

2018

Strategic Plan for

Intelligent Transportation Systems



Prepared by
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ACRONYMS AND ABBREVIATIONS

ACM	Active Corridor Management	ICM	Integrated Corridor Management
AMD	Asset Management Database	ITS	Intelligent Transportation Systems
API	Application Programming Interface	MDOT	Michigan Department of Transportation
ATM	Active Traffic Management	MOT	Maintenance of Traffic
ATMS	Advanced Traffic Management System	MVDS	Microwave Vehicle Detection Systems
AV	Automated Vehicle	IPO	Intelligent Transportation Systems Program Office
BWBOC	Blue Water Bridge Operations Center	QPL	Qualified Products List
CAV	Connected and Automated Vehicles	RWIS	Road Weather Information System
CCTV	Closed-Circuit Television	SMART	Specific, Measurable, Attainable, Relevant, Time-Bound
CMS	Changeable Message Signs	SPaT	Signal Phasing and Timing
CV	Connected Vehicle	TOC	Traffic Operations Center
DMS	Dynamic Message Sign	TMP	Transportation Management Plan
DOT	Department of Transportation	TPIMS	Truck Parking Information System
DTMB	Department of Technology, Management, and Budget	TSMO	Transportation Systems Management and Operations
DUAP	Data Use Analysis and Processing	VII	Vehicle Infrastructure Integration
EPE	Early Preliminary Engineering		
HAR	Highway Advisory Radio		

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1. INTRODUCTION

The purpose of this strategic plan is to act as a compass for the Michigan Department of Transportation (MDOT) Intelligent Transportation Systems (ITS) Program (referred to herein as “the Program”) in supporting decisions and setting priorities moving forward in the changing ITS landscape. The plan is comprised of “SMART” goals and actions, which are carefully crafted to align with the Program’s Mission and Vision.

SPECIFIC | MEASURABLE | ATTAINABLE | RELEVANT | TIME-BOUND



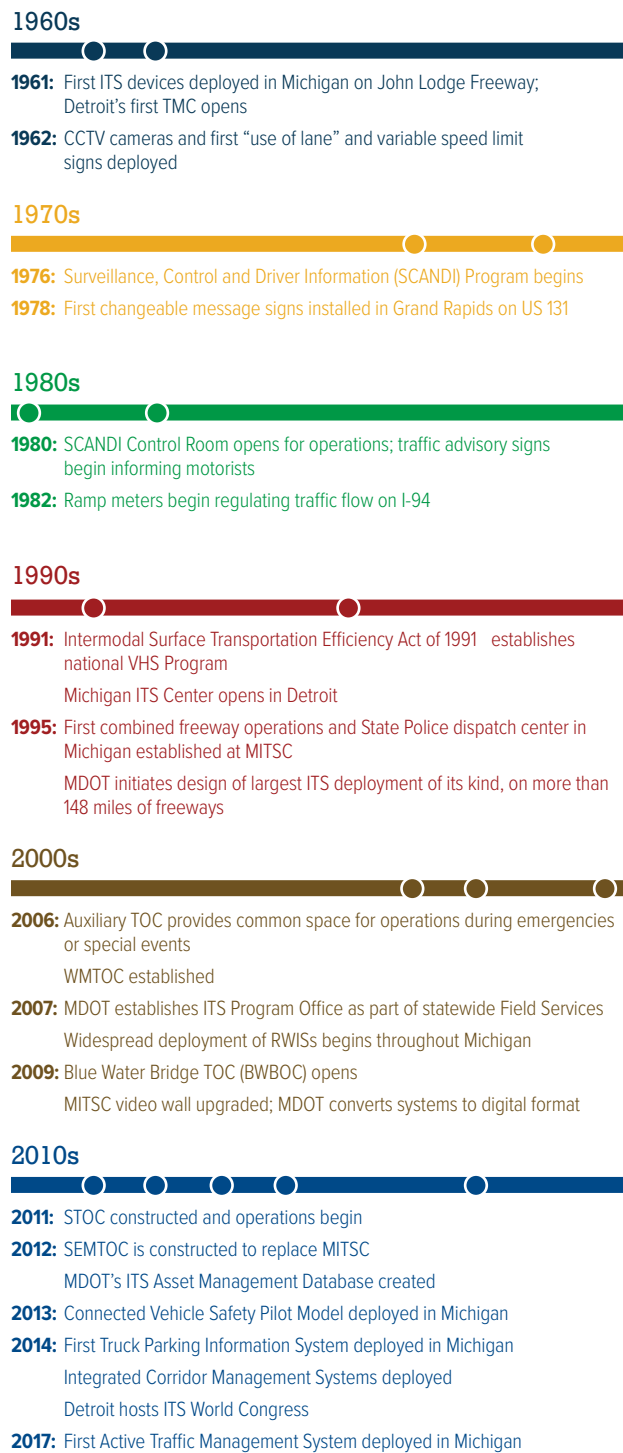
The Program falls under the Transportation Systems Management and Operations (TSMO) program umbrella and interrelates with several other MDOT programs and business areas. The objective of this plan is to provide clear direction and vision for the Program to support MDOT’s TSMO initiative, in turn helping MDOT achieve the Department’s overall Mission, Vision, Values, and Strategic Areas of Focus as defined in the [MDOT 2017 Strategic Plan](#).

1.1. PROGRAM EVOLUTION

MDOT has been deploying and pioneering intelligent transportation systems (ITS) since the 1960s. **Figure 1** provides a timeline of significant events in the Program’s history which have helped advance the Program to where it is today.

Early on, the systems included loop detectors, ramp metering, dynamic message signs (DMS) (also referred to as changeable message signs, or CMS), motorist aid telephones, highway

Figure 1: MDOT ITS Program Timeline



advisory radio (HAR), and closed-circuit television (CCTV) surveillance systems. Today, the Program is in control of nearly 6,000 devices statewide, including over 600 CCTVs and over 200 DMSs. The diversified list of devices includes equipment for road weather information systems (RWIS), an active traffic management (ATM) corridor, microwave vehicle detection systems (MVDS), connected vehicle (CV) deployments, truck parking information and management systems (TPIMS), and communications infrastructure. These ITS devices are operated from MDOT’s three transportation operation centers (TOCs) and the Blue Water Bridge Operations Center (BWBOC) to actively monitor MDOT’s roadways and manage traffic incidents.

1.2. METHODOLOGY

Figure 2 illustrates the collaborative approach that drove the development of this strategic plan. The steps are outlined in detail below.

- **Step 1: State of the Practice Evaluation:** This step included an industry scan and literature review on existing programs; project development, prioritization, and selection;

implementation strategies; best practices; public outreach; funding considerations; and emerging technologies. The review evaluated internal MDOT programs and initiatives, other state DOTs, transportation agencies, and federal guidance.

- **Step 2: External DOT Outreach:** This step included strategic outreach to DOTs to gain various perspectives on mature ITS programs, performance metrics, project selection, ATM, traffic signals, connected vehicles, emerging technologies, etc. Targeted DOTs are provided in **Table 1**.
- **Step 3: Success Management Process:** This multi-step process, identified below, focused on developing a shared vision of success for the Program.
 - » *Internal MDOT Survey:* An online survey was distributed in September 2017 to a wide range of MDOT staff and stakeholders with questions focused on background, impact, communications, and vision for the Program. A total of 62 respondents completed the survey and provided over 120 open-ended responses.

Figure 2: Strategic Plan Development

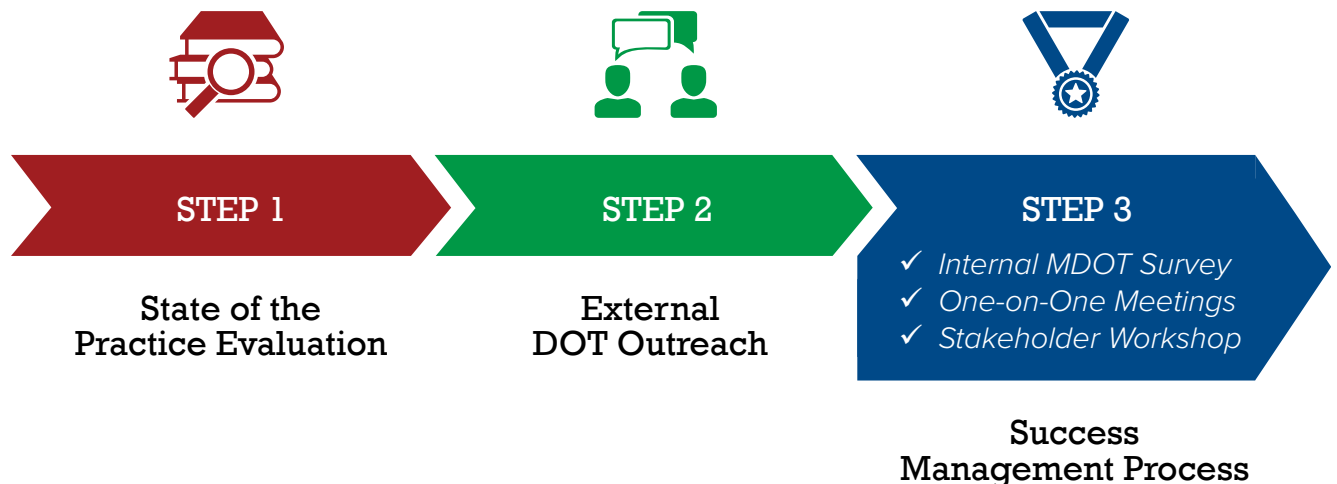


Table 1: State DOT Outreach

DOT	FOCUS AREA
VIRGINIA DOT	Performance metrics and project selection process
TEXAS DOT	Research and warrants for installing, decommissioning, and device replacement
FLORIDA DOT	Progressive and mature ITS program
WASHINGTON DOT	ATM and emerging technologies
IOWA DOT	ATM and emerging technologies
MINNESOTA DOT	ATM, ramp metering, and emerging technologies
GEORGIA DOT	Integration of ITS and traffic signals
UTAH DOT	Integration of ITS and traffic signals, performance metrics and reporting

The MDOT internal survey was distributed in September 2017 to a wide range of MDOT staff and stakeholders. The list of targeted groups included the following:

- » MDOT Leadership
- » Region Engineers
- » Region ITS Staff
- » ITS Program Office TOCs
- » Traffic Signals
- » Work Zone
- » Incident Management Communications
- » Congestion and Mobility
- » TSMO
- » Maintenance

» *One-on-One Meetings:* In December 2017 and January 2018, one-on-one meetings were organized between the ITS Program Manager and a cross-section of MDOT leadership. The focus of the discussions was to understand each participants vision of success, risks and opportunities, and focus areas for the Program moving forward. The

discussion format allowed for more elaboration and conversation surrounding the topics. The project team utilized feedback from one-on-one discussions to develop draft mission, vision, focus areas, and goals for the Program to be used at the stakeholder workshop.

» *Stakeholder Workshop:* An ITS stakeholder workshop was conducted in March, 2018 to review and discuss draft mission, vision, focus areas, goals, and prevailing themes of previous efforts. The intent of the workshop was to gain feedback and develop a shared vision of success on the goals and actions to incorporate into the new strategic plan.

- **Future Updates:** Moving forward, this strategic plan should be modified on an annual basis to re-evaluate and update focus areas, goals, and/or actions. While the plan should have a five-year outlook, annual modifications will allow the program to adjust for emerging technologies and ensure the focus is on the right opportunities.

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2. MDOT ITS PROGRAM STRATEGIC PLANNING

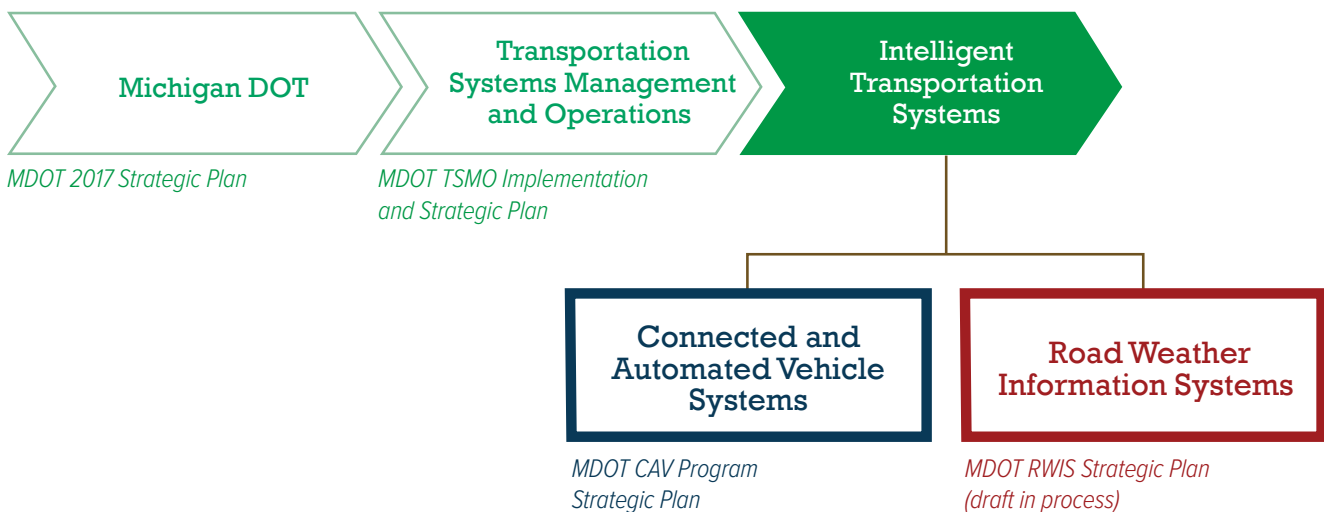
The Program’s mission and vision are the guiding principles used to align the Program’s focus. Where the Program’s goals and actions may change more frequently, the mission and vision are likely to remain constant until a larger shift in the direction of the Program calls for an update. Focus areas, goals, and objectives developed during the strategic planning process should serve as the path for the program to achieve its mission and vision.

As shown in **Figure 3**, the Program falls under MDOT’s TSMO initiative and ultimately under MDOT as a whole. Therefore, it is critical to build alignment in the Program’s mission and vision that interrelates through TSMO ([MDOT TSMO Implementation and Strategic Plan](#)) and MDOT ([MDOT 2017 Strategic Plan](#)). The development of the Program’s mission and vision took careful consideration of program alignment with existing and upcoming strategic plans.

TSMO is an integrated program that optimizes the performance of existing multimodal infrastructure by implementing systems, services, and projects to maximize capacity and improve the security, safety, and reliability of the transportation system. Ten MDOT business areas fall under the “TSMO’s umbrella,” which range from work zone management to modal interaction and integration.

As shown in **Figure 3**, the Connected and Automated Vehicle (CAV) and RWIS Strategic Plans fall under the purview of the ITS Program. For more information on CAV and RWIS strategic direction, refer to the [MDOT CAV Program Strategic Plan](#) and the [MDOT RWIS Strategic Plan](#), respectively. Additional resources are provided in the ATM Strategies and Concepts Guide.

Figure 3: ITS Program Alignment



2.1. MISSION

The Program’s mission statement is intended to be an all-encompassing definition of the purpose of the Program. Everything the Program does should be in line with its mission statement, which focuses the direction of the Program.

Table 2 highlights the alignment in the mission statements of the MDOT, TSMO and ITS programs. When comparing the three mission statements, the common theme of integration becomes apparent. Safety, reliability, operational performance, economic benefit, and improved quality of life are also interwoven throughout the mission statements. These themes were considered when creating the Program focus areas, goals, and actions.

2.2. VISION

The vision statement is intended to describe where the Program wants to be in the future. The vision statement guides the development

Table 2: Program Mission Statement

PROGRAM	MISSION STATEMENT
MDOT	Providing the highest quality integrated transportation services for economic benefit and improved quality of life.
TSMO	Operate and manage an optimized, integrated transportation network by delivering high quality services for safe and reliable mobility for all users.
ITS	Provide high quality, adaptive, and integrated transportation technology solutions that improve safety and mobility for all users.

of focus areas, goals, and actions that provide a path to achieve the Program’s vision. As shown in **Table 3**, the vision for the Program complements the visions of TSMO and MDOT.

Table 3: Program Vision Statement

PROGRAM	MISSION STATEMENT
MDOT	MDOT will be recognized as a progressive and innovative agency, with an exceptional workforce that inspires public confidence.
TSMO	<ul style="list-style-type: none"> Integrate Operations as a core MDOT program united with the execution of MDOT’s overall mission. Inspire public confidence as a progressive and innovative national leader in the management and operations of our transportation system. Collaborate across program areas, leveraging technology and resources to achieve the best possible results. Maintain a sustainable and engaged operations workforce with exceptional knowledge, skills, and abilities.
ITS	Integrate MDOT’s ITS Program into all TSMO business areas and leverage both proven and emerging transportation technologies to sustainably enhance safety, mobility, economic benefit, and support improved quality of life.

2.3. FOCUS AREAS, GOALS, and ACTIONS

The ITS focus areas, goals, and actions provide the foundation for a path to successfully achieve the Program’s mission and vision. **Figure 4** provides a visual representation of how the focus areas, goals, and actions support the mission and vision.

The ITS focus areas are rooted in the seven TSMO strategic areas of focus, as shown in **Table 4**. **Table 5** provides a description of each ITS Focus Area.




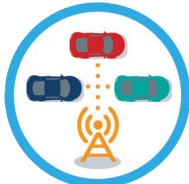



Figure 4: Focus Areas, Goals, and Action Structure



Table 4: Focus Area Alignment

TSMO STRATEGIC AREAS OF FOCUS		ITS FOCUS AREA
1	Evaluate and Streamline Information Technology Processes	→ Information Technology Processes
2	Integrate Operations across All Business Areas	→ TSMO Business Area Integration
3	Integrate the Operations of ITS and Signals	→ ITS/Signal Program Integration
4	Adapt Processes, Products, and Training to Advances in Technology	→ Emerging Technologies
5	Enhance Communications and Outreach to External and Internal Stakeholders	→ Partners and Outreach
6	Prioritize Resources to Meet Critical Emerging Needs	→ Workforce Development
7	Drive Progress with Meaningful Performance Measures	→ Performance-Based Priorities

Table 5: Focus Areas

	<p>#1 Information Technology Processes</p>	<p>Streamline and maximize efficiency of information technology processes within the ITS Program, with related MDOT areas, and with the Department of Technology, Management, and Budget (DTMB).</p>
	<p>#2 TSMO Business Area Integration</p>	<p>Provide relevant and meaningful support to each of the ten TSMO business areas.</p>
	<p>#3 ITS/Signal Program Integration</p>	<p>Develop and implement a path to achieving sustainable integration between the MDOT ITS and Signal Programs to increase interoperability.</p>
	<p>#4 Emerging Technologies</p>	<p>Effectively deploy advanced transportation technologies in a timely manner to remain a DOT leader in emerging technologies and innovation.</p>
	<p>#5 Partners and Outreach</p>	<p>Cultivate partnerships, conduct robust outreach, and effectively communicate to increase the awareness, collaboration, and sustainability of MDOT's ITS Program.</p>
	<p>#6 Workforce Development</p>	<p>Recruit, develop, and retain an engaged workforce that is prepared for the rapidly changing nature of the ITS landscape.</p>
	<p>#7 Performance- Based Priorities</p>	<p>Prioritize resources that deliver the most value and highest return to meet the ITS mission, vision, and focus areas.</p>

2.4. GOALS

The Program goals are drivers that align with focus areas to set the direction of the Program. Goals were created based on the

collaborative approach discussed in **Section “1.2. Methodology”**, which included state of the practice research, surveys, interviews, and workshops. **Table 6** outlines the Program goals.

Table 6: Goals

FOCUS AREA	GOALS
1 Information Technology Processes	<ul style="list-style-type: none"> A. Enhance network capability and reliability B. Collaborate with DTMB to align processes C. Enhance availability of ITS data to public
2 TSMO Business Area Integration <i>(TSMO business areas)</i>	<ul style="list-style-type: none"> A. Utilize ITS technologies to increase throughput, reduce travel time, mitigate crashes, and enhance safety <i>(congestion management, safety)</i> B. Enhance effectiveness of existing ITS assets <i>(field equipment, assets and functionality management)</i> C. Effectively implement the CAV and RWIS strategic plans <i>(connected and automated vehicle systems, weather management)</i> D. Support work zone, maintenance, and incident management <i>(traffic incident management, work zone management)</i> E. Utilize ITS technologies to promote modal interaction and integration <i>(modal interaction and integration)</i> F. Optimize data socialization between ITS and other MDOT business areas <i>(TOCs and traveler information systems; data collection, storage, utilization, analytics, and decision support systems)</i>
3 ITS/Signal Program Integration	<ul style="list-style-type: none"> A. Sustainably increase interoperability between ITS and Signal programs B. Identify and leverage commonality areas
4 Emerging Technologies	<ul style="list-style-type: none"> A. Be a DOT leader in emerging technologies and embrace innovation
5 Partners and Outreach	<ul style="list-style-type: none"> A. Engage stakeholders B. Engage in industry partnerships to drive economic benefit C. Support legislative actions D. Partner with universities to conduct research
6 Workforce Development	<ul style="list-style-type: none"> A. Develop and retain a high-performing workforce B. Recruit a talented and motivated workforce
7 Performance-Based Priorities	<ul style="list-style-type: none"> A. Implement and manage project prioritization and selection process B. Maintain a sustainable program C. Optimize funding D. Establish success measures on every ITS project

2.5. ACTIONS

The Program’s actions are developed as a path to achieve the associated goals and focus areas. Actions are provided in the following tables:

- #1 Information Technology Processes: **Table 7**
- #2 TSMO Business Area Integration: **Table 8**
- #3 ITS/Signal Program Integration: **Table 9**
- #4 Emerging Technologies: **Table 10**
- #5 Partners and Outreach: **Table 11**
- #6 Workforce Development: **Table 12**
- #7 Performance-Based Priorities: **Table 13**

Table 7: Information Technology Processes – Actions

	GOALS	ACTIONS
Focus Area #1 – Information Technology Processes	A. Enhance network capability and reliability	<ol style="list-style-type: none"> 1) Maintain system functionality while addressing critical ITS software upgrades and enhancements 2) Identify and mitigate critical infrastructure communications gaps 3) Create a network position within the Program to collaborate with internal (IT steering committee, signals unit, etc.) and external partners (DTMB, municipalities), identify private network partnerships, manage existing ITS network, and plan for future enhancements 4) Develop and implement a network security plan 5) Plan for future infrastructure communications needs to facilitate ITS data transfer needs 6) Develop guidance on use of communications infrastructure mediums for ITS deployments
	B. Collaborate with DTMB to align processes	<ol style="list-style-type: none"> 1) Identify an MDOT statewide lead to facilitate coordination with DTMB on behalf of the Program for ATMS, device integration, and network capacity, capability, and associated security protocols 2) Identify and prioritize processes that provide the most impact to the Program and develop action plan(s) for improvement 3) Implement efficient and consistent process for ATMS enhancements 4) Include a DTMB lead during the early preliminary engineering (EPE) and design phases of every ITS Project
	C. Enhance availability of ITS data to public	<ol style="list-style-type: none"> 1) Enhance quality of ITS data to public 2) Enhance processes and policy to efficiently share data with public and third-party applications 3) Work with Office of Communications to enhance Mi-Drive to provide user-friendly, reliable, and accurate information 4) Develop and implement an outward facing platform to educate users on the effectiveness and benefits of ITS research and deployments

Table 8: TSMO Business Area Integration – Actions

GOALS	ACTIONS
<p>Focus Area #2 – TSMO Business Area Integration</p> <p>A. Utilize ITS technologies to increase throughput, reduce travel time, mitigate crashes, and enhance safety</p>	<ol style="list-style-type: none"> 1) Implement targeted ITS deployments to mitigate crashes, enhance safety, and provide real-time, accurate traveler information in advance of high-congestion locations 2) Partner with MDOT’s Safety Program to develop a safety focused ITS deployment toolbox 3) Partner with MDOT’s Congestion and Mobility Unit to aid in the identification of high-congestion locations 4) Balance demand and available capacity through the following methods: <ol style="list-style-type: none"> a) Providing real-time, accurate alternate route information b) Providing flexible capacity systems where permanent capacity improvements are not possible or practicable 5) Develop external partnerships with other agencies and private industry to improve mobility and safety for Michigan’s motorists
<p>B. Enhance effectiveness of existing ITS assets</p>	<ol style="list-style-type: none"> 1) Identify and implement new uses for MDOT’s existing ITS assets
<p>C. Effectively implement the CAV and RWIS strategic plans</p>	<ol style="list-style-type: none"> 1) Successfully implement the CAV Strategic Plan goals, strategies, and tactical actions 2) Successfully implement the RWIS investment strategies 3) Mitigate identified CAV critical and moderate gaps 4) Continue to assess stakeholder needs and resource availability as new weather management technologies become available
<p>D. Support work zone, maintenance, and incident management</p>	<ol style="list-style-type: none"> 1) Provide real-time, accurate work zone (e.g., lane closure, location, reduced speeds, queues etc.) and incident (e.g., queue warning, lane closure, location, reduced speeds, etc.) information 2) Utilize ITS technologies and available data to minimize work zone operational impacts and support quick incident identification and clearance 3) Partner with Work Zone Unit to develop a toolbox of useful ITS deployment options for various staging schemes and work types 4) Require all Transportation Management Plan (TMP) and (Maintenance of Traffic) MOT plans to include an “ITS Considerations” section
<p>E. Utilize ITS technologies to promote modal interaction and integration</p>	<ol style="list-style-type: none"> 1) Partner with multimodal transportation services to incorporate transit and bicycle/pedestrian into ITS solutions 2) Partner with transportation network companies (TNC) to promote shared mobility
<p>F. Optimize data socialization between ITS and other MDOT business areas</p>	<ol style="list-style-type: none"> 1) Identify and implement automated processes to optimize efficiency and increase accuracy of ITS devices and TOC response plans 2) Utilize data Use Analysis and Processing (DUAP) to support data sharing processes and policies with other business areas 3) Identify and leverage data socialization between ITS and other MDOT business areas to enhance performance monitoring

Table 9: ITS/Signal Program Integration – Actions

	GOALS	ACTIONS
Focus Area #3 – ITS/Signal Program Integration	A. Sustainably increase interoperability between ITS and Signal programs	<ol style="list-style-type: none"> 1) Develop a work flow that supports the integration of signals and ITS work areas for enhanced operability to improve mobility and safety 2) Actively manage Michigan roadways utilizing ITS and connected traffic signal technologies
	B. Identify and leverage commonality areas	<ol style="list-style-type: none"> 1) Conduct program planning session to develop a shared vision of success for the signals and ITS work areas 2) Develop working groups that include staff from each work area with complementary skill sets 3) Develop joint standards and specifications for shared equipment where applicable

Table 10: Emerging Technologies – Actions

	GOALS	ACTIONS
Focus Area #4 – Emerging Technologies	A. Be a DOT leader in emerging technologies and embrace innovation	<ol style="list-style-type: none"> 1) Establish an evaluation process to measure the effectiveness of emerging technologies 2) Test/pilot emerging technologies with high potential to positively impact mobility and safety 3) Allow and encourage flexibility in ITS solution(s) to provide the latest available technology to address mobility and safety 4) Aid in the communication and education of new technology to MDOT staff 5) Support emerging traveler experience/information technologies and solutions (e.g., dynamic routing, parking information, predictive traveler information, etc.)

Table 11: Partners and Outreach – Actions

	GOALS	ACTIONS
Focus Area #5 – Partners and Outreach	A. Engage stakeholders	<ol style="list-style-type: none"> 1) Identify and include critical stakeholders (public, other agencies, other department, etc.) during planning phase of projects 2) Hold project update meetings with critical stakeholders during development, construction, and integration phases of projects 3) Host yearly program partnership meetings to provide a forum open to MDOT, municipalities, engineering community, contractors, and other ITS stakeholders (topics to include: critical actions from the program, sharing best practices, evaluating risks and mitigation measures, and identifying emerging opportunities)
	B. Engage in industry partnerships to drive economic benefit	<ol style="list-style-type: none"> 1) Support Planet M and MEDC efforts to further enhance the state of Michigan’s position in the industry 2) Partner with Mcity and ACM to test and evaluate emerging technologies in a controlled environment 3) Partner with traveler information providers (e.g., Google, Waze, Inrix, HERE, etc.) through application programming interface (API) agreements to promote data being facilitated to Michigan’s motorists 4) Attract and retain private partners and workforce talent to drive economic benefit
	C. Support legislative actions	<ol style="list-style-type: none"> 1) Support MDOT policy updates to keep up with technology and provide environment to drive economic benefit 2) Support legislative efforts needed to enhance viability of ITS and CAV on Michigan roadways
	D. Partner with universities to conduct research	<ol style="list-style-type: none"> 1) Continue to partner with universities to conduct research on emerging technologies

Table 12: Workforce Development – Actions

GOALS	ACTIONS
<p>Focus Area #6 – Workforce Development</p> <p>A. Develop and retain a high-performing workforce</p>	<ol style="list-style-type: none"> 1) Document roles and responsibilities of all ITS staff members 2) Prepare standard operating procedures for program processes and typical actions to facilitate transfer of information and responsibilities 3) Engage ITS staff in MDOT’s most complex, significant projects 4) Engage junior staff in an ITS rotational program that exposes them to the various activities and phases of ITS initiatives and projects to generate interest in future opportunities 5) Send staff to industry conferences and encourage presentations on innovative projects
<p>B. Recruit a talented and motivated workforce</p>	<ol style="list-style-type: none"> 1) Identify current and future skill sets required by MDOT to deliver the ITS Program 2) Partner with universities to support changing curriculum to incorporate ITS (devices, supporting equipment, and network communications) and emerging transportation technologies 3) Participate in MDOT’s Youth Development Mentorship Program (YDMP), Transportation and Civil Engineering (TRAC) Program, and Engineer Development Program (EDP) 4) Provide ITS-related presentations to relevant student organizations on college campuses

Table 13: Performance-Based Priorities – Actions

	GOALS	ACTIONS
Focus Area #7 – Performance-Based Priorities	A. Implement and manage project prioritization and selection process	<ol style="list-style-type: none"> 1) Implement project prioritization and selection process to align ITS deployments with focus areas, goals, and actions of the ITS Strategic Plan 2) Identify deployment gaps that align with mobility, safety, and critical decision-making locations
	B. Maintain a sustainable program	<ol style="list-style-type: none"> 1) Develop and implement a device modernization plan to address aging ITS infrastructure (TOC and field devices) and software needs 2) Continue to increase and leverage benefits of ITS Asset Management Database to improve system planning 3) Follow the systems engineering process on all ITS projects 4) Update and maintain the ITS regional architecture and deployment plans
	C. Optimize funding	<ol style="list-style-type: none"> 1) Develop an ITS business plan to identify funding needs, sources, and other considerations with a five-year horizon that incorporates all aspects of the program (i.e. research/pilot projects, new deployments, legacy O&M, device modernization, etc.) 2) Identify and align internal funding mechanisms 3) Identify and pursue grant opportunities to fund ITS and CAV initiatives 4) Identify and leverage private investment opportunities
	D. Establish success measures on every ITS project	<ol style="list-style-type: none"> 1) Define measures of effectiveness for ITS deployments during project planning 2) Monitor deployment to measure if anticipated benefits are being achieved

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3. MOVING FORWARD

The emerging technologies landscape continues to evolve at an unprecedented pace. Adoption rate of technology and deployment by forward-thinking manufacturers are making change happen today that are impacting Michigan’s roadways. In the past, the Program has been focused on deploying and operating DMS, CCTV, and MVDS. However, as shown in **Figure 5**, the changes in the industry are drastically increasing the breadth and depth of the transportation technology industry. The challenge for the Program is to focus on solutions with the potential of providing maximum benefit to Michigan’s motorists. The sections below provide a direction for the Program to focus on the right opportunities, prioritize its resources, and implement the plan in an effective and fiscally responsible way.

3.1. PROGRAM ALIGNMENT

The current Program is comprised of several ITS functions in various life-cycle stages ranging from a mature ITS Asset Management Database to a recently deployed Flex Route ATM system, the first of its kind in Michigan. With the development of new focus areas for the Program, a review of each existing Program function was completed to determine the strength of the function’s current alignment. The intent is to determine which existing functions have strong alignment with the focus areas and which have room for improvement to strengthen the alignment. Moving forward, the Program can strategically invest resources to maximize alignment with the strategic plan and focus on the right emerging mobility solutions.

Figure 5: Changes in the Industry

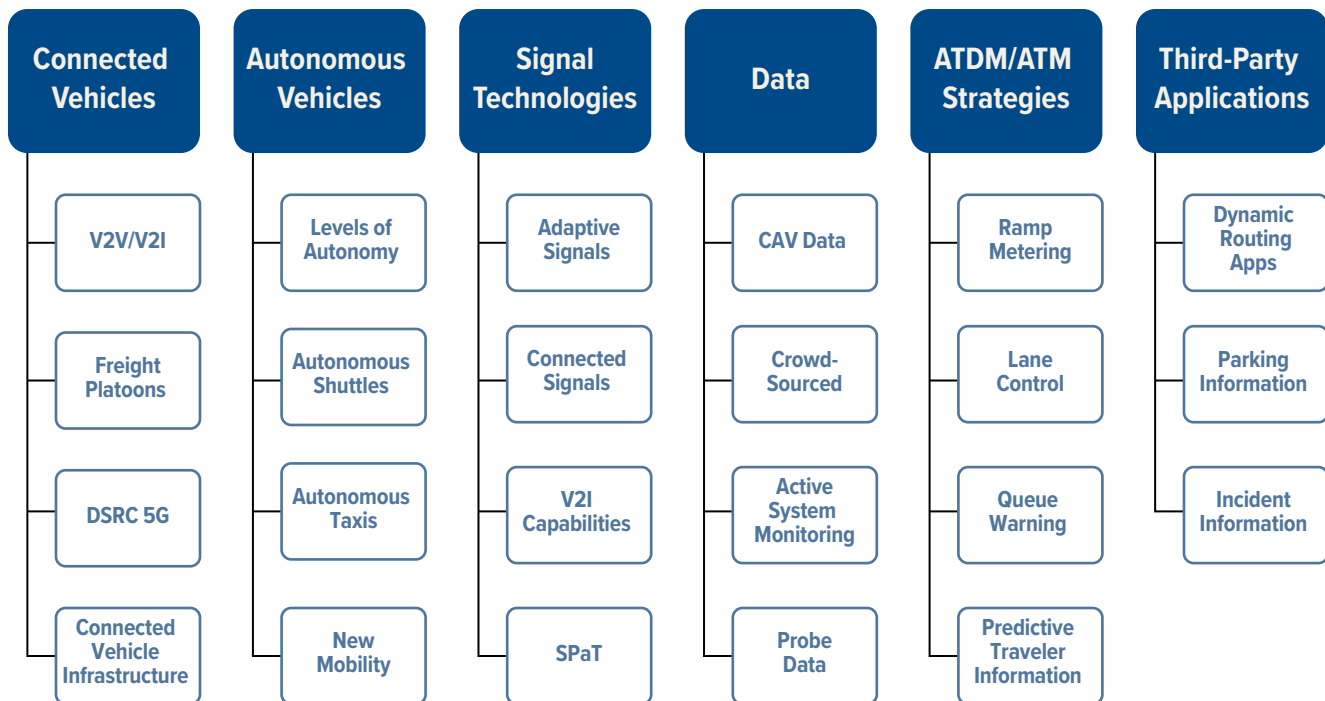


Table 14 provides an evaluation of the alignment between the Program’s current functions and the seven focus areas.

HOW TO READ THE TABLE

Each row of the table represents an existing MDOT ITS Program function. Each column of the table represents a focus area of the Program. The symbols indicate the degree to which each function (row) supports a given focus area (column).

- The function is maximizing its potential to support the focus area
- ◐ The function is partially supporting but has opportunity to increase support to the focus area
- The function is not supporting but has potential to support the focus area
- The function does not relate to the focus area

With this information, the Program can identify which functions to concentrate on, which functions are no longer applicable, and determine the direction of future Program functions. The table can be read vertically or horizontally, as follows:

- **By row** to determine how each function impacts and aligns with the focus areas, or
- **By column** to determine which focus areas are supported by existing functions.

A brief overview of each MDOT ITS Function in the table is provided in Appendix A.

Table 14: ITS Program Alignment

		FOCUS AREAS						
		Information Technology Processes	TSMO Business Area Integration	ITS/Signal Program Integration	Emerging Technologies	Partners and Outreach	Workforce Development	Performance-Based Priorities
Existing MDOT ITS Program Functions		1	2	3	4	5	6	7
MDOT ITS Network	ITS Devices	●	●	○	●	—	—	○
	Communications Network	●	●	●	●	—	—	○
	ATMS Software	●	●	○	●	—	—	●
	TOC Operations	●	●	○	—	—	●	○
Innovative Projects	Flex Routes	●	●	●	●	●	●	●
	ATDM	●	●	●	●	—	●	●
	TPIMS	●	●	—	●	●	●	●
	Wrong-Way Driver Warning System	●	●	—	●	●	●	○
	Border Wait Time Information System	●	—	—	●	●	●	○
	Wx-TINFO	●	●	—	●	—	●	●
	Adaptive Traffic Signal Control	●	●	●	●	—	●	●
	Traffic Responsive System	●	●	●	●	—	●	●
	Over-Height Warning System	●	●	—	●	—	●	○
	Integrated Corridor Management	●	●	●	●	●	●	○
	Curve Speed Warning System	●	●	—	●	—	●	○
	Connected and Autonomous Vehicles	●	●	●	●	●	●	○
	Data Use Analysis and Processing	●	●	●	●	●	●	●
	Program Activities	ITS Maintenance	●	●	●	●	—	●
Asset Management		●	●	●	●	●	●	○
Developing and Maintaining Standards		●	●	●	●	—	—	○
ITS Architecture		●	●	●	●	—	—	○
Collaboration and Communication Efforts	MDOT Initiative Support	●	●	●	●	●	●	●
	Inter-Departmental Coordination	●	●	●	●	●	—	—
	Industry Participation and Leadership	—	—	—	●	●	●	—
	Michigan Partner Support	—	—	—	●	●	—	—
	Public Outreach	●	—	—	—	●	—	○
	Video Sharing	●	—	—	—	●	—	—
	Data Sharing	●	●	●	●	●	—	—

- Program function is maximizing its potential to support the focus area
- ◐ Program function is partially supporting but has opportunity to increase support to the focus area
- Program function is not supporting but has potential to support the focus area
- Program function does not relate to the focus area

The following text provides an overview of **Table 14**, summarized by focus area.

INFORMATION TECHNOLOGY PROCESSES (#1)

Focus area 1 is supported by almost all existing Program functions. However, only five of the 26 functions are maximizing their potential support. Therefore, there are many opportunities to strengthen existing functions in a way that positively impacts this focus area. For instance, ITS Maintenance is being maximized because of the performance metrics attached to the Maintenance Support Contract to maintain network reliability. Whereas the Asset Management Database could improve support through the integration of fiber management functionality.

TSMO BUSINESS INTEGRATION (#2)

While this focus area is a newer initiative for MDOT, it aligns with many current program functions. Some functions, such as the Flex Route, have reached full potential within the focus area by providing a system that supports incident management, work zones, and maintenance. The Flex Route utilizes ITS technologies to increase throughput, reduce travel time, mitigate crashes, and enhance safety, crossing multiple TSMO business areas. On the other hand, the ATMS software could be enhanced to deliver ITS data to other TSMO business areas.

ITS/SIGNAL PROGRAM INTEGRATION (#3)

As another new initiative for MDOT, this focus area aligns with 18 current program functions, three providing no current support, 14 providing partial support, and one providing maximum support. For example, TOC Operations do not currently monitor MDOT’s traffic signal

systems. However, TOC’s could support the active management of MDOT’s traffic signal systems to improve arterial operations.

EMERGING TECHNOLOGIES (#4)

ITS is currently referred to as emerging technologies. Therefore, it is no surprise that all but three existing Program functions support this focus area. MDOT’s advanced traffic management systems (e.g. Flex Routes, Data Use Analysis and Processing) and connected and autonomous vehicle deployments are leading the industry in the deployment and effective use of emerging technologies. As new technologies continue to become available, the Program must assure legacy systems (e.g. Asset Management, ATMS software) are capable of integrating these technologies.

PARTNERS AND OUTREACH (#5)

This focus area is supported by the fewest functions. However, the functions that do support the focus area are well aligned. For instance, the TPIMS project includes partnerships with universities, engineers, software developers, the truck driving community, and private truck stop operators to successfully operate the system. In addition, MDOT is partnering with MCity and the American Center for Mobility to support the research and development of connected and autonomous vehicles.

WORKFORCE DEVELOPMENT (#6)

Innovative projects provide opportunities for workforce development by exposing MDOT staff to emerging technologies and promoting the development of an expanded skill set. Some functions, such as Flex Routes and TPIMS, are actively managed which depends on highly-trained staff to effectively operate the system. Industry participation and leadership is

one function that could be leveraged to better support the recruitment of a talented and motivated workforce.

PERFORMANCE-BASED PRIORITIES (#7)

This focus area has the greatest opportunity for improvement within the Program's existing functions, in turn resulting in the greatest impact. Thirteen functions are currently providing no support but have the capability to enhance Performance-Based Priorities. For instance, Curve Speed Warning Systems are commonly noted as a safety benefit. However, the Program does not currently establish performance expectations, nor monitor their performance following deployment. Understanding the performance of existing functions will support the Program investing in solutions providing the highest benefits.

3.2. PRIORITIZATION

As previously mentioned, the emerging technologies landscape continues to evolve at an unprecedented pace. This results in a wide range of projects, initiatives, collaborative efforts, partners, and distractions. Therefore, it is critical for the Program to evaluate and select those functions that will provide the greatest benefit to Michigan's motorists. The Program recently developed a project prioritization process as defined below. Similar processes should be implemented to evaluate other Program functions, such as research, collaborative efforts, industry partnerships and other initiatives to ensure alignment and prioritize resources.

The ITS project prioritization and selection process is used to assist the Program in evaluating, comparing, and prioritizing ITS related projects throughout the state. The process includes a "Project Proposal Template" and "Device Location Form." The

project proposal template provides project information in a consistent format including existing conditions, purpose and need, mobility or safety issues being addressed, and most importantly, alignment with the ITS Strategic Plan focus areas. The device location form identifies proposed ITS devices and approximate costs broken by project phase: planning, design, construction, implementation, and operations and maintenance.

The IPO administers the process and collects the completed forms in advance of the annual call for ITS projects. The IPO in conjunction with the MDOT ITS stakeholders group evaluate and rank the proposed projects based on predefined categories such as impact to mobility and safety and alignment with the Program's focus areas.

3.3. IMPLEMENTATION

The crux of the strategic plan is in the implementation phase. Formalizing SMART components to each action is critical to its success. As shown in **Figure 6**, the following multi-step process will guide the Program to a successful implementation.

- **Step 1: Identify Lead.** The IPO and ITS Stakeholders, as the administrators of the ITS Strategic Plan, must identify a lead, or owner, for each goal carried forward from the strategic plan. Leads should be assigned to higher priority goals first, with lower priority goals assigned a Lead as resources become available. The lead is responsible for the success of the goal and associated actions.
- **Step 2: Verify Proposed Actions.** The lead must evaluate the associated actions to build a path to accomplish the assigned goal. Actions should be specific, measurable, attainable, relevant, time-bound, and clearly identify necessary resources (e.g., funding, schedule, etc.).

- **Step 3: Identify Resources Needed.** The lead must identify supporting individuals, groups, programs, and/or business areas that are critical for making the goal and associated actions become a reality.
- **Step 4: Establish Timeframe.** The lead and supporting resources must develop a schedule to identify critical path items and establish a timeframe to accomplish the goal and associated actions.
- **Step 5: Develop Performance Measures.** Performance measures must be set for each goal to measure actual performance against a set target.
- **Step 6. Review Progress.** Regular ITS stakeholder meetings should be held to conduct check-ins on a quarterly basis to understand the progress towards goals. Every goal does not need to be reviewed at each check-in if each goal is reviewed at least once per year. The

lead of each goal should present the status of the goal, action, successes, barriers, opportunities, considerations, and other relevant information. If warranted, adjustment or realignment of goals, actions, or supporting efforts should be made based on barriers identified, change in direction for the Program, resource constraints, or other considerations.

- **Step 7. Update the Plan.** The final important aspect of the Implementation Phase is the upkeep of the Strategic Plan. Based on the outcome of Step 6, new actions should be considered, particularly when gaps are identified in achieving the strategic plan. Therefore, the new actions and modifications to existing actions should act as an on-going strategic plan assessment and update. Results from the above implementation steps should be used to update the strategic plan to ensure the Program is focused on the right opportunities.

Figure 6: Implementation Plan

