data-sharing and open data.

Recommendations

2.1 Work with professional associations to promote data-sharing and coordination activities.

Professional associations such as IMAGIN, MiCAMP, the Michigan Association of Equalization Directors, the Michigan Association of Counties, the Michigan Assessors Association, the County Road Association of Michigan, and many other similar organizations have an important role in defining the value proposition of openly sharing data by providing clarity on the benefits of open data as well as a better understanding of the barriers that keep constituents from sharing their data. These organizations can also be extremely helpful in distributing information supporting open data, as mentioned in the next recommendation. As mentioned in the consensus workshop, other, non-GIS associations can, and should, be partners to promote open data.

2.2 Document and promote open data and data-sharing business cases.

Sharing data often increases the value of a data theme beyond its immediate creators and maintainers. As validated by consensus workshop participants, credible return-on-investment studies, and concrete business cases, in addition to those offered here, will help to promote the need for open data.

The National States Geographic Information Council (NSGIC) is an organization created to encourage effective and efficient government through the coordinated development of geographic information and technologies to ensure that information may be integrated at all levels of government. In 2011, NSGIC published "Geospatial Data Sharing: Guidelines for Best Practices" that stated:

> *The National States Geographic Information Council (NSGIC) strongly believes that open sharing of geospatial data is in the best interest of our communities, states, and nation. One of our goals is to make all non-sensitive geospatial data, produced or maintained using taxpayer funds, a part of the public record.*

The document cited societal benefits resulting from open data for communities and their developers, lenders, insurers, and emergency planners. These benefits are in addition to direct benefits to government agencies and communities that produce geospatial data through the elimination of staff and attorney costs to develop or defend data sharing agreements, reduction of staff time taken up by data sales, lower costs for data development, and improved data accuracy as a result of increased data usage and feedback. Finally, studies were mentioned that show a direct correlation between increased open data polices and increased property values.

State geospatial coordination offices have increasingly embraced the movement toward more open data. For example, according to NSGIC's most recent Geospatial Maturity Assessment of all 50 states in 2022, 44% of states reported address data being made available for download, via API, publicly, and to the National Address Database in 2021 compared to only 29% in 2019. Likewise, 22 states, or about 44%, are currently making their parcel data freely available and 38 states identified that their transportation data is available either through a web service or as downloadable information.

These numbers from NSGIC are not surprising. There are many compelling situations in which having a larger, shared, dataset is much more valuable than a narrow, closeted one. Documenting these as business cases can be a powerful way to bring organizations into data-sharing collaborations. For example, an accurate Remonumentation layer was highlighted by a number of stakeholders during the interviews as valuable to many sectors across the state. Its value would increase with its level of accessibility to those sectors. Ideally, the Remonumentation layer would be one of many critical data sets that everyone can access. Another example is the shared creation of a culvert and undercrossing dataset, in which road-maintaining agencies all share geospatial data about these road facilities. This dataset will be valuable for road maintainers of course, but also very useful to emergency responders, hydrographers, wetland ecologists, and aquatic biologists.

Open datasets and the shared data used to create them are key components of regional and national programs, too. For example, the decennial census uses shared geospatial data to construct the TIGER dataset used for census fieldwork and as the spatial framework in which the census is analyzed, reported, and published. The national address database is a related product created through data sharing. The National Transportation Atlas and other USDOT datasets are all created through formal data-sharing programs. Educating the decision-making community and geospatial professionals about how shared, open data has an impact beyond Michigan's borders is yet another way to foster more sharing of data and participation in structured data collection and maintenance programs. Having these

programs and the associated stakeholders have access to the authoritative data prevents scenarios where less accurate data is used because the authoritative data is not made accessible.

2.3 Provide information to state and local agencies about the benefits of open data.

CSS should work with partners to disseminate information about the benefits of open data, including those related to economic and social value, and to help reduce or eliminate barriers to sharing data, such as potential liability of inaccurate data, costs related to sharing, burdensome agreements, and uncertainty related to downstream use. In addition to promoting values of open data, limitations that result from data that are not fully open and shared should be understood. For example, 34 states are contributing to the National Address Database (NAD) while Michigan is not able to contribute because this dataset is not in the public domain. As a result, Michigan is not able to take full advantage of accurate and up-to-date address data layers for uses such as permitting, school siting, guiding mobile health services to addresses and many other government services and activities. Illustrating the value of open data to geospatial data consumers will help drive a demand that barriers to open data be lowered.

CSS, with partners, should commit to a pervasive effort to communicate the benefits of open data as well as the limitations that currently exist in the absence of fully open data. Workshop participants observed that these issues are not always well understood by governmental decision-makers. Therefore, it is important that the communication take advantage of multiple communication channels such as the CSS website, conferences, meetings, reports, white papers, documents, presentations, and examples from other states.

Goal 3. Enhance and improve communications with stakeholders and partners.

Goal Description

This goal and set of recommendations are closely related to Goal 1. CSS should continue, and strengthen, the leadership of statewide geospatial coordination because effective bilateral communication is the foundation of successful coordination.

Recommendations

3.1 Increase awareness of DTMB CSS and its offerings to partners and stakeholders.

The survey results, and to some extent, the interviews, showed that there is room for improving how well the geospatial community understands what CSS does, what it plans to do, and what that means to the community in the way of its offerings. A more complete understanding will increase the effectiveness of CSS engagements with its partners and stakeholders. One way that the community's understanding can be increased is to use the introduction of the strategic plan and its eventual implementation as an opportunity to talk comprehensively about the work of CSS. Consensus workshop participants recognized the importance of this recommendation to the GIS community, to state agencies, and to the non-governmental public sector. CSS already does traveling presentations (roadshows) and "in-person" meetings throughout the state. These should continue, augmented by

other ways to communicate too. Webinars, formal presentations to GIS consumers (e.g., professionals who use geospatial data in their work but are not GIS professionals), and even perhaps social media may be useful additions to explaining CSS. A short survey might be a good means to find out stakeholder preferences on communication modes.

3.2 Market DTMB CSS so that it is easily recognizable as an authoritative source of geospatial data, services, and expertise.

An effective marketing or advertising plan is a way to associate an organization's identity with its mission, values, and offerings using a name or a symbol. This recommendation is about ensuring that CSS is seen as the organization that is leading geospatial coordination throughout the state, including providing data, services, and expertise.

Creating a marketable identity is a long-term endeavor that takes advantage of a multitude of small and large opportunities to connect results with organizational identity. CSS should consider the potential advantages of a clearer name for itself – something like DTMB Geospatial Services, for example – that better represents the organization's efforts to its constituents.

CSS has a unique opportunity to use the roll-out of this strategic plan as a springboard for its marketing effort.

Participants of the consensus workshop believed that social media and a marketing/communication team can help this recommendation to succeed and noted that the involvement of CSS in geospatial efforts was not always obvious.

3.3 Employ Associations, Advisory Group, and the statewide user group meetings as vehicles for messaging.

CSS can use its partnerships to help circulate important messages. In particular, the professional geospatial associations, a future Advisory Group, and the statewide user group meetings provide opportunities for CSS and partners to inform the community about important issues, such as the high value of open data, for example. Consensus workshop participants recognized that CSS already informs stakeholders through its mass email channel, presentations, and in the Statewide GIS User Group. However, they also thought that CSS could use the GIS professional societies to even greater effect, asking them to broadcast CSS information to their members and perhaps also co-sponsoring webinars. Other professional associations with a GIS consumer interest in the work of CSS can be good information dissemination channels. For example, the Michigan Association of Regions could be helpful in communicating with local governments and the Michigan Association of Equalization Directors can convey information useful to those who work with geospatial data about real properties. Stakeholders interviews also highlighted the need for CSS as the state GIS Office to look for opportunities to sit on other councils or boards where having a geospatial presence will help with coordination. CSS currently has representation within groups like the Transportation Asset Management Council, Michigan Infrastructure Council, and the Michigan Government Management Information Sciences group. Potential other opportunities exist for CSS staff or Advisory Group members to attend meetings and represent the geospatial community and report findings back to the geospatial community.

3.4 Improve the web presence of DTMB CSS.

This recommendation encourages the deliberate use of the CSS web presence to provide valuable, up-to-date information about all things geospatial for consumption by the statewide GIS community. It also serves as an additional way to find and access the clearinghouse. This one-stop source of information can be an important component of effective statewide coordination. Some consensus workshop participants believed that using a professional web consultant would ensure an optimized website.

Goal 4. DTMB CSS is a clearinghouse for authoritative geospatial data and services.

Goal Description

CSS has historically provided a web resource from which shared geospatial data sets can be accessed by government and private organizations. The GIS Open Data Portal, which contains the Michigan Geographic Framework, is a freely available repository of statewide spatial data. Other repositories and resources contain statewide data too. Survey respondents and interview participants identified the importance and potential value of expanding those shared resources by having an authoritative statewide geospatial clearinghouse hosted and maintained by CSS.

The clearinghouse should serve as an access point for a state spatial data infrastructure (SDI) – a framework of geographic data, metadata, and tools that allows efficient, flexible use of data. Many other states have organized statewide data in a clearinghouse or portal. Some examples include Arizona's AZGEO. Montana's MSDI Clearinghouse, North Carolina's OneMap, Indiana's IndianaMap, and Pennsylvania's PASDA. All these sites bring together not just datasets but also serve as information and spatial services information centers. The need for a clearinghouse was confirmed by the workshop participants who supported the recommendations associated with this goal.

The initial content of the clearinghouse would contain correlates of the national spatial data infrastructure (NSDI) data themes. Michigan has already developed many of these. Michigan also has an excellent suite of enterprise spatial services in place at CSS. Improving the state's spatial data infrastructure and providing a clearinghouse interface to it may involve design and configuration more than wholesale data creation efforts.

Recommendations

4.1 Continue to improve content, organization, functionality, and performance of a one-stop clearinghouse for data, maps, and data services.

This recommendation encourages the continuous improvement of the delivery of those data by increasing relevant content, enhancing organization to support data discovery, expanding the functionality of the clearinghouse to discover and use the data, and monitoring and improving performance as needed. Participants of the workshop also noted:

- Clearinghouse functionality should make it easy for data stewards to contribute data.
- Multiple State government access points for geospatial data should be consolidated to facilitate a "one-stop" clearinghouse.
- An advisory group could help define and reinforce statewide data standards and prioritize data needs.
- A strong search capability would be helpful.
- Metadata must document standards that change over time and help a potential data user to understand if a particular dataset is appropriate for a specific use case.

This recommendation, along with many of the recommendations within this goal, will require support from the stakeholders in the GIS community such as providing access to data, willingness to coordinate access to information and data through one central clearinghouse, and coordinated messaging and communication about accessing data from a one-stop clearinghouse. For example, survey respondents and interviewees indicated it is difficult and confusing to try to find information and data across the state agencies as there are data resources in multiple locations, multiple open data portals and various locations where users need to go to find GIS maps or applications.

4.2 Migrate the MGF to be a clearly defined Michigan Spatial Data Infrastructure.

As discussed above, a spatial data infrastructure (SDI) is a framework of geographic data, metadata, users, and tools that are interactively connected to use spatial data in an efficient and flexible way. A fully developed SDI, therefore, is the foundation for a robust clearinghouse. It also incorporates the recognized data standards and best practices promoted by CSS. This recommendation acknowledges the long-term vision of a statewide SDI that is driven by a clear plan.

Part of the challenge of this recommendation is related to clarification of what is an "authoritative" data set, especially when multiple versions exist of the same or similar data. The workshop participants believed that a group could be formed to address this question, consisting of geospatial users across the state, perhaps acting as a subcommittee to an overall advisory group.

Since the MGF is already defined as the name for the state's SDI datasets, it should be retained to avoid confusion. However, getting users to recognize that the MGF is, in fact, the core of the clearinghouse and is the Michigan correlate of the National Spatial Data Infrastructure is important. Educating users, and in some way marketing the MGF to convey that it is the authoritative infrastructure can help reduce this confusion for clearinghouse users. CSS currently has the backend technology in place to aggregate authoritative data into statewide SDI layers and it may just require increasing the frequency of publishing layers to a well-advertised spatial data one map for Michigan to help meet the goals of an improved GIS data clearinghouse.

4.3 Create and reinforce recognized data standards along with best practices and models for geospatial data content, quality, and timeliness.

Data standards serve as the glue with which datasets can seamlessly operate as part of an SDI and are therefore a critical element of success. Accepted best practices and proven models work with data standards to ensure data relevance, quality, and timeliness (currency). A group (or groups per SDI data theme), perhaps acting as a subcommittee to an overall advisory group, could be helpful in creating and promulgating statewide data standards.

4.4 Improve the content, quality, and timeliness of statewide geospatial data as a result of increased data sharing and open data.

A clearinghouse depends on data that is provided by many data stewards, who by definition have a vested interest in high-quality data. This arrangement best ensures that the data is updated as needed and that it is of a quality level that suits the business needs of its creator, at a minimum. Statewide data-sharing across the geospatial community, therefore, involves the incremental increase of contributing data stewards which will ultimately result in robust data content within the SDI. The result is an extremely valuable data resource that benefits all the citizens across the state, directly or indirectly. As stated elsewhere, open data is an ultimate long-term goal. Achieving that goal will require incremental progress over an extended period of time. The clearinghouse needs to facilitate the increased opportunities for data sharing across the statewide community as mentioned in 4.1.

Goal 5. Continuously review and improve State of Michigan (SOM) and DTMB CSS Business Processes.

Goal Description

This group of recommendations is about continuous improvement over time of the business processes with which CSS operates to carry out its mission. Although these recommendations are about processes within the Michigan State Government, the consequences of implementing the recommendations will affect all CSS partners and stakeholders. Interestingly, several of the workshop participants assumed that one or more of these recommendations were already implemented.

Recommendations

5.1 Formally recognize that DTMB CSS is serving as the Geographic Information Office for the State of Michigan.

CSS functions as a state geographic information office but is not universally recognized in that capacity. The statewide GIS community stated this in the survey and interviews conducted for this plan and expressed that formally recognizing DTMB as the Geographic Information Office would confirm the coordination role that DTMB has working with federal, state, and local levels of government and the GIS community in Michigan as a whole. Establishing a title of Geographic Information Officer (GIO) signals that the State has a geographic information office. It also makes clear that CSS is in a coordinating role within State government and within the GIS community, because these are normal functions of a geographic information office and is already a role that DTMB is fulfilling through its day-to-day activities.

Today there are more than 30 states with an identified GIO. Also, there is a common theme that was shared amongst GIOs which is having the nationally recognized role of GIO within the state and communicating that out does help in confirming a GIS leadership position within the state. Having an identified GIO clarifies a primary contact within the State to share communication, partner, plan, and prioritize initiatives that help move geospatial activities forward in alignment with all levels of government, program coordination, and collaboration around potential funding opportunities. Fulfilling this recommendation could be accomplished through an administrative action by assigning the role of Geographic Information Officer (GIO) to the existing Geospatial Services Manager position. Since this role is housed in CSS, it then confirms that CSS is the geographic information office for the State. As appropriate, this change can be marketed as described in Goal 3.

5.2 Enhance procedural mechanisms to ensure DTMB CSS is involved early in procurements and projects with geospatial components.

The current procurement process offers the opportunity to include CSS via a checkbox. However, the interview activity discovered that some procurements that involve geospatial technology, products, or data advance to late stages or are completed without the involvement of CSS. There is, therefore, an opportunity to review and tighten current procurement processes to ensure the timely involvement of CSS in relevant projects. In addition, projects with a geospatial component that don't rise to the level of formal procurement should also involve CSS early in the process. This can be facilitated by DTMB Agency Services staff being more geospatially aware, per recommendation 5.5. This recommendation was viewed as important by the workshop participants.

5.3 Continue to identify national and regional data initiatives with significant geospatial data collection and development activities and involve DTMB CSS in them when the involvement benefits the statewide GIS community.

CSS has had great success aligning with and participating in regional and national projects with significant geospatial content. For example, CSS has played a significant role in projects that include Next Generation 911, Broadband Mapping, the USGS 3D National Hydrography Program (3DHP), and statewide aerial imagery and Lidar data acquisition through partnerships established by CSS using the MiSAIL program. This recommendation recognizes this high level of collaborative participation and encourages CSS to continue involvement in such projects. These national projects often include funding for geospatial activities. Furthermore, the future advisory group should play an important role in identifying these large initiatives and opportunities for cost-sharing across stakeholders.

5.4 Identify national and regional funding opportunities that promote DTMB CSS strategic goals and increase the capacity of the statewide GIS community.

While CSS has its annual funding for operations, it should continue to look for opportunities to financially support its mission through other funding avenues to support geospatial technology and data proliferation. For example, 911 activities are helping to fund geospatial activities in several states across the country. Massachusetts State 911 Office provided funding for MassGIS to build out a statewide parcel dataset at a high level of standardization. Similarly, MA 911 funds MassGIS' development and maintenance of the state's standardized master address database. And furthermore, MA municipalities' ability to receive funding from the State 911 grants program is contingent upon their submission of maintained parcels and notification of address changes. Wisconsin Act 261 created a NG911 GIS grant funding program for county land information offices, for GIS data development and maintenance, to assist in the creation of Next Generation 911.

Likewise, national initiatives such as the American Recovery Plan Act of 2021 (ARPA), the Infrastructure Investment and Jobs Act of 2022 (IIJA), and the Inflation Reduction Act (IRA) of 2022 are huge national investments that directly and indirectly rely upon geospatial data and analysis. These federal acts have and will continue to result in large amounts of geospatial funding for state and local government projects that use GIS. The article, *Billions in New Federal Spending and Its Business Impacts*, by James Higgins in Esri's WhereNext online publication states, "Geographic information system (GIS) software enables business leaders to determine where federal funding might overlap with a company's assets and operations." Similarly, Bill Johnson of AppGeo writes in the blog, *GIS Data is the Key to Unlocking New Federal Broadband Funds*, "I could be wrong, but I do not recall any time in the past where the disposition of so much money depends entirely on geospatial data." Public health actions that depend on geospatial data, such as health equity and outreach, are called for in the ARPA and IRA. Large investments in transportation planning, and public works such as maintenance and new construction are part of the ARPA, IIJA, and the IRA. Better broadband access for all communities – an inherently geospatial problem – is funded in the ARPA and the IIJA. Environmental monitoring, remediation, and resilience planning and actions, all of which rely on spatial data and analyses, are centerpieces of the IRA. Identifying disadvantaged communities and regions and then supporting their development is an inherently geographic activity that is a key part of the IIJA. CSS can publicize opportunities that it finds or that are found by others and even, when appropriate, be an active partner in pursuing them.

5.5 Ensure DTMB staff housed in agencies are "geospatially aware" and communicate with DTMB CSS as appropriate.

DTMB Agency Services staff that are providing IT services to the specific agencies that they support have the potential to promote the geospatial capabilities of CSS to those agencies since they would naturally learn of potential opportunities early in the process. They can also help identify agency projects that may have a geospatial component and loop in CSS at an early stage. Obviously, CSS must continue to educate other DTMB staff about the capabilities of CSS in order for them to be proficient advocates.

5.6 Set priorities for allocation of funding between resources, training, data development, and other needs.

Given the competing priorities among agencies, external partners, etc., CSS will need to be able to prioritize how funding is expended for human and other resources, training, data development and maintenance, and other projects and activities. These priorities should be set based on the overall operational requirements for its core enterprise GIS services supporting the state agencies and recommendations from this strategic plan. Also, it should be noted that priorities can change based on current outside factors such as administration changes, unexpected events such as the COVID-19 pandemic, national or state economic recessions, public sector hiring environment, etc.

5.7 Evaluate whether the State should incorporate GIS skills and experience within its employment system.

Interviews with state agencies revealed the challenge of hiring people with geospatial skills and experience because there is currently not an established and accepted category of GIS positions within the state hiring process. Michigan can join a growing list of other states that either are developing (or have developed) geospatial employment categories in order to overcome this challenge, or alternatively, to include GIS skills and qualifications within applicable existing position descriptions.

5.8 Analyze current roles and responsibilities within DTMB CSS to make sure current and foreseeable needs are met.

A staffing plan is a helpful tool to ensure that current and future levels of effort match existing and future staffing levels. It depends on a thoughtful analysis of roles and responsibilities as well as an accurate understanding of how and where effort is expended currently and expected to be expended in the future. This kind of credible accounting of resource needs is also very useful to justify additional staffing, if and when additional resources are needed. This analysis should be reviewed and updated periodically to ensure that staffing levels are appropriate as circumstances change over time.

Prioritization and Timeline

Effective prioritization of the strategic goals, which require finite CSS resources, especially human resources, is necessary to make the best use of those resources and to ensure that time-sensitive opportunities can be appropriately addressed. Prioritization is usually a subjective exercise. An outcome of the consensus workshop included the prioritization of the five strategic goals. Figure 3 below illustrates the ranking of the goals based on the opinions of what is most important to the

workgroup participants. It should be noted that participants commented that they thought much of Goal 5 should already be intrinsic to the state's operations and since it's mostly internal to the State, didn't feel like a high priority to them personally.
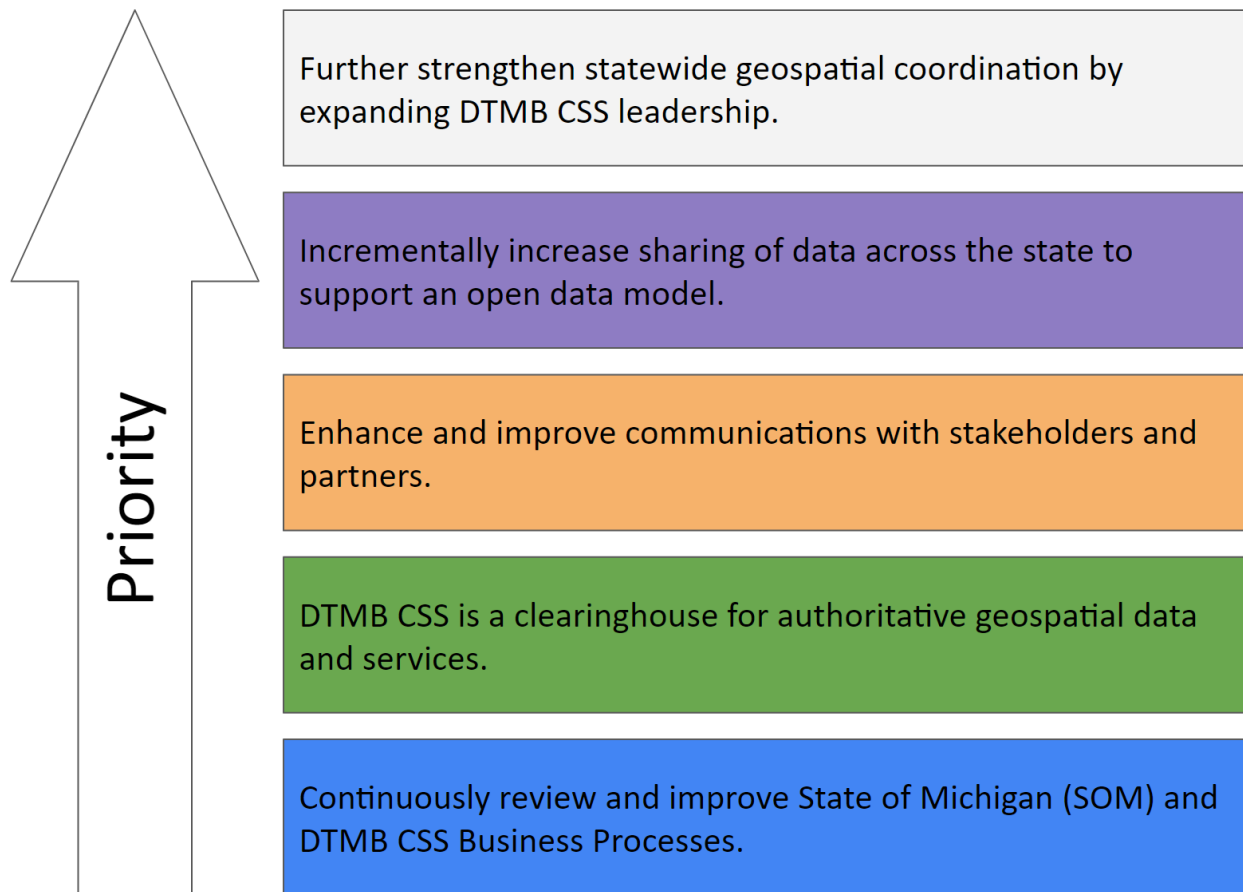
Figure 3. Prioritization of Strategic Goals per the consensus workshop participants.

 It may also be insightful to consider the goals and recommendations in terms of relative time frames for each. A suggested timeline chart is presented below. Note that these timeframes consider both the consumption and availability of resources as well as the need for coordination. Generally speaking, the higher the need for resources the longer the timeframe required to accomplish the goal. Likewise, the more coordination that is required to accomplish a goal the longer the timeframe that will be needed. They are also presented in timeline order so they interlock logically based on understood predecessors and dependencies. Also, this chart indicates that the effort associated with some goals is ongoing. In some of these cases, we are showing the optimum time frame to place emphasis on the recommendation rather than the entire time frame for the recommendation.

Goals and Recommendations	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Ongoing
1. Further strengthen statewide geospatial coordination by expanding DTMB CSS leadership.																					
1.1 Continue to lead statewide geospatial coordination activities.																					Y
1.2 Use a formal advisory group to support the work of statewide GIS coordination.																					Y
1.3 Use IMAGIN and MiCAMP as a means to advance statewide GIS coordination.																					Y
1.4 Continue statewide user group meetings, advocating for them to be as inclusive as possible.																					Y
1.5 Publicize and promote training opportunities throughout the stakeholder community and, when possible, provide training.																					Y
2. Incrementally increase sharing of data across the state to support an open data model.																					
2.1 Work with professional associations to promote data-sharing and coordination activities.																					Y
2.2 Document and promote open data and data-sharing business cases.																					Y
2.3 Provide information to state and local agencies about the benefits of open data.																					Y
3. Enhance and improve communications with stakeholders and partners.																					
3.1 Increase awareness of DTMB CSS and its offerings to partners and stakeholders.																					Y
3.2 Market DTMB CSS so that it is easily recognizable as an authoritative source of geospatial data, services, and expertise.																					
3.3 Employ Associations, the Advisory Group, and the statewide user group meetings as vehicles for messaging.																					Y
3.4 Improve the web presence of DTMB CSS.																					
4. DTMB CSS is a clearinghouse for authoritative geospatial data and services.																					
4.1 Continue to improve content, organization, functionality, and performance of a one-stop clearinghouse for data, maps, and data services.																					Y
4.2 Migrate the former MGF to a clearly defined Michigan Spatial Data Infrastructure.																					
4.3 Create and reinforce recognized data standards along with best practices and models for geospatial data content, quality, and timeliness.																					Y
4.4 Improve the content, quality, and timeliness of statewide geospatial data as a result of increased data sharing and open data.																					Y
5. Continuously review and improve State of Michigan (SOM) and DTMB CSS Business Processes.																					
5.1 Formally recognize that DTMB CSS is serving as the Geographic Information Office for the State of Michigan.																					
5.2 Enhance procedural mechanisms to ensure DTMB CSS is involved early in procurements and projects with geospatial components.																					
5.3 Continue to identify national and regional data initiatives with significant geospatial data collection and development activities and involve DTMB CSS in them when the involvement benefits the statewide GIS community.																					Y
5.4 Identify national and regional funding opportunities that promote DTMB CSS strategic goals and increase the capacity of the statewide GIS community.																					Y
5.5 Ensure DTMB staff housed in agencies are "geospatially aware" and communicate with DTMB CSS as appropriate.																					
5.6 Set priorities for allocation of funding between resources, training, data development, and other needs.																					Y
5.7 Evaluate whether the State should incorporate GIS skills and experience within its employment system.																					
5.8 Analyze current roles and responsibilities within DTMB CSS to make sure current and foreseeable needs are met.																					Y

Figure 4. Goals and Recommendations 5-year Implementation Timeline

When ready to start implementing this plan, CSS should use this timeline as a management tool by maintaining it in an interactive Gantt chart software. This will allow the implementation team's project manager to add real start and end dates, connect dependencies, and update dates and durations based on actual accomplishments and task completion.

Another recommendation to consider is to tie the implementation team members' individual work goals to the goals and recommendations in this plan. The effectiveness of this approach was recently shown in Indiana, where the Indiana GIO was able to make sure the plan was being moved forward by staff actions. The benefits of this recommendation include:

- The team is motivated to read the plan in detail.
- The team is invested in the plan and individuals know they are contributing to its success.
- Recommendations that are unclaimed by any team member – orphans – are identified and a decision taken as to who should claim them, or if new staff are needed to handle them.
- The timeline is adjusted to meet team resources and availability. If orphan recommendations are retained, then they may be moved to a later start.

Monitoring & Measuring Progress and Success

While this plan presents a multi-year vision and set of recommendations, the conditions (organizational, political, technological) in which this plan was formed will evolve over time. It will be essential to revisit the plan periodically and to recalibrate priorities based on what has been achieved as well as new technological and political developments. Ultimately, strategic planning – particularly for technology – must be viewed as an ongoing effort and not a one-time exercise. We recommend a collaborative, quarterly (or at least annual) review of the strategic goals and recommendations with input from both CSS and the Advisory Group to (1) assess progress as compared to the schedule/priorities presented in this plan and (2) to recalibrate goals based on new information/circumstances. This periodic snapshot should be captured using the following chart, as a similar rubric. Ratings are based on a qualitative assessment, all things considered.

Strategic Goal	Overall Goal Status (Color-Code)*	Recommendations	Comment or Suggested Recalibration (Color-Code for Recommendation Status)*
1. Further strengthen statewide geospatial		1.1 Continue to lead statewide geospatial coordination activities.	

coordination by expanding DTMB CSS leadership.		1.2 Use a formal advisory group to support the work of statewide GIS coordination.	
		1.3 Use IMAGIN and MiCAMP as a means to advance statewide GIS coordination.	
		1.4 Continue statewide user group meetings, advocating for them to be as inclusive as possible.	
		1.5 Publicize and promote training opportunities throughout the stakeholder community and, when possible, provide training.	
2. Incrementally increase sharing of data across the state to support an open data model.		2.1 Work with professional associations to promote data-sharing and coordination activities.	
		2.2 Document and promote open data and data-sharing business cases.	
		2.3 Provide information to state and local agencies about the benefits of open data.	
3. Enhance and improve communications with stakeholders and partners.		3.1 Increase awareness of DTMB CSS and its offerings to partners and stakeholders.	
		3.2 Market DTMB CSS so that it is easily recognizable as an authoritative source of geospatial data, services, and expertise.	
		3.3 Employ Associations, the Advisory Group, and the statewide user group meetings as vehicles for messaging.	
		3.4 Improve the web presence of DTMB CSS.	
4. DTMB CSS is a clearinghouse for authoritative geospatial data and services.		4.1 Continue to improve content, organization, functionality, and performance of a one-stop clearinghouse for data, maps, and data services.	
		4.2 Migrate the former MGF to a clearly defined Michigan Spatial Data Infrastructure.	

		4.3 Create and reinforce recognized data standards along with best practices and models for geospatial data content, quality, and timeliness.	
		4.4 Improve the content, quality, and timeliness of statewide geospatial data as a result of increased data sharing and open data.	
		5.1 Formally recognize that DTMB CSS is serving as the Geographic Information Office for the State of Michigan.	
		5.2 Enhance procedural mechanisms to ensure DTMB CSS is involved early in procurements and projects with geospatial components.	
		5.3 Continue to identify national and regional data initiatives with significant geospatial data collection and development activities and involve DTMB CSS in them when the involvement benefits the statewide GIS community.	
		5.4 Identify national and regional funding opportunities that promote DTMB CSS strategic goals and increase the capacity of the statewide GIS community.	
		5.5 Ensure DTMB staff housed in agencies are "geospatially aware" and communicate with DTMB CSS as appropriate.	
		5.6 Set priorities for allocation of funding between resources, training, data development, and other needs.	
5. Continuously review and improve State of Michigan (SOM) and DTMB CSS Business Processes.		5.7 Evaluate whether the State should incorporate GIS skills and experience within its employment system.	

		5.8 Analyze current roles and responsibilities within DTMB CSS to make sure current and foreseeable needs are met.	

Color Key (during operational use, cells in the preceding table will be color-coded and comments added as appropriate).

Color: Rating
Blue: Not yet started
Green: Fully meets expectations and requirements (e.g., on schedule and achieving desired outcome)
Yellow: Partially meets expectations and requirements (e.g., behind schedule, but making reasonable progress toward desired outcome)
Red: Not meeting expectations and requirements (e.g., behind schedule and very little or no progress toward desired outcome))

Figure 5. Measuring Success Rubric

Appendices

A. Survey Summary (separate .PDF)