



Transportation Management Center (TMC) Operator Performance

Traffic management systems (TMSs) enable agencies to monitor real-time conditions, share information with travelers and partners, manage operational strategies, and actively manage traffic conditions in realtime. TMSs vary significantly in the types of services provided, functions performed, geographic coverage of service areas, types of environments covered, and available resources or staff to manage traffic. Operators within the TMCs of the TMSs may be needed during peak travel periods only, for special events, or 24 h per day and 7 d per week all year. Assessing the performance of TMS operators is critical in that it helps to accomplish the following:

- Improve overall TMS performance.
- Enhance staff morale.
- Improve operational culture.
- Improve staff retention.
- Facilitate reviewing actual demand and performance against estimates (e.g., after-action assessment).
- Support improving workload estimates and needed positions.
- Facilitate optimal staff scheduling (e.g., reduce overtime) and support resources.
- Support identifying improvement opportunities.
- Support developing staff capabilities.

BENEFITS OF ASSESSING TMS OPERATOR PERFORMANCE

Developing and implementing a structured process for assessing the performance of TMS operators provides a range of opportunities to continually improve TMS performance, including the following:

- Building and maintaining support for TMS staff, resources, and improvements.
- Creating a baseline to compare TMS operators' current and future capabilities and performance.
- Providing a basis to prioritize improvements.
- Identifying opportunities to improve individual TMS operator capabilities, job satisfaction, contributions, and performance.
- Adjusting agency job classifications and position descriptions.
- Adjusting workload estimates, schedules, and staffing approaches.
- Facilitating performance reviews focused on open growth and sustained improvement.
- Identifying opportunities to improve TMS performance (e.g., policies and procedures).





Analytical methods and assessment tools are available that enable agencies to support TMC operator performance assessments. Figure 1 illustrates a six-step process for assessing operator performance. Critical steps in assessing TMS operators' performance are as follows:

- Step 1—Assess, prepare, and engage. The first step in assessing operator performance focuses on evaluating, preparing, and engaging stakeholders involved in assessment activities. Key steps in this activity are confirming TMS scope, performance objectives, and goals, and identifying TMS functions, services, and actions that should be considered.
- Step 2—Determine knowledge, skills, abilities, and needed positions. This step entails defining staff performance measures aligned with TMS operational performance measures.
- Step 3—Determine staffing needs. This process focuses on collecting data on current staffing demands and performance.
- Step 4—Develop staffing approach. This process focuses on finalizing job roles and classifications and determining whether to use contracted or in-house support.
- Step 5—Develop staff management strategies. This process focuses on establishing recruitment and staff retention approaches, as well as performance management goals.
- Step 6—Implement, monitor, and evaluate. The purpose of this last step in the process to estimate staffing needs is to develop and implement a comprehensive performance monitoring approach, implement reporting mechanisms, and incorporate monitoring results into day-to-day management.



FIGURE 1. Flowchart. Steps to assessing TMS operator performance.

Source: Federal Highway Administration (FHWA).

KSA = knowledge, skills, and abilities.

PERFORMANCE AND PRODUCTIVITY MONITORING APPROACHES

The three primary approaches for assessing TMS operator performance are as follows:

- Real-time oversight and monitoring—Supervisors' real-time reviews of active incidents are the first step in ensuring the accuracy and effectiveness of TMC services. With this approach, shift supervisors are typically responsible for monitoring whether actions taken by operators are timely and appropriate, and whether the information distributed from the TMC is professional, factual, clear, complete, and relevant to the operational conditions. An example of this monitoring could be reviewing changeable message sign (CMS) messages before the boards are activated and reviewing incident details as they are entered into the advanced TMS (ATMS) platform.
- Postshift reviews—This approach entails conducting short, focused meetings, typically with the supervisor and one or more TMC operators immediately after the shift. This review provides an opportunity to assess incidents while they are still fresh in the minds of all involved and to help identify what went right and what needs to be improved operationally, with a focus on improving future performance. This review may also help identify where operators may need additional training.
- Operator performance monitoring and reporting against targets—This approach is primarily facilitated by analyzing operator data entry and other activities using data derived from the ATMS platform, internal dashboard data, and reviews of voice and email communications going into and out of the TMC.



KEY OUTCOMES

- Standard operating procedures (SOP) and other operational support materials (e.g., stakeholder distribution and contact lists) updated.
- Needed enhancements to various TMS components identified.
- Training and operator development materials revised.
- Operator performance measures reassessed to:
 - Align with TMS operational performance measures.
 - Support TMS functions, actions, and services.

PERFORMANCE AND PRODUCTIVITY MEASURES

The effectiveness of a TMC operator should be considered in terms of both performance and productivity. Performance relates to how well operators execute their job duties and responsibilities. Productivity relates to the amount of work operators can complete in a given amount of time.

Performance Measures

Performance measures should relate to each function and subsystem of the TMS used during normal and emergency operational conditions. TMS operator performance measures should focus on the activation, update, and deactivation of each subsystem, given the operational conditions and events.

Example performance measures relating to CMS usage are provided in table 1.

EXAMPLE MEASURES RELATED TO CMS USAGE
Correct CMS activated?
Correct message posted?
Activated within a specified time?
Correct updates provided?
Correct default message activated?
Deactivated within specified time?
Correct maintenance ticket submitted?

TABLE 1. Example performance measures related to CMS usage.



Productivity Measures

In addition, defining productivity measures that are also key elements of TMC operator performance assessment is important as it helps to determine if operators are accomplishing the amount of work that is expected for their position. Productivity measures should meet the following criteria:

- Align with TMS operational performance measures.
- Support TMS functions, actions, and services.
- Support assessment of operators' ability to manage their time, tasks, and resources to maximize the effectiveness of the TMS.

Potential operator performance measures are provided in table 2.

POTENTIAL OPERATOR PRODUCTIVITY MEASURES
Number of CMS activations and updates per shift.
Number of 511 messages posted per shift.
Number of incidents entered in the TMS per shift.
Number of closed-circuit television movements per shift.
Number of internal notifications per shift.
Number of external notifications per shift.

TABLE 2. Potential TMS operator productivity measures.

Assessing productivity during critical situations (e.g., major weather events and incidents) and normal operations is also important as it helps to determine if operators are accomplishing the amount of work that is expected for their position.

KEY ISSUES TO CONSIDER FOR SUCCESSFUL TMS OPERATOR PERFORMANCE ASSESSMENTS

Several factors are important for developing and implementing a process for assessing TMS operator performance, including the following:

- Ensuring critical processes are included to improve overall performance of TMSs.
- Supporting performance-based contracts (when applicable).
- Focusing on developing staff capabilities.
- Measuring both operator performance and operator productivity.
- Supporting improving workload estimates and needed positions.
- Facilitating optimal staff scheduling (e.g., reducing overtime) and support resources.



CURRENT PRACTICES

The following subsections summarize current practices used by various agencies to measure TMC operator performance for both agency self-performed services and outsourced services.

Iowa Department of Transportation (DOT)—Statewide TMC¹

TMC operator performance in the Iowa DOT statewide TMC is measured primarily through a process that analyzes the following:

- Operator data entry and other activities using data derived from the TMS platform's internal dashboard data.
- Recordings of voice and email communications entering and leaving the TMC. Data elements captured from the TMS are measured against established SOPs and protocols, such as requirements for notifying operational partners (e.g., maintenance garages requesting snow and ice removal, or posting CMS messages in a timely manner).

Analysis scores and the operators' activity levels are then used to arrive at an established percentage that measures the operators' accuracy in the tasks they are required to perform. Each operator is expected to achieve a 97-percent or greater score.

Iowa DOT also uses a real-time component to operator performance assessment that is closely related to quality control (QC). TMC supervisors conduct real-time QC of work products, such as reviewing CMS messages before posting to the public or reviewing email messages before sending to operational partners.

New York State DOT (NYSDOT) | Region 8—Hudson Valley TMC (HVTMC)²

Operator performance at the HVTMC is assessed using a manual process where all major (level 1) and intermediate (level 2) incidents are reviewed during the shift immediately following the shift in which the incident occurred (i.e., shift supervisors working the second shift review incidents that occurred during the first shift).

Discrete, time-stamped incident summaries generated by the ATMS are compared to the traffic incident management response checklist to determine if the individual operator made any errors in working the given incident. Based on this assessment, if operators did not enter information correctly or in a timely manner, an email is generated that specifies what their errors were. In addition, operators are provided with a link to the specific SOP that provides guidance regarding the procedure for which the errors occurred. The operators are required to acknowledge that they have read and understand the SOP.

Florida DOT | District 6 SunGuide TMC³

Operator performance at the SunGuide TMC is measured primarily through a manual process facilitated by the QC manager. The QC manager is responsible for grading TMC operators through the assessment of discrete events that happen in the roadway network (e.g., crashes), entering TMC control room staff errors into the QC software, and running reports on control room staff performance on a monthly and annual basis in support of a performance-based contract. The QC software was developed by the vendor operating the SunGuide TMC and works in concert with the TMS platform. Examples of TMC functions on which operator performance focuses include the following, among others:

- Accurate and timely dispatch of resources.
- Timely validation and confirmation that an event has occurred.
- Correct CMS messages posted within a required time frame.
- Timely notification of operational partners.

¹Information obtained in an interview with Ashley Hochberger, Transportation Management Center and Highway Helper Program Manager, on September 25, 2023.

²Information obtained in an interview with Evan Rosen, NYSDOT, Region 8 HVTMC Operations Manager, on September 24, 2023.

³Information obtained in an interview with Javier Rodriguez, Director of Transportation Development, Florida DOT District 6; Yamilet Diaz, Transportation Systems Management and Operations Engineer, Florida DOT District 6; and Don Avery, Senior Manager, AECOM, on November 15, 2023.



Maryland DOT (MDOT) State Highway Administration (SHA) | Coordinated Highways Action Response Team⁴

MDOT SHA uses a manual analysis process after the incident to measure TMC operator performance. After-action reviews are conducted for events that receive media attention, events with known operational challenges, and/or events that are brought to the attention of the MDOT SHA Office of the Administrator. This process is not used to examine and adjust staffing levels.

MDOT SHA also has a formal process for monitoring the newly hired MDOT SHA operators' level of performance through progress conferences and identifying job deficiencies. The assessment review process is structured around the following two primary focus areas:

- General factors—Operators' dependability, initiative, work environment, interpersonal relationships, and work habits.
- Job-specific factors—Operators' job knowledge, job quality, and productivity.

This process helps identify general and job-specific areas requiring improvement and specific areas of deficiency. Through this process, target areas for improvement and action plans to identify them are outlined and communicated to the TMC operator.

Wisconsin DOT (WisDOT)

WisDOT implemented a TMS operator performance assessment process in 2016 that is structured to ensure quality, accuracy, consistency, and continuous improvement (Klein and Nauman 2025). Quality specialists and shift supervisors conduct performance assessments, providing real-time oversight and monitoring. They also analyze all incidents that include full closures of State roadways in either one or both travel directions. All operators are analyzed at least monthly. WisDOT's analysis process is spreadsheet based and uses data visualization tools.

Analysis results are documented and shared with WisDOT leadership during monthly meetings. Results are also shared with supervisors and operators to identify areas in which performance improvements are needed, as well as supplemental training needs. In addition, analysis results are used to support annual operator certifications and recertifications. Furthermore, results are used to identify gaps in existing SOPs and the need for new procedures.

⁴Information obtained in an interview with Rashad Rice, Division Chief, TMC Operations, Office of Transportation, Mobility, and Operations, MDOT SHA, on October 13, 2023.



AVAILABLE RESOURCES:

FHWA. 2024a. "TMC Pooled-Fund Study" (web page). <https://tmcdfs.ops.fhwa.dot.gov/>, last accessed March 27, 2025.

FHWA. 2024b. "Methods and Tools to Estimate Staffing Needs for Traffic Management Systems (TMSs)." Presentation. https://tmcdfs.ops.fhwa.dot.gov/pdfs/Task-2357_Presentation.pdf, last accessed March 27, 2025.

Klein, R., and S. Nauman. 2025. "Traffic Management Center (TMC) Operator Performance." Webinar from Traffic Management Center (TMC) Pooled-Fund Study. FHWA, Washington, DC, April 16, 2025.

FOR MORE INFORMATION ON OTHER TMC PRACTICES:

- NOCoE: National Operations Center of Excellence. <https://transportationops.org/>.





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