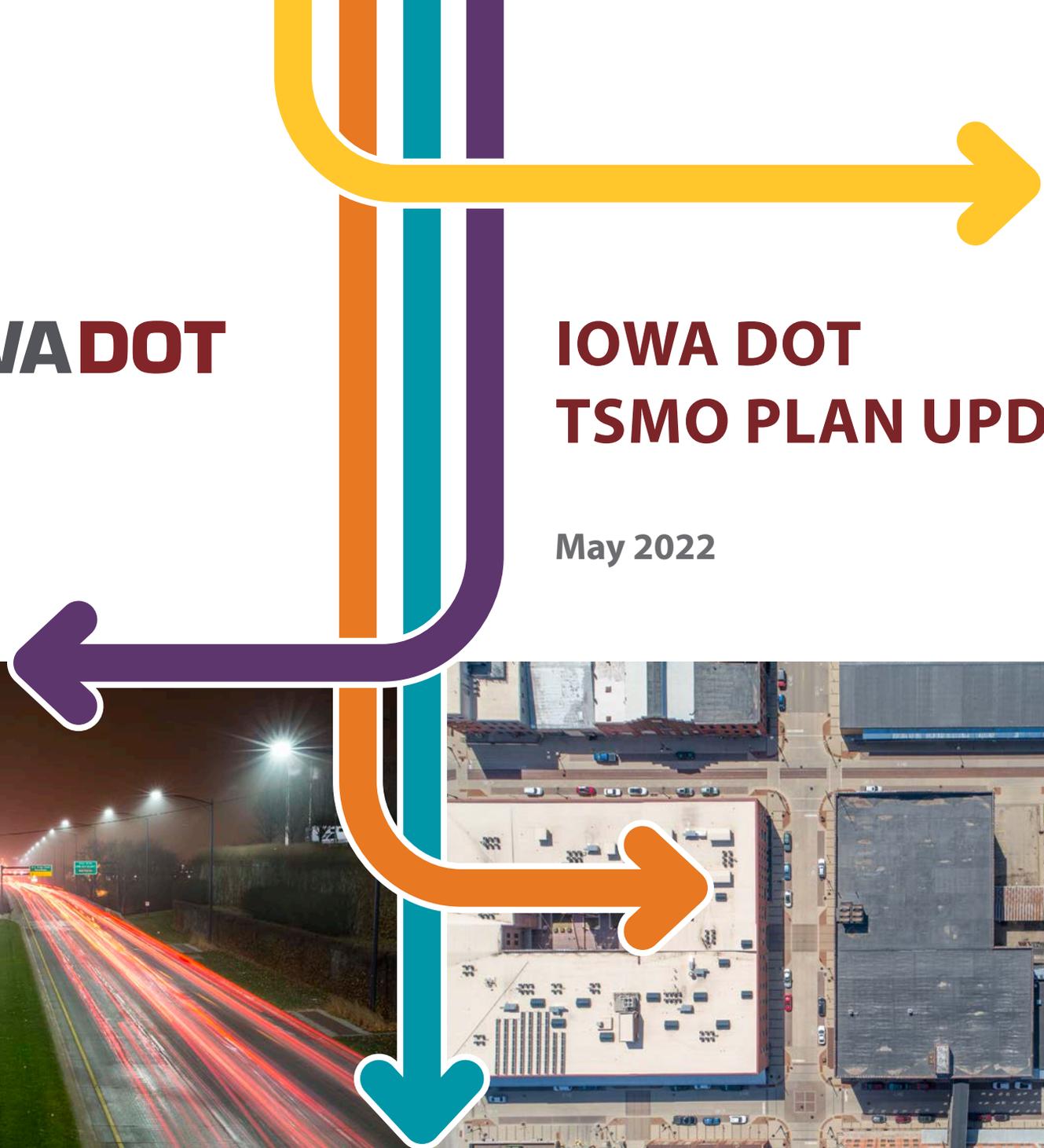
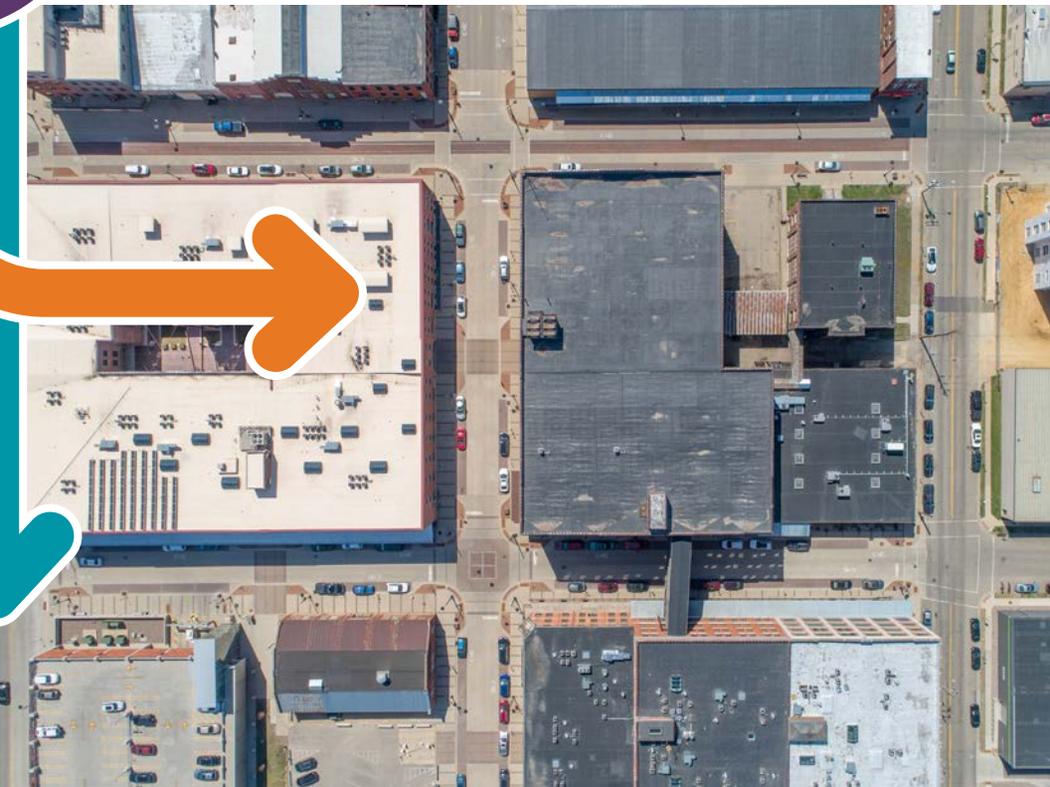
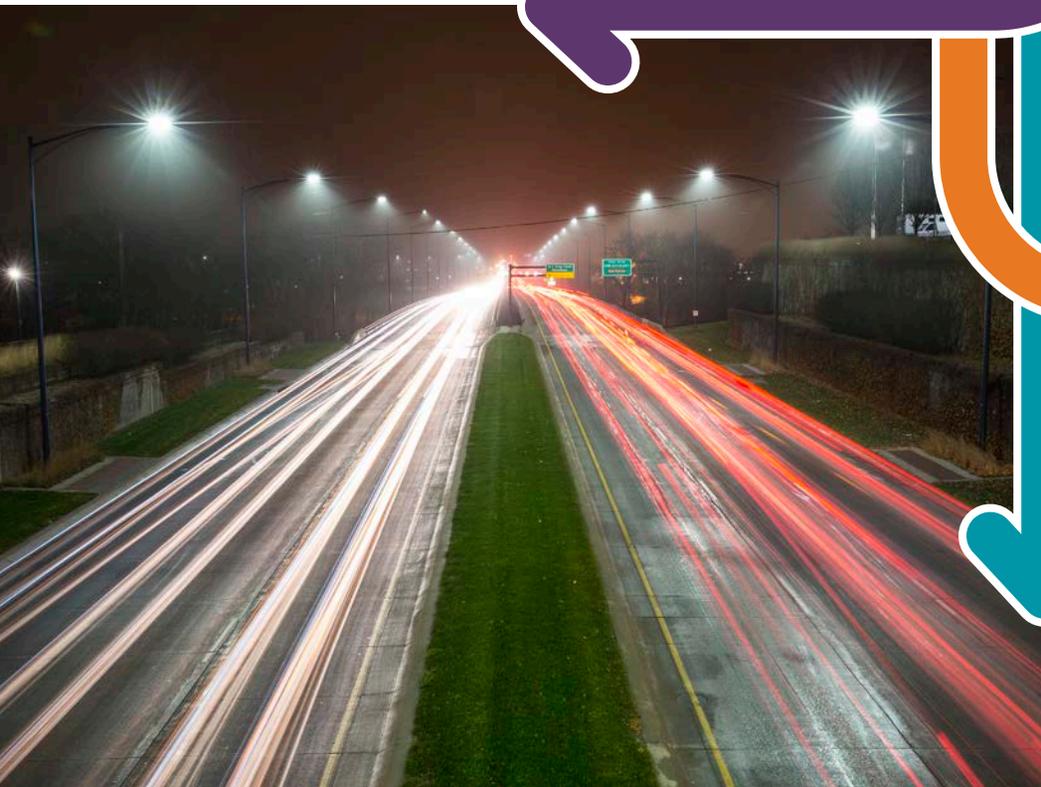




# IOWA DOT TSMO PLAN UPDATE

May 2022



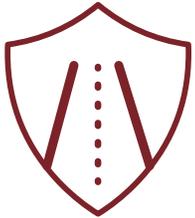


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## What's TSMO?

Transportation Systems Management and Operations (TSMO) is comprised of integrated strategies to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services, and projects designed to preserve capacity and improve security, safety, and reliability of the transportation system. The benefits of TSMO have been connected with Iowa DOT's Business Plan (page 3) and are listed below.



### Safer Roads

TSMO strategies can decrease Iowa's roadway injuries and fatalities by reducing impacts of non-recurring congestion (ex. incidents, construction). Managing work zones using technology and providing wrong-way driving detection systems can reduce crashes and deaths.

Crashes lead to delay, and by using TSMO strategies such as providing emergency responder training to help clear traffic incidents more quickly, the chance of secondary crashes is reduced.

- The safety benefits of TSMO reflect Goal 1 of Iowa DOT's Business Plan, which is to "improve transportation system safety and performance." The outcomes of Goal 1 include zero fatalities in work zones and a reduction in overall roadway fatalities.



### Efficient & Reliable Trips

Better traveler information, a reduction of incident clearance times, and modernizing technologies (e.g., adaptive traffic signal systems) are just a few strategies that have been proven to increase the efficiency of transportation systems.

Integrating TSMO improves everyday travel, whether it's a truck moving goods across rural Iowa or someone dropping their kids off at school. A highly reliable transportation network leads to a better quality of life for Iowans.

- Creating efficient, reliable trips relates to Goal 1 and Goal 5 of Iowa DOT's Business Plan, which (respectively) are to "improve transportation system safety and performance" and "grow innovation." An outcome of Goal 1 is to increase efficiency, reliability, and resiliency of Iowa's roadways. The innovation (Goal 5) involved in creating a more reliable system may include adopting new, smart technology and modernizing current systems.



### Cost-Effective

A major benefit of TSMO is that its implementation is cost-effective due to its "use what we already have" approach. Using TSMO strategies creates a high benefit-cost ratio compared to more traditional roadway expansion projects.

- Goal 4 of Iowa's Business Plan is to "secure stable and sustainable funding." Because TSMO is a cost-effective solution with high benefit, it is more economically sustainable than traditional, non-TSMO projects whether as a stand-alone initiative like the Highway Helper Program, or integrating intelligent transportation systems into a traditional highway project, TSMO is a sound investment to get the most out of the infrastructure we have. The economical nature of TSMO may also lend itself to innovative solutions to Iowa's transportation network issues, which correlates to Goal 5 (grow innovation).



### Quick Turnaround

The proposed TSMO Plan Projects, Services, and Activities help to further streamline the implementation process, making it relatively quick and simple to take action.

Many of the actions can be taken immediately, leading to results sooner. TSMO doesn't require massive, physical overhauls to the transportation system, which also leads to faster implementation.

- The faster implementation of TSMO means that Goal 1 (improve transportation system safety and performance) can also be achieved more quickly.



## 2022 Plan Update

The 2022 TSMO Plan Update builds on existing activities and recognizes the evolution of Iowa's transportation system. The nature of transportation operations is dynamic, which is why Iowa DOT updates the TSMO Plan on a five-year cycle to recognize and capitalize on emerging technologies and strategies. The original Plan was internally focused in its entirety. The 2022 TSMO Plan Update includes several recommendations based on outreach to nine of Iowa's largest metropolitan areas. The Iowa DOT Business Plan acts as a solid foundation upon which to build the 2022 TSMO Plan.

The purpose of Iowa DOT's TSMO Plan is to improve the performance of Iowa's transportation system. TSMO uses and improves upon infrastructure, processes, technology, and other components of the system that Iowa already has and takes a proactive role in system management. This TSMO Plan Update encompasses Iowa DOT's strategic direction, values, core focus, and goals while working toward integrating TSMO into all of Iowa DOT's processes



## Iowa DOT's Business Plan Core Values

### ▶ Safety First

The safety, security, and wellbeing of staff, travelers, and customers is of utmost importance. We are committed to continuous feedback and learning to be safer, proactive, more resilient, and highly prepared.

### ▶ People Matter

We are committed to diversity, respect, listening well, and engaging all in meaningful ways. Our culture emphasizes civility, continuous improvement, innovation, and reasonable risk taking.

### ▶ Customer Focused

We are committed to consistently providing high quality service for our external and internal customers. We promote a positive customer focus by understanding customer needs and empowering staff to be responsive.

### ▶ Servant Leadership

We are intentional to never be complacent and to always follow through with serving the public and each other. Leading by serving embraces a positive commitment to personal growth, being helpful, and aligning our efforts.

### ▶ Integrity Without Exception

We foster a culture of respect, honesty, and commitment. Transparency, accountability, and ethical behavior undergird all we do as stewards of Iowa's transportation resources.



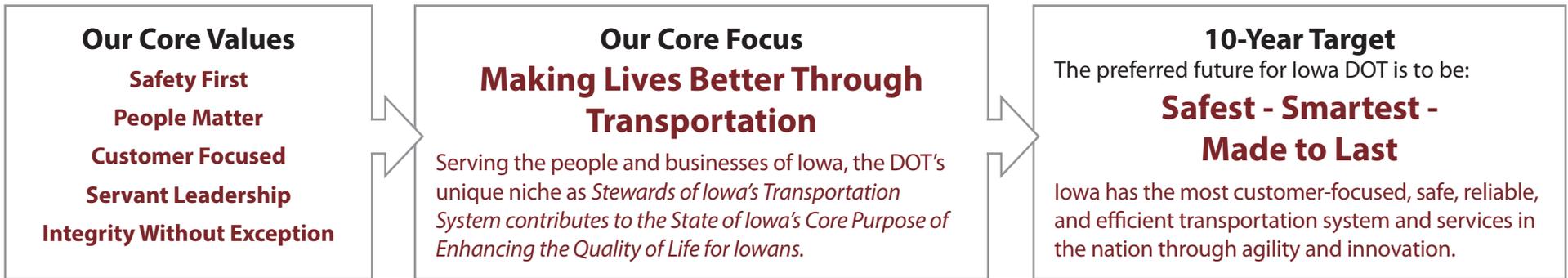
## 2021-2025 Iowa DOT Business Plan

Iowa DOT’s Business Plan represents a new way of doing business and was developed to effect change and improvement toward DOT’s vision for a better future. With strategic direction guided by the State Long-Range Transportation Plan, the Business Plan outlines nearer term focus with tools to bring the DOT’s vision from ten years all the way down to the highest priority quarterly actions known as 90-Day “Rocks”.

### The Business Plan Comprises Three Sections



### Iowa DOT’s Vision



### Our 5-Year Priority Goals

Iowa DOT leadership has prioritized five Priority Goals as the overarching direction for the Business Plan:



**Improve Transportation System Safety & Performance**

**Outcomes include:** zero fatalities in work zones, total traffic fatalities significantly reduced, increased efficiency, reliability, resiliency, and condition of our transportation system



**Improve Customer Service**

**Outcomes include:** greater levels of customer satisfaction across all programs and services



**Advance Workforce for Future Challenges & Opportunities**

**Outcomes include:** engaged and empowered employees, increased diversity, equity, and inclusion, and steady reductions in turnover rate (non-retirement)



**Secure Stable & Sustainable Funding**

**Outcomes include:** implemented funding strategies, ensured diversified funding mechanisms, and reduced technical debt (e.g., legacy systems)



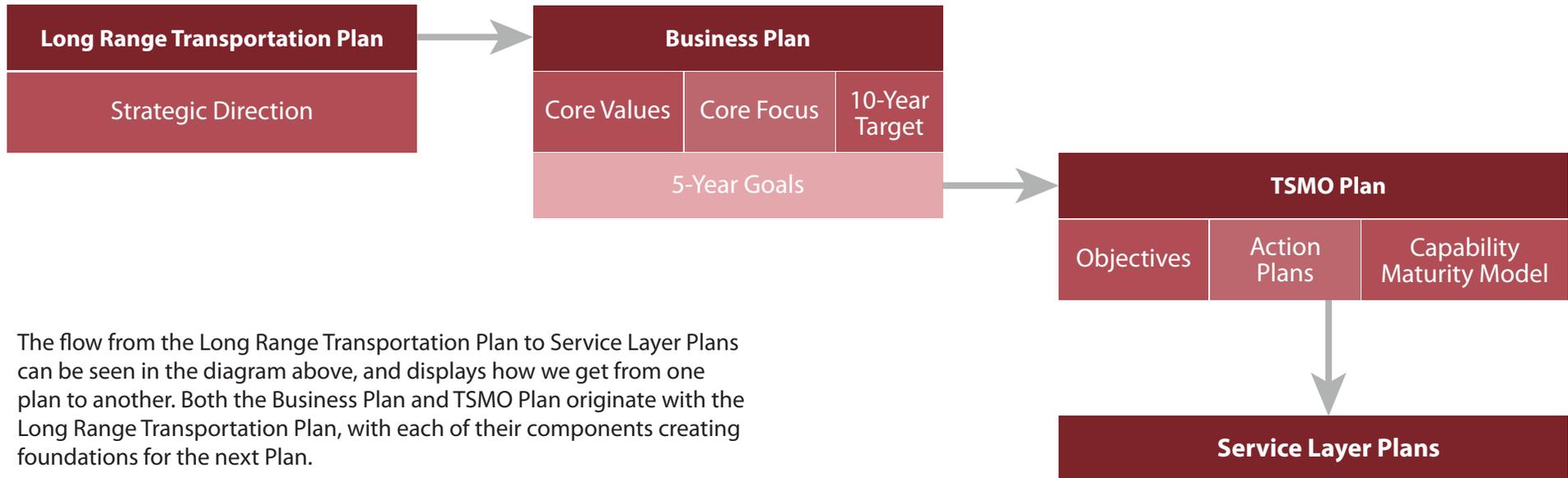
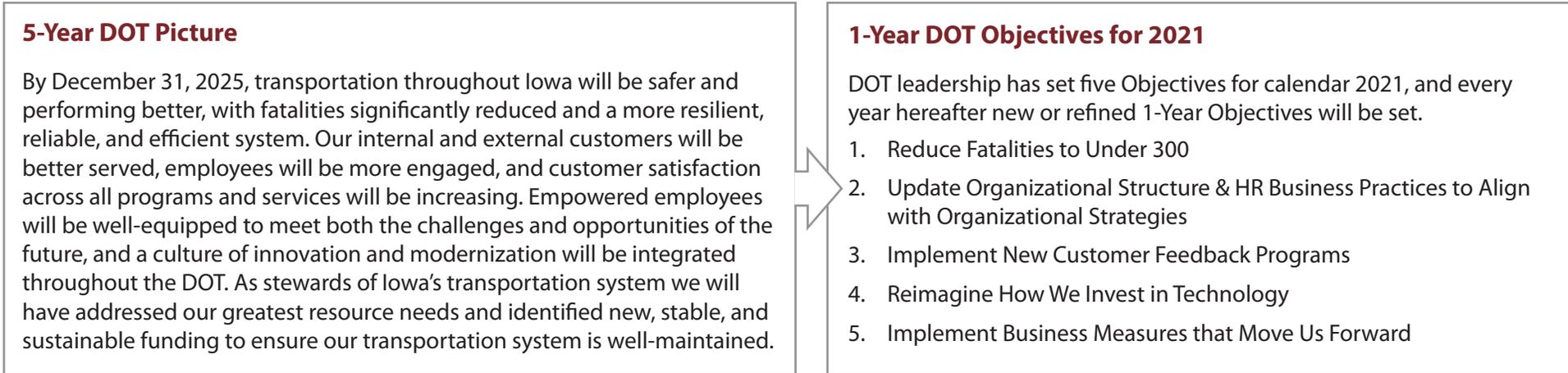
**Grow Innovation**

**Outcomes include:** adopted smart technologies, culture of innovation, and modernized systems



**Where We're Going** as an organization is centered on the Priority Goals over the next five years. **How We Get There** involves an action-oriented implementation approach and set of tools for identifying 1-Year Objectives each calendar year, assigning ownership for 90-Day Rocks, and adhering to a cadence of efficient meetings and accountability for Rocks and key business metrics.

### Implementation & Traction



The flow from the Long Range Transportation Plan to Service Layer Plans can be seen in the diagram above, and displays how we get from one plan to another. Both the Business Plan and TSMO Plan originate with the Long Range Transportation Plan, with each of their components creating foundations for the next Plan.



## Business Plan Goals & Correlated TSMO Objectives

Goal	Objective
1. Improve Transportation System Safety and Performance	<ul style="list-style-type: none"> <li>• Reduce the number of fatal and severe crashes</li> <li>• Reduce the number of secondary crashes caused by traffic incidents</li> <li>• Reduce the number of work zone (and maintenance) related traffic incidents</li> <li>• Improve travel time reliability</li> <li>• Increase the resilience of the transportation system to floods, winter weather, and other extreme weather events</li> <li>• Improve level of service on major freight corridors</li> <li>• Maximize use of existing roadway capacity</li> <li>• Respond to and clear traffic incidents as quickly as possible</li> <li>• Minimize the environmental impacts of the transportation system</li> <li>• Integrate TSMO into existing Iowa DOT policies, plans and procedures</li> </ul>
2. Improve Customer Service	<ul style="list-style-type: none"> <li>• Provide timely, accurate and comprehensive information to customers</li> <li>• Allow no unplanned road closures or restrictions due to conditions within Iowa DOT's control</li> <li>• Accommodate bike, pedestrian, transit, and commercial vehicles in transportation management and operations</li> <li>• Build coalitions that improve TSMO (e.g., Statewide TIM, Automated Transportation Council, etc.)</li> <li>• Proactively coordinate responses to large scale traffic incidents with adjacent states</li> </ul>
3. Advance Workforce for Future Challenges and Opportunities	<ul style="list-style-type: none"> <li>• Provide staff knowledge and management resources to enable adaptation to rapidly changing technology</li> <li>• Define TSMO workforce (position types) of the future</li> <li>• Develop strategies to attract and retain new types of positions to support TSMO</li> </ul>
4. Secure Stable and Sustainable Funding	<ul style="list-style-type: none"> <li>• Develop cost sharing models for integrated corridor management</li> <li>• Consistently pursue grant opportunities</li> </ul>
5. Grow Innovation	<ul style="list-style-type: none"> <li>• Provide high quality, high fidelity data in standards-based formats for partner collaboration</li> <li>• Use proven and emerging technologies to improve performance management and decision support systems</li> <li>• Implement integrated corridor management strategies to manage traffic across multiple jurisdictions and modes</li> <li>• Develop highway automation Infrastructure in coordination with Industry trends</li> <li>• Leverage university partnerships to innovate</li> <li>• Engage Iowa's entrepreneur network to improve TSMO</li> </ul>

## Report Structure

The 2022 TSMO Plan Update uses a streamlined structure to deliver comprehensive and easily digestible TSMO information.

### TSMO Plan Overview

A history of TSMO at Iowa DOT is outlined. The business case for implementing TSMO activities at Iowa DOT is made using congestion and safety statistics.

### Organizational Structure

The structure of Iowa DOT's bureaus is summarized, including TSMO-related roles and responsibilities. A description of internal and external groups that address TSMO issues is also provided.

### Advancing the TSMO Plan at Iowa DOT

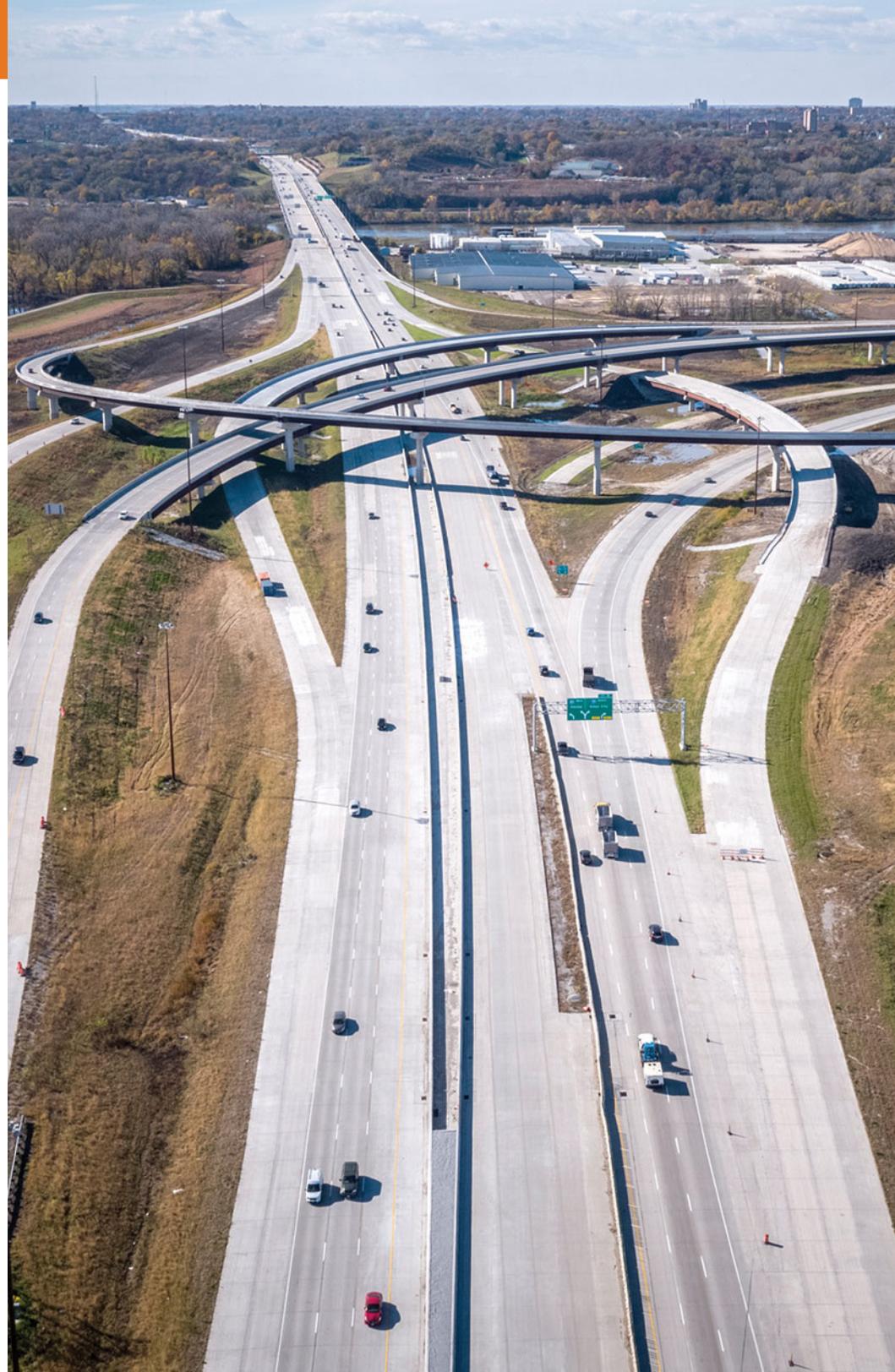
Highlights how Iowa DOT has used the 2016 Plan to advance and mature TSMO across the Department.

### Performance Management & Decision Support

Ongoing performance management actions are detailed, and decision support is analyzed through a TSMO lens.

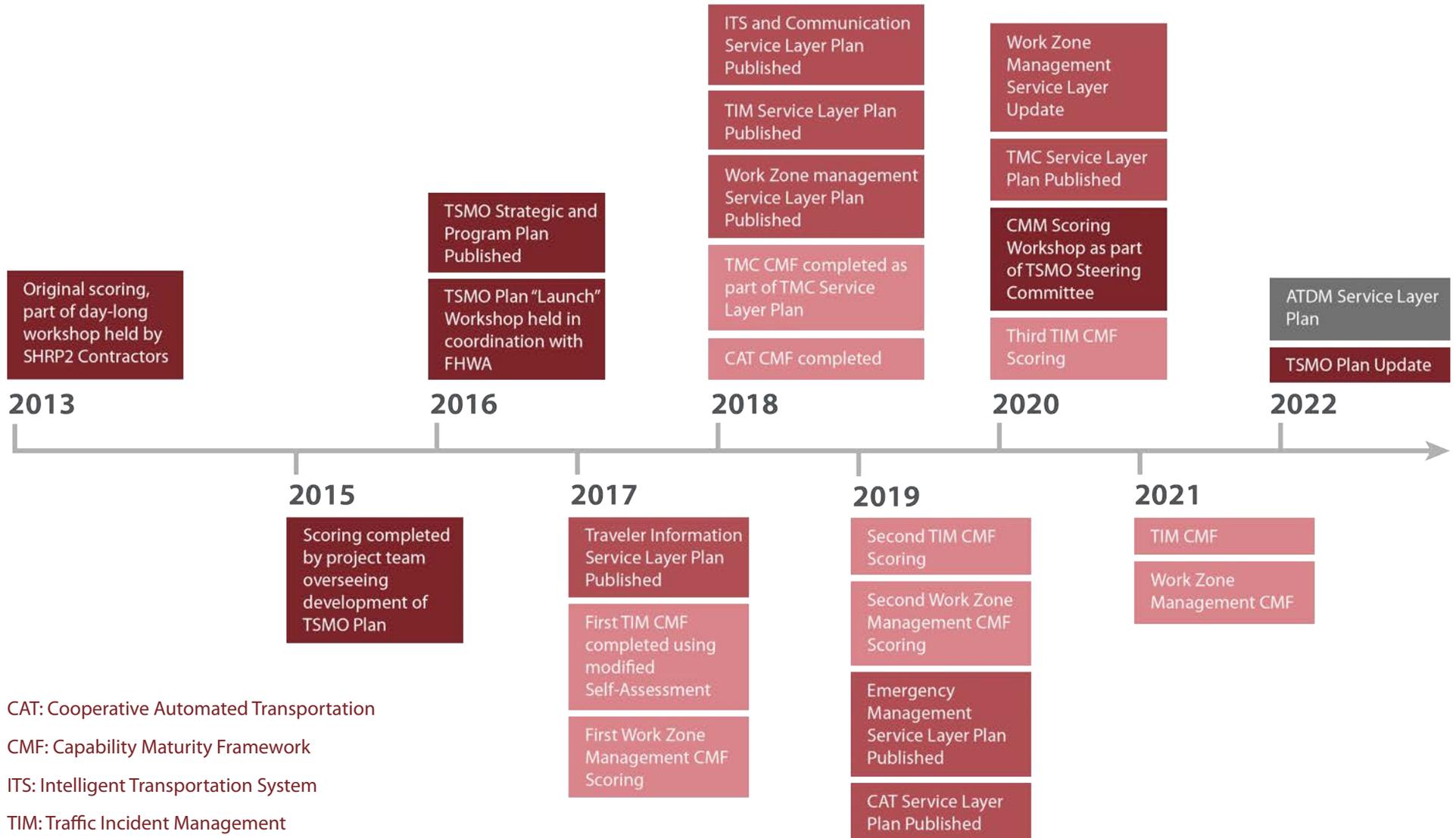
### Projects, Services, & Activities

Projects, services, and activities are identified and organized by TSMO Capability Maturity Model (CMM) dimensions. This serves as actionable guidance toward furthering TSMO in Iowa.



## A History of TSMO at Iowa DOT

Iowa has been working toward the continual improvement of its transportation system by implementing TSMO for nearly a decade. In 2013, NCHRP published a report called *Program Planning and Development for TSMO in State DOTs* that would go on to shape TSMO Programs nationwide. Iowa held its first workshop in the same year to assess its current activities related to TSMO.



CAT: Cooperative Automated Transportation

CMF: Capability Maturity Framework

ITS: Intelligent Transportation System

TIM: Traffic Incident Management

## 2016 TSMO Plan

In 2016, Iowa DOT's first TSMO Plan was created. It focused on traffic congestion and other roadway issues related to congestion (incidents, safety, efficiency, etc.).

The 2016 TSMO Plan was split into three components: a Strategic Plan, a Program Plan, and a series of eight Service Layer Plans. Seven out of eight of the Service Layer Plans were completed over the course of the last five years.



## SUCCESSES

- **7 of 8 Service Layer Plans completed.**
  - Traffic Incident Management
  - Traveler Information
  - Emergency Management
  - Work Zone Management
  - ITS & Communications
  - Traffic Management Center
  - Cooperative Automated Transportation (CAT)
- **The Program Plan has seen 24 projects or activities completed with 16 more underway.**
- **Multiple TSMO-focused positions hired at Iowa DOT, including the State TSMO Program Manager at the Assistant Bureau Director level, CAT-focused position, District TSMO Engineers, and a TMC Systems Manager.**
- **The Statewide TIM Committee and TSMO Steering Committee are helping to promote TSMO in Iowa.**

## Opportunities

The Program Plan has 22 incomplete action items, which is about a third of the total number of projects and activities listed in the Plan.

## Why TSMO Matters: The Case for TSMO

Both big cities and small towns across the United States face a variety of transportation challenges. Every economy is different and smaller regions often count on reliable mobility as a quality-of-life aspect that allows them to compete with larger, more economically diverse regions. In 2017, congestion caused urban Americans to travel an extra 8.8 billion hours and purchase an extra 3.3 billion gallons of fuel for a congestion cost of \$166 billion (an increase of \$8 billion over one year).<sup>1</sup>

Stewardship forces us to think about taking care of what we have (the existing system) instead of expanding or growing capacity. TSMO provides cost-effective solutions to the challenges the system is facing today, and proactively manages changes in demand on Iowa's roadways. The TSMO Plan update continues to address systemic issues related to safety and mobility on Iowa's roadways.

### Movement of Goods

The highway network is the backbone of our economy, allowing Iowa motorists to travel 33.5 billion miles annually (compared to U.S. motorists traveling 3.2 trillion miles annually<sup>2</sup>) and moving a significant portion of the \$357.4 billion worth of commodities shipped to and from the state each year.<sup>3</sup>

### Travel Growth Outpacing Population Growth

From 2000 to 2018, vehicle travel on Iowa's roads increased by 14 percent. The state's population increased by eight percent from 2000 to 2019.<sup>2</sup>

### Freight Traffic Growth

Iowa is a major agricultural producer and approximately 80% of goods rely on trucking to get to market. From 2012 to 2040, truck tonnage is projected to grow by 32.4% from 819 million tons to 1,084 million tons.<sup>4</sup>

### Jobs

Approximately 759,000 full-time jobs (out of 1.5 million total jobs in Iowa) in key industries like tourism, retail sales, agriculture, and manufacturing are completely dependent on the state's transportation network.<sup>2</sup>

1 <https://trid.trb.org/view/1647076>

2 <https://iowadot.gov/maps/msp/vmt/30yearvmt.pdf>

3 [https://tripnet.org/wp-content/uploads/2020/04/TRIP\\_Fact\\_Sheet\\_IA.pdf](https://tripnet.org/wp-content/uploads/2020/04/TRIP_Fact_Sheet_IA.pdf)

4 <https://iowadot.gov/iowainmotion/files/Iowa-State-Freight-Plan-Update-2018.pdf>

### Delay Costs

Annual congestion costs for Iowa's two largest cities, Des Moines and Cedar Rapids, alone account for \$250 million due to lost time and wasted fuel.<sup>5</sup>

### Road Condition Costs

A total of 23 percent of Iowa's major roads are in poor or mediocre condition. Driving on deteriorated roads costs Iowa motorists \$759 million per year – \$336 per motorist – in the form of additional repairs, accelerated vehicle depreciation, and increased fuel consumption and tire wear.<sup>2</sup> TSMO strategies can help enforcement minimize impacts to our roads due to overweight vehicles.

### Safety Costs

From 2016 through 2020, 1,726 people died on Iowa's highways, an average of 345 annual fatalities. Fatal and serious motor vehicle crashes cost Iowa motorists \$463 million per year in medical costs, lost productivity, travel delays, workplace costs, insurance costs and legal costs. 190,270 people died on U.S. highways, an average of 38,054 annual fatalities. Traffic crash deaths cost U.S. travelers \$55 billion in medical and work loss costs. 512 secondary crashes occurred in Iowa in 2020; for every minute that a lane is blocked, the likelihood of a secondary crash increases by 2.8 percent.<sup>6</sup> TSMO strategies can assist in improving the safety of our transportation network, whether it's working closely with emergency responders to remove crashes quickly or using sensing technologies to let motorists know when it's safe to cross a high speed rural expressway.

### Time Matters

72% of congestion and delay experienced by the traveling public in Iowa is non-recurring; it is caused by bad weather, traffic incidents, work zones, special events, and similar events.<sup>7</sup> In 2020, the average clearance time for incidents was 33 minutes in urban areas and 50 minutes in rural areas.<sup>8</sup> Through strategic, data driven use of TSMO strategies, Iowa has become a national leader on its approach to managing traffic through highway work zones. Iowa's continued investment in driving down its clearance times and proactive management of highway work zones will help keeping Iowa moving safely.

5 <https://www.bts.gov/content/annual-highway-congestion-cost>

6 <https://www.cdc.gov/transportationsafety/statecosts/index.html>

7 2016 TSMO Plan

8 CTRE Reactor

## Systems Operations Division

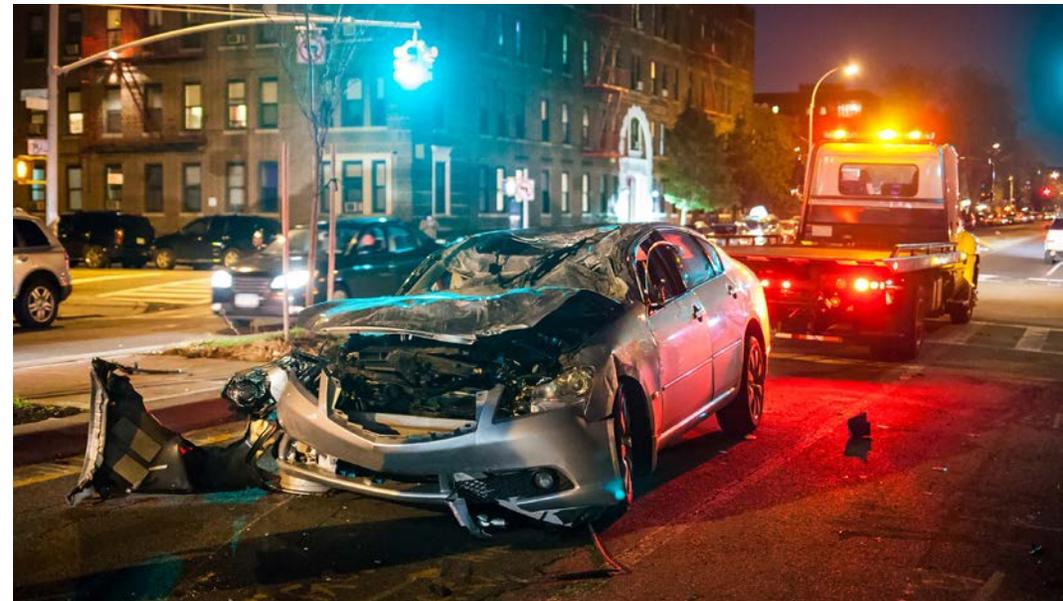
In 2018, the Operations Division was reorganized to include five Bureaus: Construction & Materials, Motor Vehicle Enforcement, Traffic & Safety, Traffic Operations, and Maintenance. In early 2021 the Operations Division was renamed Systems Operations Division.

The purpose of the Systems Operations Division is to proactively manage, operate, and maintain the transportation system as safely and efficiently as possible. The goals of the Systems Operations Division include continuing highway safety, well-maintained roadside facilities, operating the statewide Traffic Management Center (TMC), supporting construction, and supporting the Iowa economy. Its staff of approximately 250 employees is distributed across five bureaus and one group each supporting TSMO at varying levels.

- **Traffic Operations Bureau** – the bureau most responsible for advancing TSMO in all forms throughout the state. It includes:
  - Operations of the TMC and Highway Helper Programs
  - Traffic Incident Management and Emergency Management
  - ITS and Communications Design and Maintenance
  - Support for the TMC Advanced Traffic Management System and 511 Traveler Information software
  - Cooperative Automated Transportation Planning
- **Traffic & Safety Bureau** – develops standards and guidelines for signing, pavement marking, and traffic control. Responsible for issuing permits to utility companies for installing infrastructure within Iowa DOT right-of-way. Traffic & Safety also is responsible for leading development of the Strategic Highway Safety Plan.
- **Maintenance Bureau** – supports a wide range of policy and guidance development related to highway maintenance activities ranging from snow and ice management, fleet management, roadway maintenance policies and procedures development, and rest areas.
- **Construction & Materials Bureau** – Maintain guidance and policies related to delivery of construction projects after they have been

awarded to contractors. The main area of TSMO supported by the bureau is related to work zone management.

- **Motor Vehicle Enforcement** – includes a mix of sworn officers and civilian staff whose core mission is the enforcement of Federal Motor Carrier Safety Regulations (FMCSR), vehicle size, weight, registration, and travel authority of commercial motor vehicles. With full police powers, MVE officers also patrol Iowa highways and enforce state and federal laws. MVE is used to help provide quick response in work zones that may be experiencing operational issues.
- **Traffic and Criminal Software (TraCS) Group** – The TraCS program is an initiative by the Iowa DOT to collect data from law enforcement at the scene of a motor vehicle collision and send that data electronically to the Iowa DOT. Iowa DOT currently receives over 95 percent of crashes electronically from local and state law enforcement agencies. The TraCS group was instrumental in modifying the crash report to help track traffic incident clearance times and secondary crashes throughout the state.



## Other Areas in Iowa DOT with TSMO Roles

- **Systems Planning Bureau** – Leads development of the Long-Range Transportation Plan, model plans, and screening tools such as the Infrastructure Condition Evaluation (ICE) and Infrastructure Condition Evaluation for Operations (ICE-Ops) that help pinpoint areas where infrastructure needs to be improved and operationally sensitive segments of highway.
- **Strategic Communications** – As part of the recent reorganization, Strategic Communications is now part of the Office of the Director. The group provides consistent messaging across multiple platforms including support during emergency events and long-term closures. Strategic Communications works closely with Traffic Operations and the TMC on sharing real-time traveler information.
- **Field Operations Division - Districts** – Three TSMO Engineers have been designated to cover the state. The TSMO Engineer in based out of Atlantic will cover the western part of the state. The TSMO Engineer based in Ames will cover the central part of the state. Lastly, the TSMO Engineer based in Cedar Rapids will cover eastern Iowa. Coupled with the District Traffic Technicians, the TSMO Engineers pinpoint and develop tactical countermeasures to operationally sensitive highway segments. The TSMO engineers are one of the primary connections to further building relationships with local agencies as the concept of integrated corridor management advances throughout the state. The districts also have construction, maintenance, and utilities staff.
- **Location and Environment Bureau** – Location and Environment has been leading preliminary planning related to integrated corridor management and advanced transportation demand management strategies in the Des Moines area for the last several years. It oversees planning studies that balance and evaluate TSMO solutions with traditional infrastructure projects.
- **Design Bureau** – Responsible for scoping and designing highway improvement projects. Making sure traffic management TSMO opportunities are identified early in the project development process is important because there are more options available the sooner opportunities are identified. A variety of activities with Location and Environment are under way to continue integrating TSMO early into the project development process.



- **Modal Transportation Bureau** – Responsible for developing various modal plans for freight, aviation, rail transportation pedestrian/bike, and public transit. There are opportunities to recognize the importance of TSMO in each modal plan, especially as interest grows in the areas of integrated corridor management.
- **Project Management Bureau** – Coordinates Outside Services contracting and is also Involved with project management teams to ensure consistent delivery of projects across the state.
- **Research and Analytics Bureau** – Involved with several initiatives that overlap to varying degrees with TSMO such as rightsizing, asset management, and data governance.

## Other Partners

- **Universities** – Iowa DOT has a long history of working closely with its university partners on applied research. Within TSMO, Iowa DOT relies on InTrans at Iowa State to support a variety of activities ranging from traffic data archiving and analysis, dashboard development, work zone research, safety engineering analysis tools, and advanced traffic signal applications. The University of Iowa, home of the National Advanced Driving Simulator supports a variety of cooperative and automated transportation research and development.

- **Iowa Department of Public Safety (DPS)** – Iowa DOT works closely with Iowa State Patrol (ISP), part of DPS, on a variety of issues related to safely operating the transportation network. The Joint Operations Policy Statement (JOPS) is signed annually by Iowa DOT and ISP to reiterate shared goals related to traffic incident management and sets targets for clearance times. Since ISP is on the front lines responding to traffic incidents, there is close coordination between both organizations' communications with the public. Also, the Governor's Traffic Safety Bureau (GTSB) supports a variety of behavioral activities related to traffic safety throughout the state including several related to TSMO such as Move Over awareness and enforcement campaigns.
- **Homeland Security and Emergency Management Department (HSEMD)** – Iowa DOT works closely with HSEMD on response to emergency events that impact the transportation network such as wide area flooding, or significant snow events. HSEMD operates the State Emergency Operations Center (SEOC) at the Joint Forces Headquarters in Johnston. At the SEOC, HSEMD and other government (including Iowa DOT) and private sector partners coordinate state response and recovery efforts.
- **Iowa Communications Network (ICN)** – ICN is an independent state agency that administers Iowa's statewide fiber optic telecommunications network. Iowa DOT works closely with ICN to improve connectivity of its network of ITS devices around the state.
- **Cities and MPOs** – Cities and MPOs partner with Iowa DOT on a variety of topics, including project identification and prioritization on roads under joint jurisdiction and planning traffic incident management diversion routes. As interest grows in integrated corridor management, cities and MPOs will become more critical since nearly all traffic signal infrastructure is operated and maintained at the local level.

## Internal TSMO-Oriented Groups

- **TSMO Steering Committee** – established in 2016 to serve as a cross divisional body to help guide and prioritize TSMO related activities and investments. The Committee meets every other month and creates and Annual Accomplishment Plan to track implementation progress.

- **Work Zone Council** – Diverse group led by Traffic & Safety, Traffic Operations, and Construction & Materials to gather input and share updates on all things related to work zone management. The Council is supported by the Work Zone Management and Traffic Operations (WZMTO) subcommittee that serves as the working group to the Council. The work of the WZMTO group recently won the 2021 National Operations Center of Excellence Award for using TSMO in work zones. Recent Innovations include Realtime Performance Monitoring, Extra Enforcement, Smart Arrow Boards, an Iowa Work Zone Data Hub, Annual Work Zone Safety Awards, Integrated Intelligent Work Zone Processes, and Improved Data Driven Work Zone Process Review Procedures.
- **District TSMO Users Group** – recently established as a recommendation from the first TSMO Plan, the District Users Group consists of TSMO Engineers, Traffic Technicians, and various district staff to discuss a variety of tactical issues ranging from lane closure maps/resources, DOT's role in TIM; unique lane closure operations, coordinating conflicting work zones, and the ICE-Ops Tool.

## External TSMO-Oriented Groups

- **Statewide Traffic Incident Management Committee** – Established in 2016, the Statewide TIM Committee is held every other month to discuss a variety of issues related to TIM such as quick clearance techniques, TIM performance measures, training, best practices and improving collaboration across emergency response disciplines. The group has also been instrumental in planning and hosting a Statewide TIM Conference about every 18 months.
- **Multi-Disciplinary Safety Teams (MDSTs)** - The 12 traffic safety groups (most of which are MDSTs) in Iowa include a wide range of local and state safety participants from various backgrounds. These teams meet on a regular basis to discuss safety topics, problems, projects, and improvements along local roadways within several regional areas of Iowa.

The backgrounds of the members vary and can include, but are not limited to, the following:

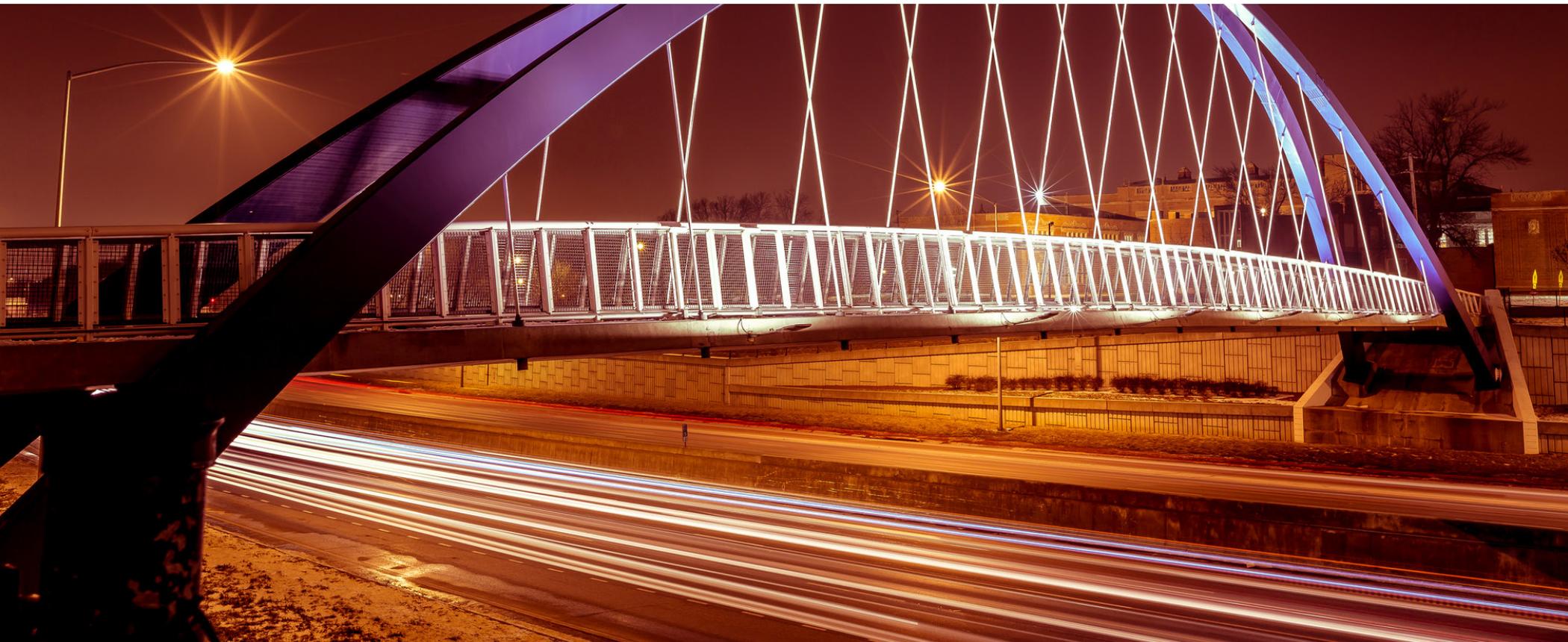
- Engineering
- Planning
- Law enforcement
- Emergency response
- Education
- Research
- Towing
- Media/marketing
- General public

Currently, there are twelve active MDSTs that meet monthly, bi-monthly, or quarterly:

- Ames MDST
- Clinton County MDST
- Council Bluffs TIM
- Davenport CARS
- Des Moines Traffic Management Advisory Committee (TMAC)

- Dubuque MDST
- Fort Dodge MDST
- Johnson County TIM
- Linn County MDST
- North Iowa MDST (Mason City)
- Ottumwa MDST
- Sioux City TIM

- **Iowa Advisory Council on Automated Transportation** – Established in 2019, the Iowa Advisory Council on Automated Transportation is intended to increase roadway safety, personal mobility, and freight movement within the state of Iowa by advancing highly automated vehicle technologies. The multi-agency, multidisciplinary Council provides guidance, recommendations, and strategic oversight of automated transportation activities in the state. Council meetings are held three times per year and four subcommittees support the council in the areas of Infrastructure Readiness, Economic Development, Policy & Legislation, and Public Safety & Enforcement.





Over the course of the last five years since publication of the original TSMO Plan, implementation of the plan recommendations and its associated Service Layers Plans have been guided through interaction with the internal TSMO Steering Committee and leadership from the Traffic Operations Bureau. One of the activities the TSMO Steering Committee oversees is development of an Annual Accomplishment Plan that defines specific costs and sources of funding. About two-thirds of the original recommendations have been completed or are in progress as shown in Figure 1. However, not all the initiatives have been advanced due to changing priorities, limited staff, and/or resources.

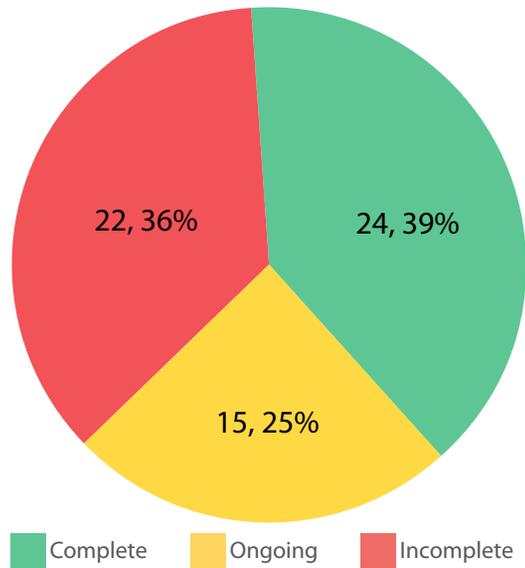


Figure 1. TSMO Program Plan Implementation Status

Over the last several years, there have been periodic times when the maturity of TSMO at Iowa DOT was measured, or assessed based on national guidance.

The last scoring event occurred in early 2020 and was completed by the TSMO Steering Committee. Figure 2 shows the results of historical scoring and the 2022 targets established by the TSMO Steering Committee. The score levels roughly translate into:

- **Level 1** - Activities and relationships largely ad hoc, informal, and champion-driven, substantially outside the mainstream of other Iowa DOT activities.
- **Level 2** - Basic strategy applications understood; key processes support requirements identified and key technology and core capacities under development but limited internal accountability and uneven alignment with external partners.
- **Level 3** - Standardized strategy applications implemented in priority contexts and managed for performance; technical and business processes developed, documented, and integrated into DOT; partnerships aligned.
- **Level 4** - Full, sustainable core DOT program priority, established based on continuous improvement with top level management status and formal partnerships.

The scoring is categorized by the six dimensions of the TSMO Capability Maturity Model (CMM) including collaboration, culture, systems & technology, performance measurement, business processes, and organization & staffing.

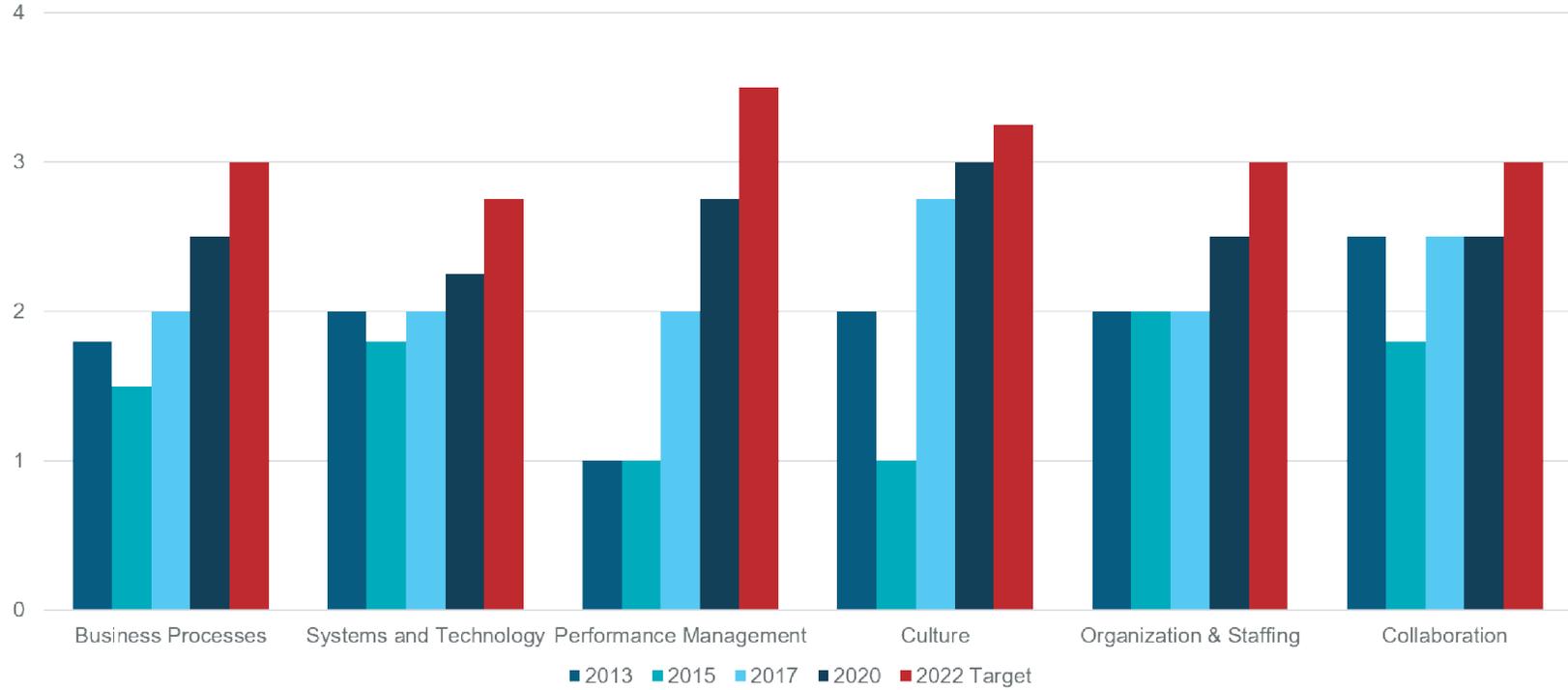


Figure 2. Historical TSMO CMM Scoring Results and 2022 Targets

The original TSMO Plan established a goal to score a 3 across all dimensions in its first five years. While not all dimensions reached a score of 3, there has been significant progress since the original TSMO Plan was published in 2016.

## Managing TSMO Performance

The array of TSMO applications offer a very cost effective way to achieve Iowa DOT's 5-year priority goal to Improve Transportation System Safety & Performance. The evidence for this arises through effective performance management processes and accurate performance measures.

Since completion of the previous TSMO Plan, the Systems Operations Division has been advancing performance management and measurement. For example, ongoing efforts related to the Performance Measurement dimension of the CMM and a dedicated TSMO Performance Management project that was concluded in 2019. Some of those recommendations are incorporated in this section, but refer to the project documents (<https://tinyurl.com/IowaPerfMgmt>) for more background and detail, particularly Technical Memo #3 Implementing Improvements and the final summary memo from December 2019. Although that project included a comprehensive review of all measures both in use and recommend in the previous Program Plan and all Service Layer Plans, the emphasis was on prioritization and the importance of first carefully defining desired outcomes (e.g., reduced work zone incidents) that align with DOT's strategic priorities. From there DOT's TSMO staff identify the performance measures that are most important, relevant, and actionable.

Apart from specific measures, the CMM recommendations from the Performance Measurement dimension help guide the DOT toward that next level of excellence. Those highest priority actions are noted on the following page.

### Priority TSMO Measures Development

Iowa DOT TSMO stakeholders have a very good culture of performance and evidence-based decision making, and continually work to define and prioritize improvements. The optimal measures are carefully prioritized to the most *relevant and feasible quantification of evidence for outcomes strongly linked to DOT strategic direction*. The following four items are the current priorities for TSMO measure improvement.

1. Crashes
  - Automate the Traffic and Criminal Software (TraCS) updates to daily; progress in 2020 has seen some improvement to partly automated and usually weekly updates of limited information to InTrans, but more data must be made available and updated daily for rapid response to anomalies
  - Track and review severe crashes daily, by commercial motor vehicle (CMV), work zones (WZs), weather, and secondary crashes
2. Non-Recurring Delay
  - Leverage and adapt the daily process already in place with InTrans for DOT's Project Prioritization Tool. This is led from Location and Environment Bureau and involves daily travel time estimates and updates for about 50 thousand road segments across Iowa. This information can be used for faster awareness, resolution, and diagnostics, and can be tied to work zones, incidents, weather, closures, special events, etc.
  - Work on this area should coordinate with the design of the Resiliency Index mentioned below and detailed in its own one-page action plan.
3. Roadway Clearance Time
  - Clearance times have been collected by the TMC since late 2016 and statewide as part of TraCS since early 2018, and DOT needs to continue scrutinizing the data, collection methods, and accuracy
  - Keeping roadway clearance time a focus has and will help all stakeholders and the public recognize the importance of quick clearance, even if the data is never perfect

- This is a top priority TIM measure, and though work in 2020 has investigated the data disconnects between the Traffic Management Center (TMC) and TraCS, further work is needed for consistency and data quality
- Though tracking of roadway clearance time has been in place in TraCS since 2018 and now viewable via InTrans, the TraCS updates should be increased to daily frequency, as already mentioned above, via MVD and TAS to DOT's data warehouse, etc.

#### 4. Winter Operations Time-to-Normal

- Enable flow of winter operations data (e.g., snowfall, severity, material application, time-to-normal, per Road Level A/B/C) to a data warehouse and increase frequency to weekly (or daily rolling 7-day windows)
- Explore development of a normalization process leveraging the existing severity index that has already been developed and is maintained by the Maintenance Bureau
- Include along with other winter operations performance items on DOT's performance dashboard
- This also relates to the recommendation to develop measures for weather-related incidents and weather-related delay

### Related Recommendations

In addition to specific measure advancement, there are several related recommendations:

- **Emergency Management** – two areas of emphasis are needed to a) establish accountability for after-action review (AAR) recommendations follow-through, and b) reinvigorate implementation of the EM Service Layer Plan recommendations

Each of the following recommendations has its own one-page action as part of this plan; please refer to those for more detail.

- **Resiliency Index** – this is a new statewide measure yet to be developed
- **Benefits Estimates** – develop estimates of benefit to cost ratios for selected TSMO applications, which are in part driven by availability of

data and performance information; this supports efforts to better relate TSMO performance throughout the DOT

- **Increase Frequency** – this applies to many measures, including those mentioned just above; for TSMO performance, measures should be tracked at least weekly, and often daily, for best value
- **Performance Data Management** – Performance management is contingent on improved data governance and management systems. The DOT now has a Strategic Data Business Plan (June 2020), and the Systems Operations Division should document and leverage the data warehouse that is part of DOT's evolving master data management system (MDMS). The new data warehouse is critical and central to the success of TSMO performance.

### Measure Tracking & Reporting

As measures improve and new ones are implemented, attention should turn to improved reporting and visually communicating performance, e.g., via dashboards such as on the continuously improving [DOT website](#). Keeping in mind the important distinction between general reporting versus effective performance dashboards, here are examples and targeted recommendations:

### TSMO Reporting

- **Annual** – for example, the Fiscal Year Performance Plan (a report and plan prepared annually by DOT for state reporting requirements), the TMC Annual Report, Operations Year in Review (a presentation to leadership prepared by the Director of the Systems Operations Division), and other required reporting
- **Quarterly or Monthly** – while more frequent than annual, these very common intermediate reports are helpful for long term tracking of measures and trends
- **Operations Management** – regular TSMO reporting also includes many metrics that are not necessarily performance measures but are still important for management, operations, and maintenance; common categories include activities (e.g., Highway Helper responses), milestones (e.g., project completion), tallies (e.g., number of cameras), outputs (e.g., DMS activations), or external data (e.g., snowfall).

Though the focus remains on improving TSMO performance outcomes, two recommendations for improved reporting are to 1) create consistent report (web, pdf, etc.) formatting across Bureaus, in collaboration with Strategic Communications; and 2) adhere to regular update schedule, for example a full annual update for priority TSMO measures with interim quarterly reports.



Questions? Contact Traffic and Safety Bureau (jan.laaser-webb@iowadot.us) or Skylar Knickerbocker (Institute for Transportation, sknick@iastate.edu)



Figure 3. Roadway Clearance Dashboard (InTrans)

## Performance Dashboards

For performance dashboards to be effective, they must be clear, intuitive, shown over time, updated frequently, and easy to access or view.

- **Updated daily** – or at least weekly for purposes of TSMO performance monitoring
- **Fully automated** – this reduces manual errors and costs of measuring
- **Active monitoring and alerts** – apart of regular visual inspection, automated measures are in turn amendable to automated monitoring for anomalies and alerting; this should be based on statistical methods such as the process control chart examples previously developed for Iowa’s TSMO program
- **Filtering and drill-down enabled** – with hundreds of TSMO measures available, performance emphasis may be highly prioritized on select measures, and the ability to filter and drill down empowers users to explore and get additional insight into performance
  - An example of this as of early 2021 is the secondary crashes performance and analytics dashboard developed and hosted by [InTrans \(link\)](#)

## ICE-Ops Tool for TSMO Analysis

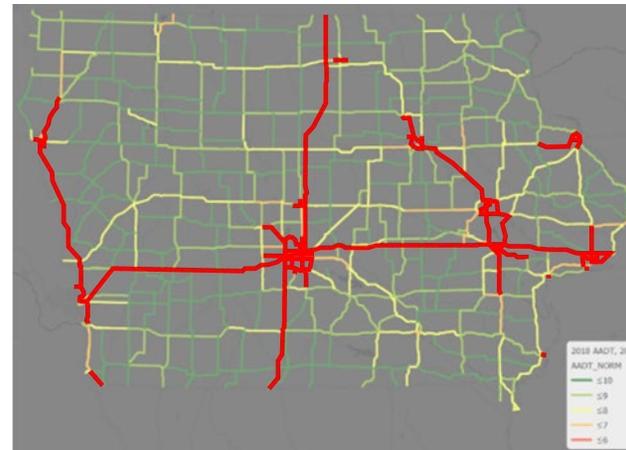
The Infrastructure Condition Evaluation-Operations (ICE-Ops) tool was built in conjunction with the Systems Planning Bureau using the Interstate Corridor Plan as a foundation. ICE-Ops is a system screening that quantifies the relative risk to the safe and reliable operation of the primary highway system. The purpose of this tool is to determine which roadways should be considered priorities for operational enhancements. ICE-Ops supports data driven decisions for Iowa's transportation system. It is not a project-specific tool but can aid in project scoping and prioritization. The scoring that ICE-Ops generates is on a 100-point scale; the higher the score, the fewer operational changes are needed. In the context of TSMO, ICE-Ops can be used to measure system reliability and assist in prioritizing system improvements.

The criteria that ICE-Ops uses include:

Criteria	Weighting
AADT	20%
Annual Bottleneck Duration	15%
Incident Density	15%
Crash Rate	15%
Buffer Time Index	10%
Event Center Proximity	5%
Flood Event Density	5%
Winter Weather Sensitive	5%
Freight Network	5%
ICE Infrastructure Score	5%
	<b>100%</b>

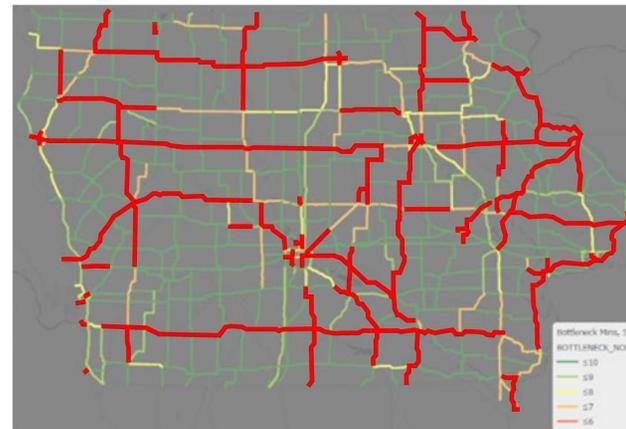
The criteria listed in the table above are shown in color coded maps that highlight Iowa's corridors. The color gradation goes from green (few operational changes needed) to red (more operational changes needed). The 2020 analyses derived from ICE-Ops are as follows.

### AADT



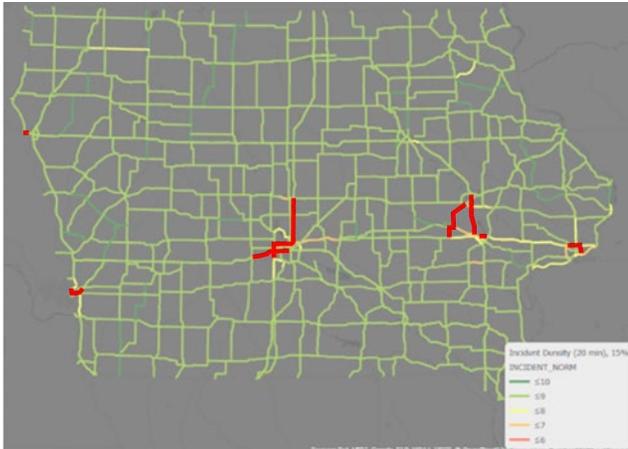
ICE-Ops analyzes AADT, with higher AADTs scoring lower. Corridors interconnecting cities have higher AADTs than the rural areas shown.

### Annual Bottleneck Duration



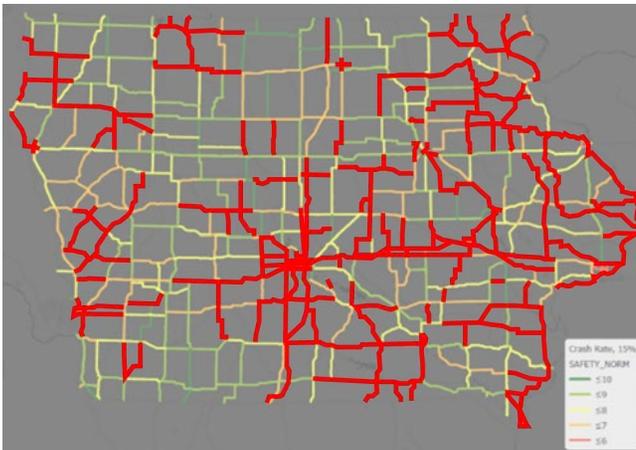
Long bottleneck durations are spread throughout Iowa and are not localized strictly to rural or urban areas. The INRIX Bottleneck Ranking Tool is used as part of this criterion, and combined with location and number of occurrences, is used to generate scores.

### Incident Density



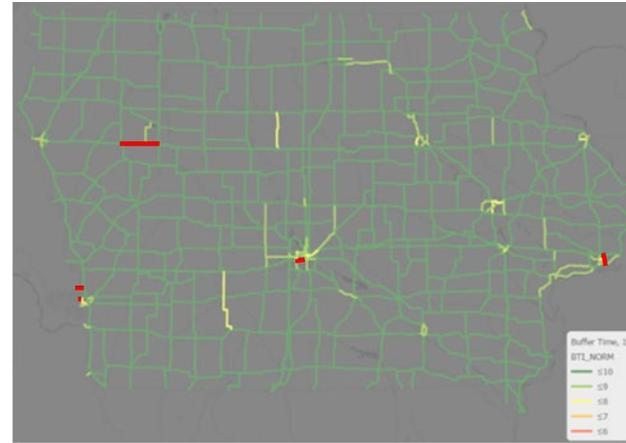
Higher incident densities are found closer to urban centers, specifically Des Moines, Cedar Rapids/Iowa City, Davenport, and Omaha.

### Crash Rate



Crash rates (crashes per mile) across Iowa scored low with ICE-Ops, meaning the crash rate on corridors around the state is high by ICE-Ops' metrics. The metrics used include an assessment of fatal, major injury, and minor injury crashes.

### Buffer Time Index



Trip predictability can be approximated using trip time variability data.

### Event Center Proximity



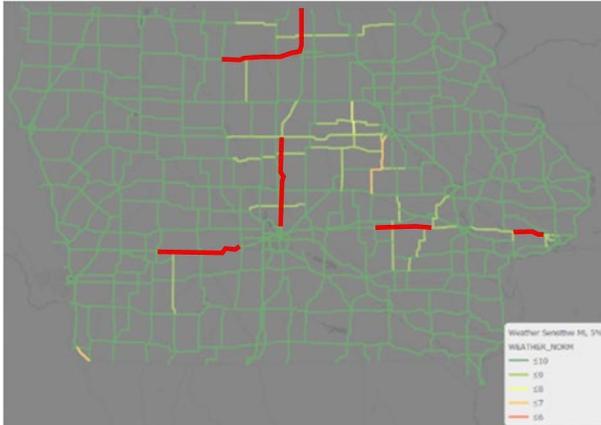
Event centers scored low in Des Moines/Ames and Cedar Rapids/Iowa City, meaning most events (ex. special events such as football games or the State Fair) take place in these locations and can have a significant impact on regional traffic.

### Flood Event Density



ICE-Ops shows a handful of corridors that are very prone to flood events on the periphery of the state.

### Winter Weather Sensitive Mileage



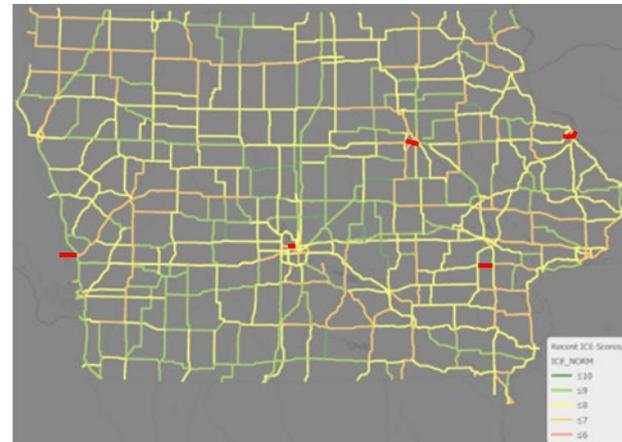
Iowa's weather sensitive corridors use weather related crashes, conditions, and characteristics along with flooding and mileage to determine the scores for this criterion.

### Freight Network Mileage



Freight routes that are heavily traveled tend to cross Iowa completely (e.g., US 20) or connect urban centers (e.g., US 30).

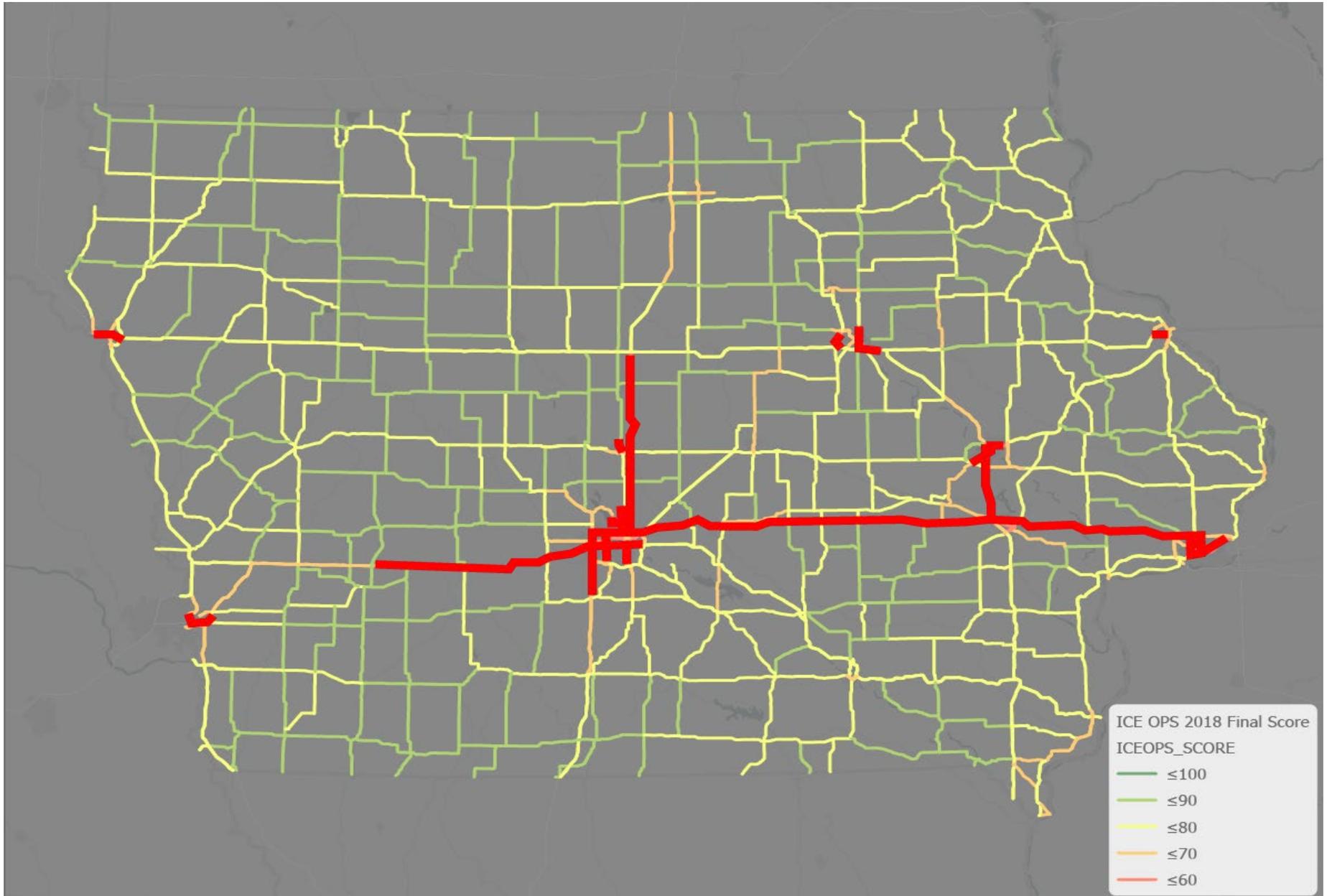
### ICE Infrastructure Score



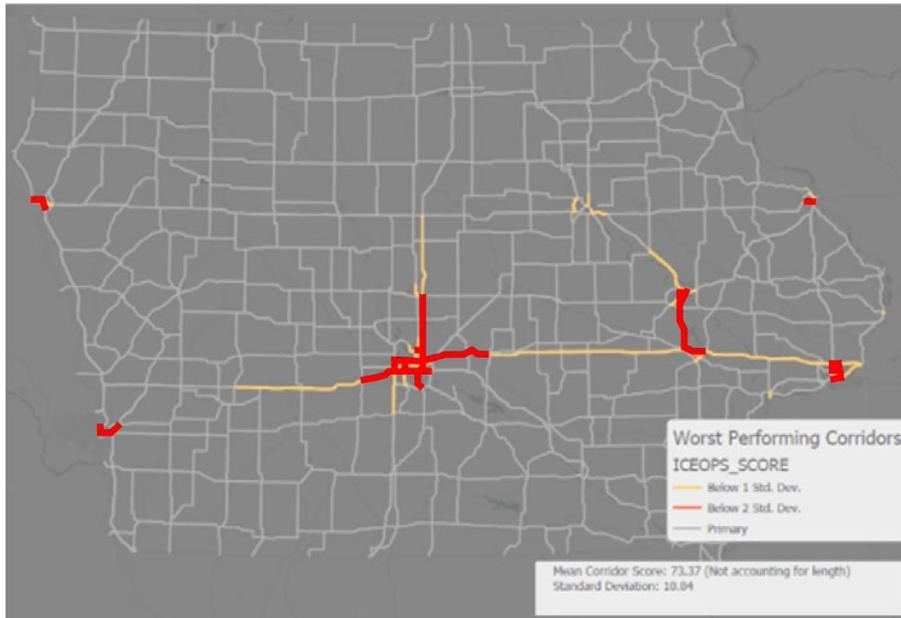
Most of Iowa's transportation corridors scored 9 out of 10 or below on infrastructure using ICE's metrics, meaning there are nearly no corridors that scored a 10 (virtually no operational changes needed). The metrics used to score this criterion include, but are not limited to Pavement Condition Index, International Roughness Index, Structure Sufficiency Ratings, etc.



### ICE-Ops Final Results



ICE-Ops compiles the data that it processes and aggregates it into a score up to 100, as seen on the previous pages. The lower the score, the worse the corridor’s performance is. Most corridors outside of urban centers scored 80 or higher. According to the ICE-Ops results, the closer to an urban center a corridor is, the worse it performs.



These “worst performing corridors” are ones that should be prioritized for operations and/or TSMO improvements. The 20 worst performing corridors are listed in the table to the right in descending order from areas of the highest concern to the least concern; the average score of the 20 lowest performing corridors is 43.87.

Route	Segment	ICE-Ops Score
I-235	Iowa 28 to US 69	35.60
I-80	Nebraska Border to I-29	38.60
I-480	Nebraska Border to I-29	40.60
I-235	W. Mixmaster to Iowa 28	41.35
I-80	Iowa 415 to E. Mixmaster	41.57
I-74	Illinois Border to I-80	41.88
I-80	W. Mixmaster to US 6	42.38
US 77	Nebraska border to I-29	43.28
I-80	Iowa 28 to Iowa 415	43.36
I-80	US 6 to Iowa 141	43.69
I-235	US 69 to E. Mixmaster	44.14
I-29	US 20/I-129 to South Dakota Border	44.39
I-29	I-80 to I-480/US 6	44.55
I-80	US 141 to Iowa 28	44.58
I-35	Iowa 160 to US 30	46.21
I-80	I-380 to Iowa 1	46.82
US 20	Iowa 32 to US 52/US 61	47.92
I-35	I-80/I-235 to Iowa 160	48.48
I-380	I-80 to US 30	48.54
IA 922	I-380 to Iowa 100	49.37



## Recommended Projects, Services, and Activities

Several TSMO projects, services, and activities have been identified. They are organized by Capability Maturity Model (CMM) dimension and include an initial selection of leading and supporting bureaus along with the goals each support. Implementing the projects, services, and activities will enable Iowa DOT to advance towards the CMM targets established by the TSMO Steering Committee.

## Collaboration

### Collaboration Dimension Definition

The effectiveness of TSMO activities depends on the ability of divisions, bureaus, districts, partner agencies, and other stakeholders to work together. Taking advantage of opportunities to build internal and external relationships will help with communication and overcoming challenges in the future.

Project, Service, or Activity	DOT Business Plan Goals					Lead	Support
	1. Safety & Perf.	2. Cust. Service	3. Workforce	4. Funding	5. Innovation		
CO1. Integrate TSMO into Multi-Disciplinary Safety Team (MDST) Meetings	●	●				Traffic & Safety	Traffic Ops. / InTrans
CO2. Multi-Disciplinary/Multiagency TSMO Training and Capacity Building		●	●			Traffic Ops.	Strategic Comm. / Local Systems / LTAP / InTrans
CO3. Integrate TSMO Into MPO & RPA Plans	●	●				Systems Planning	Traffic Ops.
CO4. Enhance Joint Traffic Ops Performance Agreements	●	●				Traffic Ops. / Traffic & Safety	Local Systems / MVE
CO5. Enhance TSMO Communication with Local Organizations		●				Traffic Ops. / Local Systems	Strategic Comm. / Districts / Systems Planning / Traffic & Safety
CO6. Establish TSMO Policy Stakeholder Group with External Partners	●	●				Trans. Dev. Division / Local Systems Bureau	Traffic Ops. / Systems Planning
CO7. Develop and Maintain Open Contracts Clearinghouse		●		●	●	Purchasing	Traffic Ops.



**Collaboration CO1: Integrate TSMO into Multi-Disciplinary Safety Team (MDST) meetings**

Associated Goals:	Safety & Perf ✓	Cust Service ✓	Workforce	Funding	Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>MDST participants being more aware and supportive of safety benefits via TSMO.</li> <li>Multi-agency collaboration on most effective paths to improved safety.</li> </ul>					
<b>Lead Unit(s)</b> Traffic & Safety	<b>Description</b>				
<b>Supporting Unit(s)</b> Traffic Operations InTrans	<ul style="list-style-type: none"> <li>Iowa's Statewide Multi-Discipline Safety Team (MDST) program bring together traffic safety professionals from different disciplines and agencies in 12 regional MDST areas.</li> <li>The goals of MDST and TSMO are very well aligned already, and this action is primarily to increase collaboration toward new solutions to traffic safety issues.</li> <li>TSMO professionals are more effective the better they understand the challenges faced by law enforcement and other first responders.</li> <li>Conversely, MDST program participants can offer valuable insight and guidance to TSMO staff, generating new ideas, approaches, or opportunities for safety improvements.</li> </ul>				
<b>Implementation</b> FY22-23	<b>Critical Steps</b>				
<b>Resources Needed</b> Staff time	<ol style="list-style-type: none"> <li>Clarify that DOT District TSMO Engineers and Traffic Technicians are the primary point of coordination between local MDSTs and TSMO.</li> <li>Ensure that DOT TSMO personnel attend and participate in every MDST meeting across Iowa.</li> <li>Offer a periodic TSMO overview presentation to each MDST if not already done.</li> </ol>				
<b>Dependencies</b> None					
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>DOT TSMO staff are participating in each MDST meeting.</li> <li>MDST program participants are more knowledgeable about TSMO opportunities for safety improvements.</li> </ul>					

**Collaboration CO2: Enhance multi-disciplinary/multiagency TSMO training and capacity building**

Associated Goals:	Safety & Perf	Cust Service ✓	Workforce ✓	Funding	Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>External training improves collaboration and awareness, builds long-term relationships and buy-in, and streamlines TSMO adoption.</li> <li>Internal training and capacity building is cost effective, develops workforce, and reduces turnover.</li> </ul>					
<b>Lead Unit(s)</b> Traffic Operations	<b>Description</b>				
<b>Supporting Unit(s)</b> Strategic Communications Local Systems LTAP InTrans	<ul style="list-style-type: none"> <li>This is to develop a training program to provide TSMO education to stakeholders within DOT and for external partners.</li> <li>Engagement across agencies and capacity building to close gaps in knowledge, skills, and abilities (KSAs) will improve awareness and collaboration.</li> <li>This should build on existing DOT training partners and programs - e.g., the Institute for Transportation (InTrans), the Local Technical Assistance Program (LTAP), or DOT's access to Institute of Transportation Engineers (ITE) resources.</li> <li>Development of training material focusing on TSMO should be geared toward a broader audience that includes planning, project development, and external partners.</li> <li>This action may also be woven with actions in the Organization &amp; Staffing area.</li> </ul>				
<b>Implementation</b> FY24-25	<b>Critical Steps</b>				
<b>Resources Needed</b> Staff time and maybe consultant support	<ol style="list-style-type: none"> <li>Review current national (e.g., FHWA Organizing and Planning for Operations, Consortium for Innovative Transportation Education (CITE) resources) and peer state guidance (e.g., <a href="#">ITS Heartland TSMO University</a>) for best practices available on TSMO training and capacity building.</li> <li>Identify gaps in current internal and external TSMO KSAs and prioritize areas of needed capacity building (refer to NCHRP 20-07 / Task 408) for the initial training program.</li> <li>Explore currently available training opportunities focusing on TSMO specifically but not overlooking how to incorporate training into existing DOT programs.</li> <li>Incorporate TSMO capacity building as part of regular, sustained employee development.</li> <li>Pilot the training with a selected District (including local partners when appropriate).</li> </ol>				
<b>Dependencies</b> Funding					
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>TSMO KSA gaps across the state have been identified.</li> <li>An initial training program is established that includes external partners when appropriate, and a pilot training workshop has been conducted.</li> </ul>					



**Collaboration CO3: Integrate TSMO into Metropolitan Planning Organization (MPO) and Regional Planning Affiliation (RPA) plans**

Associated Goals:	✓ Safety & Perf	✓ Cust Service	Workforce	Funding	Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Integrating TSMO into local plans throughout Iowa helps expand TSMO statewide.</li> <li>Local planners will have better knowledge of TSMO opportunities to achieve their organizations' goals.</li> </ul>					
<b>Lead Unit(s)</b> Systems Planning	<b>Description</b>				
<b>Supporting Unit(s)</b> Traffic Operations	<ul style="list-style-type: none"> <li>Just as it is important for TSMO to be integrated into the Statewide Long-Range Transportation Plan (SLRTP), this action is to ensure TSMO is integrated into long-range plans of Iowa's nine metropolitan planning organizations (MPOs) and 18 regional planning affiliations (RPAs).</li> </ul>				
<b>Implementation</b> FY24-26	<ul style="list-style-type: none"> <li>Long-range plans are a federal requirement for MPOs, and Iowa DOT also requires RPAs to develop and maintain long-range plans.</li> </ul>				
<b>Resources Needed</b> Staff time	<ul style="list-style-type: none"> <li>This effort should draw out common alignments with strategic direction among agencies, specifically those related to safety, mobility, and access.</li> </ul>				
<b>Dependencies</b> Plan update cycles	<ul style="list-style-type: none"> <li>Integrating TSMO into regional planning is necessary upstream work to help ensure that TSMO and intelligent transportation systems (ITS) are considered well before projects reach the Statewide Transportation Improvement Program (STIP).</li> </ul>				
<b>Critical Steps</b>					
<ol style="list-style-type: none"> <li>Identify a lead DOT staff person for this action.</li> <li>Gather and review all 27 plans to identify those that do not include TSMO.</li> <li>Document the schedule for plan update cycles, and plan to interject TSMO early in plan redevelopment.</li> <li>Leverage the opportunity for outreach and engagement, as well as training and capacity building addressed in other TSMO actions.</li> <li>Recommend and work to make changes to MPO and RTA plans on an ongoing basis and subject to plan update cycles.</li> </ol>					
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>DOT has identified gaps where TSMO integration is needed and has an engagement plan.</li> <li>In time, all 27 plans will have TSMO integrated.</li> </ul>					

**Collaboration CO4: Enhance joint agency traffic operations performance agreements**

Associated Goals:	✓ Safety & Perf	✓ Cust Service	Workforce	Funding	Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Maximize alignment of goals and objectives for operations performance beyond just the DOT.</li> <li>Improve collaborative, evidence-based decision-making for TSMO-related initiatives between agencies.</li> </ul>					
<b>Lead Unit(s)</b> Traffic Operations Traffic & Safety	<b>Description</b>				
<b>Supporting Unit(s)</b> Local Systems Motor Vehicle Enforcement	<ul style="list-style-type: none"> <li>Improving TSMO performance is part of broader, interagency goals for safety and mobility and depends on collaboration for greatest impact.</li> <li>Interagency collaboration is already an important work between agencies, especially the Department of Transportation, Department of Public Safety, MPOs, counties, and cities statewide.</li> <li>The joint operations performance agreement is also the place to outline mutual expectations for protocols, cooperation, and communication.</li> <li>This action should be done in concert with the Systems Operations Division performance management initiatives and the related Performance Measurement dimension actions herein.</li> </ul>				
<b>Implementation</b> FY24	<b>Critical Steps</b>				
<b>Resources Needed</b> Staff time	<ol style="list-style-type: none"> <li>Identify highest priority agencies to be signatories for joint agreement(s).</li> <li>Each agency nominates a primary point of contact and champion for developing and drafting the agreement, and being a liaison for their director.</li> <li>Discuss, determine, and clearly define cooperative goals and/or objectives.</li> <li>Clearly articulate joint desired results, using outcome-oriented language and deferring specific targets for later.</li> <li>Define and document agreed upon performance measures, data sources, and update frequencies.</li> </ol>				
<b>Dependencies</b> Agency directors support					
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>Draft joint agreement(s) are clear, complete, have buy-in, and are ready for director signatures.</li> <li>Joint operations performance measures are regularly updated, reviewed in interagency meetings, and used for further decision-making.</li> </ul>					



**Collaboration CO5: Enhance TSMO communication with local organizations**

Associated Goals:	Safety & Perf	<input checked="" type="checkbox"/> Cust Service	Workforce	Funding	Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Improved communications is a critical step toward ongoing operational collaboration across Iowa.</li> <li>Effective network-wide and multimodal TSMO fundamentally depends on communication between DOT and local governments.</li> </ul>					
<b>Lead Unit(s)</b> Traffic Operations Local Systems	<b>Description</b>				
<b>Supporting Unit(s)</b> Strategic Communications Districts Systems Planning Traffic & Safety	<ul style="list-style-type: none"> <li>There is a need to improve and refine DOT's approach to person-to-person communication with local public agencies and planning organizations on TSMO as well as infrastructure condition and safety.</li> <li>Beyond just communication, this action is to advance mechanisms for ongoing interagency dialogue around TSMO, operations, and achieving shared goals for achieving better safety and mobility.</li> <li>This action constitutes an important step toward deeper collaboration and resourcing high priority operational improvements where needed most around Iowa.</li> <li>This action may benefit from collaboration with action CU3 (internal DOT advocacy).</li> </ul>				
<b>Implementation</b> FY24	<b>Critical Steps</b>				
<b>Resources Needed</b> Staff time	<ol style="list-style-type: none"> <li>Identify a central champion for this action, but include District TSMO Engineers and Strategic Communications throughout this action.</li> <li>Audit DOT's current TSMO or operations communications with local agencies, counties, and MPOs; identify gaps and immediate opportunities for improvement.</li> <li>Assess opportunities to reach local agencies through recently elevated Institute of Transportation Engineers (ITE) Iowa Section designation.</li> <li>Also review DOT's other regular communications to assess areas where operations and TSMO could be woven in or further highlighted, particularly for major projects or emergencies (e.g., severe weather).</li> <li>Include both personal communication and technical communication, e.g., utilization of DOT's TSMO data feeds (but this action does not extend to communications infrastructure such as fiber networks).</li> <li>In all cases, identify opportunities to improve format, frequency, latency, interoperability, protocols, automation, and so forth.</li> </ol>				
<b>Dependencies</b> None					
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>Synthesis of current DOT communications complete with a set of priority recommendations for improvement or refinement.</li> <li>Improvements and refinements for TSMO in DOT communications are fully integrated.</li> </ul>					

**Collaboration CO6: Establish TSMO policy stakeholder group with external partners**

Associated Goals:	<input checked="" type="checkbox"/> Safety & Perf	<input checked="" type="checkbox"/> Cust Service	Workforce	Funding	Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Provide the central point of coordination for TSMO policy issues that will continue to arise or that need to be addressed.</li> <li>More efficient, accountable, and transparent deliberation on TSMO policies impacting DOT programs and external stakeholders.</li> </ul>					
<b>Lead Unit(s)</b> Transportation Development Division Local Systems Bureau	<b>Description</b>				
<b>Supporting Unit(s)</b> Traffic Operations Systems Planning	<ul style="list-style-type: none"> <li>Iowa will benefit from a policy group focused on TSMO, bringing together key internal and external stakeholders to review programs and relationships.</li> <li>The purview of this group is distinct from the TSMO Steering Committee.</li> </ul>				
<b>Implementation</b> FY23	<b>Critical Steps</b>				
<b>Resources Needed</b> Staff time	<ol style="list-style-type: none"> <li>Elect a member of the TSMO Steering Committee to draft a group description, purview, and membership.</li> <li>Provide draft material to Steering Committee for review and discuss changes at a subsequent meeting.</li> <li>Invite members and convene the first meeting of the TSMO Policy Stakeholder Group.</li> </ol>				
<b>Dependencies</b> Director support					
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>Policy stakeholder group is defined, documented, and approved by TSMO Steering Committee and DOT Director.</li> <li>Formative TSMO Policy Stakeholder Group has met and is prioritizing its initial direction and initiatives.</li> </ul>					



**Collaboration C07. Develop and maintain open contracts clearinghouse**

Associated Goals:	Safety & Perf	 Cust Service	Workforce	 Funding	 Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Awareness of available equipment and services that can be purchased based on previous competitive bidding processes.</li> <li>Reduced cost of agencies trying to procure similar equipment.</li> <li>Allows agencies to buy equipment they may be interested in testing at a lower cost.</li> </ul>					
<b>Lead Unit(s)</b> Purchasing	<b>Description</b>				
<b>Supporting Unit(s)</b> Traffic Operations	<ul style="list-style-type: none"> <li>Based on discussions held with the nine metropolitan areas with populations greater than 50k, there seems to be duplication in procurement of TSMO equipment.</li> <li>Making everybody aware of products and associated terms and conditions across the state will be beneficial by reducing the cost of developing individual procurement documents.</li> <li>Over time, if agencies cooperate in the planning of procurements, discounts could be realized through volume discounting, and interoperability should also increase.</li> </ul>				
<b>Implementation</b> FY23					
<b>Resources Needed</b> Staff time	<b>Critical Steps</b>				
<b>Dependencies</b> None	<ol style="list-style-type: none"> <li>Develop a survey to poll the nine metro areas and others to gather the types of TSMO related equipment services available.</li> <li>Follow-up with agencies willing to participate to gather initial listing of open procurement contracts.</li> <li>Publish list to the DOT website</li> <li>Develop process for updating the list on a periodic basis.</li> <li>Maintain list on agreed upon periodic basis.</li> </ol>				
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>This activity will never be done, but should require minimal effort once processes for updating and maintaining open procurement contracts is established.</li> </ul>					



# Culture

## Culture Dimension Definition

Represents the values and beliefs that lead to certain decisions being made. Through a business case or outreach opportunities, TSMO messaging can be communicated to others inside and outside of the agency to gain support.

Project, Service, or Activity	DOT Business Plan Goals					Lead	Support
	1. Safety & Perf.	2. Cust. Service	3. Workforce	4. Funding	5. Innovation		
CU1. Add Access Management to TSMO Processes	●				●	Traffic & Safety	Districts / Location & Env. / Traffic Ops.
CU2. Add Maintenance Operations to TSMO Processes	●		●		●	Maintenance	Traffic Ops. / MVE / Districts
CU3. Share TSMO & ITS Benefits Within/Beyond Iowa DOT		●				Strategic Comm.	Traffic Ops.
CU4. Integrate TSMO into Existing Conferences and Meetings in Iowa		●	●		●	Traffic Ops.	InTrans / Traffic & Safety



Associated Goals:		✓ Safety & Perf	Cust Service	Workforce	Funding	✓ Innovation
<b>Benefits, Impacts, Outcomes</b>						
<ul style="list-style-type: none"> <li>TSMO and Access Management shared goals are better met through process integration.</li> <li>Improved awareness and opportunities to leverage complementary nature of each area.</li> </ul>						
<b>Lead Unit(s)</b>	<b>Description</b>					
Traffic & Safety	<ul style="list-style-type: none"> <li>Iowa DOT seeks to coordinate better between Access Management and TSMO processes.</li> <li>TSMO and Access Management share complementary goals for safety and mobility.</li> <li>Access Management is more specific than the breadth of TSMO and has well established guidelines and processes.</li> <li>Access Management is led by Traffic &amp; Safety (TAS) who will work to ensure its inclusion in TSMO planning, programming, and implementation processes.</li> <li>Anytime administrative rule updates are underway for Access Management process streamlining are good times for also integrating TSMO with Access Management policy.</li> <li>For reference, the online Access Management page is <a href="https://iowadot.gov/traffic/access-management/access">https://iowadot.gov/traffic/access-management/access</a>.</li> </ul>					
<b>Supporting Unit(s)</b>	<b>Critical Steps</b>					
Districts Location and Environment Traffic Operations	<ol style="list-style-type: none"> <li>First, work to better understand all existing Iowa DOT processes for Access Management planning, decision-making, and coordination.</li> <li>Review policy and guidelines - such as the Access Policy Guidebook and Guidelines for Traffic Impact Analysis - for lack of incorporation of TSMO, and recommend inclusion where possible.</li> <li>Review and implement best practices from within and beyond Iowa.</li> <li>Ensure that Access Management is recognized in the TSMO Program Plan, and in subsequent Service Layer Plans as applicable.</li> <li>Target 4-lane expressways at urban fringe areas as a case study on how TSMO and Access Management complement one another.</li> </ol>					
<b>Implementation</b>	<b>How do we know if we are done?</b>					
FY23	<ul style="list-style-type: none"> <li>TSMO plans and processes include Access Management.</li> <li>Access Management personnel are better aware of TSMO's role.</li> </ul>					
<b>Resources Needed</b>						
Staff time						
<b>Dependencies</b>						
Update cycles for plans and guidelines						

**Culture CU2: Add maintenance operations to TSMO processes**

Associated Goals:		✓ Safety & Perf	Cust Service	✓ Workforce	Funding	✓ Innovation
<b>Benefits, Impacts, Outcomes</b>						
<ul style="list-style-type: none"> <li>Safety benefits through points of integration between maintenance and TSMO.</li> <li>Better leveraged TSMO application benefits in Maintenance Operations.</li> </ul>						
<b>Lead Unit(s)</b>	<b>Description</b>					
Maintenance	<ul style="list-style-type: none"> <li>There is opportunity to integrate TSMO-related Maintenance Operations activities and training into DOT's TSMO processes.</li> <li>This builds on initiatives already existing such as sharing plow location / information and winter weather performance measures.</li> <li>Part of the motivation is reducing risk to all workers through TSMO applications, which is a priority for DOT.</li> <li>Integrating TSMO and maintenance should include better staff training on traffic control standards and better awareness / communication across the state.</li> <li>Work also includes further integrating weather management and TMC functions, leveraging maintenance vehicles as new sources of data, and improving roadway design with long-term maintenance in mind (e.g., cable barriers rendered ineffective by snow cover).</li> </ul>					
<b>Supporting Unit(s)</b>	<b>Critical Steps</b>					
Traffic Operations Motor Vehicle Enforcement Districts	<ol style="list-style-type: none"> <li>Convene small working group between lead and support units (e.g., one liaison from each District) to identify priority points of integration opportunities between TSMO and Maintenance Operations.</li> <li>Evaluate whether Maintenance Operations should have its own TSMO Service Layer Plan, or if the efforts of this action and working group are sufficient.</li> <li>Consistent with TSMO Program Plan and other priority actions, assess viability (cost, time, feasibility, expected benefits) of each identified improvement.</li> <li>Starting with the item with the highest impact relative to effort, work to integrate or implement improvements.</li> </ol>					
<b>Implementation</b>	<b>How do we know if we are done?</b>					
FY24	<ul style="list-style-type: none"> <li>Working group has completed assessment and coordination has improved.</li> <li>Mutual awareness is better and integration improvements are underway.</li> </ul>					
<b>Resources Needed</b>						
Staff time						
<b>Dependencies</b>						
None						



**Culture CU3: Share TSMO and Intelligent Transportation Systems (ITS) benefits within and beyond the Iowa DOT**

Associated Goals:	Safety & Perf	Cust Service ✓	Workforce	Funding	Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Advocating for TSMO throughout the DOT helps its adoption as part of regular planning and programming.</li> <li>Broader understanding of TSMO benefits improves and accelerates resourcing and adoption.</li> </ul>					
<b>Lead Unit(s)</b> Strategic Communications	<b>Description</b>				
<b>Supporting Unit(s)</b> Traffic Operations	<ul style="list-style-type: none"> <li>An essential part of improving the cultural adoption of TSMO across Iowa DOT is communicating - regularly and persuasively - the business case and benefits of TSMO and ITS as part of routine communications.</li> <li>TSMO holds a compelling position being situated extremely well with its inherent alignment with the strategic direction laid out in Iowa's Statewide Long-Range Transportation Plan and in DOT's Business Plan (January 2021), and this should be part of regular internal messaging.</li> <li>The messaging done as part of this action can also inform action CO6 (communicating with local agencies).</li> <li>Whenever a higher impact or emergency event occurs is an opportunity to weave in the value of TSMO and ITS, e.g., traveler information during flooding closures or hazardous winter weather conditions.</li> </ul>				
<b>Implementation</b> FY24-25					
<b>Resources Needed</b> Staff time					
<b>Dependencies</b> Action PM2 underway					
<b>Critical Steps</b>					
<ol style="list-style-type: none"> <li>Identify a lead staff person from the Systems Operations Division to champion this action and monitor ongoing opportunities, and ask Strategic Communications to assign a staff person to act as a liaison.</li> <li>Drawing from the updated TSMO Program Plan and action PM2 (benefits), work with Strategic Communications to create a simple communications plan.</li> <li>Consider creating a BrandScript based on StoryBrand (ask your Strategic Communications partner for more information).</li> <li>Create internal blogs or videos showcasing TSMO applications.</li> <li>Remain watchful for impactful external events that will be leveraging TSMO or ITS, and offer input to Strategic Communications as appropriate.</li> </ol>					
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>Systems Operations Division and Strategic Communications are connected on this action and have a simple plan for improving TSMO messaging.</li> <li>TSMO and ITS business cases and benefits are increasingly part of regular internal DOT communication.</li> </ul>					

**Culture CU4: Integrate TSMO into existing conferences and meetings in Iowa**

Associated Goals:	Safety & Perf	Cust Service ✓	Workforce ✓	Funding	Innovation ✓
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Improves stakeholder relationships among TSMO community and helps mainstream TSMO beyond the core community.</li> <li>Seeds new ideas, builds capacity and knowledge of TSMO opportunities and successes statewide, and can help streamline TSMO planning.</li> </ul>					
<b>Lead Unit(s)</b> Traffic Operations	<b>Description</b>				
<b>Supporting Unit(s)</b> InTrans Traffic & Safety	<ul style="list-style-type: none"> <li>As done with other business areas the DOT is responsible for, this action is to deliberately integrate TSMO into existing meetings rather than create a separate annual meeting.</li> <li>Setting aside a block of time at existing Iowa DOT meetings will allow key partners to candidly share challenges and issues, shift toward collaboratively solving them, and is intended to help with planning and alignment along common goals, objectives, and measures.</li> <li>This action may present an opportunity to support one or more of the other actions addressing internal or external training and capacity building.</li> </ul>				
<b>Implementation</b> FY22-23					
<b>Resources Needed</b> Staff time					
<b>Dependencies</b> Director support					
<b>Critical Steps</b>					
<ol style="list-style-type: none"> <li>Appoint a staff champion to lead this action to integrate TSMO into existing Iowa DOT events. Partner events can also be candidates for integration.</li> <li>Identify 2-3 key Iowa DOT and/or partner events (e.g., ITE Iowa Section Annual Meeting, ATSSA, Mid-Continent Transportation Research Symposium, Iowa Traffic &amp; Safety Forum) to integrate TSMO as a track or major topic theme.</li> <li>Work with event organizers to bring in Iowa DOT and other state thought leaders to share TSMO best practices.</li> </ol>					
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>TSMO becomes a standing topic, theme, or track at 2-3 annual events.</li> </ul>					



# Systems and Technology

## Systems and Technology Dimension Definition

Appropriate planning, construction, operations, and maintenance of systems and technology ensures operational needs of an agency are met. By developing standard protocols and an iterative data management process, transportation solutions can be effective in enhancing mobility.

Project, Service, or Activity	DOT Business Plan Goals					Lead	Support
	1. Safety & Perf.	2. Cust. Service	3. Workforce	4. Funding	5. Innovation		
ST1. Improve Traveler Info for Transit & Rideshare	●	●			●	Public Transit	Traffic Ops. / Systems Planning
ST2. Improve Connectivity & Interoperability between State & Locally Managed Systems	●				●	Traffic Ops.	Network & Cyber / IT / Org. Improvement (GIS) / TMC
ST3. Establish ITS Configuration Control Board	●					Traffic Ops.	Network & Cyber
ST4. Establish Systems Engineering Guidelines & Repository	●				●	Traffic Ops.	IT
ST5. Develop approaches to Better Leverage Ops Data	●	●			●	Traffic Ops.	MVE / Network & Cyber / IT / Org. Improvement (GIS)
ST6. Implement Integrated Corridor Management Concepts	●	●			●	Traffic Ops. / Districts	Traffic & Safety / Network & Cyber
ST7. Expand Statewide Video Sharing Strategy	●	●			●	Traffic Ops.	Network & Cyber



**Systems & Technology ST1: Improve traveler information for transit and rideshare**

Associated Goals:	✓ Safety & Perf	✓ Cust Service	Workforce	Funding	✓ Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Improved multimodal traveler information improves mobility, equity, and accessibility for all system users.</li> <li>Provision of integrated, seamless traveler information improves DOT's customer experience.</li> </ul>					
<b>Lead Unit(s)</b> Public Transit	<b>Description</b>				
<b>Supporting Unit(s)</b> Traffic Operations Systems Planning	<ul style="list-style-type: none"> <li>Real-time traveler information has known gaps and barriers, especially across modes and for first and last mile travel.</li> <li>As Iowa DOT continues to improve multimodal service, integrating transit and ride share into general traveler information is aligned with DOT's strategic direction.</li> <li>DOT's customers having seamless access to travel across modes and associated real-time information improves outcomes related to safety, mobility, and accessibility.</li> </ul>				
<b>Implementation</b> FY24-25	<b>Critical Steps</b>				
<b>Resources Needed</b> Staff time and IT support	<ol style="list-style-type: none"> <li>Assess data gaps across modes with initial focus towards transit and ride share services.</li> <li>Assess role of private sector information providers and DOT's role in supporting data provision for transit and ride share statewide.</li> <li>Reach out to modal advocacy groups to elicit input on priorities for multimodal traveler information.</li> <li>Scan peer agency successes in providing traveler information for transit and ride share services.</li> <li>Define areas where DOT can provide standards guidance to agency and private sector partners to make future technical integration easier.</li> </ol>				
<b>Dependencies</b> Data availability and interfaces					
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>Information gaps (technical, accessible) for transit and ride share are identified and prioritized for addressing.</li> <li>Transit and ride share information is better integrated into DOT's traveler information services.</li> </ul>					

**Systems & Technology ST2: Improve connectivity and interoperability between state and locally managed systems**

Associated Goals:	✓ Safety & Perf	Cust Service	Workforce	Funding	✓ Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Better situational awareness, especially during special events or emergencies.</li> <li>Improves collaboration between agencies and provides a more seamless customer experience.</li> </ul>					
<b>Lead Unit(s)</b> Traffic Operations	<b>Description</b>				
<b>Supporting Unit(s)</b> Network & Cyber Information Technology Org Improve (GIS) TMC	<ul style="list-style-type: none"> <li>There is interest among DOT and local transportation agencies to advance statewide visibility of the status of transportation systems managed by individual participating jurisdictions; local agencies already have a lot of access to DOT network conditions, but not vice versa.</li> <li>Systems here refers primarily to intelligent transportation systems (ITS) such as cameras, message signs, integrated corridor management (ICM), signals, etc.</li> <li>The extent to which systems follow the federal Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT) will make interfaces, data sharing, and subsequent innovation easier to accomplish.</li> <li>Agencies may need to modify or update protocols and interfaces to enable system status visibility.</li> <li>The priority is awareness and monitoring, and in no case does this action suggest sharing of intelligent transportation systems (ITS) management or control.</li> </ul>				
<b>Implementation</b> FY24-25	<b>Critical Steps</b>				
<b>Resources Needed</b> Staff time and IT, including from Distrits and local agencies	<ol style="list-style-type: none"> <li>Recruit a key local agency partner that has interest and a viable ITS application of interest to DOT.</li> <li>Assess current architecture (including Des Moines ICM and Statewide Architecture efforts), interoperability, interfaces, standards, and protocols to identify necessary improvements or modifications.</li> <li>Determine whether additional resourcing is needed to make the improvements or to maintain interfaces long term.</li> <li>Complete the initial demonstration, ensure there are benefits, and move on to working with other jurisdictions.</li> </ol>				
<b>Dependencies</b> ITS Architecture					
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>DOT has established architecture, standards, and protocols for real-time interagency information sharing.</li> <li>An initial proof of concept demonstration is completed and other jurisdictions are working on ITS information sharing.</li> </ul>					



**Systems & Technology ST3: Establish Intelligent Transportation Systems (ITS) configuration control board**

Associated Goals:	✓ Safety & Perf	Cust Service	Workforce	Funding	Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Less resource waste through increased efficiency for transportation technology systems development, integration, operations, and maintenance.</li> <li>Improved resiliency and reduced risk of system design errors, interface incompatibilities, or system faults.</li> </ul>					
<b>Lead Unit(s)</b> Traffic Operations	<b>Description</b>				
<b>Supporting Unit(s)</b> Network & Cyber	<ul style="list-style-type: none"> <li>Broadly, a configuration control board (CCB) is an expert group charged with overseeing and approving various technology, hardware, software adoption, documentation, and changes.</li> <li>Configuration management is an essential part of intelligent transportation systems (ITS) and system engineering (SE), and the CCB will be responsible for monitoring ITS, TSMO, and other operational technology development, testing, and validation processes.</li> <li>The CCB monitors TSMO developments and continues throughout operations and maintenance lifecycles.</li> <li>This action should accompany or follow closely on ST4 (systems engineering).</li> </ul>				
<b>Implementation</b> FY23-24					
<b>Resources Needed</b> Staff time					
<b>Dependencies</b> None	<b>Critical Steps</b>				
	<ol style="list-style-type: none"> <li>Define core membership of the new CCB, likely with overlap from action ST4 (systems engineering).</li> <li>Convene initial meeting and outline need for thorough understanding of systems engineering development and maintenance processes; pursue capacity building where needed.</li> <li>Collect example change forms for reference and adapt for Iowa DOT use; suggest electronic only, e.g., via SharePoint app.</li> <li>Clearly document expectations for budget or funding changes to implement needed changes.</li> <li>Backed by director support, communicate the role of the CCB and expectations for TSMO staff and their consultants.</li> </ol>				
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>CCB is formed and has established regular meetings.</li> <li>Expectations are documented, including change form and resourcing.</li> </ul>					

**Systems & Technology ST4: Establish systems engineering guidelines and repository**

Associated Goals:	✓ Safety & Perf	Cust Service	Workforce	Funding	✓ Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Systems Engineering reduces risk, especially in an increasingly digital environment.</li> <li>More efficient systems development, maintenance, and configuration management.</li> </ul>					
<b>Lead Unit(s)</b> Traffic Operations	<b>Description</b>				
<b>Supporting Unit(s)</b> Information Technology	<ul style="list-style-type: none"> <li>The systems engineering (SE) development process has been of great value for intelligent transportation systems (ITS) for decades, and there exists a need for Iowa DOT to adopt basic guidelines and establish an online repository for ITS architecture and related SE documentation.</li> <li>The primary motivations for adopting SE are a) risk reduction, following established methods for development and deployment catches and solves issues earlier in the process than they otherwise would be; and b) efficiency, in terms of resource use, reduced rework, streamlined system maintenance, upgrades or improvements, and configuration management.</li> </ul>				
<b>Implementation</b> FY22-23					
<b>Resources Needed</b> Staff time and consultant support	<b>Critical Steps</b>				
<b>Dependencies</b> Funding, management buy-in	<ol style="list-style-type: none"> <li>Identify a lead staff to take charge of this and provide with needed resources (and training / capacity building as needed).</li> <li>Compile recent (within 5-10 years) MPO developed regional architectures, project architectures and related SE documentation.</li> <li>Create statewide ("regional") ITS architecture in most recent version of the Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT) software.</li> <li>Establish an internal file storage home for SE guidelines and ITS architecture; publishing statewide architecture online for partner use is a future option.</li> </ol>				
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>Statewide architecture exists.</li> <li>SE guidelines in place and being followed by ITS project development on major ITS projects and those involving more than one agency.</li> </ul>					



**Systems & Technology ST5: Develop approaches to better leverage operations data**

Associated Goals:	✓ Safety & Perf	✓ Cust Service	Workforce	Funding	✓ Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Increased use of operations data leads to improved safety, performance, and customer service.</li> <li>Better interagency collaboration and customer service (e.g., traveler information).</li> </ul>					
<b>Lead Unit(s)</b> Traffic Operations	<b>Description</b>				
<b>Supporting Unit(s)</b> Motor Vehicle Enforcement Network & Cyber Information Technology Org Improve (GIS)	<ul style="list-style-type: none"> <li>Improved leveraging and sharing of operations data offers many benefits for collaboration, customer service, and safety and performance.</li> <li>Iowa DOT has already invested in making some of its operations data available through its Open Data website: <a href="https://public-iowadot.opendata.arcgis.com/">https://public-iowadot.opendata.arcgis.com/</a></li> <li>The initial effort is to identify gaps and develop requirements for real-time operations data sharing with partners (e.g., emergency responders, public works, transit).</li> <li>Much of this is already underway, e.g., the wealth of data flowing from the Traffic Management Center (TMC) in Ankeny and its associated software systems, the Maintenance Bureau's automated vehicle location (AVL) system, and others.</li> <li>Leverage the guiding framework in the thorough Strategic Data Business Plan (2020).</li> </ul>				
<b>Implementation</b> FY25-26	<b>Critical Steps</b>				
<b>Resources Needed</b> Staff time, outreach, and internal or external IT expertise	<ol style="list-style-type: none"> <li>Gather and review current DOT data management and sharing policies and guidance, e.g., the Strategic Data Business Plan.</li> <li>Clarify or establish clear policy that TSMO and operations data sharing is beneficial and has the support of DOT leadership.</li> <li>Identify areas where data sharing is prohibited or a gray area, especially if there are more prominent security or privacy issues.</li> <li>Evaluate interest from partner agencies, customers, or other stakeholders for data that is not currently available.</li> <li>For both existing and new data sources, identify ways to increase awareness, improve documentation, make data easier to use, and pursue outreach and support for better leveraging operational data.</li> <li>Prioritize data types that have greatest interest and viability (policy, security, technical) for further requirements development and data sharing agreements.</li> </ol>				
<b>Dependencies</b> Agreements and data availability					
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>Operations data sharing policy and blanket requirements are clear.</li> <li>Requirements for specific, priority data types are established to enable follow-up sharing.</li> </ul>					

**Systems & Technology ST6. Implement Integrated Corridor Management (ICM) concepts**

Associated Goals:	✓ Safety & Perf	✓ Cust Service	Workforce	Funding	✓ Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Better transportation network situational awareness and improved efficiency</li> <li>Strengthened relationships with local agencies</li> </ul>					
<b>Lead Unit(s)</b> Traffic Operations Districts	<b>Description</b>				
<b>Supporting Unit(s)</b> Traffic & Safety Network & Cyber	<ul style="list-style-type: none"> <li>Integrated Corridor Management-type projects help to get the most out of existing corridors across jurisdictional boundaries by optimizing current transportation within highway corridors; allowing motorists to make better travel decisions; reducing incidents, travel time and delays, and fuel consumption; and increasing the predictability and reliability of travel times. ICM is an alternative to expensive infrastructure projects.</li> <li>The Des Moines area is undergoing a significant ICM Study and preliminary recommendations include a set of projects (e.g., ramp metering, improved regional signal coordination, improved emergency vehicle access).</li> <li>This initiative looks at applying ICM strategies across the state, beyond just the Des Moines area.</li> </ul>				
<b>Implementation</b> FY25-26	<b>Critical Steps</b>				
<b>Resources Needed</b> Staff time, outreach, and internal or external IT expertise	<ol style="list-style-type: none"> <li>Inventory local agency TSMO technologies across the state (e.g., signal systems, cameras, communications networks, etc.) including interoperability with Iowa DOT technology stack. To minimize duplication, leverage ongoing ICM work in Des Moines and Cedar Rapids.</li> <li>Assess role of TMC in ICM. Currently, the TMC is primarily focused in the freeway network. Need to understand what additional knowledge, skills, and abilities capacity needs to be developed to take on support of various ICM strategies. For example, some state DOTs have developed a higher level of TMC Operator to manage more active transportation strategies like part-time-shoulder use.</li> <li>Develop one or two ICM pilot proof of concepts outside the Des Moines area to demonstrate statewide benefits.</li> <li>Program improvements in STIP and advance towards design (if needed)</li> </ol>				
<b>Dependencies</b> Agreements and data availability					
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>ICM pilot projects demonstrate benefits of ICM throughout the state.</li> <li>Support builds at the local level for continued investment in ICM strategies.</li> </ul>					



**Systems & Technology ST7. Expand statewide video sharing strategy**

Associated Goals:	✓ Safety & Perf	✓ Cust Service	Workforce	Funding	✓ Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Improved situational awareness across the state will lead to improved traffic incident response.</li> <li>Better interagency collaboration and customer service (e.g., traveler information).</li> </ul>					
<b>Lead Unit(s)</b> Traffic Operations	<b>Description</b>				
<b>Supporting Unit(s)</b> Network & Cyber	<ul style="list-style-type: none"> <li>Many partner agencies have their own network of fixed and movable pan-tilt-zoom cameras for the purpose of managing traffic. Some also use their video networks as a foundation for video image detection analytics.</li> <li>Iowa DOT already shares video and limited control with many agencies around the state.</li> <li>This initiative will systematically bring in video from partner agencies into the TMC.</li> </ul>				
<b>Implementation</b> FY24-25	<b>Critical Steps</b>				
<b>Resources Needed</b> Staff time, outreach, and internal or external IT expertise	<ol style="list-style-type: none"> <li>Inventory local agency video technologies across the state including central systems, control protocols, recording capabilities and associated communications networks.</li> <li>Consider making video and data sharing part of future ICAAP projects which fund a significant portion of local agency traffic signal system improvements throughout the state.</li> <li>Prioritize list of agencies that would mutually benefit from sharing video between agencies.</li> <li>Engage local partners to discuss advantages of sharing video, and in some cases control capabilities.</li> <li>Pilot two-way video sharing with 2-3 local partners to advance video sharing by connecting IT staff from Iowa DOT and agencies to resolve connectivity, firewall, and other security issues.</li> </ol>				
<b>Dependencies</b> Agreements and compatible video availability					
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>Done initially when we have 2-3 agencies sharing video with Iowa DOT.</li> <li>Longer term completion includes sharing video with local partners in the nine metropolitan areas around the state.</li> </ul>					



# Performance Measurement

## Performance Measurement Dimension Definition

Used to evaluate the effectiveness of mobility strategies and whether additional changes need to be made to achieve mobility goals. They are essential for making the business case for TSMO to decisionmakers and the public, and for gauging program success. Furthermore, monitoring performance measures regularly allows the program to be constantly improved and advances institutional continuous improvement.

Project, Service, or Activity	DOT Business Plan Goals					Lead	Support
	1. Safety & Perf.	2. Cust. Service	3. Workforce	4. Funding	5. Innovation		
PM1. Develop Ops-Oriented Resiliency Index	●				●	Systems Planning	Traffic Ops. / Traffic & Safety / InTrans
PM2. Develop B/C Estimates for Key TSMO Applications		●		●		Traffic Ops.	Systems Planning / InTrans
PM3. Increase Frequency of Performance Reporting	●	●				Strategic Communications	Traffic Ops. / Maintenance / Const. & Materials / MVE / Traffic & Safety



**Performance Measurement PM1: Develop operations-oriented resiliency index**

Associated Goals:		✓ Safety & Perf	Cust Service	Workforce	Funding	✓ Innovation
<b>Benefits, Impacts, Outcomes</b>						
<ul style="list-style-type: none"> <li>Insight into systemwide uptime improves accountability for DOT as Stewards of Iowa's Transportation System.</li> <li>DOT's system performance goal is better achieved by including resiliency, reliability, and uptime.</li> <li>Understanding resiliency from a network point of view will enable Iowa DOT to pursue new grant opportunities.</li> </ul>						
<b>Lead Unit(s)</b>	<b>Description</b>					
Systems Planning	<ul style="list-style-type: none"> <li>DOT has a unique niche as Stewards of Iowa's Transportation System, responsible for providing reliable access and mobility for people and goods.</li> </ul>					
<b>Supporting Unit(s)</b>	<ul style="list-style-type: none"> <li>Because resiliency is an essential component of DOT's system performance goal, this action is to develop an operations-oriented resiliency index based on the network uptime concept.</li> </ul>					
Traffic Operations	<ul style="list-style-type: none"> <li>The focus of this action for its first iteration is the Interstate system, and this new measure should be developed assuming likely incorporation into ICE-Ops, which supports multiple uses.</li> </ul>					
Traffic and Safety	<b>Critical Steps</b>					
InTrans	<ol style="list-style-type: none"> <li>Identify staff person from Systems Planning to lead this effort.</li> <li>Carefully articulate the desired outcome or result in alignment with DOT strategic direction and goals.</li> <li>Define the performance measure for resiliency or uptime, in concert with identifying available data and data needs to support this item.</li> <li>Confirm the formulated outcome and measure with Systems Operations Division leadership.</li> <li>Work with InTrans to implement measure and add to Reactor dashboard.</li> </ol>					
<b>Implementation</b>						
FY22-23						
<b>Resources Needed</b>						
Staff time and InTrans						
<b>Dependencies</b>						
None						
<b>How do we know if we are done?</b>						
<ul style="list-style-type: none"> <li>Outcome and measure clearly defined.</li> <li>Measure implemented and viewable on a dashboard showing performance over time.</li> </ul>						

**Performance Measurement PM2: Develop benefit/cost estimates for key TSMO applications**

Associated Goals:		✓ Safety & Perf	✓ Cust Service	Workforce	Funding	✓ Innovation
<b>Benefits, Impacts, Outcomes</b>						
<ul style="list-style-type: none"> <li>Documented benefits help the business case and improve broader understanding of TSMO applications and appreciation for their return on investment (ROI).</li> <li>Improved and widespread regard for the value of TSMO streamlines further integration and implementation.</li> </ul>						
<b>Lead Unit(s)</b>	<b>Description</b>					
Traffic Operations	<ul style="list-style-type: none"> <li>This action is to prepare benefit-cost estimates for key applications within TSMO and intelligent transportation systems (ITS), e.g., integrated corridor management (ICM), ramp metering, Highway Helper, the Towing and Recovery Incentive Program (TRIP), and other tactics in use, under consideration, or that would present a stronger case with objective benefits estimates.</li> </ul>					
<b>Supporting Unit(s)</b>	<ul style="list-style-type: none"> <li>Estimating various TSMO or ITS benefits used to be trickier, but there is now a wealth of data and methods to do this well; Traffic Operations may need to clarify consistent methodology and parameters (e.g., discount rate, value of time, etc.).</li> </ul>					
Systems Planning	<ul style="list-style-type: none"> <li>Along with communicating the principle of right-sizing transportation systems, there is a parallel opportunity to better communicate the benefits - e.g., B/C, ROI - for TSMO, across modes and geographies.</li> </ul>					
InTrans	<b>Critical Steps</b>					
<b>Implementation</b>	<ol style="list-style-type: none"> <li>Assess TSMO / ITS materials, cost data, evidence of benefits and ROI, and case studies on hand; identify gaps in applications and geographies.</li> <li>Clarify methodology for B/C and ROI calculations, then develop those estimates; prioritize or be prepared to address applications currently up for consideration.</li> <li>Follow up with communication and outreach about TSMO benefits, for both intra- and inter-agency decision-makers and key stakeholders.</li> <li>Educate key staff of benefits and ROI and have them continually advocate for TSMO.</li> <li>Leverage current and recent impact events to highlight the benefits that TSMO and ITS bring to safety, resiliency, and recovery.</li> </ol>					
FY23-24						
<b>Resources Needed</b>						
Staff time						
<b>Dependencies</b>						
Data availability						
<b>How do we know if we are done?</b>						
<ul style="list-style-type: none"> <li>Methodology is established and maintained by Traffic Operations, and Iowa-specific TSMO or ITS application B/C and ROI estimates are on hand.</li> <li>Communications of benefits is lessening resistance to changes toward pro-TSMO policies, procedures, and integrat</li> </ul>						



**Performance Measurement PM3: Increase frequency of performance reporting**

Associated Goals:	✓ Safety & Perf	✓ Cust Service	Workforce	Funding	Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Allows faster spotting of issues and corrective action.</li> <li>More efficient use of resources through automation.</li> </ul>					
<b>Lead Unit(s)</b> Strategic Communications  <b>Supporting Unit(s)</b> Traffic Operations Maintenance Construction & Materials Motor Vehicle Enforcement Traffic & Safety  <b>Implementation</b> FY22-23  <b>Resources Needed</b> Staff time and IT  <b>Dependencies</b> Data availability	<b>Description</b> <ul style="list-style-type: none"> <li>Increasing the frequency of reporting critical business / performance measures has multiple benefits.</li> <li>Reducing latency from quarterly to monthly to weekly and sometimes daily enables faster identification of issues and subsequent remediation.</li> <li>For example, through automated performance dashboards, a new work zone goes into effect and a safety issue is captured within a day or two instead of a week or more.</li> <li>Through automation this uses fewer resources, not more.</li> <li>DOT wants to provide frequent performance reports (monthly) for internal and external audiences for awareness and to help prioritize efforts.</li> <li>There are many ongoing efforts regarding performance reporting, and they need to be coordinated with other efforts.</li> </ul> <b>Critical Steps</b> <ol style="list-style-type: none"> <li>Review the Systems Operations Division performance management recommendations (December 2019).</li> <li>Identify gaps that still need to be filled, focusing first on outcome measures.</li> <li>Business (vs outcome) measures - e.g., salt quantities - can be included because they're important for managing operations, but they won't be part of external performance reports.</li> <li>Prioritize automation and dashboarding first, which ensures the data processes are in place, then follow with regular reports as requested by management.</li> </ol>				
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>The 2019 Systems Operations Division Performance recommendations are completed.</li> <li>Automated dashboards are improved and regular performance reports are underway.</li> </ul>					



# Business Processes

## Business Processes Dimension Definition

Includes all the planning, budgeting, procurement, and process development required for TSMO programs. To be implemented, TSMO activities and initiatives must be supported financially and institutionally. Protocols and procedures are necessary for TSMO to become ingrained in agency culture.

Project, Service, or Activity	DOT Business Plan Goals					Lead	Support
	1. Safety & Perf.	2. Cust. Service	3. Workforce	4. Funding	5. Innovation		
BP1. Integrate TSMO into Iowa DOT Policies & Guidance	●					Design / Location & Env. / Maintenance	Traffic Ops. / Const. & Materials / Bridges & Structures / Contracts & Specs. / Districts / Program Mgmt.
BP2. Integrate TSMO Deployment Planning & the 5-Year TIP	●	●		●		Traffic Ops. / Program Mgmt.	Systems Planning / Districts
BP3. Develop District-Level TSMO Plans	●					Districts	Traffic Ops.
BP4. Ensure Adequate Access to Funding for TSMO Projects through Existing &/or New Budget Categories	●			●	●	Exec. Leadership Team / System Ops. Division	Program Mgmt. / AMIT / Traffic Ops.
BP5. Streamline TSMO Procurement Processes		●	●		●	Procurement & Distribution / Traffic Ops	IT
BP6. Establish Innovative Funding Team				●	●	Traffic Ops.	Strategic Comm. / Finance



**Business Processes BP1: Integrate TSMO into Iowa DOT policies and guidance**

Associated Goals:	✓ Safety & Perf	Cust Service	Workforce	Funding	Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Helps ensure gaps and oversights about operations are filled in guidance.</li> <li>Broadens consideration of TSMO throughout all programs and locations for additional safety and performance benefits.</li> </ul>					
<b>Lead Unit(s)</b> Design Location & Environment Maintenance	<b>Description</b>				
<b>Supporting Unit(s)</b> Traffic Operations Construction & Materials Bridges & Structures Contracts & Specifications Districts Program Mgmt	<ul style="list-style-type: none"> <li>This action centers directly on the Priority Goal for Iowa DOT is to Improve Transportation System Safety and Performance.</li> <li>A key part of improving outcomes on the transportation system is applying TSMO wherever beneficial. Ensuring that TSMO is integrated into DOT policy and planning is essential for mainstream TSMO adoption.</li> <li>TSMO principles should be more broadly integrated into DOT funding streams, policies, programming, design, construction, and maintenance documents.</li> </ul>				
<b>Implementation</b> FY22+	<b>Critical Steps</b>				
<b>Resources Needed</b> Staff time	<ol style="list-style-type: none"> <li>Review major policies and guidance documents to see whether TSMO is sufficiently included.</li> <li>Identify gaps or oversights about operations that need to be filled in guidance.</li> <li>Recommend or make updates as soon as possible, referencing the TSMO Program Plan and TSMO benefits wherever helpful.</li> <li>For key documents on a longer update cycle (e.g., every 3 or 5 years), ensure that TSMO integration is in the queue.</li> </ol>				
<b>Dependencies</b> Document update cycles					
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>Policy and guidance documents including associated tools have been updated to better integrate TSMO.</li> <li>TSMO has become a more common consideration in new functional areas.</li> <li>TSMO projects are considered objectively along with traditional infrastructure projects.</li> </ul>					

**Business Processes BP2: Integrate TSMO deployment planning and the Five-Year Transportation Improvement Program**

Associated Goals:	✓ Safety & Perf	✓ Cust Service	Workforce	✓ Funding	Innovation
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>DOT's programs will better reflect and support DOT's strategic direction and business plan.</li> <li>Better integration between the Five-Year Transportation Improvement Program and TSMO provides better efficiency, interoperability, and system performance outcomes.</li> </ul>					
<b>Lead Unit(s)</b> Traffic Operations Program Mgmt	<b>Description</b>				
<b>Supporting Unit(s)</b> Systems Planning Districts	<ul style="list-style-type: none"> <li>This action improves the linkage between TSMO deployment planning and the Five-Year Highway Improvement Program.</li> <li>Incorporating TSMO into an already well-established business process like the Five-Year Program will improve process efficiency and a more consistent implementation.</li> <li>The TSMO and intelligent transportation systems (ITS) program will be annually vetted with Districts, leveraging District TSMO Engineers as internal champions.</li> <li>Improving the back and forth communication between TSMO and Highway Improvements will help identify priorities for addressing safety and system performance.</li> </ul>				
<b>Implementation</b> FY24-25	<b>Critical Steps</b>				
<b>Resources Needed</b> Staff time	<ol style="list-style-type: none"> <li>Review Five-Year Program development process and timeline to identify where, if at all, TSMO or ITS appears now, and where it should first appear in the future.</li> <li>Coordinate this action with closely related budgeting and programming actions (e.g., BP4, BP6)</li> <li>Backed by DOT Executive Leadership Team (ELT) support and consistent with DOT's strategic direction and Business Plan, work with Program Management and Systems Planning to recommend changes to the process so TSMO / ITS are considered earlier.</li> <li>Enact change to the development process to explicitly include TSMO, ITS, and related operational strategies early.</li> </ol>				
<b>Dependencies</b> ELT support					
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>ELT supports the linkage, and a small team has drafted recommended process changes.</li> <li>TSMO linkages are made more explicit and documented, and TSMO / ITS always considered earlier in the process.</li> </ul>					



**Business Processes BP3: Develop district-level TSMO plans**

Associated Goals:		✓ Safety & Perf	Cust Service	Workforce	Funding	Innovation
<b>Benefits, Impacts, Outcomes</b>						
<ul style="list-style-type: none"> <li>Concise plans for Districts, aligned with statewide TSMO and related plans, focuses limited resources for maximum benefit.</li> <li>Achieve greater resource and implementation efficiency with clarity of purpose and expectations for TSMO within each District.</li> </ul>						
<b>Lead Unit(s)</b> Districts	<b>Description</b>					
<b>Supporting Unit(s)</b> Traffic Operations	<ul style="list-style-type: none"> <li>There is value in District-specific TSMO Plans tailored to local District issues and priorities using ICE-Ops output as a source of operationally sensitive areas.</li> <li>These will help guide more efficient use of limited resources for implementing the most beneficial TSMO improvements.</li> </ul>					
<b>Implementation</b> FY25-26	<ul style="list-style-type: none"> <li>The District plans should be concise, to the point, actionable, and readily updatable, not long nor overly produced.</li> </ul>					
<b>Resources Needed</b> Staff time from each District, with one statewide consultant	<ul style="list-style-type: none"> <li>District activity must be aligned with Iowa's Statewide Long-Range Transportation Plan (SLRTP), the DOT's Business Plan, and the TSMO Program Plan.</li> </ul>					
<b>Dependencies</b> Funding, completed statewide TSMO Plan	<b>Critical Steps</b>					
	<ol style="list-style-type: none"> <li>Understand TSMO-related strategic direction from DOT plans noted above.</li> <li>Use ICE-Ops as a basis for determining tactical TSMO strategies and locations.</li> <li>Identify where District TSMO Plans need to carefully align with strategic and programmatic direction already established.</li> <li>With completed TSMO Plan in hand, work with the Traffic Operations Bureau and other District TSMO Representatives to outline and draft District-specific plans.</li> </ol>					
<b>How do we know if we are done?</b>						
<ul style="list-style-type: none"> <li>All Districts have a completed, reviewed, and approved Plan.</li> <li>District TSMO activity aligns with Plan.</li> </ul>						

**Business Processes BP4: Ensure adequate access to funding for TSMO projects through existing and/or new budget categories**

Associated Goals:		✓ Safety & Perf	Cust Service	Workforce	✓ Funding	✓ Innovation
<b>Benefits, Impacts, Outcomes</b>						
<ul style="list-style-type: none"> <li>Budgeting provides for more deliberate, transparent, and multi-year TSMO planning and programming.</li> <li>Allows predictable near term and District budget planning for TSMO deployment, operations, and maintenance.</li> </ul>						
<b>Lead Unit(s)</b> Executive Leadership Team Systems Operations Division	<b>Description</b>					
<b>Supporting Unit(s)</b> Program Mgmt AMIT Traffic Operations	<ul style="list-style-type: none"> <li>This action creates a separate line item category in state DOT annual and multiyear budget to allow for more flexibility and capability to plan TSMO beyond ad hoc add-ons or standalone projects.</li> <li>Budgeting information should be drawn from existing and current expenditures by category, source, and current commitments.</li> <li>Budget planning should be informed by DOT strategic direction, DOT's Business Plan, and the TSMO Program Plan.</li> <li>TSMO planning and development for studies, research, software development, etc.</li> </ul>					
<b>Implementation</b> FY24-25	<b>Critical Steps</b>					
<b>Resources Needed</b> Staff time	<ol style="list-style-type: none"> <li>Work with ELT to confirm top level support for pursuing this and follow their direction, and do so in coordination with closely related budgeting and programming actions (e.g., BP2, BP6).</li> <li>Estimate past, current, and forecast TSMO expenditures statewide and per District, encompassing design, implementation, operations, and maintenance.</li> <li>Identify current and future monetary sources for TSMO, by budget category.</li> <li>Audit current statute and administrative rules for changes needed to allow a new budget line items for TSMO.</li> <li>Coordinate with action BP2 as necessary for continued integration of TSMO with the 5-Year Highway Improvement Program.</li> </ol>					
<b>Dependencies</b> ELT support and legislative or administrative rule allowances						
<b>How do we know if we are done?</b>						
<ul style="list-style-type: none"> <li>Options are well understood, recommendations made, and changes underway.</li> <li>A new, separate TSMO line item budget category exists.</li> </ul>						



**Business Processes BP5: Streamline TSMO procurement processes**

Associated Goals:	Safety & Perf	Cust Service	Workforce	Funding	Innovation
		✓	✓		✓
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>This provides cost savings, clarity, risk reduction, and predictability for TSMO development processes.</li> <li>Allows for faster adaptation to evolving TSMO technology and DOT priorities.</li> </ul>					
<b>Lead Unit(s)</b> Procurement & Distribution Traffic Operations	<b>Description</b>				
<b>Supporting Unit(s)</b> Information Technology	<ul style="list-style-type: none"> <li>The procurement processes for TSMO warrant better definition, streamlining, and approaches.</li> <li>This includes the need to clarify technical specification roles of Traffic Operations and Procurement &amp; Distribution Bureaus and potentially several across the IT Division.</li> <li>Procurement options for Iowa DOT may exist but be unknown or underleveraged, e.g., via commodity bid, contractor or consultant, etc.</li> <li>Conventional procurement paths may be hindering adoption and proliferation of beneficial TSMO applications.</li> </ul>				
<b>Implementation</b> FY23-24	<b>Critical Steps</b>				
<b>Resources Needed</b> Staff time	<ol style="list-style-type: none"> <li>Convene a small working group and work to understand DOT's procurement process and range of options for TSMO and intelligent transportation systems (ITS).</li> <li>Define and document changes needed and options for streamlining TSMO / ITS procurement.</li> <li>Collaborate with DOT procurement staff on solving issues or barriers that have been identified.</li> <li>Make the agreed upon modifications or adaptations to make TSMO procurement better, and proceed with initial trial(s) procurement.</li> <li>If working well, standardize and formalize changes in procurement guidelines for statewide use.</li> </ol>				
<b>Dependencies</b> None					
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>Current procurement options for TSMO are understood and desired changes documented.</li> <li>New or streamlined TSMO procurement paths are utilized.</li> </ul>					

**Business Processes BP6: Establish innovative funding team**

Associated Goals:	Safety & Perf	Cust Service	Workforce	Funding	Innovation
				✓	✓
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>A dedicated team will most quickly drive DOT to new TSMO funding options.</li> <li>Innovative funding and resourcing for TSMO accelerates its adoption statewide.</li> </ul>					
<b>Lead Unit(s)</b> Traffic Operations	<b>Description</b>				
<b>Supporting Unit(s)</b> Strategic Communications Finance	<ul style="list-style-type: none"> <li>The DOT should establish a small but standing, dedicated, core team to evaluate and pursue innovative funding opportunities for TSMO.</li> <li>Just as TSMO innovation is continuously occurring, it is important to be more assertive and innovative in efforts to find or leverage other resources and funding.</li> <li>TSMO benefits are achieved more comprehensively through DOT moving beyond ad hoc resources to innovative and well-established long term funding.</li> </ul>				
<b>Implementation</b> FY22-23	<ul style="list-style-type: none"> <li>Funding is not limited to new deployments but must be part of ongoing operations, maintenance, staffing, and lifecycle replacements.</li> <li>The Innovative Funding Team is encouraged to work with FHWA, MPOs, private industry, universities, and any others to collaborate on TSMO resourcing.</li> </ul>				
<b>Resources Needed</b> Staff time	<b>Critical Steps</b>				
<b>Dependencies</b> Funding source rules	<ol style="list-style-type: none"> <li>Explore collaboration opportunities with other agencies (FHWA, MPOs, other regional jurisdictions) or third-party / private data or services.</li> <li>Coordinate with closely related budgeting and programming actions (e.g., BP2, BP4) on current and desired TSMO funding sources and structures.</li> <li>Innovative funding for TSMO should be considered as a topic for the inaugural Partner Forum (see action CU4).</li> <li>Pursue the new or innovative funding opportunities.</li> </ol>				
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>Dedicated team is formed, current TSMO funding is well understood, and innovative opportunities are identified.</li> <li>A new or innovative source of funding for TSMO in Iowa has been leveraged.</li> </ul>					



## Organization and Staffing

### Organization and Staffing Dimension Definition

Technically qualified staff and an organizational structure that unites TSMO activities into an integrated project delivery approach are key to supporting effective TSMO solutions. Through training, identifying TSMO responsibilities, and building relationships across teams, TSMO functions can be ingrained in an agency’s day-to-day work efforts.

Project, Service, or Activity	DOT Business Plan Goals					Lead	Support
	1. Safety & Perf.	2. Cust. Service	3. Workforce	4. Funding	5. Innovation		
OS1. Increase Direct Iowa DOT Staffing in TMC		●	●			Exec. Leadership Team	Traffic Ops. / Employee Services
OS2. Develop a TSMO Training Rotation Program			●		●	Employee Services	Traffic Ops.
OS3. Conduct Systems Ops Division Staffing Assessment			●			Systems Ops. Division	Employee Services / Traffic Ops. / Maintenance / MVE / Const. & Materials / Traffic & Safety
OS4. Enhance GIS Capabilities & Resources to Support Ops.			●		●	Org. Improvement (GIS)	GIS SMEs



**Organization & Staffing OS1: Increase direct Iowa DOT staffing in Traffic Management Center (TMC)**

Associated Goals:	Safety & Perf	Cust Service	Workforce	Funding	Innovation
		✓	✓		
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Reduces risk of discontinuity upon changes in contractors.</li> <li>More direct line of accountability and not subject to contract language.</li> </ul>					
<b>Lead Unit(s)</b> Executive Leadership Team	<b>Description</b>				
<b>Supporting Unit(s)</b> Traffic Operations Employee Services	<ul style="list-style-type: none"> <li>Iowa's Statewide Traffic Management Center (TMC), Highway Helper Service, and ITS Maintenance are essential and permanent function of the DOT.</li> <li>Since 2013, staff for 24/7 control room operations and these other services - including operators, shift supervisors, technicians, and drivers - have been funded and supplied via contractors and consultant support.</li> <li>While staffing via outside services is common, some agencies staff similar TSMO functions from within the organization.</li> <li>There are trade-offs either way, and this action is to evaluate approaches to DOT staffing for TSMO positions and develop recommendations for upper management.</li> </ul>				
<b>Implementation</b> FY25-26					
<b>Resources Needed</b> Position budgets, outside services policies, and staff time					
<b>Dependencies</b> Employee requirements or restrictions	<b>Critical Steps</b>				
	<ol style="list-style-type: none"> <li>Coordinate with CO4 action regarding outside services as well as related staff assessments underway in other Divisions.</li> <li>Scan peer state DOTs for current practice and recommendations for TMC, Service Patrol and ITS Maintenance staffing; leverage nationwide TMC Pooled Fund Studies and NOCoE guidance.</li> <li>Starting with certain positions or shifts, identify which position(s) should be converted to DOT first, and work to create the position description(s) and establish the position within the Traffic Operations Bureau or elsewhere as needed.</li> <li>Recruit and fill the position(s), working with current TMC contractor on the transition and training needs.</li> </ol>				
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>Converted position description complete and position created and funded.</li> <li>New DOT staff positions filled and transition from contractor to DOT completed.</li> </ul>					

**Organization & Staffing OS2: Develop a TSMO training rotation program**

Associated Goals:	Safety & Perf	Cust Service	Workforce	Funding	Innovation
			✓		✓
<b>Benefits, Impacts, Outcomes</b>					
<ul style="list-style-type: none"> <li>Widespread TSMO knowledge and experience leads to easier adoption throughout DOT programs.</li> <li>Better, holistic stewardship of Iowa's transportation system happens through operations training.</li> </ul>					
<b>Lead Unit(s)</b> Employee Services	<b>Description</b>				
<b>Supporting Unit(s)</b> Traffic Operations	<ul style="list-style-type: none"> <li>As Iowa DOT implements an engineering training rotation program, TSMO must be a core component of that. A small group will rotate instead of the whole program.</li> <li>Because TSMO spans modes and should be an integral part of the entire development and lifecycle process for transportation, all technical staff across the DOT should have better knowledge of TSMO.</li> <li>Operations and TSMO continue to grow as integral parts of being comprehensive stewards of Iowa's transportation system.</li> <li>Several prominent resources are available to help guide training if needed, e.g., USDOT's ITS Professional Capacity Building (PCB) products.</li> </ul>				
<b>Implementation</b> FY24					
<b>Resources Needed</b> Staff time					
<b>Dependencies</b> Director commitment	<b>Critical Steps</b>				
	<ol style="list-style-type: none"> <li>First, assess current status of DOT's engineering training rotation program, and if it is not yet implemented, advocate for it and position TSMO to be a pilot rotation.</li> <li>Define and document key TSMO training elements to be covered during a rotation program for participants.</li> <li>Refer to national and other training guidance, and coordinate with action CO2 (training and capacity building).</li> </ol>				
<b>How do we know if we are done?</b>					
<ul style="list-style-type: none"> <li>Training procedures and outcomes are documented for a DOT rotation program.</li> <li>TSMO rotation is core component of DOT's capacity building program.</li> </ul>					



**Organization & Staffing OS3: Conduct Systems Operations Division staffing assessment**

Associated Goals:		Safety & Perf	Cust Service	Workforce ✓	Funding	Innovation
<b>Benefits, Impacts, Outcomes</b>						
<ul style="list-style-type: none"> <li>A better equipped workforce is able to advance TSMO more broadly and in alignment with DOT strategic direction.</li> <li>Improved Division staff retention, recruitment, and development (and reduced cost of turnover).</li> </ul>						
<b>Lead Unit(s)</b> Systems Operations Division	<b>Description</b>					
<b>Supporting Unit(s)</b> Employee Services Traffic Operations Maintenance Motor Vehicle Enforcement Construction & Materials Traffic & Safety	<ul style="list-style-type: none"> <li>The Systems Operations Division continues to evolve and adapt to changing demands and new opportunities to leverage technology for system improvement.</li> <li>A Division staffing assessment through the TSMO lens will help identify gaps in functional units as well as gaps in TSMO-related knowledge, skills, and abilities (KSAs).</li> <li>Position descriptions will be reviewed across the Division to check for sufficient leadership capacity, technical support, and program support to advance TSMO.</li> <li>Reflecting on needed KSAs for TSMO will help identify current gaps among staff and capacity building opportunities (e.g., through action CO2).</li> </ul>					
<b>Implementation</b> FY23-24	<b>Critical Steps</b>					
<b>Resources Needed</b> Staff time, minor consultant support	<ol style="list-style-type: none"> <li>Collect all current position descriptions, check for TSMO-specific language, and identify gaps in functional units.</li> <li>Evaluate existing staff KSAs and identify gaps among staff (refer to NCHRP 20-07 / Task 408 and other NOCoE resources).</li> <li>For new or modified positions under consideration, include a salary survey for benchmarking.</li> <li>Develop a Systems Operations Division recruiting and succession strategy.</li> <li>Follow-up with training or capacity building opportunities for current staff working on TSMO.</li> </ol>					
<b>Dependencies</b> None						
<b>How do we know if we are done?</b>						
<ul style="list-style-type: none"> <li>Organization and staff KSA gaps are identified.</li> <li>A strategy for recruitment and capacity building is in place.</li> <li>As staff announce retirements, processes are in place to capture institutional knowledge.</li> </ul>						

**Organization & Staffing OS4: Enhance geographic information systems (GIS) capabilities and resources to support operations**

Associated Goals:		Safety & Perf	Cust Service	Workforce ✓	Funding	Innovation ✓
<b>Benefits, Impacts, Outcomes</b>						
<ul style="list-style-type: none"> <li>Better tools and analytics for monitoring, decision-making and allocation of scarce resources.</li> <li>Address GIS needs with an optimized combination of DOT staff, shared resources, and outside expertise.</li> </ul>						
<b>Lead Unit(s)</b> Organizational Improvement (GIS)	<b>Description</b>					
<b>Supporting Unit(s)</b> GIS subject matter experts	<ul style="list-style-type: none"> <li>GIS is a critical and increasing part of operations and TSMO analysis and planning.</li> <li>Deeper and more widespread GIS resources are needed to support existing needs so TSMO staff can improve efficiencies while utilizing available tools.</li> <li>Depending on specific GIS needs, additional expertise and resources may be provided through training, staffing, or other resources.</li> <li>Capacity building for spatial data management, analysis, and visualization can improve TSMO planning and targeting of scarce resources where safety or mobility can be improved the most.</li> <li>Recent organizational departures have left a void in needs to support Traffic Operations.</li> </ul>					
<b>Implementation</b> FY22-23	<b>Critical Steps</b>					
<b>Resources Needed</b> Staff time, possible dedicated or shared positions, funding for external resources	<ol style="list-style-type: none"> <li>Identify GIS resources currently available throughout DOT. Specifically assess the specific needs and resources within the Systems Operations Division.</li> <li>Review guidance for GIS use in TSMO and identify gaps to be filled.</li> <li>Check for points of coordination with recommendation CO2 "Enhance multi-disciplinary/multiagency TSMO training and capacity building."</li> <li>Consider the creation of a dedicated GIS Coordinator within the Systems Operations Division.</li> <li>Take steps to implement future recommendations such as creating positions, changing position descriptions, and/or contracting for additional services.</li> <li>Identify candidates for GIS expertise development and follow through with training (internal or external).</li> </ol>					
<b>Dependencies</b> None						
<b>How do we know if we are done?</b>						
<ul style="list-style-type: none"> <li>GIS expertise and resource gaps among the Systems Operations Division are identified.</li> <li>Opportunities for GIS positions and resources are targeted and undertaken by Division staff.</li> <li>All Systems Operations tools and resources that involve GIS are supported in a manner that does not rely on a single person or position for operations and maintenance.</li> </ul>						



## Schedule

A schedule has been developed by translating the sequencing of when the recommended projects, services and activities should occur.

TSMO Project, Service, or Activity	Implementation Year				
	FY22	FY23	FY24	FY25	FY26
<b>Collaboration</b>					
CO1. Integrate TSMO into MDST Meetings					
CO2. Multi-Discipline Training & Capacity Building					
CO3. Integrate TSMO Into MPO & RPA Plans					
CO4. Enhance Joint Traffic Ops Performance Agreements					
CO5. Enhance TSMO Communication with Local Orgs					
CO6. Establish TSMO Policy Stakeholder Group					
CO7. Develop and Maintain Open Contracts Clearinghouse					
<b>Culture</b>					
CU1. Add Access Management to TSMO Processes					
CU2. Add Maintenance Ops into TSMO Processes					
CU3. Share TSMO & ITS Benefits within/Beyond Iowa DOT					
CU4. Integrate TSMO into Existing Conferences/Meetings in Iowa					
<b>Systems &amp; Technology</b>					
ST1. Improve Traveler Info for Transit & Rideshare					
ST2. Connectivity/Interop. b/w State/Locally Managed Systems					
ST3. Establish ITS Configuration Control Board					
ST4. Establish Systems Engineering Guidelines & Repository					



TSMO Project, Service, or Activity	Implementation Year				
	FY22	FY23	FY24	FY25	FY26
ST5. Develop Approaches to Better Leverage Ops Data				█	█
ST6. Implement Integrated Corridor Management Concepts				█	█
ST7. Expand Statewide Video Sharing Strategy			█	█	
<b>Performance Measurement</b>					
PM1. Develop Ops-Oriented Resiliency Index	█	█			
PM2. Develop B/C Estimates for Key TSMO Applications		█	█		
PM3. Increase Frequency of Performance Reporting	█	█			
<b>Business Processes</b>					
BP1. Integrate TSMO into Iowa DOT Policies & Guidance	█	█	█	█	█
BP2. Integrate TSMO Deployment Planning & 5-Year TIP			█	█	
BP3. Develop District-Level TSMO Plans				█	█
BP4. Ensure Adequate Access to Funding for TSMO Projects through Existing/New Budget Categories			█	█	
BP5. Streamline TSMO Procurement Processes		█	█		
BP6. Establish Innovative Funding Team	█				
<b>Organization &amp; Staffing</b>					
OS1. Increase Direct Iowa DOT Staffing in TMC				█	█
OS2. Develop a TSMO Training Rotation Program			█		
OS3. Conduct System Ops Division Staffing Assessment		█	█		
OS4. Enhance GIS Training Capabilities/Resources to Support Ops	█	█			



# IOWA DOT TSMO PLAN UPDATE

May 2022

