SCAN TEAM REPORT

NCHRP Project 20 68A, Scan 10 04

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE-MEASUREMENT DATA COLLECTION

Supported by the

National Cooperative Highway Research Program

Acknowledgments

Bruce E. Kenney III, PE, AASHTO Chair, West Virginia DOH

Teresa Krenning, Missouri DOT

John Nelson, Colorado DOT

Kevin D. Price, PE, Illinois DOT

Sgt. Michael Tagliaferri, Maryland State Police

Edward "Tiger" Harris, PE, PMP, Subject Matter Expert, Open Roads Consulting, Inc.

Disclaimer

The information in this document was taken directly from the submission of the authors. The opinions and conclusions expressed or implied are those of the scan team and are not necessarily those of the Transportation Research Board, the National Research Council, or the program sponsors. The document has not been edited by the Transportation Research Board.

Scan 10-04

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE-MEASUREMENT DATA COLLECTION

REQUESTED BY THE

American Association of State Highway and Transportation Officials

PREPARED BY

**Bruce E. Kenney III, PE,
AASHTO Chair**
West Virginia DOH

Teresa Krenning
Missouri DOT

John Nelson
Colorado DOT

Kevin D. Price, PE
Illinois DOT

Sgt. Michael Tagliaferri
Maryland State Police

**Edward "Tiger" Harris, PE, PMP,
Subject Matter Expert**
Open Roads Consulting, Inc.

SCAN MANAGEMENT

**Arora and Associates, P.C.
Lawrenceville, NJ**

September 2013

Table of Contents

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH
INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW
ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

1

List of Figures

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH
INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW
ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

3

List of Appendices

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

5

Abbreviations and Acronyms

AA-1

AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ATIS	Advanced Traveler Information System
ATMS	Advanced Traffic Management System (Wisconsin)
AVL	Automated Vehicle Location
BTO	Bureau of Traffic Operations (Wisconsin)
CAD	Computer-Aided Dispatch
CapWIN	Capital Wireless Information Net (Maryland)
CCTV	Closed Circuit Television
CDU	Central Dispatch Unit (New Jersey)
CHART	Coordinated Highways Response Team (Maryland)
CTP	Consolidated Transportation Program (Maryland)
DelDOT	Delaware Department of Transportation
DMS	Dynamic Message Sign
DOT	Department of Transportation
DVRPC	Delaware Valley Regional Planning Commission (New Jersey)
EMS	Emergency Medical Services
FHWA	Federal Highway Administration
Global JXDM	Global Justice XML Data Model
IDOT	Illinois Department of Transportation
IEEE	Institute of Electrical and Electronics Engineers
IM	Incident Management
IMOG	Incident Management Operations Group (New Jersey)
IREACH	Illinois Radio Emergency Assistance Channel

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH
INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW
ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

AA-1

IT	Information Technology
ITIP	Intelligent Transportation Infrastructure Program (FHWA)
ITS	Intelligent Transportation Systems
ISP	Illinois State Police
KOHS	Kentucky Office of Homeland Security
KYTC	Kentucky Transportation Cabinet
LE	Law Enforcement
LMIGA	Lake Michigan Interstate Gateway Alliance
MDTA	Maryland Transportation Authority
MDOT	Maryland Department of Transportation
MDSHA	State Highway Administration (Maryland)
MOU	Memorandum of Understanding (MOUs, Memoranda of Understanding)
MPO	Metropolitan Planning Organization
MSP	Maryland State Police
NCHRP	National Cooperative Highway Research Program
NCIC	National Crime Information Center
NCR	National Capital Region (Maryland)
NJDOT	New Jersey Department of Transportation
NJSP	New Jersey State Police
NJTA	New Jersey Turnpike Authority
NTCIP	National Transportation Communications for Intelligent Transportation System Protocol
O&M	Operations and Maintenance
ODOT	Oregon Department of Transportation
OSP	Oregon State Police
RFP	Request for Proposal
RITIS	Regional Integrated Transportation Information System (Maryland)
RTMS	Remote Traffic Microwave Sensor (Illinois)

SHSP	Strategic Highway Safety Plan (Federal Highway Administration)
SOC	Statewide Operations Center (Maryland)
SOP	Standard Operating Procedure
SSP	Safety Service Patrol (New Jersey)
STMC	Statewide Traffic Management Center (New Jersey)
STOC	State Traffic Operations Center (Wisconsin)
TIA	Traffic Incident Alert (Wisconsin)
TIM	Traffic Incident Management
TIME	Traffic Incident Management Enhancement (Wisconsin)
TIMS	Traffic and Incident Management System (Illinois)
TMC	Traffic Management Center
TOC	Traffic Operations Center
TOPS Lab	Traffic Operations and Safety Laboratory (Wisconsin)
TSM	Transportation Systems Management (New Jersey)
TTID (FHWA)	Transportation Technology Innovation and Demonstration Program
UMD	University of Maryland
UW	University of Wisconsin
WisDOT	Wisconsin Department of Transportation
WSDOT	Washington State Department of Transportation
WSP	Washington State Patrol, Wisconsin State Patrol

Executive Summary

Traffic incident management (TIM) depends fundamentally on effective communication among responsible personnel (e.g., in incident reporting, response dispatch, and traffic management). Experience gained from each incident provides opportunities to improve agencies' TIM performance. Both communication and learning from experience are being enhanced by new technology and management practices, such as computer-aided dispatch (CAD), inter-jurisdictional harmonization of agency communication procedures (e.g., standardization of terminology and adoption of common radio frequencies), and channels for communicating with travelers and collecting data on traffic performance.

This scan focused on examining the TIM practices in regions that have enhanced TIM performance through integrated communication between traffic management centers (TMCs) and law enforcement (LE) and effective performance-measurement data collection. The scan team selected and subsequently interviewed scan participants to learn about their best practices and the important features of those practices in each region. The team placed additional focus on collecting the lessons learned and insights gained through the participants' adoption of their particular practices, with particular regard for adoption of CAD and related technologies. The scan explicitly considered the perspectives of transportation, LE, and other incident-response agencies.

The scan team was particularly interested in having discussions with state departments of transportation (DOTs) and other agencies that perform traditional traffic operations, specifically related to TIM, in collaboration with LE or emergency management and their respective CAD technologies. Furthermore, of those entities that have developed processes and procedures for collaboration, the team wanted to learn what performance measures they regularly monitor and track to ensure that their program is delivering the desired results. Additionally, the team searched for those entities that perform the above-mentioned collaboration in a collocated facility or TMC.

The team's general topics of interest included:

- Specialized technologies being used for existing and new projects and programs associated with TMC operations

- Standards, guidance, and best practices for developing and fostering collaboration and data sharing between TIM operations and LE personnel

- Criteria for measuring the effectiveness and/or performance of the various strategies in use at TMCs

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

ES-1

The scan team collected data for consideration in developing a fully functional, inter-jurisdictional, multiagency operations center, with a focus on data sharing and operational efficiencies between TIM and LE. This information is being used to assist the American Association of State Highway Officials (AASHO) and the Federal Highway Administration (FHWA) in developing best practices and technologies to maximize the realized collaboration benefits between TIM and LE personnel at TMCs.

Based on the desk scan of agencies and their current practices in the areas of interest, the scan team developed an extensive list of amplifying questions to further examine what each agency believed was most instrumental to their program's success. This additional information and further discussions with each agency enabled the scan team to hone the list of agencies of interest even further. A number of factors beyond simply collocation of different entities or successful data integrations enabled the scan team to identify the following agencies for further investigation and on-site fact-finding meetings:

- New Jersey DOT (NJDOT)

- Delaware DOT (DelDOT)

- Maryland State Highway Administration (MDSHA)

- FHWA

- Illinois State Toll Highway Authority (Tollway)

- Kentucky Transportation Cabinet (KYTC)

- Wisconsin DOT (WisDOT)

- Oregon DOT (ODOT)

- Washington State DOT (WSDOT)

  - Vancouver

  - Olympia

  - Tacoma

The entire scan team visited the host agencies over two weeks. The data and information that were collected ultimately lead to the findings and recommendations that are included in this report.

The scan team thoroughly reviewed the information supplied by each agency during the tour, collated the individual team members' notes, and identified a handful of key strategies of interest. The team determined a subset of consistent practices and/or objectives that have proven beneficial to the TIM and LE stakeholders and assembled a series of recommended best practices that could be adapted to a vast array of scenarios and TMC configurations. The scan team believes that by adopting some of these practices or simply understanding their underlying objectives, members of

the TIM and LE community can create and foster a more efficient, productive, and collaborative means of managing traffic incidents and improving the user experience for all.

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

ES-3

1.0 Background

Scan Tour Objectives

Traffic incident management (TIM) depends fundamentally on effective communication among responsible personnel (e.g., in incident reporting, response dispatch, and traffic management). Experience gained from each incident provides opportunities to improve agencies' TIM performance. Both communication and learning from experience are being enhanced by new technology and management practices, such as computer-aided dispatch (CAD), inter-jurisdictional harmonization of agency communication procedures (e.g., standardization of terminology and adoption of common radio frequencies), channels for communicating with travelers, and collecting data on traffic performance.

This scan was initiated to examine the TIM practices in regions that have enhanced TIM performance through integrated communication between traffic management centers (TMCs) and law enforcement (LE) and effective performance-measurement data collection.

Scan Approach

The scan team selected and subsequently interviewed scan participants to learn about their best practices and the important features of those practices in each region. The team placed additional focus on collecting lessons learned and insights gained through the participants' adoption of their particular practices, with particular regard for adoption of CAD and related technologies. The scan explicitly considered the perspectives of transportation, LE, and other incident-response agencies.

The scan tour focused on identifying agencies that have not only taken on the task of integrating their operations efforts, but have also made efforts to integrate CAD systems and promote data sharing between the groups. Surprisingly, and for various reasons, many agencies have not taken the next step, which is integrating data between the groups. In fact, it appears that collocating the agencies typically provides a belief that integration at the data and system level is no longer necessary. The scan team identified the need to pay close attention to this belief and make an effort to understand and capture any practices that these agencies have used to understand this philosophy better.

The team further narrowed the scan's focus to look at what were believed to be the core issues facing U.S. transportation management centers (TMCs) today:

- Incident reporting/detection

- Incident response/dispatch

- Incident clearance

- Traffic management

- Performance measurement

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

1-1

Once the scan team finalized these focus areas, it then examined each element to determine what practices existed in the industry that made certain agencies more effective than others—specific practices that capitalized on personal communications, automated communications, and integrated technologies.

TIM Common Goals

At its core, TIM is one of the most visible and important elements of traffic management. Because TIM has a direct and measurable impact on every element of everyday life, TIM programs that operate at maximum efficiency offer the public countless direct and indirect benefits. The following list captures just some of the known benefits of TIM:

- Improved incident detection and response

- Reduced incident clearance times

- Reduced congestion

- Reduced emissions and, thus, improved air quality

- Reduced fuel usage and, thus, improved natural resource preservation

- Reduced secondary crashes and, in turn, reduced injuries and deaths

- Improved efficiency of roadway infrastructure

- Improved customer (i.e., the traveling public) satisfaction

TIM Best Practices

It was clear from the outset, and from the team members' general experience, that there is a common set of objectives in the TIM community. The Federal Highway Administration (FHWA) publishes a widely accepted standard set of strategies or objectives set forth by the National Unified Goal for TIM[1]. These strategies are:

- Responder safety

- Safe, quick clearance

- Prompt, reliable incident communications

Ultimately, this scan does not focus explicitly on the National Unified Goal strategies. However, any practice in use within the industry that encourages improvement of an agency's performance in those key areas were of interest to the team and should be captured and shared for the betterment of TIM everywhere.

---

[1] A National Unified Goal for Traffic Incident Management (TIM): What is it and why is it needed?, ITS PCB T3 Webinar, National Traffic Incident Management Coalition, September 11, 2008, http://www.pcb.its.dot.gov/t3/s080911/corbin.pdf

Coordination Between TIM and LE

The scan team was also tasked with finding industry examples of practices that have been implemented and used to tighten the coordination between TIM and LE. More specifically, the team was to look for tools and techniques currently in use that could be easily adapted to other similar agencies. By strengthening the coordination between these entities, it was widely believed that the overall performance of both of their programs ultimately would be improved.

On closer inspection, it became clear that coordination was simply scratching the surface between these groups. In fact, above all else, successful communication and sharing of information provided the most benefit to each. While these findings were not far from what was expected, what was most interesting was the means that the various successful agencies were using to achieve them.

Scan Team

The scan team was made up of a sampling of representatives from a variety of backgrounds. The team included members of the public sector, ranging from professionals overseeing entire intelligent transportation systems (ITS) programs on a statewide scale and individuals who oversee statewide ITS, Traffic, Signing, and Engineering Divisions, to individuals who bridge the gap between Engineering and TIM Operations programs. The scan team also included a member of the LE industry who serves as the liaison between the state highway patrol and a state highway administration that oversees TIM objectives statewide. The scan team also included private sector individuals ranging from technologists who have focused on advanced traffic management and advanced traveler information systems (ATIS) and other technologies that improve the collaboration and communications between TIM and LE agencies, to investigative professionals who guided the scan team through an intricate and proven process to provide the results within this report.

Contact and biographical information for scan team members is provided in Appendix A and Appendix B, respectively. These individuals can help your agency or organization share the team's findings with your stakeholders. Contact any of the team's members if you or your agency would like additional information or presenters for a particular purpose.

The scan team comprised the following individuals:

- Bruce E. Kenney III, PE, AASHTO Chair, West Virginia Division of Highways, ITS Coordinator/Systems Management Engineer

- Teresa Krenning, Missouri DOT, Traffic Operations Engineer

- John Nelson, Colorado DOT, ITS Operations Program Manager

- Kevin D. Price, PE, Illinois DOT, ITS Operations Engineer

- Sgt. Michael Tagliaferri, Maryland State Police, State Highway Administration Liaison

- Tiger Harris, PE, PMP, Subject Matter Expert, Open Roads Consulting, Inc., Director of Business Services

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

1-3

Scan Tour Participants

The scan team performed an exhaustive search of agencies to identify potential participants in the more detailed investigative phase(s). The team followed a proven process to evaluate various agencies, technologies, and industry practices to determine the areas the team would evaluate further (see Data Collection).

A scan includes several stages, including:

- The preliminary desk scan

- The exploratory phase, which includes further questioning of potential candidates

- On-site visits where the chosen agencies host the team to provide an up-close look at what each believe is key to their programs' success

Rather than focus on all of the agencies that were involved or included in all phases of the research, the scan team's findings and resulting recommendations are predominantly based on findings from the agencies that hosted the on-site visits. The team is grateful for the willingness of these agencies to open their doors, share information, and allow the team an open-ended opportunity to ask questions and tour each facility. These agencies, known as the scan tour participants, were:

- Delaware DOT[2] (DelDOT)

- Federal Highway Administration[3] (FHWA)

- Illinois State Toll Highway Authority[4] (Tollway)

- Kentucky Transportation Cabinet[5] (KYTC)

- Maryland State Highway Administration[6] (MDSHA)

- New Jersey DOT[7] (NJDOT)

- Oregon DOT[8] (ODOT)

- Washington State DOT[9] (WSDOT)

- Wisconsin DOT[10] (WisDOT)

---

[2]   Delaware Department of Transportation, http://www.deldot.gov/
[3]   Federal Highway Administration, http://www.fhwa.dot.gov/
[4]   Illinois Tollway, http://www.illinoistollway.com/homepage
[5]   Kentucky Transportation Cabinet, http://transportation.ky.gov/Pages/default.aspx
[6]   Maryland State Highway Administration, http://sha.md.gov/Home.aspx
[7]   New Jersey Department of Transportation, http://www.state.nj.us/transportation/
[8]   Oregon Department of Transportation, http://www.oregon.gov/odot/Pages/index.aspx
[9]   Washington State Department of Transportation, http://www.wsdot.wa.gov/
[10] Wisconsin Department of Transportation, http://www.dot.wisconsin.gov/

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH
INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW
ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

1-5

2.0 Data Collection

This section defines the specific processes and procedures that the scan team followed to gather the necessary data to develop the scan tour results. The team built its process for determining the most appropriate agencies on the successful efforts of past scan teams. Future scan teams will likely follow in this team's footsteps and continue the evolution of these successful data collection and evaluation processes to ensure that the scan program continues to evolve and maintain its high level of efficiency.

Desk Scan

The scan team first focused on identifying host agencies or participants to share details and specifics about their successful programs with the team. The process started with the subject matter expert performing a detailed desk scan. This scan entailed conducting preliminary research and gathering general information from a set of agencies and contacts with existing professional relationships with one or more members of the scan team.

The desk scan helped identify the most appropriate TMCs for the team to visit. Following that, questions that amplified the general topics of interest were sent to the host TMC operations managers/supervisors.

The desk scan resulted in a summarization of the findings captured through e mail communications, telephone and in-person interviews, and website and Internet searches. General discussions and interviews were directed toward targeted information regarding the overall view of integrations of TIM and LE efforts at the TMC traffic operations levels. Additional investigation was performed to identify locations that have invested time and/or resources in CAD integration efforts.

In general and as expected, across the board every agency contacted and every industry expert consulted sees great value in close coordination between traffic operations and LE. Unfortunately, each of them has experienced difficulty putting the desired coordination into practice. Many obstacles appear to face agencies when they set out to integrate TIM and LE. Fortunately, many positives can be realized.

The following is a collection of information gathered throughout the desk scan. In most cases, the most common responses were identified and then used to help develop the preliminary amplifying questions. The team used this information during the organization meeting to finalize the amplifying questions.

- **Levels of integration**
  The team found that a broad range of integration levels has already been implemented. Findings indicate that some agencies have taken integration as far as they care to. As alluded to previously, surprisingly few agencies have taken the extra step of integrating their systems in addition to their operations.

■ **Organizational benefits**
It is widely believed that integrating TIM and LE offers major organizational benefits and can have a positive impact on the way agencies do business and set goals. There was at least one opinion that agencies could benefit just as much through other means; however, no specific examples were offered.

■ **Lack of industry consideration**
There is a general belief within agencies that most of their colleagues have not given enough consideration to integrating TIM and LE.

■ **Lack of leadership buy in**
Many believe that senior leadership simply has not bought into the idea of integrating TIM and LE.

■ **Technologically difficult**
Many believe that integrating the disparate systems is just too technically challenging to attempt. The team believed that the scan tour would help dispel this most common myth. It is clear, however, that following solid systems engineering practices is critical.

■ **Better coordination and response**
As expected, the greatest benefits from integrating TIM and LE have been better coordination and response to emergent situations, major traffic events/crashes, and planned events.

■ **CAD integration: the challenging next step**
Clearly, information sharing has been successful; however, the next step, integration, is a difficult one for agencies to take. Nearly all of those interviewed share video between groups, and most share communications, facilities, and training objectives. It is clear they need help identifying and showing the benefits of CAD integration to senior leadership and understanding the cost of the various available options.

Background Questions

Upon completion of the desk scan, the team had a robust list of potential agencies that had documented some form of collaborative practices that were deemed worthy of a closer look. The scan team developed a series of background questions to help it narrow the list of agencies and refine the scope of information pertaining to those practices that appeared to be most instrumental to those agencies. The agencies' responses to these questions are provided in Appendix C.

At this stage of the scan process, the scan team was interested in identifying appropriate agencies for this scan based on their answers to the following questions:

■ Does the agency have a process or program in place that it believed would be considered interesting and useful to the TIM/LE industry?

■ How is the agency structured?

- What is the scope of the agency's TIM and LE efforts?

- What level of integration does the agency have in place or has it attempted to put in place?

- How do the agency's operations support those integrations and/or collaboration between TIM and LE?

It was clear to the team that the background questions would be an introductory line of questioning that would serve multiple purposes.

- **Which agencies would even take the time to respond to the questions?**
  If an agency did not have the resources or capability to answer this entry level of questions, then it likely did not have the available bandwidth or level of information readily available that could be of the highest value to the scan team.

- **What similarities exist among agencies that appeared to have successful collaboration?**
  The scan team would look for commonalities in agency structures to determine if certain organizational strategies stood out as potential catalysts and deserved additional investigation. The team would also focus on common integrations or technologies in the responses to identify those that might have higher value or return on investment to implement.

- **What helped or hindered agencies in their efforts to implement specific strategies?**
  There was a common preliminary belief that using technology would improve the successful integration of TIM and LE. Furthermore, there was a common perception that funding might be the largest hindrance in agencies implementing their desired strategies.

Amplifying Questions

The scan team collected the agency responses to the background questions and condensed the list of potential agencies. The team then approached this new, more-targeted group of agencies with another set of questions, which included a much more detailed and investigative line of inquiry. The answers to these amplifying questions (see Appendix D) were used as the basis of a likely follow-up on-site visit. It was the scan team's intention to visit and engage with each of the agencies that was asked to respond to the amplifying questions; however, not every agency was able to commit the necessary resources to either answer the questions or commit to the possibility of an on-site visit.

The amplifying questions were effectively a continuation of the background questions. Each agency had already expressed an interest in the scan team's work and had demonstrated some level of integration and/or coordination that would prove useful to the scan tour's research. The amplifying questions were an extensive series of questions, some of which were time-consuming to answer. The scan team could not have been as efficient as it was without the considerable effort put in by the potential participating agencies. Their answers to this second set of questions enabled the scan

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

2-3

team to conduct a more directed and targeted visit at each of the host agencies, allowing those involved to spend more time focusing on the issues, items, and initiatives that were valuable to each particular host agency.

The amplifying questions focused on the following target/key areas:

- Technical Issues

  - **General:** Provide details of the successful integration or incorporation of technologies or processes the agency had implemented

  - **Institutional Issues:** Identify any barriers and/or champions that had a substantial influence on the effectiveness of the agency's efforts/initiatives

  - **Implementation Issues:** Identify the means by which the agencies were able to implement their various strategies, including the effectiveness, or lack thereof, of each

  - **Operational Issues:** Identify the various obstacles that made the implementation(s) difficult, and/or any processes that proved to be beneficial and contributed greatly to the success of the agency's program

- **Performance Measures:** Detail the objectives and, specifically, the performance measures that became important for the successful monitoring and justification of the agency's program

- **Resources:** Detail the resources (including financial) necessary and crucial to implementing the agency's various strategies and/or initiatives

- **Emerging Technologies:** Detail any technologies that were identified and subsequently used or not used to make the agency's program as effective as possible

A common theme throughout the amplifying questions was the underlying principle that not everything attempted would prove beneficial. To that end, the scan team was just as focused on initiatives that agencies used and abandoned as it was on those initiatives that are still in place today.

The other objective of the amplifying questions was not only to investigate what was or was not working efficiently, but also to determine what the ideal process was to initiate/implement those things that were proving beneficial to each agency's program. The reason for this objective was so that other agencies can take the scan team's findings and ultimately put new, proven practices in place to improve their own programs.

Preliminary Findings

The scan team selected the tour's host agencies based on the results of the desk scan and the information collected via both the background and amplifying questions. The team used the collected information to investigate further the key topics while on site at each of the selected agencies.

The scan team's focus was to identify agencies that have not only taken on the task of integrating their operations efforts, but also have made efforts to integrate CAD systems and promote data sharing between the groups. Surprisingly, and for various reasons, many agencies have not taken the next step of integrating data between the groups. In fact, it appears that collocating the agencies typically creates the belief that integration at the data and system level is no longer necessary. The scan team identified the need to pay close attention to this belief and make an effort to understand and capture any practices that these agencies have used to understand this philosophy better.

The team further narrowed the scan's focus to look at what were believed to be the core issues currently facing U.S. TMCs:

- Incident reporting/detection

- Incident response/dispatch

- Incident clearance

- Traffic management

- Performance measurement

Once the scan team finalized these focus areas, its next step was to focus further on each element to determine what existing industry practices made certain agencies more effective than others. Furthermore, the team sought to identify specific practices those agencies used that capitalized on manual communications, automated communications, and technology integration—practices that could be used for the betterment of other agencies.

The following are the highlights of the information the scan team gathered before it launched the on-site visit phase of the scan tour:

- There is no single solution (i.e., there is no 100% completely right or wrong answer).

- Integration is beneficial, but it is unclear to what level.

- Departments/agencies do not necessarily have upper management support.

- A common myth is that technical challenges are insurmountable. (This myth was dispelled as the tour progressed.)

- Integrations, to-date, have largely produced improved results.

- Sharing information is difficult, but typically cost-effective.

- A widespread belief is that that collocation is good enough.

3.0   Scan Tour

The culmination of all the preparatory work and data collection was the actual on-site visits with the various agency hosts to look at these programs first-hand. Coordinating the various agencies and the individual scan team members was no small task. Arora and Associates, P.C., served as the principal investigators on the scan team and handled identifying and scheduling the on-site visits with the host agencies.

The information collected at the various on-site visits proved to be invaluable. Between building relationships with the host agency members who were actually performing the work to actually seeing the programs each of them had built, the experience was phenomenal. Appendix E provides information on the scan tour itinerary and lists the various agencies that were represented at each of the participant locations.

One commonality of each participating agency is that each is understandably and justifiably proud of the programs it has put in place. Moreover, each expressed a desire to continue improving on what it has already built. Each scan tour participant dedicated a substantial amount of time and resources to this endeavor, and the scan team is indebted to each host agency for its informative and invaluable efforts. For additional information or for clarification of the information from an agency, contact information for each agency is provided in Appendix F.

4.0 Key Findings

The scan tour's on-site visits resulted in a number of detailed findings that build on and, in most cases, complement the initial findings. The scan team was able to take a much closer look at the host agencies' specific initiatives and objectives. The information collected from these agencies is the heart of the scan tour and is what ultimately lead to the scan team's recommendations.

This chapter presents the scan team's detailed findings. This frank and detailed information is a direct result of the on-site visits and is what ultimately lead to the scan team's final recommendations. The items described throughout this chapter were repeatedly highlighted as being critical to the success of the host agencies' programs.

Relationships and Trust

One of the scan team's most common findings is that personal and professional relationships across agencies are critical. Program leaders repeatedly referred to a specific relationship they had built over the years with another agency representative. In some cases, that relationship directly resulted in individuals leaving one agency and leading up new initiatives within the TIM agency. This ultimately led to a successful launch of the KYTC's TIM Program[11], for example.

Trust was another element that continued to be evident among the various scan participants. The agencies must not only know and understand the roles of each of the other agencies involved, it is vital that they can rely on the other agencies and believe in their ability to fulfill their obligations. Chapter 5.0 describes ways that agencies have been able to foster the necessary trust in their relationships.

Another encouraging finding regarding relationships and trust is that not only do they strengthen over time, but they can also be built if they do not already exist. One caution: relationships and trust require constant nurturing, and they should never be taken for granted. Most programs that appeared successful but had somehow faltered, lost funding, or suffered some similar fate most likely experienced a failure in one of the critical relationships.

Total Buy-In

Another key element of a successful program is total buy-in across the different agencies and throughout the agency's different levels. First, each successful program must have buy-in from the owning agency's management. To be sure, funding is critical. Just as critical as pure financial funding, however, is the commitment of the resources necessary to keep the program running smoothly and without excess time limitations so that it can mature sufficiently.

---

[11]   Incident Management, Kentucky Transportation Cabinet, http://transportation.ky.gov/Incident-Management/Pages/default.aspx

In addition to a program having the necessary funding, it is imperative that it have the support of the other agencies involved. Furthermore, having the necessary physical resources at the facilities or TMCs is equally important, even if it is not the most crucial element. The program must have both the initial and continued commitment of those necessary resources—human and otherwise—to be truly as successful as it can be.

Financial commitments and funding are not the only important form of buy-in. Each agency and, more specifically, each of the involved members of those agencies (i.e., the "boots on the street") need to understand and buy in to the program's objectives and to the corresponding role(s) of their particular agency.

Federal Support

FHWA support, both initially and throughout the life of the program, is crucial. While most of the programs the scan team encountered did not receive all the funding they desired and/or felt they absolutely needed, they all relied on a federal commitment to initiate their efforts. Using federal resources and supporting federal initiatives (e.g., National Unified Goal for TIM) enables most programs to obtain at least some level of financial support. By further embracing the use of performance measures (see Performance Measures), many of the programs the scan team encountered enjoy ample FHWA support.

In addition to financial support, agencies have a host of FHWA-funded studies and research project results to call on to help build a successful program. FHWA has invested considerable resources and finances over decades to build a repository of information and industry lessons learned for just this purpose. Using those previous FHWA investments has repeatedly proven a valuable tactic for creating a successful TIM program and with corresponding integration with LE.

Technology

Technology is a valuable tool for encouraging and/or reinforcing collaboration between TIM and LE. It is obvious that for a program to be successful and efficient, it must rely on an entire toolbox of elements. Technology has proven an effective, affordable means to initiate the collaboration necessary between TIM and LE. However, technology alone is not a panacea.

One of the most encouraging features of useful technology is that it is largely transferrable between similar and, in some cases, disparate programs. Even if programs do not share identical objectives, technologies can often be repurposed or translated to new or different uses.

Technology has been most useful in collecting disparate sets of data from stakeholders who would otherwise be unable to participate fully in a given program's TIM/LE collaboration. Real-time CAD or 911 data has been integrated successfully in many instances. Sharing data between stakeholders has been shown to make existing programs more successful and put new programs on a fast track to eventual success.

Technology simply makes agency collaboration and integration easier; however, it does not replace the need for all the other elements that are vital to a successful program. In fact, technology has

repeatedly been a successful catalyst for programs that do not have the relationships necessary for the programs' success.

Performance Measures

The only true way of measuring a program's success is by identifying those criteria that are most important to the agency meeting its objectives. More precisely, the agency must identify the facets of the program that need to be accurately captured and regularly measured to ensure that the objectives are being met as efficiently as possible. To this end, performance measures and their accuracy are of vital importance to a successful program.

Performance measures and, more specifically, the introduction of their use into a program have proven to be a catalyst for improvements, regardless of how they are actually used. In fact, the scan team learned that the simple act of implementing performance measures immediately made some of the scan participants' programs more successful. As described in Chapter 5.0, a set of performance measures that has proven useful to successful programs can be implemented in other programs with little effort.

One of the most interesting aspects of using performance measures within a program is that they can be regularly fine-tuned and improved. When used efficiently, performance measures are evolutionary and become more focused as the program matures. Over time, each agency will identify additional parameters and elements it finds crucial to its program's success. The ability to monitor those parameters and understand how the program maximizes the effect of those parameters are at the heart of using performance measures successfully.

Planning Organizations

Metropolitan Planning Organizations (MPOs) have an important role in many successful programs. At many of the on-site visits, the MPO associated with that particular scan participant was an active member of the program. The scan team noted that the more involved a given MPO was in the overall program, the greater the likelihood that the program would be successful. Many programs also enjoy healthy funding opportunities by maximizing the involvement of their respective MPOs. More specifically, those agencies that relied on their MPO the most, enjoyed a more cohesive collaboration between their TIM and LE operations.

Sustainability

Sustainability is an entity's or program's ability to last. Ultimately, a program's longevity is analogous to its sustainability. Planning is critical for the long-term success of an efficient program. Chapter 5.0 provides details on strategies that agencies can implement to ensure maximized program sustainability.

Sustainability is more than simply being able to continue funding your program. Funding is obviously a necessity; however, having in place processes and resources that promote longevity is nearly as important. For a program to succeed, it needs to overcome obstacles and forces that seem to be working against it. Regardless of what stands in the way and what techniques are used to

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

4-3

combat these obstacles, your agency's program needs to be sustainable.

Regardless of how successful an agency is at implementing and starting its program, if that agency does not plan for success, it will not achieve it. Planning for success encompasses infinitely more than simply rolling out a new program or implementing a new technology. Successful programs are defined just as much by their ability to endure as they are for their effectiveness. Regardless of its scope or comprehensiveness, a program will succeed if an agency has a clear, actionable plan for maintaining it.

5.0 Recommendations

The scan tour's on-site visits resulted in a number of detailed findings that build on and, in most cases, complement the initial findings. The scan team was able to take a much closer look at the specific initiatives and objectives of the host agencies. The information collected from those agencies is the heart of the scan tour and is what lead to the team's recommendations.

This section presents some of the scan team's detailed findings. The detailed, frank information shared during the team's on-site visits is the source of the team's final recommendations. The following topics were repeatedly highlighted as being critical to the success of the host agencies' programs.

Champions

One common hallmark of every successful program the scan team studied was that each had champions. Many programs succeed with only a single champion. However, the more champions a program can identify, foster, and maintain, the more likelihood of success. To be successful, the agency needs champions who have more than simply a passing interest in the program or are more than just resources assigned to the program. A champion must have an emotional and/or personal interest in the program's success.

As early as possible in the TIM program's evolution, the agency must identify and nurture champions who will take a serious interest in the agency's objectives and eventual success. The host agencies that proved the most successful were those that could easily identify an individual or small group that was instrumental in getting the program up and running. Furthermore, those same individuals were usually responsible for seeing the programs through the obstacles that undoubtedly cropped up over the years.

Champions come in all shapes and sizes. In fact, they are not always in the agency. The search for champions should extend beyond the agency itself. Pay close attention to other agencies and stakeholders that will benefit from the improved IM performance that will result from your agency's successful program.

Collaboration

Successful programs always comprise multiple agencies. The sooner an agency understands the benefits of collaboration, the more likely the program is to succeed. A successful program will certainly have collaboration between TIM and LE. In fact, that collaboration takes many forms, none of which is necessarily right or wrong. Other collaborations have proven to be substantially beneficial as well.

Agencies have used some highly successful elements to further enhance the collaboration between TIM and LE. Collaboration starts with simple communication. The agencies and stakeholders must communicate via traditional methods, and automate communication as much as possible with the help of technology.

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

5-1

However, many successful programs have enjoyed greatly improved performance and collaboration between TIM and LE by implementing a safety service patrol or highway assistance program. Bridging the gap between the TIM that predominantly happens at the TMC and the efforts of the first responders and LE (the "boots on the street"), all agencies have benefited greatly.

Many of the host agencies the scan team visited have additionally identified other agencies beyond LE that help make their programs more successful. Many programs have enjoyed greater success by engaging and encouraging improved participation and collaboration with towing agencies and local towing organizations.

Figure 1 – *Emergency Patrol Vehicle, Maryland State Highway Administration*

Figure 2 - *Mobile Transportation Management Center, Delaware Department of Transportation*

Figure 3 - *Emergency Patrol Vehicle, Delaware Department of Transportation*

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

5-3

Figure 4 - *Emergency Response Unit, Delaware Department of Transportation*

Business Objectives

One of the scan team's surprising findings was that even successful programs sometimes lacked focus. As a result, many programs take time and nurturing to turn into a success. A common theme found among the host agencies was that, to be truly successful, an agency must define precisely what it is that it is trying to accomplish. All too often agencies find that they have started a new initiative based on completely founded and worthwhile needs, only to later realize that they had never fully understood the problems they were trying to rectify.

The various stakeholders associated with your program must be engaged early in the process, and each must be pushed to identify the particular business objectives they hope to achieve. Until the full breadth of the program's objectives are collected and openly evaluated, the program will never succeed at its full potential. Continue to challenge all those involved to repeatedly review and evaluate the program's business objectives. Last, work collectively to identify any performance measures or other means that will allow the agency to transparently gauge the program's effectiveness and how well it meets the intended business objectives.

Strategic Highway Safety Plan

As the definition and maintenance of the agency's business objectives matures, additional benefits will, it is hoped, be achieved where it matters most: on the roadway and to the travelling public. Ultimately, any TIM program should focus on providing a safer environment for the agency's customers: the highway users. To ensure maximum benefit to the end users, the agency should include TIM as part of the Strategic Highway Safety Plan[12] (SHSP).

Obviously, inclusion in the SHSP will undoubtedly bring additional scrutiny and awareness into the efficiency and/or performance of the agency's program. In many cases, a program becomes more successful simply because of this added attention. Unfortunately, many agencies will forego this practice specifically because of that added attention. Steps like this one will indicate whether a program is truly built on principles that will allow it to enjoy long-term success and stability or whether it is built simply for the sake of building a program. An agency should never lose sight of the program's ultimate goals: safer roads that result in fewer incidents and the drive toward zero deaths.

Early Collaboration and Coordination

All too often, initiatives are not undertaken until a major incident or catalyst forces those initiatives into place. Understandably, unpredictable circumstances or unlikely outcomes will always necessitate action. The point is, an agency has more flexibility and likelihood of meeting its business objectives if it develops its program before an event or catastrophe forces its hand.

An unfortunate and common practice is to have only the resources and political fortitude to institute policies and/or programs because of a highly visible and public event. When events such as these happen, capitalize on the added attention the agency is undoubtedly going to get, and do not rush to implement a program without following as many of the recommendations in this chapter as possible. If the agency is able to initiate a program before a public event forces it, be sure to spend the necessary time to make sure there are no barriers to collaboration and coordination between the various stakeholders and agencies.

Another common misstep some programs make is to fail to successfully identify the business objectives for the program's desired results, only to later realize that there is no mechanism or means of effective collaboration and coordination among the various stakeholders and agencies. Focus equally on the business objectives that will allow for maximized efficiency of the collaboration and coordination that is necessary for the program to be successful. Most importantly, focus on identifying and implementing any necessary strategies before outside influences force your hand.

---

[12]   Strategic Highway Safety Plan, Federal Highway Administration, http://safety.fhwa.dot.gov/hsip/shsp/

Performance Measures

As previously mentioned, the only true way of measuring the program's success is by identifying meaningful performance measures that help the agency monitor and maintain maximized efficiency. As described earlier, the National Unified Goal for TIM is a beneficial starting point for any agency and TIM program to measure their performance. However, as programs across the country mature and evolve, additional performance measures are being used to challenge agencies to become more and more efficient.

Many of the most meaningful performance measures are associated with reducing the incident timeline, as defined by FHWA. The incident timeline identifies the entire life cycle of an incident from the time of occurrence, through the various stages of incident response, and ultimately in the full restoration of full service to the roadway. Historically the occurrence time has been difficult to ascertain in any automated fashion, since in most cases the incident was identified by real-time monitoring of traffic conditions or via human detection and reporting.

After its occurrence, the next—and in most regards, most important—stage of an incident is its detection. Regardless of the mechanisms used, most efforts have focused on the portions of the incident timeline that occur after the actual incident detection, as that indicates the earliest time an agency could be made aware of the incident. Programs have been able to more efficiently use performance measures by focusing on just those incident stages over which an agency and its stakeholders have influence.

The scan team paid close attention to the various host agencies to capture additional performance measures that the TIM industry could easily use. Some of the more interesting performance measures the team collected are presented in the following sections.

Incident Detection

As previously mentioned, the incident timeline officially starts when the incident occurs. However, TIM activities, and therefore the agency's performance in meeting its objectives, cannot realistically begin until the incident is detected. While detection may imply that an incident was somehow automatically identified, it also encompasses the more likely scenario of an incident being reported by an end user or member of the traveling public.

The following performance measures have proven beneficial in improving the speed and accuracy of incident detection.

- If available, what was the time between the incident's occurrence and the TMC being made aware of the incident?

- What is the agency's incident-detection goal time?

- How often did the agency meet its incident detection goals?

- Of the total incidents, what percentage was detected within the goal time frame?

- In your program, what are the most accurate and/or reliable means of detecting incidents?

Roadway Clearance

Roadway clearance, the first stage in the agency's actual response to an incident, is effectively the time from when an incident occurs to when the roadway is restored to full capacity. "Full capacity" means that there is no physical barrier to the traffic flow and the expected level of service on a particular roadway.

Roadway clearance requires collaboration and shared responsibility by multiple agencies to be truly successful. As any agency can attest, simply having TMC Operations marching toward a common goal is not sufficient if the other associated agencies do not share in part of that goal.

The following performance measures have been used successfully to promote improved Roadway Clearance objectives.

- How rapidly were notifications sent out?

- How quickly did those notified respond?

- Were additional notifications required to clear the roadway?

- How quickly was the roadway cleared?

- Did any agencies hinder the roadway clearance? How? Why?

Incident Clearance

For agencies that already have a successful TIM program, it should not come as a shock that incident response does not end when the roadway is reopened. Many studies have unequivocally proven that the remaining wreckage and on-scene responders will continue to disrupt traffic flow. In other words, just because the road network is officially back at full capacity, its level of service is still unrestored.

Incident clearance time is a valuable indicator of when traffic is truly capable of returning to normal. For that reason, many agencies have adopted some combination of performance measures directly associated with incident clearance times.

Agencies attempt to gather and analyze the following data relating to incident clearance times.

- How long did it take to clear the affected/involved vehicles?

- How long did it take to clear the scene completely?

- How many agencies/responders were still on the scene?

- What actions contributed to a faster or slower incident clearance time?

Secondary Crashes

Secondary crashes are incidents that occur as a direct result of the effects of an originating incident. It is widely believed that reducing secondary crashes holds the largest potential for

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

5-7

making a meaningful improvement in overall safety of the traveling public. Interestingly, the scan team encountered some agencies that were not yet convinced that secondary crashes were in fact more deadly and therefore more urgently in need of focus. Regardless, the widely held belief in the industry supports the position that reducing the quantity of secondary crashes will directly reduce the number of highway deaths.

The single biggest factor in reducing the likelihood of a secondary crash is the reduction of the overall incident timeline. Conversely, the single biggest obstacle to measuring how effective an agency's program is at reducing secondary crashes is being able to accurately identify incidents that are, in fact, secondary or directly attributable to the effects of another incident. This obstacle sometimes makes agencies doubt the accuracy of their secondary crash data and eventually abandon the performance measures associated with them.

The scan team strongly encourages that agencies focus on reducing secondary crashes. If an agency is having difficulty keeping accurate information on secondary crashes or understanding the importance of this information, it should use whatever means necessary to keep it in the forefront of its TIM objectives. It should also engage its local FHWA representative to stay apprised of any federally provided means of capturing such data with more efficiency.

Nearly every performance measure statistic has a direct or indirect effect on the number of secondary crashes. As a result, only two performance measures are specific to secondary crashes.

- How many of the managed incidents are considered secondary?

- How many of the secondary crashes included serious and/or fatal injuries?

Timely Dissemination of Information

One of the most common themes the scan team heard when discussing performance measures revolved around timely dissemination of accurate and real-time information. Some of the specific performance measures and/or objectives pertaining to this include the following.

- Did the agency have the accurate real-time information?

- How quickly was the real-time information disseminated?

- What devices and other means did the agency use to disseminate the information?

- In hindsight, precisely how accurate was the real-time information?

- How can information become more accurate?

- How can the agency push the real-time information to more end users?

Program Sustainability

Processes

The success of any program is ultimately limited by the agency's ability to sustain the program

for the long term. One common theme the scan team found as a key to prolonged success was the definition and monitoring of processes specifically focused on the program's sustainability. Those processes must focus on defining an objective or series of objectives that clearly identifies what the agency hopes to accomplish throughout the program's life. Keep in mind that the identified objectives include both operational and technical items. In other words, the agency must focus both on the elements that drive operations actions and those associated with integrating new technologies and new data sources, for example.

Stakeholders

The roles and responsibilities of every stakeholder must be clearly identified and maintained. Every stakeholder should be held accountable to meet the program expectations of their corresponding agency. To uphold and/or maintain that accountability, it is crucial to clearly define the expectations of every member. Equally important is a regularly scheduled measure and update of those expectations.

Because it is unlikely that each stakeholder's expectations and commitment to the program will remain constant, the program must have provisions for regularly adjusting and re-evaluating those expectations throughout the program's life. Most successful programs re-evaluate their stakeholder roles and responsibilities definitions biannually, at a minimum. Some programs review and modify their expectations even more frequently than that, which has proven valuable to the success of those particular programs.

Memoranda of Understanding

Another element of successful programs that is married to the stakeholder expectation definitions, is clearly defined and maintained Memoranda of Understanding (MOUs) between the various agencies. Within each MOU, each agency is able to more succinctly define what it hopes to achieve by participating in the program, along with what it expects of each of the other participants.

It is extremely important to identify early in the creation of the agency's program the other entities that have a direct correlation with the agency's ability to meet its performance measures. Any agency that has an activity or responsibility that affects the incident timeline or the resulting value of any performance measure requires an MOU.

Many agencies have had some success proceeding with an unwritten MOU; however, be forewarned. These agreements are only as good as the personnel involved in the agreements themselves. It is highly recommended that the agency commit to writing any MOU elements that are critical for the program's sustainability. While not always practical, agencies would greatly benefit by capturing every MOU element in a formal document. Many of the scan hosts have been successful at creating and maintaining MOUs with various agencies. Refer to the contact information in Appendix F to request samples of these MOUs.

One other trait of a successful program is the ability and willingness to share information and learn from others. Take advantage of the available resources and be willing to ask for help or guidance from those who have come before you.

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

5-9

6.0 Implementation Strategy

T he scan team developed the following list of potential target audiences for distribution of the scan's results. It also developed a PowerPoint presentation with a detailed script for the scan team members can use for presentations and workshops.

The team developed this report for distribution by NCHRP, AASHTO, FHWA, and other agencies with similar audiences. The following list is not meant to be exhaustive, but rather to serve as a starting point for sharing the team's findings.

The team fully expects that the presentation and/or report documentation will be supplemented over time to encompass any emerging developments and/or technologies put in place that move the scan tour's goals forward.

- Webinars
  - National Cooperative Highway Research Program (NCHRP)
  - American Association of State Highway and Transportation Officials (AASHTO)
  - Transportation Research Board
  - Intelligent Transportation Society of America[13] (ITSA)
- Conferences
  - AASHTO Special Committee on Transportation Security and Emergency Management[14]
- Transportation Research Board (e.g., workshops and committees)
  - Potential Committees
  - AHB00: Section – Operations
  - AHB10: Regional Transportation Systems Management & Operations[15]
  - AHB15: Intelligent Transportation Systems[16]
  - AHB20: Freeway Operations[17]
  - AHD10: Maintenance and Operations Management[18]

---

[13] Intelligent Transportation Society of America Member Services Coordinator
[14] AASHTO Special Committee on Transportation Security and Emergency Management
[15] Transportation Research Board AHB10: Regional Transportation Systems Management & Operations
[16] Transportation Research Board AHB15: Intelligent Transportation Systems
[17] Transportation Research Board AHB 20: Freeway Operations
[18] Transportation Research Board AHB 10: Maintenance and Operations Management

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

6-1

- TSA (e.g., national, regional, and state)

- Institute of Transportation Engineers[19] (i.e., international, state, and district) annual meeting

- IM workshops (i.e., state-level DOTs)

- Highway safety conferences (states: Wisconsin[20])

- I-95 Corridor Coalition[21], I-81 Corridor Coalition[22] I-94 West Corridor Coalition[23,] Northwest Passage[24]

- Highway Operations Group

- LE (e.g., State Police, local police, and fire departments)

- Emergency Numbers Board[25]

- Local and Tribal Technical Assistance Program[26] (i.e., state level)

- Safety councils (i.e., universities)

- Publications

  - AASHTO Bookstore[27]

  - TR News[28]

  - ITS Resources[29]

  - Institute of Transportation Engineers Article Library[30]

  - Better Roads[31]

  - Engineering News-Record[32]

  - Roads & Bridges[33]

  - Transportation Research Record[34]

  - International Association of Chiefs of Police[35]

---

[19] Institute of Transportation Engineers, http://www.ite.org/
[20] 2013 Governor's Conference on Highway Safety (materials), Safety & Consumer Protection, Wisconsin DOT, http://www.dot.wisconsin.gov/safety/govconf/index.htm
[21] I-95 Corridor Coalition, http://www.i95coalition.org/i95/Default.aspx
[22] I-81 Corridor Coalition, http://www.i-81coalition.org/
[23] Green Light 94, I-94 West Corridor Coalition, http://greenlight94.com/
[24] Northwest Passage, http://www.nwpassage.info/
[25] Emergency Numbers Systems Board, Department of Public Safety & Correctional Services, http://www.dpscs.state.md.us/agencies/ensb.shtml
[26] Local and Tribal Technical Assistance Program, http://www.ltap.org/
[27] AASHTO Bookstore, https://bookstore.transportation.org/
[28] TR News, Transportation Research Board, http://www.trb.org/Publications/PubsTRNewsMagazine.aspx
[29] ITS Resources, ITS America, http://www.itsa.org/knowledgecenter
[30] ITE Article Library, Institute of Transportation Engineers, http://www.ite.org/itejournal/index.asp
[31] Better Roads, http://www.ite.org/itejournal/index.asp
[32] ENR (Engineering News-Record), http://enr.construction.com/infrastructure/transportation/
[33] Roads & Bridges, http://www.roadsbridges.com/
[34] Transportation Research Record: Journal of the Transportation Research Board, http://www.trb.org/Publications/PubsTRRJournalPrint.aspx
[35] International Association of Chiefs of Police, http://www.theiacp.org/

Scan Team Contact Information

Bruce E. Kenney III, PE – AASHTO Chair
ITS Coordinator/Systems Management Engineer
Building 5, Room 550
1900 Kanawha Boulevard East
Charleston, WV 25305-0430
Phone: (304) 558-9449
Fax: (304) 558-1209
E-mail: bruce.e.kenney@wv.gov

Teresa A. Krenning
Traffic Operations Engineer
Missouri Department of Transportation
PO Box 270
Jefferson City, MO 65102
Phone: (314) 275-1534
Fax: (314) 340-4509
E-mail: teresa.krenning@modot.mo.gov

John V. Nelson
ITS Operations Program Manager
Colorado Department of Transportation
425 C Corporate Circle
Golden, CO 80401
Phone: (303) 512-5838
E mail: john.nelson@dot.state.co.us

Kevin D. Price, PE
ITS Operations Engineer
Illinois Department of Transportation
Central Bureau of Operations
2300 Dirksen Parkway
Springfield, IL 62764-0001
Phone: (847) 705-4380
Fax: (847) 705-4356
E-mail: kevin.price@illinois.gov

Sgt. Michael Tagliaferri
Maryland State Police
State Highway Administration Liaison
7491 Connelley Drive
Hanover, MD 21076
Phone: (410) 582-5616
Fax: (410) 582-9880
E-mail: mtagliaferri@sha.state.md.us
           mtagliaferri@mdsp.org

Edward "Tiger" Harris, PE, PMP – Subject Matter Expert
Director of Business Services
Open Roads Consulting, Inc.
600 Perry Creek Drive, #2B
Chapel Hill, NC 27514
Phone: (757) 546-3401
E-mail: tiger.harris@openroadsconsulting.com

Scan Team Biographical Sketches

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH
INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW
ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

B-1

BRUCE E. KENNEY (AASHTO CHAIR) is the State ITS Coordinator and Systems Management Engineer for the West Virginia Division of Highways. He is responsible for all aspects of ITS, signal and lighting systems, statewide pavement markings, and the West Virginia Tourist-Oriented Directional Signs Program/Kentucky Logos programs statewide. Kenney authored West Virginia's original ITS concept of operations and initiated the state's ITS program in 2008. He has been responsible for design and operations of the statewide Transportation Management Center (TMC), along with its satellite systems within the West Virginia's Parkway Authority, as well as the disaster relief/academic training satellite at the Rahall Transportation Institute, which is affiliated with Marshall University. Kenney has made inroads in expanding West Virginia's ITS program to include the integration of the state's Division of Homeland Security and the State Fusion Center. Current programs under his lead include integration with approximately 25 county 911 centers, and a future statewide CAD integration with the state police. He holds a bachelor's and master's degrees in civil engineering from the University of Kentucky and West Virginia University, respectively. His professional affiliations include membership in AASHTO's Special Committee on Transportation Security and Emergency Management, Subcommittee on Systems Operation and Management, and the Subcommittee on Traffic Engineering's NTPEP.

TERESA A. KRENNING is a member of Missouri DOT's (MoDOT's) St. Louis District Traffic Management Team as the Traffic Operations Engineer. In her leadership role, she is responsible for the application of traffic engineering principles and management practices to the state highway system as they relate to traffic signing, signals, and striping, as well as highway safety engineering. Krenning began her career with MoDOT in 1990 as a traffic studies engineer. She worked from 1996 until late 2011 on Intelligent Transportation Systems, Incident Management, and TMC operations, where she served as the first MoDOT manager of the Gateway Guide program and Transportation Management Center. Krenning recently returned to management and oversight of traffic engineering in MoDOT. Krenning graduated from the University of Missouri – Rolla (now known as Missouri University of Science and Technology) with a bachelor's degree in civil engineering. She is a licensed professional engineer in Missouri. She is also a member of ITS America and ITS Heartland.

JOHN V. NELSON is the Operation Program Manager for the Colorado DOT. His current responsibilities include the Colorado Transportation Management System; system integration activities for the Colorado Transportation Management Center; ITS Research and Development; Commercial Vehicle Operations; and Planning and Development for ITS activities. Nelson came to the Colorado DOT in 1992 from the private sector to assist in the development of the automated Port of Entry at Trinidad, Colorado, and development of the Traffic Management Center. Nelson has 20 years of experiences in industrial engineering, system analysis, system design, software development, database administration, project management, computer operation-center management and customer service.

KEVIN D. PRICE is the Intelligent Transportation Systems (ITS) Operations Engineer for the Illinois DOT (IDOT). In this role, he coordinates and collaborates with the nine district offices on

statewide technical and policy direction for ITS operations. He also has been providing oversight on fiber optic utility permits along state-maintained highways, especially as it relates to the Broadband Technology Opportunities Program. He serves as an Illinois director on the board of ITS Midwest, a chapter of ITS America. In a previous role with IDOT, Price managed the maintenance of the two-radio and Highway Advisory Radio (HAR) systems in the six northeast counties of Illinois. Before joining IDOT in 2001, he was a software engineer for a telecommunications company, developing two-way radio dispatch consoles. Price is an electrical engineering graduate of Michigan Technological University and is a licensed professional engineer in Illinois.

FIRST SERGEANT MICHAEL TAGLIAFERRI is the Maryland State Police Liaison to the State Highway Administration's Coordinated Highways Action Response Team (CHART). He has been a trooper for the past 14 years and is currently a Field Operations Bureau staff member funded by and permanently assigned to SHA. In this role he manages the state police activities at the Statewide Operations Center and TIM response out in the field. He coordinates all mutual activities between the two agencies and ensures effective lines of communication are maintained to improve operations. He was a subject matter expert and member of the Maryland Statewide CAD/RMS Procurement Selection Team and continues to assist in the project's implementation phase. Tagliaferri has also provided direction to both agencies during recent discussions to integrate the statewide CAD/RMS and CHART's Advanced Traffic Management System. He holds a bachelor's degree from the University of Connecticut and is a graduate of the University of Maryland Operations Academy Senior Management Program. He is a member of The Traffic Incident Management for the Baltimore Region (TIMBR) Committee, the I-95 Corridor Coalition, the Maryland Quality Initiative (MDQI) Committee, and is a CHART board member.

EDWARD "TIGER" HARRIS, PE, PMP (SUBJECT MATTER EXPERT) is the Director of Business Services for Open Roads Consulting, Inc., in Chesapeake, VA. Harris is responsible for overseeing the Corporate Project Management Office (PMO) from his office in North Carolina. In addition to managing the business services and business delivery functions, he also oversees the company's strategic pursuits and serves as principal-in-charge and senior project manager on various engagements. Harris has nearly 20 years of experience managing advanced traffic management systems and advanced traveler information systems programs in the Intelligent Transportation industry. Many of his past projects focus on technology and successful collaboration between traffic operations and LE agencies. Harris serves as the state chapter representative for the board of directors of the Virginia Chapter of the Intelligent Transportation Society of America (ITSA). Harris received his bachelor's degree in electrical engineering from the Massachusetts Institute of Technology (MIT). He is a registered project management professional (PMP) and a registered professional engineer in North Carolina and in 25 other states.

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

B-3

Background Questions

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

C-1

This appendix comprises host agency answers to the background questions the scan team sent them in preparation for the scan tour. Each question is followed by a compilation of answers from each state in alphabetical order. When an agency did not answer a question, that agency's state is not listed in the compilation.

Provide a brief overview of your organization.

New Jersey   Transportation Systems Management (TSM) is currently composed of the Division of Traffic Operations, which includes:

- A 24/7 Statewide TMC (Woodbridge, NJ)

- A 16/5 Traffic Operations Center (TOC) (Cherry Hill, NJ)

- A 24/7 Central Dispatch Unit (CDU) in Hamilton, NJ

- The statewide Safety Service Patrol (SSP), which operates out of two SSP Yards in Cherry Hill (South Jersey) and Harding (North Jersey)

- The statewide IM Program

TSM also includes the Bureau of Mobility and Systems Engineering, which provides engineering services and technical support and maintenance for Intelligent Transportation Systems (ITS) initiatives, vehicular mobility during construction, signalized corridors, and ATIS deployment and management. The Bureau of Mobility and Systems Engineering is also responsible for overseeing:

- The design of ITS equipment/operations

- ITS contracts and agreements

- The Advanced Traffic Signal Systems, including optimization and adaptive signal systems

- The ATIS such as the 511 telephone system and public webpage that provides real-time travel information for motorists

- Review of constructability of capital and maintenance projects from a mobility perspective

- Managing travel time systems

The Bureau of Mobility and Systems Engineering is also responsible for the repair and maintenance of ITS equipment statewide and the implementation of mobility management strategies to review and approve all planned lane closure requests associated with statewide construction and maintenance projects so that traffic delays are kept to a minimum.

The overall mission of TSM is to keep traffic safely moving by quickly clearing

incidents and providing real-time traffic information by using the latest transportation technology.

The Organization, Structure, and Responsibilities for Your Agency's Traffic Operations

Staffing

Does your agency provide staffing or do you have contracted staff?

Delaware State employees

Illinois Agency employees staff the TOC.

Kentucky State employees staff our Operations Center.

Maryland The Maryland State Highway Administration (MDSHA) provides both permanent and contracted staff for the operations activities of the Coordinated Highways Response Team (CHART).

New Jersey New Jersey DOT provides staffing.

Oregon Agency provides.

Washington All our staffing is with agency employees.

Wisconsin The Wisconsin Traffic Operations and Safety Laboratory[36] (TOPS Lab) has a combination of academic full-time staff, post-docs, graduate research assistants, and student hourly positions. The director is a faculty member in the University of Wisconsin (UW), Madison, Department of Civil and Environmental Engineering. The TOPS Lab program managers are full-time academic staff. Some projects include contractors and other subaward mechanisms; however, TOPS Lab Information Technology (IT) staff develops and operates the TIM systems in-house.

How large is your operational staff?

Delaware 19

Illinois Five technicians and TOC manager

Kentucky 11 operators, 1 supervisor

Maryland The Office of CHART & ITS Development has 59 permanent/full-time and 15 contracted employees.

---

[36] Wisconsin Traffic Operations and Safety Laboratory, Department of Environmental and Civil Engineering, University of Wisconsin–Madison, http://www.topslab.wisc.edu/

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

C-3

New Jersey
- TOCs: 23 (North and South)

- CDU: 23 (One 24/7 center statewide)

- SSP: 70 (North and South)

- IM Response Team: 3 full time (14 others have different primary functions but will respond to an incident when needed

- New Jersey State Police (NJSP): 7 (1 lieutenant, 6 sergeant first class)

Total Operations staff is approximately 130, which does not include NJDOT's Maintenance forces.

Oregon   6 managers/supervisors and approximately 40 dispatchers

Washington   Approximately 40 statewide

Wisconsin   TOPS Lab IT staff operates the TIM systems; this consists of the IT program manager, one systems developer, and graduate assistant support. TOPS Lab coordinates with four to five key staff members at the WisDOT State Traffic Operations Center[37] (STOC), who are responsible for TIM control room operations. TOPS Lab also coordinates with key staff at the respective public safety agencies that are connected to the TIM systems. The STOC control room is staffed with 1 manager, 3 shift supervisors, and 7 operators, all of whom are contracted staff.

What are the operational hours of your center?

Delaware   24/7

Illinois   Monday through Friday: 5:00 a.m. to 8:00 p.m., and selected holiday and weekend coverage as scheduled.

Kentucky   24/7

Maryland   The CHART program's Statewide Operations Center (SOC), located in Hanover is the hub for all operations activities and is operational 24/7. However, safety patrols are conducted 16 hours/day, 5 days/week.

New Jersey
- 24/7: Traffic Operations North/Statewide Traffic Management Center (STMC- Woodbridge) collocated with the New Jersey Turnpike Authority (NJTA) and the NJSP

---

[37]   State Traffic Operations Center, Travel Information, Wisconsin Department of Transportation, http://www.dot.wisconsin.gov/travel/stoc/

- 16/5: Traffic Operations South, Cherry Hill

- 4:00 a.m.–8:30 p.m. (weekdays) and 10:00 a.m. – 8:30 p.m. (weekends and some holidays): SSP

Oregon   24/7/365

Washington
- 24/7/365: six centers

- 24/7: one center

- Weekends and as needed: one center

Wisconsin   The WisDOT STOC is a 24/7/365 call center for TIM. TOPS Lab follows regular business hours.

How many shifts? How many staff members per shift?

Delaware   Three shifts, staff number varies; normal TMC operational shift is two TMC technicians and a TMC supervisor.

Illinois
- Two shifts with typically two technicians per shift (5:00 a.m. to 1:00 p.m. and noon to 8:00 p.m.)

- One technician works 7:00 a.m. to 3:00 p.m. to cover breaks, etc.

- Supervisory coverage is normally 7:00 a.m. to 3:00 p.m., but it varies.

Kentucky   3 shifts; normally two to three staff members per shift

Maryland   As mentioned above, SHA's operations are managed by the SOC 24/7/365, but safety patrols are conducted for 16 hours per day, 5 days/week. The 24/7 SOC operation is divided into three eight-hour shifts per day with three to five employees per shift. A typical shift will include an operations manager, highway operations technician supervisor, and three highway operations technicians.

Emergency response technicians are assigned to strategically located TOCs across the state conduct safety patrols using two eight-hour shifts between 5:00 a.m. and 9:00 p.m. (16 hours), Monday to Friday only. SOC conducts operations between 9:00 p.m. and 5:00 a.m. or during weekend hours; selected ERTs are on-call during these times.

These numbers are often affected by highway/weather conditions, incidents, emergencies, and special events, as well as the time of the year.

New Jersey   24/7 STMC: five shifts (regular shift normally consists of one supervisor and one to three engineering techs, with some overlap)

16/5 TOC South (Cherry Hill): two shifts (regular shift normally consists of one supervisor and two engineering techs)

CDU: five shifts (regular shift normally consists of one communications supervisor and three communications operators, with some overlap)

SSP: two daily shifts (one regional supervisor, one overall crew supervisor, two shift supervisors, and seven to 13 operators per shift)

Oregon   We have four TOCs, and they typically each run three shifts per day. They try to run a minimum of two people per shift per center; however, there are periods when only one person is working.

Washington   Staff ranges from one to four depending on the center and the time of day.

Wisconsin   The WisDOT STOC has three shifts, 6:00 a.m.–2:00 p.m., 2:00 p.m.–10:00 p.m., and 10:00 p.m.–6:00 a.m.

- Tuesday through Thursday: two operators and one supervisor per shift

- Monday and Friday: one operator and one supervisor per shift

- Saturday and Sunday: one operator per shift

In addition, an additional operator works a swing shift from 8:30 a.m.–4:30 p.m. Monday through Friday.

Scope

How is your agency structured (e.g., districts, divisions, regions)? Please provide details.

Delaware   Divisions

Illinois   The Illinois State Toll Highway Authority is formally a commission under the governor's office. It is quasi-independent agency and not part of the Illinois DOT. The Illinois State Toll Highway Authority (Tollway) has full responsibility over four segments of interstate highway in northern Illinois (i.e., I-294/94, I-88, I-90, and I-355). The agency's Traffic Operations is a system-wide function within the Maintenance and Traffic division, which is one of five divisions within the Engineering department. Eleven maintenance sections cover the four corridors that comprise the Tollway system at present.

Kentucky   The KYTC has a central office that is divided into offices, departments, and divisions. Statewide, 12 districts each have their own departments and divisions within that multicounty district, with each county having its own maintenance

barn and crew, in addition to the main district office.

Maryland   The MD SHA is composed of offices and districts, with different divisions. A high-level list of these offices is provided below.

- Office of the Administrator
- Deputy Administrator for Administration Office
- Deputy Administrator/Chief Engineer for Planning, Engineering, Real Estate and Environment's Office
- Deputy Administrator/Chief Engineer for Operations Office
- Office of Administration
- Office of Audits
- Office of CHART & ITS Development
- Office of Communication
- Office of Construction
- Office of Environmental Design
- Office of Equal Opportunity
- Office of Finance
- Office of Highway Development
- Office of the Intercounty Connector
- Office of Information Technology
- Office of Planning and Preliminary Engineering
- Office of Policy and Research
- Office of Procurement and Contracts
- Office of Real Estate
- Office of Structures
- Office of Traffic and Safety
- Office of Maintenance
- Office of Materials and Technology
- State Roads Commission

■ Districts 1–7

The agency's highway operations, however, are managed by CHART's operations staff assigned to the SOC, located at the MD SHA's Hanover complex. As previously mentioned, the SOC is supported by TOCs strategically placed across the state to effectively perform incident/emergency management and response statewide.

New Jersey   NJDOT is composed of senior level management (commissioner, deputy commissioner, chief of staff, and seven major units headed by assistant commissioners and/or executive directors). From there, each unit is broken down into divisions and bureaus. NJDOT's Capital Program Management and Operations areas are broken into three regions or districts—north, central, and south—while TSM (formerly Statewide Traffic Operations) is broken down into two regions or districts (north and south).

Oregon   We have five regions, which are divided into 14 districts; within those districts are multiple crews.

Washington   We have six geographic regions that operate with semi-autonomy. Each region has a TMC that operates 24/7/365. One region has an additional winter operations TMC covering key Cascade mountain passes. One region has an additional Canadian border TMC that operates as needed.

Wisconsin   The WisDOT STOC provides statewide coverage for TIM, traveler information, and related traffic operations activities. The STOC is part of the Bureau of Traffic Operations (BTO), which falls under the Division of Transportation Development (DTSD); five transportation regions also that fall under DTSD. Each region has a WisDOT TIM representative, and regular TIM meetings are held with local stakeholders.

The Wisconsin State Patrol (WSP) is a division of WisDOT and has liaison staff collocated at the STOC. WSP is organized into five regions with seven regional dispatch centers around the state.

The UW-Madison TOPS Lab works closely with the STOC on TIM data and systems integration development.

What other agencies are housed within your center?

Delaware   Delaware State Police Headquarters Communications and the Delaware Emergency Management Agency

Illinois   None

Kentucky   Kentucky State Police Headquarters Radio, Kentucky State Police Intelligence,

and the Kentucky Office of Homeland Security (KOHS) occupy the center. There are work areas for the FBI, the Department of Corrections, Emergency Management, the Transportation Cabinet Division of Operations, the Department of Homeland Security, the Border Patrol, and some local metro LE agencies.

Maryland To facilitate coordination and cooperation during operations activities, the Office of CHART provides funding for a full-time Maryland State Police (MSP) liaison. This liaison position is permanently assigned to SHA and works out of the SOC. The liaison supervises troopers who work SHA-funded overtime on the SOC floor during peak periods of traffic volume and weather-related events. Many of our TOCs are also collocated at MSP barracks (e.g., TOC-7 is collocated at the Frederick Law Mall in Frederick). MSP personnel who work at a barrack with these TOCs also have access to the CHART network via workstations and the Internet.

New Jersey At the 24/7 STMC, NJDOT is collocated with the NJTA and the NJSP. At the 24/7 Central Dispatch Center, NJDOT is housed with NJSP and the Department of Environmental Protection. All agencies perform dispatching functions from this location.

Oregon Two of the four centers are collocated with other agencies. One is collocated with Oregon State Police (OSP) and the other is collocated in a separate city with OSP, Oregon Emergency Management, Oregon Emergency Response, LE Data System, Oregon Air Guard, and the Oregon National Guard.

Washington Of the six year-round TMCs, two are WSDOT only, three are collocated with the Washington State Patrol (WSP), and one is collocated with city, county, transit, and regional MPO staff (none of which is LE).

Wisconsin No outside agencies are housed or collocated at the STOC.

TOPS Lab has several different program areas, including IT, ITS, Safety Engineering, Modeling and Simulation, and Freight Operations. All programs work closely with WisDOT and often work together on different projects, including TIM. However, TIM systems development at TOPS Lab is primarily within the IT program through WisDOT BTO/STOC sponsorship.

What is the area of coverage for your operations (e.g., statewide or regional)?

Delaware Statewide

Illinois The Tollway owns and operates 286 centerline miles of Interstate Highway covering 12 counties in northern Illinois. These routes include I-294/94 from Indiana to Wisconsin, I-88 from the Eisenhower Expressway to Rock Falls,

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

C-9

I-90 from the Kennedy Expressway to Rockford/Wisconsin, and I-355 from I-80 to I-290. The Tollway carries more than 4 million customers per day—a large percentage of daily commuter traffic.

Kentucky   Statewide

Maryland   CHART Operations personnel respond to incidents and emergencies statewide. However, safety patrols are conducted on specific routes only for the purposes of driver assists and incident response. All other responses are performed under the direction of the SOC and TOCs previously mentioned.

New Jersey   Statewide (for incidents and traffic operations)

The SSP covers only a portion (approximately 300 miles) of the state's highways, mainly freeways.

Oregon   Statewide

Washington   Each year-round TMC covers its entire region; the seasonal TMCs provide more concentrated operations coordination to key areas. All of our statewide road network is covered by our TMCs.

Wisconsin   The STOC is a statewide center.

How many centerline miles of roadway are within your responsibility?

Delaware   Approximately 4,500 miles

Illinois   286 centerline miles, 2,047 lane miles

Kentucky   SAFE patrol services 800 miles of interstates and 619 miles of parkways. The KYTC services 27,613 miles of roadway total.

Maryland   Emergency Traffic Patrols (ETPs) cover 324 centerline miles Monday through Friday, but the CHART program's incident response and patrol responsibility includes 559 centerline miles. The agency will, however, respond to and assist with incident/emergency response, traffic management, highway maintenance, and special events across the entire state.

New Jersey   NJDOT is responsible for 2,323 centerline miles or 13,000 roadway lane miles. State, county, and municipal governments and toll road authorities share New Jersey. Combined, these agencies own and operate more than 38,000 centerline miles.

Oregon   Approximately 8,200 miles

Washington   We operate 764 centerline (3,949 lane) miles of interstate, 1,015 centerline

(3,307 lane) miles of urban roads, and 5,265 centerline (11,133 lane) miles of rural roads.

Wisconsin   Wisconsin has 11,800 miles of state and interstate highways.

What types of roadways make up those miles (e.g., interstate, U.S. routes, and state routes)?

Delaware   Basically, 95% of the roads in Delaware are DelDOT's responsibility.

Illinois   Interstate routes in northeastern Illinois (I-294/94, I-90, I-88, and I-355)

Kentucky   Interstates, US routes, state routes, and county routes

Maryland   The centerline miles mentioned above include state, U.S., and interstate routes within Maryland.

New Jersey   For NJDOT, interstates, U.S. routes, state routes, and freeways

Oregon   Interstates, U.S. routes, state routes, and frontage roads

Washington   Interstates (as above). I do not know the break out of U.S. routes and state routes.

Wisconsin   We cover the complete state trunk network (i.e., interstates, U.S. routes, and state routes), with an emphasis on major freeways and expressways.

Do your operations involve any handoffs of control/responsibility? Please explain.

Delaware   The Delaware Transportation Management Center (TMC) is responsible for coordinating and managing DelDOT's response to any incident or event that affects Delaware's multimodal transportation system.

Illinois   We interchange traffic with the Illinois DOT, which operates the expressway systems in and out of Chicago and the remaining interstates in Illinois. The Tollway also coordinates activities with Indiana, Michigan, and Wisconsin as part of the Lake Michigan Interstate Gateway Alliance[38] (LMIGA).

Kentucky   We work with three different regional TMCs that manage their own portions of the state. We share information with these centers so that both agencies are up-to-date, letting the local center manage its area independently.

Maryland   The Office of CHART does not hand off responsibilities to other agencies. However, the MSP and the Office of Maintenance will often respond to minor incidents during hours when the TOCs are closed (i.e., 9:00 p.m. to 5:00 a.m.).

---

[38]   Lake Michigan Interstate Gateway Alliance, http://www.lmiga.info/doku.php

New Jersey   Based on the Incident Command System (ICS), the individual who arrives first on the scene, and depending on the incident, there could be a handoff and/or control of responsibility. The handoff could be to another individual within the agency or to an individual outside the agency (e.g., from an SSP operator to NJSP).

Oregon   Yes, they do. There are situations where we take over specific aspects of a scene from another agency or handle it until another agency is on the scene to manage it. We also shift operations between operations centers as the need for coverage arises.

Washington   Certain state highways that are within the city limits or in cities with populations of 20K or larger are required to take on certain maintenance requirements for those roads. We also have some agreements with cites for control and responsibility, typically where we take on the responsibility for certain aspects of a local road.

Wisconsin   In many cases, the STOC and the regional dispatch centers share incident notification. The STOC handles 511 and may help coordinate between multiple agencies involved with an incident. Public Safety primarily handles control.

The STOC provides traveler information/warning using the 511 phone and website, dynamic message signs (DMSs), portable changeable message signs, highway advisory radio, and e-mail alerts referred to as traffic incident alerts (TIAs). The State Patrol dispatch centers also send out TIAs and, in some regions, also have the ability to place messages on the two types of message signs. This redundancy in responsibility does require close coordination between the STOC and State Patrol.

Integration

Have you done any level of integration between your TIM operations and LE?

Delaware   Ours is a transportation management center we coordinate closely with federal, state, county, and municipal police agencies. We work closely with the Delaware Intelligence and Analysis Center (DIAC), which is the state's fusion center.

Illinois   The Central Dispatch Center employs civilian telecommunicators (Tollway employees), who, from the same center, dispatch the Illinois State Police (ISP), District 15, and Tollway Maintenance & Operations.

The Dispatch Center uses a CAD system (the agency's third-generation CAD system) to assist all dispatch operations, including a detailed notification requirement in addition to resource management. The current Windows-based CAD system, developed in 2001, is two-way integrated into the TOC. When

dispatch is handling an incident that affects live traffic lanes, the information is automatically shared with the TOC's Traffic and Incident Management System (TIMS). While the Dispatch Center focuses on managing the incident, including emergency response, the TOC initially assists in managing the incident (e.g., confirming what is reported via video) and then focuses on traffic management, such as alerting motorists to the condition. Conversely, the TOC may detect a decline in system performance via the sensor network or video surveillance and automatically notify the Dispatch Center of the incident.

Kentucky   We are collocated with Kentucky State Police in the Center. We also have an National Crime Information Center[39] (NCIC) terminal, so we receive both intrastate and out-of-state notifications from LE agencies. Our IM coordinators work with local LE at the state and local level when responding to incidents and crash scenes.

Maryland   As previously mentioned, the MSP has access to the CHART network via both on-site and off-site CHART workstations; the MSP uses this system for communication and the coordination of operations activities with the SHA. The SOC also monitors MSP radios/scanners, which facilitates the coordination process.

New Jersey   Since 1995, the NJDOT and NJSP entered into an annual MOU to carry out statewide IM activities. The agreement provides for seven troopers—six regional coordinators and one unit supervisor—distributed geographically, basically along NJSP troop and NJDOT regional boundaries. The primary function for the NJSP representatives is to respond to large-scale incidents along with NJDOT on the state's limited access highway system to mitigate the impact to the regional transportation network. While not performing incident response functions, NJSP works with its NJDOT partners to conduct outreach, provide instruction in both the Incident Command System and IM System, and develop countywide traffic diversion routes.

A component of the NJDOT/NJSP IM Program is the IM Response Teams (IMRT). These specially trained teams respond to incidents that have a major impact on transportation; they provide technical, logistical, and IM support to the incident commander (IC). The IMRT member's goal is to keep the traffic safely moving by:

- Setting up traffic safety devices, demarcating diversion routes, and warning motorists

---

[39]   National Crime Information Center, The Federal Bureau of Investigation, U.S. Department of Justice, http://www.fbi.gov/about-us/cjis/ncic

■ Safely and quickly restoring lanes of traffic

■ Serving as the liaison between the IC and the department so that resources (e.g., sand trucks, sweepers, and light towers) are obtained quickly

■ Facilitating necessary repairs and reopening the roadway

In addition, NJDOT and NJSP IMRT members work with other agencies, including neighboring states (Pennsylvania, New York, and Delaware) in planning, coordinating, and implementing traffic remediation efforts for special events such as major sporting and entertainment events.

Oregon   Yes, but the level of integration differs based on location.

Washington   Yes.

Wisconsin   We have two main systems. InterCAD provides real-time Institute of Electrical and Electronics Engineers (IEEE) 1512[40]-based XML data exchange between public safety CAD centers and the STOC control room. WSP has been on the system since 2009. Milwaukee, Waukesha, and Dane Counties are coming onto the system this year (2012). (The STOC had been receiving CAD data from the Milwaukee County Sheriff's Office for over 10 years, but on a different system.)

Our TIA system is a shared system for the STOC and WSP regional dispatch centers to send TIAs by e-mail, fax, and Twitter text messages.

Other TIM systems that are not a formal integration between operations and LE:

■ The STOC operates the Wisconsin 511 system, which includes capabilities for the WSP dispatchers to enter winter road conditions and general floodgate message capabilities. STOC control room operators can post InterCAD traffic incidents to 511.

■ The STOC provides live traffic video to the WSP regional dispatch centers and many county agencies. In many cases, agencies can share control of the cameras.

■ The LinkWISCONSIN[41] system (referred to in this document as Link) provides web-based access to traffic video for use by traffic incident responders such as public safety, fire/emergency medical services (EMS), towing, and county highway departments.

---

[40]   IEEE Incident Management Working Group, Vehicular Technology Society, Institute of Electrical and Electronics Engineers , http://grouper.ieee.org/groups/scc32/imwg/

[41]   The LinkWISCONSIN Initiative, State of Wisconsin, http://www.link.wisconsin.gov/lwi/Default.aspx?bhcp=1

If not, were there obstacles preventing the integration or just no institutional need to warrant the integration?

Illinois　　　Both the Illinois Tollway and District 15 state police positively supported the integration. However, assurances regarding protection of sensitive law-enforcement data did arise with the Department of State Police, but were quickly resolved.

If so, to what extent? Mark all that apply and provide details where applicable.

Delaware
- Collocation at facility: Added the statewide TMC to the existing Statewide Emergency Operations Center

- Regular information-sharing meetings: Day-to-day, incidents and planned events; developed statewide Transportation Management Team program

- Shared training exercises: Yes

- Shared contact/distribution lists: Yes

- Shared radio communications: Yes statewide 800 MHz radio

- E-mail/text communications: Yes

- Use of social media: Transportation information, including incidents and events, are sent to Twitter and Facebook

- Shared data/systems: Yes

Illinois
- Collocation at facility: –

- Regular information-sharing meetings: –

- Shared training exercises: –

- Shared contact/distribution lists: –

- Shared radio communications: –

- E-mail/text communications: –

- Use of social media: –

- Shared data/systems: –

Kentucky
- Collocation at facility: Kentucky State Police Headquarters Radio in the Center

- Regular information-sharing meetings: As needed

- Shared training exercises: Yes

- Shared contact/distribution lists: No, due to administrative permissions of e-mail

- Shared radio communications: No, separate radio systems

- E-mail/text communications: Yes, e mail is shared between agencies.

- Use of social media: No

- Shared data/systems: No

Maryland

- Collocation at facility: Yes

- Regular information-sharing meetings: –

- Shared training exercises: Yes

- Shared contact/distribution lists: Yes

- Shared radio communications: –

- E-mail/text communications: Yes

- Use of social media: –

- Shared data/systems: Yes

New Jersey   N/A – NJDOT and NJSP have an excellent partnership and collaborate on the following on a regular basis.

Oregon

- Collocation at facility: Two of our four centers are collocated with OSP.

- Regular information-sharing meetings: Occasional, as the need arises, about IT projects and day-to-day functions.

- Shared training exercises: Tend to occur once a year

- Shared contact/distribution lists: –

- Shared radio communications: Yes, in the incident response trucks

- E-mail/text communications: –

- Use of social media: No

- Shared data/systems: Yes, we are able to send/receive incident information electronically with OSP and are in the process of building the same

functionality between ourselves, OSP, and several public-safety answering points. We hope eventually expand statewide.

Washington

- Collocation at facility: Three of our year-round TMCs are collocated with WSP, two are within WSP divisional centers, and one is within our regional center and is staffed as a WSP Operations Center. The winter pass center has both WSDOT and WSP staffing.

- Regular information-sharing meetings: Monthly between all year-round TMCs and WSP operations staff

- Shared training exercises: As needed

- Shared contact/distribution lists: Between all TMCs and all Divisional Centers

- Shared radio communications: Yes, but the extent varies by region. We have both shared center-to-center communication and mobile-to-center communication.

- E-mail/text communications: E mail, via established center-to-center contact lists

- Use of social media: Not for operations, only for public relations

- Shared data/systems: Many examples, share video, and data

Wisconsin

- Collocation at facility: Limited

- Regular information-sharing meetings: Yes

- Shared training exercises: Yes

- Shared contact/distribution lists: Yes

- Shared radio communications: Yes

- E-mail/text communications: Yes

- Use of social media: Yes

- Shared data/systems: Yes

What prompted the integration between your TIM operations and LE and how did you fund your effort(s)?

Delaware

It was included in Delaware's Integrated Transportation Management System Plan published in 1997. The plan defined several strategies to improve

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

C-17

transportation system management.

Illinois   In the late 1980s and early 1990s, the Tollway increasingly began to focus on congestion mitigation, particularly about the length of time it took to handle incidents on the system. Proactive management by the Tollway and not just the state police began in the '90s, with the Tollway taking over towing from the state police, the creation of the Vehicle Recovery program, and regular response from maintenance forces to provide traffic control at incidents. In the late 1990s, the Tollway was concurrently developing a request for proposal (RFP) for the third-generation CAD system and acquiring the professional services of a systems integrator to develop the Tollway's first TOC. The integration of these two computer systems was a Tollway Operational Initiative focused on improved traffic and IM and thereby improved system performance and overall safety. Both initiatives were funded with Tollway capital improvement funds.

Kentucky   The governor ordered the creation of a Fusion Center that involved integration of the KYTC (which hosts the center), the Kentucky State Police, the KOHS, and other state and federal agencies.

Maryland   The CHART program itself is a cooperative effort of the MD SHA, Maryland Transportation Authority (MDTA), and the MSP, and is committed to the development of its five functional elements: traffic and roadway monitoring, traffic management, IM, traveler information, and emergency and weather response. These elements require coordination and cooperation among transportation management and first responder/emergency management agencies. As a result, any integration of TIM and LE is beneficial to highway operations and incident/emergency management and response. It is for this reason that the MD SHA's and MSP's highway operations and IM activities are coordinated.

The CHART program's operations activities are federally funded and, as a result, the integration of the CHART-related TIM and LE activities are supported by these funds. CHART's operations are 80% federally funded and require a 20% state match.

New Jersey   Since the mid-1990s, NJDOT has made a more concerted effort to manage its highway system more proactively (or more efficiently) to make our roadways safer to travel for the motoring public. The implementation of safety- and tech-nology-based programs (e.g., the SSP, the ITS Engineering Programs, the TOCs, and NJDOT's/NJSP's partnership on a statewide IM Response Program) have all combined to reduce the state's average total incident duration from an average of 2.75 hours in 1995 to less than 60 minutes in 2011.

Oregon   When ODOT decided to have TOCs, an agreement was made with OSP to

collocate where they already were established. We started out with three out of the four centers being collocated, but OSP reduced its dispatch centers to two, leaving only two collocated. The districts made it a priority and provided funding to start up. Now the centers are funded from operations money

Washington   Based on evolving needs for coordination. Funding provided as needed.

Wisconsin   The need to integrate TIM and LE was identified early in the deployment of ITS devices in the southeast region (mid-1990s). Development was funded primarily through ITS earmarks.

If the TIM and LE occupy the same facility, are they separated and do they have their own sovereignty?

Delaware   Yes and yes. We mainly coordinate through a CAD system, e mails, telephone, and 800 MHz radio.

Illinois   Both systems are owned and operated by the Illinois Tollway and are located within the Central Administration Building but are separated by two floors. The separation was driven by space limitations in the building; however, we embraced the separation so that Dispatch's focus was primarily on high-volume, accurate public safety communication and the traffic center's focus was on traffic and communication with customers, the media, and the public. Since the traffic center is not open 24/7, the Central Dispatch Center has full TIMS functionality during the hours when the traffic center is closed.

Kentucky   Yes, they are separated and have their own command structure and responsibilities.

Maryland   There is no physical separation. SHA's and MSP's representatives share the professional accommodations to facilitate coordination and cooperation. However, both organizations are operationally sovereign.

New Jersey   NJDOT and NJSP maintain their own sovereignty despite being collocated in several locations.

Oregon   In one of the collocation situations, they are separated by a wall and have their own sovereignty. The other situations they are in the same room; while we operate as we choose, OSP still has common rules that apply to our staff as well.

Washington   Of the three year-round centers that are collocated with WSP, one has the TMC and WSP operations staff on separate floors, one separates the staff with a glass wall, and one has the staff sit back to back in the same room. The agencies have their own operations protocols and procedures.

Wisconsin   No other agency is housed/collocated within the STOC's control room. However,

the State Patrol does have a full-time lieutenant who serves as a liaison and works out of the STOC.

Operations

Describe your decision process(es) (e.g., centralized, decentralized, or mixed).

Delaware Based on level of event as defined in the Delaware Emergency Operations Plan (DEOP) and DelDOT's Transportation Incident and Event Management Plan (TIEMP)

Illinois Decision processes are mixed. The Tollway is divided into 11 maintenance sections, each of which has full responsibility for daily system operation. This effort is centrally coordinated through a senior management staff at the Central Administration Building. Similarly, the state police have divided the road into patrol zones, with central coordination through ISP command staff. Both the Dispatch Center and TOC are system-wide functions that are centralized through our Administration Building.

Kentucky Centralized. The center's director and supervisor have offices in the center and manage daily operations.

Maryland The decision-making process can be described as a mixed process, as operations decisions are affected by the operations activity, agency role (lead versus support), and the specific situation (e.g., incident, emergency, traffic management, and special event).

New Jersey Decision processes for the Statewide IM Program are centralized. For example, NJDOT, NJSP, and local LE work as a team to develop for each county traffic management plans that are used to divert traffic if there is a significant incident. These diversion plans serve as a playbook for agencies to follow to clear incidents quickly and reopen travel lanes to the motoring public.

In addition, regular outreach meetings are held for NJDOT, NJSP, local LE, firefighters, and emergency responders to gather and discuss issues of mutual concern and to provide training and instruction.

Oregon Mixed. The centers' managers make the local daily decisions with guidance, direction, and/or input from the agency's statewide governing body.

Washington Based on evolving need over time. We have operated TMCs for more than 35 years; the evolution was based on need and capability at the time.

Wisconsin Decision processes are mixed.

What funding levels are available for maintaining and improving TIM programs on your highway network?

Delaware   Under the Capital Transportation Program is the Transportation Management Program. The TMC reviews every capital transportation project to include transportation-management system technologies.

Illinois   TIM Funding undergoes the same struggle for budget funds as any other Tollway operation. Since all operations (with the exception of toll collection) fall under the Maintenance & Traffic Division, we have successfully integrated TIM into the daily fabric of roadway maintenance activities. The various functional units within the division (i.e., roadway maintenance, fleet maintenance, IM, traffic operations [includes ITS], permits and utilities, and central dispatch operations) are clearly focused on the agency's mission of providing safe, efficient movement of customers on the Tollway system.

We are also able to leverage investments to serve multiple purposes. For example, many cameras installed for security at toll plazas can be used for traffic surveillance and IM.

Kentucky   Federal grants through Transportation and Homeland Security.

Maryland   The current operations budget for the CHART program is $9M and includes funding for the agency's operations staffing, device maintenance, and operations patrol and coordination.

New Jersey   The IM and SSP programs are federally funded at $5.8M and $6M statewide, respectively. On top of this, NJDOT spends about $1M on vehicle purchase/year.

Oregon   The funding comes from dedicated funding to the Operations limitation. We are using data to prove the effectiveness of TIM functions.

Washington   We have a dedicated operations budget that supports TMC staffing and incident operations staff; however, other budgets supplement them as needed.

Wisconsin   The statewide Traffic Incident Management Enhancement (TIME) Program is supported by a $350,000 consultant contract.

What funding levels are available for furthering your integration objectives between TIM and LE?

Delaware   As indicated above, funding for integration with LE is part of the Transportation Management program. Funding varies depending on each fiscal year's program and desired projects.

Illinois   Both systems are fully integrated. In addition, the TIM system is integrated

into the Regional ATIS – Gateway System that is operated by the Illinois DOT. Future funding is focused on deploying ITS to enhance current operations and improve interagency coordination with the Illinois DOT and other interstate operators in the Lake Michigan Interstate Gateway Alliance and the Great Lakes Regional Transportation Operation Coalition[42].

Kentucky   State funds and federal funds/grants.

Maryland   Currently, no funding sources are available for further development of the agency's TIM and LE integration. Pending the approval of the agency's senior leadership, applications for funding through planning and development projects may be submitted to conduct further integration efforts.

New Jersey   NJDOT recently entered into a partnership with State Farm Insurance, which began sponsoring SSP in April 2013.

Oregon   The project we are involved in to share incident information electronically with public safety answering points was a Transportation Commission-selected innovative project proposal.

Washington   None at the moment

Wisconsin   The InterCAD project is currently supported by a $250,000 contract with the TOPS Lab.

If so, what are your future objectives?

Illinois
- Interagency sharing and cross-jurisdictional sharing of CCTV images

- Consistent messaging to customers throughout corridors involving multiple agencies

- Improved communication to customers at interim decision points on our system (e.g., major nonsystem interchanges)

- The Tollway has announced the "Move Illinois" program that will spend $12 billion over the 15 years. The reconstruction and capacity improvements to I-90 will be a major focus of this program, and the Tollway is pursuing positioning this corridor to be equipped for vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication and become a future Smart Corridor.

Kentucky
- Improving infrastructure for communication with DMSs and roadway cameras

- Increasing camera coverage and installing more DMSs throughout the state

[42]   Great Lakes Regional Transportation Operations Coalition, http://www.glrtoc.org/

- Increasing SAFE patrol staff levels and areas of operations

- Increasing IM Coordinator staff levels and reducing response areas.

Maryland   If adequate funding becomes available, the full integration of TIM and LE highway operations systems and databases would be an ideal case, as this would facilitate the real-time exchange of highway operations and IM data (e.g., incidents and accidents). However, the Regional Integrated Transportation Information System[43] (RITIS) currently serves as a clearinghouse for transportation-system information data and exchange among transportation and first responder agencies within the District of Columbia, Maryland, and Virginia. Enhancements to this existing system may be the best approach to improve communications between TIM and LE agencies.

New Jersey
- We will be completing the last of the 21 county traffic diversion plans (Union County) in 2013.

- New Jersey plans to implement the Move It Law in the near future.

- We will attempt to institute a towing incentive program for major incidents statewide.

- New Jersey has only one TIM Task Force composed of NJDOT, NJSP, local LE, and emergency responders. We will try to bring this number to four task forces statewide throughout the next year.

Oregon   The current plan is to expand the electronic incident information sharing statewide to LE, public safety answering points, and other agencies that would find electronic sharing useful and a time saver.

Wisconsin   With respect to InterCAD, we anticipate integrating several new county CAD systems over the next two years. We are also coordinating with a planned upgrade of the WSP CAD system starting at the end of 2012.

Integrating fire/EMS into the existing data exchange is also of great interest.

We are also starting to look at capabilities to incorporate mobile devices into TIM systems development.

---

[43]   RITIS, University of Maryland CATT Lab, https://www.ritis.org/login?r=Lw==

Amplifying Questions

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

D-1

This appendix comprises host agency answers to the amplifying questions the scan team sent them in preparation for the scan tour. Each question is followed by a compilation of answers from each state in alphabetical order. When an agency did not answer a question, that agency's state is not listed in the compilation.

Provide a brief overview of your organization—the organization, structure, and responsibilities for your agency's traffic operations.

Illinois: Background

Before answering the amplifying questions, we felt it important to provide some background information regarding Tollway operations and LE, since there are significant differences from a typical state DOT.

The Illinois Tollway is a pure tollway in that it operates solely based on user fee revenues; there are no significant external funding sources. A single State Police district (District 15) is assigned exclusively to the Tollway and provides LE. A formal agreement exists between the Illinois Tollway Authority and the Department of State Police that details this assignment. Within the Tollway structure, District 15 is considered a department and is subject to the annual budgeting process. The Tollway funds all District 15 operating and capital costs.

Prior to the development of the Tollway's first TOC – TIM system and integration with the third-generation CAD system in 2002, several maintenance operating procedures were developed and evolved as Maintenance took a more active role in IM. These procedures were designed to be complementary to state police activities. These procedures and the on-scene coordination began as many as 20 years ago. There was initial resistance to a non-LE entity intruding on their turf. This was particularly true when Tollway management staff arrived on the scene of the crash and inquired why it was taking so long to clear the incident.

At multiple levels, discussions were held to educate and heighten the understanding from both sides that Maintenance's initial role was to assist the state police in securing the scene and providing for the safe movement of vehicles around the crash while also enhancing responder safety. Tollway maintenance trucks were equipped with arrow boards, and troopers readily accepted maintenance arrival with an arrow board to protect them at the scene.

In addition, a major shift in attitude and cooperation occurred when the Tollway created the Vehicle Recovery Program and subsequently relieved the state police district of all responsibility for towing by establishing formal agreements (e.g., franchise agreements) between the agency and various towing and recovery firms. The creation of formal agreements gave the Tollway much greater control over towing and recovery activities, relieving the State Police of a significant burden.

During the same time, formal agreements between the agency, fire departments, and protection districts (originally to specify compensation only) were modified to require departments and districts to work cooperatively at incident scenes with Tollway and ISP responders. These agreements did not magically establish cooperation with fire departments; however, they at least

set the stage for what would be a concerted effort to improve all responder behavior at incident scenes.

In summary, the Tollway actively worked to provide new resources, relieving the state police of administrative burdens, and opened dialogues with the fire departments. This logical sharing of responsibilities related to IM brought all the players to the table and really initiated all the cooperative efforts that followed.

When the decision was made to integrate the new traffic center and the Public Safety CAD System, it was viewed as a logical next step to integrate the numerous procedures and practices into one TIM system. Because the rapid exchange of traffic- and incident-related data was viewed as critical, the integration of the TIM and CAD systems was intended to accurately and quickly share data between the two systems, thereby enhancing the performance of each.

Wisconsin: Background

Answers to amplifying questions are provided from two contexts, where appropriate:

- WisDOT TIME Program: The WisDOT TIM Enhancement (TIME) program[44] is a comprehensive multiagency, multidisciplinary program dedicated to coordinating and enhancing TIM in Wisconsin. Initiated in 1995 in southeastern Wisconsin, the TIME program was expanded statewide in 2006 in an effort to coordinate TIM activities that were occurring at various levels across the state.

- WisTransPortal/Advanced Traffic Management System (ATMS) TIM Software: The WisTransPortal refers to the statewide transportation data hub at the Traffic Operations and Safety (TOPS) Laboratory. The WisTransPortal was developed through primary sponsorship of WisDOT BTO to support statewide traffic operations and safety data management and data integration objectives. Several TIM software applications have been developed on the WisTransPortal to enhance control room operations at the STOC. (See our answer to What data collection and integration tools have you developed to support identification and evaluation of these strategies?)

  ATMS refers to the control room software at the WisDOT Bureau of Traffic Operations (BTO) Statewide TOC (STOC). The ATMS handles communication with ITS devices (e.g., detectors, message signs, cameras, and highway advisory radio), control room traffic monitoring, and IM capabilities.

---

[44] Programs – Traffic Incident Management Enhancement (TIME), Travel Information, Wisconsin Department of Transportation, http://www.dot.wisconsin.gov/travel/stoc/time.htm

Technical Issues

Generally, how would you define a successful integration of LE within your state transportation management center that significantly influences your transportation IM plan?

Illinois   To be fully successful, operating procedures, philosophy, management systems, and communication systems need to be fully integrated. Strong relationships at all levels, including trust and a clear understanding of the needs, roles, and responsibilities of each party are critical to success. Successful integration is evident when integration efforts measurably improve safety and timely response.

Maryland   A successful integration of LE with TIM would be represented by an operations environment where both agencies possess the ability to communicate in real time, with secure access to pertinent incident/emergency management information, and CAD data. This would also include the seamless coordination of center and field operations activities.

Wisconsin   WisTransPortal/ATMS TIM Software: Successful integration addresses the following objectives:

- Reduces time between the onset of an incident and notification of the STOC

- Reliably captures incident update information and dispatch activities

- Facilitates dissemination of incident data to 511, media, other TIM partners

- Incorporates accurate location information, duration, and other attributes

- Archives incident data for planning and analysis purposes

Define the limits of your integration, from the planning through design stages.

Illinois   A cross-discipline committee of all Tollway departments, including ISP District 15, was assembled to guide the development of the functional requirements of the TOC–TIM System. An outside consultant was hired through the Professional Services Bulletin process to provide technical support to this committee and, based on the functional requirements, developed the technical specification of the TIMS. This ensured that the system would be built consistent with the regional ITS architecture established by the Chicago Metropolitan Agency for Planning[45], the regional MPO for northeastern Illinois, and national standards such as the National Transportation Communications for Intelligent Transportation System Protocol[46] (NTCIP).

---

[45]   Chicago Metropolitan Agency for Planning, http://www.cmap.illinois.gov/

[46]   The National Transportation Communications for ITS Protocol ONLINE RESOURCE…, http://www.ntcip.org//

Similarly, although not as formal or extensive, a user group comprised of State Police, Information Technology, and Maintenance & Traffic Operations guided the development of the Tollway's third-generation CAD system. (Since the Tollway had been operating a CAD system for two decades, there was no need to create a large committee.)

The TIMS and CAD systems were acquired/developed through separate Requests for Proposal. The successful systems integrator provided the detailed design, development, and implementation of the TIMS, and built the TOC. In the case of the CAD system, all proposals represented proprietary/custom solutions, and selection was made based on a formal RFP process. The Tollway administered these contracts separately, but each was required as part of their contract to provide for full two-way integration of non-LE traffic data This integration was defined at the TIMS Concept of Operations stage.

Maryland   Coordination within the TMC to support incident scene operations in the field represents the limits of our agency's LE integration. A connection for the real-time exchange of LE data does not exist. However, selected LE agencies have access to operations data via CHART workstations and the Internet.

In a few broad sentences, how would you describe your success with regard to integration of your TMC with LE?

Illinois   This effort has been highly successful from both the central dispatch and TOC points of view. While the dispatch center is handling an emergency event, traffic-related data streams seamlessly to the TOC, which then can support TIM through visual confirmation of the incident and can implement response plans to communicate to the customers, media, and commercial trucking firms, quickly and efficiently.

Concurrently, the dispatch center manages the flow of radio traffic regarding the incident and is not distracted from dispatching various resources to the incident and notifying key Tollway management staff. Each entity is allowed to focus on its primary responsibility, ensuring that public-safety and traffic-management efforts complement and do not detract from each other. Both sides understand their roles, appreciate the roles of the other side, and coordinate continuously with each other. We believe our system is still a premier example and may have been the industry's pioneer two-way CAD–TMC integration effort.

Maryland   As previously mentioned, a real-time exchange of data between our agency and LE does not exist; however, LE has access to the agency's CHART network via on-site and off-site CHART workstations. The MSP uses this system to communicate and coordinate operations activities with SHA and gain access to the agency's video images. The SHA-funded full-time MSP liaison position

and LE staffing of the SOC also aids in filling in the previously mentioned integration gaps. This arrangement has proven successful and has facilitated improved communications between both organizations. The SOC also monitors MSP radios/scanners, which facilitates the coordination/cooperation process.

Wisconsin   WisDOT TIME Program/STOC: Having WSP as a division of WisDOT facilitates collaboration between operations and public safety at the state level. This is further strengthened through an onsite WSP liaison position at the STOC. The TIME program represents successful and ongoing coordination between TIM partners, including LE, fire, EMS, towing and recovery, emergency management, maintenance/public works personnel, and other transportation officials.

WisTransPortal/ATMS TIM Software: Several shared traffic operations/public safety software systems (InterCAD, TIA, and Link; see our answer to What data collection and integration tools have you developed to support identification and evaluation of these strategies? below) have been developed to enhance traffic-incident data exchange and facilitate coordinated information dissemination.

What are your agency's priorities for implementing strategies associated with bettering communications between your group and LE?

Illinois   The Tollway has always been safety- and customer-focused, and traditionally has supported technological advances that promote safety and efficiency of operations to serve our customers. This applies to both District 15 of the ISP and Tollway maintenance operations. When considering new initiatives, our business approach involves three typical questions:

- Will it improve safety?

- Will it improve mobility?

- Can we measure cost and benefit?

Most of the strategies are developed at or near the operational level, although communication has to occur at all levels.

Maryland   SHA's priorities, through its CHART program, revolve around activities that serve to improve communication and cooperation between SHA/CHART and LE to address traffic/IM, emergency/evacuation management, and special event coordination. Specifically, the agency's priorities with respect to LE integration are to:

- Define and improve on agency roles and responsibilities during operations

- Enhance the coordination of on- and off-site operations activities (e.g.,

IM, quick-clearance practices, and improved towing operations)

- Reduce incident response times further through enhanced coordination and cooperation

- Implement a real-time data exchange program (e.g., integrate LE CAD/AVL [automated vehicle location] systems)

- Integrate TMC and LE as part of the implementation of the state's proposed 700 MHz radio system

- Improve safety and security for responders and the traveling public

Wisconsin   WisTransPortal/ATMS TIM Software:

- Enhance traffic incident monitoring at the STOC through traffic camera deployment and CAD/ATMS data exchange. Emerging ITS technologies such as third-party traffic data and video detection are of interest but are still under evaluation. Continue to use traditional voice and radio communication.

- Provide accurate, reliable, and timely traffic incident information to 511, the media, and other TIM responders in a coordinated and consistent manner. Use social media (e.g., Twitter) to expand traveler information capabilities and provide two communication opportunities.

- Archive traffic incident data for subsequent analysis, performance measures reporting, and integration with other transportation data sets.

WisDOT TIME Program/STOC:

- Maintain regular communications with LE through information sharing at statewide conferences and regional TIME meetings.

How does risk influence your approach to identifying and evaluating application of these strategies?

Illinois   Risk does not necessarily influence identification and evaluation of solutions, but is always a consideration. The Tollway does not enjoy tort immunity, like IDOT or the state police, yet business decisions that assume greater risk, such as agency management of towing and recovery contract agreements, which the state police previously handled, have been enacted to achieve improved TIM and service to our customers.

If policy, operational, and technical issues need to be resolved and the agency chooses to implement a clearly beneficial strategy, care is taken that critical

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

D-7

stakeholders are involved and the agency is very deliberate in developing, testing, and implementing. As we have often looked for new ways to improve our operations, we often ask, "What is the risk of not doing anything?"

Maryland   Any integration of TMC and LE operations will involve the exchange of sensitive or enforcement-related information and data, which presents risks of varying levels, depending on the method used to share the data. Considering this, both agencies have to, at all times, be mindful of the way this information is handled, and data exchange is often governed by agency rules and regulations. The approach to the differing needs of both agencies (criminal/enforcement versus highway operations) must also be considered daily.

Wisconsin   WisTransPortal/ATMS TIM Software:

- Gear technology solutions toward reliable data collection strategies, such as traffic cameras, CAD/ATMS data exchange, and the continued use of phone and radio

- Continue to work toward improved incident location and duration information.

- Improve information sharing with responders, media, traveling public

What data collection and integration tools have you developed to support identification and evaluation of these strategies?

Illinois   Using the towing and recovery programs as examples, we are able to monitor and measure their response times and on-scene performance and compare that against their administrative compliance (we provide Tollway invoices and audit 100% of invoicing). All performance measures are summarized in a rating program. Firms under agreement are required to score 80% or greater to retain their agreement. For every system related to TIMS, CAD, and IM, numerous performance measures are reviewed regularly to ensure the strategies are working. All key data is archived for analysis in both systems.

Maryland   Internally, the CHART program tracks and analyzes its operations performance based on the results of the CHART Performance Evaluation, which the University of Maryland (UMD) conducts annually. This evaluation uses data collected to assess the benefits of CHART operations to the state of Maryland in terms of calculated user cost savings and reductions in delay, secondary incidents, and emissions.

Regional/area-wide initiatives include the Capital Wireless Information Net[47]

---

[47]   Capital Wireless Information Net, A. James Clark School of Engineering, University of Maryland, http://www.capwin.org/

(CapWIN), RITIS, and coordination committees such as the Metropolitan Area Transportation Operations Coordination program, National Capital Region (NCR) Transportation Planning Board's[48] Management, Operations and ITS Technical Subcommittee[49]. These initiatives and committees are used to collect, exchange, and distribute transportation and enforcement data/information, and benefits regional stakeholders (e.g., DOTs and first responders) within the Baltimore-Washington metropolitan area. They also provide the means to evaluate the performance of operations activities and share lessons learned with the NCR.

Wisconsin   WisTransPortal/ATMS TIM Software: The STOC ATMS includes an Event Manager component for tracking incidents in the control room and forwarding incident reports to the 511 Traveler Information System. Incident information is entered manually as a result of phone or radio communication and automatically via the InterCAD system.

The InterCAD system facilitates real-time, Institute of Electrical and Electronic Engineers (IEEE) 1512-based data exchange from public safety CAD systems to the STOC control room. CAD traffic incident data is also archived and made available through a password-protected online query and retrieval interface. The InterCAD system currently supports CAD incident data exchange from the WSP dispatch centers. Waukesha, Milwaukee, and Dane Counties were added to the system in 2012. The Milwaukee County InterCAD integration represents an upgrade to an existing automated feed that has been operational since approximately 2004.

The TIA system provides a shared interface for the STOC and WSP regional dispatch centers to send real□time traffic incident notifications and formal news releases to the media, incident response organizations, and the public. Incident alerts are sent by e mail, fax, and Twitter text messages to a wide range of recipients, many of which further disseminate traffic incident information around the state and regionally.

LE, county highway departments, 911 centers, towing, and other organizations involved in TIM and highway maintenance use the Link agency video sharing system to access live WisDOT traffic video and related real-time traffic

---

[48]   The Transportation Planning Board, Transportation, Metropolitan Washington Council of Governments,
http://www.mwcog.org/transportation/tpb/

[49]   Management, Operations and Intelligent Transportation Systems Technical Subcommittee; Transportation; Metropolitan Washington Council of Governments;
http://www.mwcog.org/transportation/committee/committee/default.asp?COMMITTEE_ID=46

information statewide. Traffic video is currently organized in terms of live "tours" that cycle through individual cameras along a specific segment of freeway.

Several local government agencies have direct access to the traffic cameras via dedicated fiber network connections. In some cases, those agencies share camera control.

The Wisconsin 511 system provides incident information to the traveling public. Certain interfaces (e.g., winter road conditions) are shared by the STOC and WSP regional dispatch centers. Still images from the traffic cameras are posted to 511 every few minutes.

Have you created public educational programs to advise users on not only how strategies work, but also why they were implemented, including the benefits of the strategies?

Illinois   The Tollway is a regular presenter at statewide traffic safety meetings hosted by the University of Illinois in Champaign and Bradley University in Peoria. The manager of Maintenance & Traffic for the Tollway and the District 15 commander recently jointly presented the Tollway's integrated operational approach with the State Police at one such conference. Tollway staff have presented on this subject at numerous other conferences/professional association meetings, including the Transportation Research Board, the International Bridge, Tunnel and Turnpike Association[50], Intelligent Transportation Society of America[51], American Public Works Association[52], American Council of Engineering Companies[53].

The Tollway schedules regular outreach and follow up to the numerous fire departments and protection districts under agreement with the Tollway to reinforce the IM training practices and principles that are to be applied on-scene at Tollway incidents. A similar effort is focused on the Towing and Recovery community.

The Tollway also has the ability to conduct outreach to I-Pass customers through a quarterly e-mail newsletter and will often use this avenue to communicate safety or other operational campaigns. Scott's Law[54] (Move Over/Slow Down for Emergency or Maintenance Vehicles) is one such safety campaign.

---

[50]   International Bridge, Tunnel and Turnpike Association, http://www.ibtta.org/
[51]   Intelligent Transportation Society of America, http://www.itsa.org/
[52]   American Public Works Association, http://www.apwa.net/
[53]   American Council of Engineering Companies, http://www.acec.org/
[54]   "Move Over Law," Safety and Consumer Protection, Wisconsin Department of Transportation, http://www.dot.wisconsin.gov/safety/motorist/workzones/move-over.htm

The State Police also has an aggressive outreach program. The District 15 public information officer works closely with Tollway Communications to assist with media requests/ride-alongs, public events (child safety seat and child identification), press releases, major incidents, and educational classes. The District 15 public information officer has conducted several classes for various commercial companies that employ drivers who frequent the Tollway system and for a multitude of schools.

Maryland   Special initiatives are communicated to the public via agency websites (e.g., the SHA home page[55] and CHART on the Web[56]). Public awareness is also addressed using SHA's Office of Customer Relations and Information[57], which serves to educate the public about the purpose of and benefits associated with statewide operations activities through agency-sponsored campaigns and information sessions using the media, information service providers, and social media resources.

Wisconsin   The TIME Program includes a broad-based train-the-trainer program covering traffic control and scene management for response partners.

A handout on the STOC and the role and benefits of the center has been developed and distributed to stakeholders statewide.

A presentation on TIA, InterCAD, and Link was made to the statewide TIME group in August 2011. These systems are also noted in TIME-related handouts.

The 511 system includes ongoing outreach.

Public outreach pieces on the Move Over Law, Steer It, Clear It Law[58], and flashing yellow arrows have been developed; outreach is ongoing.

What enforcement issues have you encountered with your strategy and how do you deal with them?

Illinois   Enforcement has become more focused and enhanced by data and reports generated by the TIMS-CAD systems. The Crash Review subcommittee of the Traffic Operations Safety Committee (comprising representatives from State Police, Maintenance & Traffic, Risk, Legal and Engineering) meets monthly and reviews system performance. Speed profiles, crash history, overweight movements, and other reports are used to identify hot spots where selective enforcement can be directed.

[55]   State Highway Administration, Maryland Department of Transportation, http://www.roads.maryland.gov/Home.aspx

[56]   Coordinated Highways Action Response Team, Maryland Department of Transportation, http://www.chart.state.md.us/

[57]   Maryland State Highway Administration – Office of Customer Relations and Information, Maryland Department of Transportation, http://www.roads.maryland.gov/Index.aspx?PageId=101

[58]   Move Over Law and If You Can Steer It, Clear It Law Public Outreach Campaigns, TIME – Legislation, Travel Information, Wisconsin Department of Transportation, http://www.dot.wisconsin.gov/travel/stoc/time-legislation.htm

Other strategies (e.g., enhanced signing [chevrons] on curves) are developed in these meetings. This committee also monitors work zone maintenance of traffic performance and provides direct feedback to project and corridor managers.

Maryland   Issues of this nature lie within the realm of agency roles and responsibilities at an incident scene. Although the agency provides support during emergency operations, SHA endeavors to maintain a separation between enforcement and highway operations. It is important for SHA to maintain its participation in the coordination of operations and uphold its support role during situations where enforcement is needed.

LE agencies also support SHA during highway operations that involve traffic management, incident/emergency response, and special event management.

Wisconsin   This is not applicable to WisTransPortal/ATMS TIM software. However, TIA does handle crash news releases/release of names and TIA incident notifications include handling agency contacts.

Institutional Issues

Did your agency champion your position with respect to integration?

Illinois   Not initially. It took considerable effort to convince the Tollway board that a traffic center and ITS deployments were worthwhile. The decision to integrate the two computer operating systems was a staff decision, driven by the manager of Maintenance & Traffic with the full support of the chief engineer and the State Police District 15 commander.

Maryland   SHA and MSP jointly champion the current LE integration effort and, through the Office of CHART & ITS Development, provide funding for a full-time MSP liaison. This liaison position is permanently assigned to SHA and works out of the SOC. The liaison supervises troopers who work SHA-funded overtime on the SOC floor during peak periods of traffic volume and weather-related events. Many of our TOCs are also collocated at MSP barracks (e.g., TOC-7 is collocated at the Frederick Law Mall in Frederick). MSP personnel who work at a barrack with these TOCs also have access to the CHART network via workstations and the Internet.

Wisconsin   WisTransPortal/ATMS TIM Software: WisDOT BTO championed and sponsored development of TIM software as a component of the TOPS Lab WisTransPortal at UW-Madison. WisDOT BTO championed the use of the ITS IEEE 1512 XML standard for InterCAD data exchange. WisDOT BTO and WSP collaborated to merge separate, pre-existing incident alert systems into a combined, shared system (TIA).

WisDOT TIME Program/STOC: WisDOT BTO championed and supports the TIME program and ongoing efforts to promote coordination between WisDOT and responders.

Is there a benefit in having a champion driving this program, if so, should one or both organizations sponsor a champion?

Illinois Certainly it is advantageous for each agency to have a champion for this or any cause, but there needs to be at least one strong leader from the funding agency to move the project to implementation. No major program, no matter what the industry, has ever advanced without the support of a champion. So, in this sense, a champion is a requirement. However, while that champion may be the name and face of the program, the champion cannot do it alone—especially when the program involves multiple departments and agencies. There must be one champion from the funding agency and there should be one from each agency; ideally, there are multiple champions of the program and the concept at many levels.

The Tollway created the position of incident manager to ensure a consistent focus on TIM as a critical operation. Recent District 15 commanders have become advocates of the integration, once they recognized the benefits of working with traffic management. The District 15 command staff has been known to bring State Police personnel from other districts to the traffic center to explain the purpose and the benefits of TIM. Our Traffic Operations Safety Committee meetings have been attended not only by our own district's personnel, but also by other State Police district personnel.

Maryland Having a champion does have its benefits, which include securing funding, providing training opportunities for staff, and others. Whether one or both organizations champion the integration effort depends on the objective of the integration effort. In our case, the CHART program is the champion and provides a professional environment suitable for the cooperative effort between transportation management and operations, as well as LE activities.

Wisconsin WisTransPortal/ATMS TIM Software: From the TOPS Lab perspective, it is particularly important for WisDOT to champion the development and ongoing maintenance of WisTransPortal TIM systems. This includes support for stakeholder coordination and technical decisions. Close collaboration between STOC and WSP, including joint project management, was also instrumental in WisTransPortal TIM, 511, and other ITS implementations.

WisDOT TIME Program/STOC: It is imperative for WisDOT to champion

the continuing progress of the TIME program, which includes support for stakeholder coordination and public outreach. WSP's support of the TIME program is also imperative to the program's success.

Should or does your agency, or any other agency/consultant, provide the technical lead?

Illinois   The Midwest region has a long history with ITS and integration; both within the DOTs and with emergency service providers. In the early 1990s, IDOT established an electronic connection with Northwest Central Dispatch to receive traffic-related incidents automatically. The regional ATIS (Gateway) established an electronic connection with *999 in the late 1990s. The Illinois Tollway integrated TIMS and CAD almost 10 years ago.

Consultants and vendors were involved in all these cases. The agency was provided some consultant support to create more complete and accurate requirements, and to verify and validate the results. The level of effort required of the consultant can vary with the skills and availability of the agency staff, but in all cases, it must be the agency making the decisions. Improvement in operational functionality needs to be at the core of the technological decisions. Therefore:

- The technical lead should be an agency staff person who is operationally savvy.

- Consultant support should always be available to ensure completeness and accuracy.

- The level of support can vary with the skills and availability of the agency staff.

Maryland   The Systems Integration Team maintains the CHART network and serves as the technical lead for all integration projects undertaken by the Office of CHART & ITS Development. However, as stated, the integration of the SOC and LE is limited to the exchange of transportation information via CHART workstations and the Internet. Future integration efforts will include the real-time exchange of information (e.g., LE CAD/AVL data).

Wisconsin   WisDOT TIME Program/STOC: The STOC uses a variety of on-site and off-site consultants to manage the control room and implement TIM software. This has worked well in terms of meeting staff level and technical expertise requirements. WisDOT employs a statewide TIM Engineer who coordinates with consultant staff on TIME Program efforts. STOC IT staff members are closely involved in all concept, design, and implementation decisions.

WisTransPortal/ATMS TIM Software: The TOPS Lab (UW-Madison) provides

technical lead, implementation, and hosting for WisTransPortal TIM software (InterCAD, TIA, and Link). TOPS Lab provided the technical lead and project management for initial deployment of the 511 system, which was developed through an RFP with an outside vendor.

Did you organize a leadership task force?

Illinois

A cross-discipline committee representing most Tollway departments and disciplines was created to guide the development of the Tollway's first TOC and the TIM system. To a lesser degree, a user group guided the development of the third-generation CAD. Both of these committee efforts achieved buy-in and support.

The current Traffic Operations Safety Committee grew out of the original task force that guided the TOC's development and its integration to CAD. For the past 10 years, this committee has met monthly and provides ongoing focus on system performance in the areas of safety, mobility, and efficiency. This committee has provided significant guidance regarding system-wide signage, particularly in relation to open road tolling signing. The committee has also been actively involved in developing the ITS five-year plan and other initiatives.

Maryland

The CHART board governs and facilitates the CHART program's leadership and agency coordination. The board's members are representatives from various transportation and emergency management agencies. CHART board meetings are held once every two months and address issues associated with current and proposed technologies and approaches that support operations initiatives throughout the state and the NCR in general.

During each meeting, participating agencies are updated on the status of ITS deployments and initiatives, agency roles and responsibilities, and regional or organizational goals and priorities, which aid the project/deployment decision-making process. This includes TMC/LE operations activities.

Wisconsin

WisDOT TIME Program/STOC: The STOC has an onsite systems management position that is a liaison between management and IT/maintenance. This position also serves as a lead for continuity of operations planning and configuration management. The WSP liaison and statewide TIM engineer serve as the leadership for the TIME Program. This leadership is further supported through the TIME Standing Committee, a group of WisDOT and WSP regional staff that collaborates on TIME Program efforts.

WisTransPortal/ATMS TIM Software: WisTransPortal TIM software requirements and design were developed in collaboration of STOC, WSP, and TOPS Lab staff. The Office of Public Affairs was also included to review TIA

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

D-15

alerts and news releases. The TOPS IT program staff and STOC staff meet each month to review status and coordinate IT issues. Implementation of 511 involved a technical advisory committee consisting of staff from across the agency. The committee met quarterly throughout the project.

What would you consider a good strategy with regard to outreach to the LE community?

Illinois

Establishing a positive relationship at various levels is key. As was noted earlier, District 15 is assigned to the Tollway, but the relationship was not always "warm and fuzzy." For many years, there was little interaction between Maintenance and the district, even at accident scenes. When Maintenance began to focus on lane clearance at incidents and overall incident times, and began responding to incidents, the initial reaction was one of friction. It took some time for District 15 personnel to view Maintenance response to incidents as support and not as a threat. To mitigate this perception, it became critical to focus on District 15 and relieving it of immediate traffic control responsibility. (An arrow board works better than flashing squad lights in guiding motorists around a crash.)

As confidence and trust grew, working together toward a common goal of safe and efficient incident clearance became the standard operating procedure (SOP) between the patrol trooper and the Maintenance worker. The Tollway does occasionally interact with other local LE. With the improved relationship between the Tollway and ISP-15, over the years it has become normal for the ISP to handle most of the outreach with other LE agencies.

Efforts continued to focus on the various additional incident responders (i.e., towing, recovery, fire and ambulance, and hazardous materials). In the case of towing, the agency decided to remove towing administration from the State Police by putting all tow operators under formal agreement with the Toll Authority. District 15 leadership was delighted with this change and fully supported making vehicle recovery a separate, highly specialized service. For outreach to work, the strategy must be outcome focused, must demonstrate near-term or immediate benefit to LE, and capture the attention and support of the actual decision makers in the LE community.

Maryland

Outreach can take a number of forms. These may include regional stakeholder meetings and workshops used to educate the LE community about the benefits of TMC/LE integration and other coordinated efforts. Cross-training between transportation operations and LE staff also helps communicate the benefits of agency cooperation strategies. Building relationships with the LE community's upper management is also a good strategy to establish a working relationship that will be mutually beneficial.

Wisconsin	WisDOT TIME Program/STOC: We consider regular coordination between WisDOT and LE through ongoing TIME meetings and being able to show the benefits of regular attendance at meetings a good strategy. If necessary, direct coordination with LE through one-on-one meetings is another strategy.
	WisTransPortal/ATMS TIM Software: For InterCAD data exchange, a high-level business process meeting should be conducted at the start of the project and at final implementation and deployment to coordinate data-sharing issues from an operations context. Roles and responsibilities should be clarified and possibly captured in an MOU. The ability to show benefits of automated data exchange and traffic incident information dissemination is important.

Originally, what role did your agency envision the TMC playing by integrating with LE?

Illinois	Since integration operations systems were already in place, the vision was that integrating these systems through a computerized TMC (that was integrated with the CAD), would result in a dramatically improved flow of incident data and improved communication to reduce incident confirmation, response, and clearance. TMC would support aggressive event management strategies and provide the State Police access to the hundreds of CCTV cameras that now could be viewed in the traffic center or State Police Operations Desk.
Maryland	The role of the TMC (SOC) was (and is) to serve as a centralized facility used to facilitate coordination and cooperation during statewide operations activities. The idea was (and is) to, through coordination, improve the efficiency and safety of the state's highway system. The TMC and its support staff would also provide support to the incident-management command structure while maintaining separation between highway operations and enforcement, which is strictly an LE activity. CHART, and its SOC, only provides support for the transportation-related operations of the integration effort; MSP provides the expertise needed for enforcement during various events.

Was your TMC used as a catalyst to foster an environment in providing inter-agency cooperation?

Illinois	Yes. However, fostering the environment does not go too far without commitment and champions within the other regional agencies.
	The TIMS-CAD integration was an instant internal success. As Tollway staff became confident with the functionality provided by TIMS to manage incidents and communicate to customers, the natural expansion was to other agencies and states that operate the same interstate routes that comprise the Tollway and to other interstate operations where traffic interchanges between the two systems. As was noted earlier, the Tollway was a participant in the original Gary-Chicago-

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

D-17

Milwaukee Priority Corridor[59] efforts and fully supported the creation of the Lake Michigan Interstate Gateway Alliance as a means of achieving improved interstate operations throughout the four-state (i.e., Wisconsin, Illinois, Indiana, and Michigan) region, including the privately managed Chicago Skyway[60] and Indiana Toll Road[61].

Cross-border cooperation, evidenced by frequent major event messaging on DMSs across multiple agencies, is an outgrowth of this expanded regional focus and peer-to-peer TOC initiative.

The Illinois Tollway also supports the Great Lakes Regional Transportation Operation Coalition[62], which focuses on the megacorridor (Interstate 94 and supporting alternate routes) between Minneapolis-St. Paul, Minnesota, and Toronto, Ontario, Canada.

Maryland   Yes. In the early 1990s when the CHART program was started, it was envisioned that the program would foster an environment used to facilitate interagency cooperation. The CHART program is a cooperative effort among SHA, MDTA, and MSP, and coordinates with other first responder and transportation management agencies.

Wisconsin   WisDOT TIME Program/STOC: The STOC was used to enhance the TIME Program relationship with local responders. Information captured at the STOC is often presented to responders during TIME meetings so responders/response agencies can see the benefits of collaboration and coordination with the STOC.

Did you face any institutional barriers between the agencies?

Illinois   We were fortunate that the same institution owns and manages both the TIMS and CAD systems. However, when looking beyond the initial integration and at the larger regional level, there were some barriers. Regionally, political priorities within states often affect the ability of operations personnel to actively participate in meetings and can represent a barrier to successful coordination. However, there is philosophical support for regional cooperation at a high level.

Recognizing these different operations types can also challenge communication and cooperation between TOCs in the region. To mitigate this, the regional agencies (through a LMIGA committee) established a set of common language

---

[59]   Regional ITS Architecture Development – A Case Study: Gary-Chicago-Milwaukee ITS Priority Corridor, Building a Framework for Tri-State ITS Corridor Integration, September 1999, http://ntl.bts.gov/lib/16000/16700/16774/PB2000104760.pdf

[60]   Chicago Skyway, http://www.chicagoskyway.org/

[61]   Illinois Tollway, State of Illinois, http://www.illinoistollway.com/homepage

[62]   Great Lakes Regional Transportation Operations Coalition, http://www.glrtoc.org/

and incident severity codes to improve communications. The various regional TMCs also started a visitation program where TOC technicians (i.e., TOC staff) would visit other LMIGA TOC operations and learn by observing what and how other TOCs operate. This allows the staff in the various TOCs to better understand the full capabilities and limitations of each other's systems and allows agencies to get the most out of each other when coordinating on an incident.

Maryland   Issues associated with the agencies' differing organizational structures proved challenging. SHA uses a centralized organizational structure, while the MSP uses a decentralized organizational structure that crosses jurisdictional boundaries. As a result, communicating with management at the appropriate level within each LE jurisdiction was initially a challenge.

Wisconsin   WisDOT TIME Program/STOC: Agencies were initially reluctant to provide information to or communicate with the STOC. Regular communication and coordination between WisDOT/STOC and LE agencies has reduced this hesitation. These relationships continue to evolve and are fostered, in part, by the TIME Program.

WisTransPortal/ATMS TIM Software: There were certainly challenges to implementing shared data exchange and information dissemination in terms of meeting both LE and STOC requirements and expectations, but not necessarily institutional barriers from the TOPS Lab perspective. STOC/WSP dispatch center collaboration is an evolving relationship of which WisTransPortal TIM and 511 represent two aspects of that partnership. These systems have helped foster a better understanding of each other's roles and capabilities, while at times requiring conflict resolution with respect to certain design requirements and business processes.

If so, what were the barriers and how did you overcome them?

Illinois   There were internal barriers within the Tollway. Sharing of data seemed to be an overarching issue. This began in the early 1980s during the creation of our first CAD system. We attempted to have both police units and Tollway units dispatched to the same CAD system events. State Police were emphatic in their desire for complete separation of incidents between police and maintenance. The system operation failed miserably when dispatch personnel were not able to keep track of incident information. Two CAD incidents had to be created and cross-referenced for any situation that required both LE and Tollway units to respond. This tracking issue forced a complete rewrite of the newly created CAD software. This extremely expensive, precedent-setting exercise set the stage for LE and Tollway units to live somewhat harmoniously (technically) within the Tollway Dispatch Operation.

LE played a key role in the design and development of our current third-generation CAD system. By this time, through years of communication and recognition of each other's operational requirements and points of view, the gap had been bridged and a mutual trust had been developed.

TIMS was being developed at the same time as the new Windows-based CAD system. Part of the development was a two-way interface between the two. Again, there was some resistance concerning the transfer of sensitive data generated by LE databases (e.g., NCIC) to incidents being transferred from the CAD system to TIMS. This was overcome by using a filtering character so that TIMS does not see sensitive data. Additional filters ensure that TIMS receives only those incidents that have the potential to impact traffic. Because TIMS does not see administrative- or investigative-type incidents, this helps LE maintain the confidentiality of those portions of its operation.

Any traffic-impacting incidents that are sent to the regional ATIS contain only location, type of incident, and basic incident information. No LE information, other than that LE is on the scene, is broadcast to the public.

Maryland   As mentioned in the answer to the previous question, crossing jurisdictional boundaries proved to be quite challenging. However, as the CHART program has evolved, so has its ability to overcome barriers of this nature. In addition, the CHART board addresses barriers related to communication and coordination.

Wisconsin   We addressed this in our answer to the previous question.

What was your overall guiding theme within your integration strategy?

Illinois   Our theme was improved system operations (performance) through improved communication, coordination, and cooperation between all IM participants. Where institutional barriers appeared, effort was focused on how to bridge the barrier, not remove the barrier, because outside of IM, those barriers often have valid and useful purposes. A key strategy is not to attack the participant's identity, but to find win-win scenarios that are complementary and allow both sides to move forward. The focus was on outcomes and getting through small hurdles quickly.

Maryland   As previously mentioned, the purpose of the LE integration effort was to facilitate better TMC/transportation operations coordination and cooperation during incidents, emergencies, and special events. Specifically, enhancing information sharing between the TMC and LE agencies to boost situational awareness during operations activities was the guiding principle during the integration effort.

Wisconsin   WisDOT TIME Program/STOC: The TIME Program promotes the person-to-person communication necessary to grow relationships. Continue to promote communication, coordination, and collaboration between the STOC and other response agencies.

WisTransPortal/ATMS TIM Software: Automated systems enhance data exchange and communication but do not replace traditional means of person-to-person communication. Provide more timely, accurate, and comprehensive traffic incident information along the entire state trunk highway system. Adhere to ITS and other standards, where possible.

How did you promote the modernization of your program—your LE agency?

Illinois   Discussed in earlier answers. The approach the Tollway took was to build a modest traffic center with little glitz but enormous functionality. Our premise was, once in operation, it would sell itself. This proved to be a highly successful approach as more and more stakeholders were invited to see/touch/hear the traffic center operation, particularly during critical events. Most who visited became instant advocates (or converts) in support of TIMS and ITS. This included both Tollway and ISP management.

Maryland   CHART's mission is to, *"Improve mobility and safety for the users of Maryland's highways through the application of ITS technology and interagency teamwork."* As the program has evolved, the agency has tailored its services to meet the needs of the state. This includes the needs of organizations, such as LE, that have a stake in the development of the region's transportation system management and operations activities. Program updates are communicated through CHART board meetings and public awareness using agency websites, ISPs, and the media.

Did you develop a multi-jurisdictional program?

Illinois   The Tollway IM Program is focused initially on internal operations that enhance safety, mobility, and efficiency with the Tollway system across urban, suburban, and rural segments. The system has been designed to facilitate the 3 C's between agencies regionally. The focus of both LMIGA and Great Lakes Regional Transportation Operations Coalition is multijurisdictional and intended to improve interstate travel within the South Lake Michigan Region and the I-94 corridor region, respectively.

Maryland   The CHART program itself represents a multijurisdictional effort. Its multiagency cooperative structure supports regional/multijurisdictional coordination among transportation-system management organizations and LE agencies. As previously mentioned, the MSP has a multijurisdictional

organizational structure, which, with coordination, is inherently a part of the CHART program.

Wisconsin   WisDOT TIME Program/STOC: TIME is a statewide program that promotes multijurisdictional, multidiscipline coordination. All TIME meetings incorporate representatives from multiple locations.

What political/funding/organizational restraints did you use within your integration program?

Illinois   The development of the Tollway's first TOC occurred during lean economic times. The focus had to be on functionality, not fancy appearance. Once opened, the benefits sold themselves, and support for expansion became a challenge to manage, but a good challenge.

Maryland   Funding for the program is generated from sources such as the Consolidated Transportation Program (CTP), Congestion Mitigation and Air Quality, and State Transportation Improvement Program. Grants are also used to fund specific projects and initiatives – please our answer regarding type of funding on page 54 for additional information.

From a political standpoint, priorities are identified to support the specific state, county, and regional needs, which are communicated to the agency by senior leadership and the CHART board.

Organizational restraints include existing SOPs and agency agreements.

Wisconsin   WisDOT TIME Program/STOC: On-site consultant staff supports the TIME Program, which assists program initiatives in conjunction with WisDOT.

WisTransPortal/ATMS TIM Software: TOPS Lab (UW-Madison) led project management (511) and implementation (WisTransPortal TIM) on behalf of WisDOT BTO.

What is your TMCs role in emergency operations?

Illinois   IM in critical situations occurs on site as well as in the traffic center. Traffic center personnel provide critical communications to media at the direction of the State Police and or the Tollway's communications department. Management personnel are able to monitor critical situations from the traffic center video and provide updates through contact with on-scene personnel. Traffic center staff communicates with our customers through DMSs, e mail messages to the media and other transportation agencies, and through automated transfer of incident information to the area ATIS system. Full closures are communicated via area-wide e-mail to surrounding states' TMCs, which then notify the affected areas. The trucking industry is also notified of full closure information via e

mail. (Trucking firms have signed up for e mail alerts via various trucking associations.)

TIMS and its functionality are available to key stakeholders of toll security, State Police, communication, executive management, and other users involved with emergency management.

Maryland The SOC and supporting TOCs manage and coordinate activities on the incident scene. This includes coordination with first responders, field operations staff, and other transportation management agencies/entities. Facilitating situational awareness during highway operations is also a key role of the SOC during incidents and emergency management activities.

Wisconsin The STOC provides and coordinates information to the traveling public, first responders, and WisDOT and provides traffic management functions. It also assists with IM and provides support and knowledge as needed. STOC staff is responsible for entering incidents into the Statewide Incident Notification and Lane Closure systems. STOC staff helps coordinate WisDOT's response during significant incidents and emergencies.

What agreements were necessary in developing the partnership between your TMC and LE, and what guidelines did you follow?

Illinois No formal agreements were developed. Since LE was included in the development of functionality and various procedures regarding camera image use and security over LE data, there has been little need to establish formal agreements. When the Tollway allowed third-party media access to video, a formal agreement governing media use of Tollway camera images was prepared with State Police input.

Maryland MOUs, Memoranda of Agreement, SOPs, and agency guidelines govern the TMC/LE operations arrangement. Specifically, these guidelines identify agency roles and responsibilities, as far as operations are concerned. As is expected, the CHART program is more concerned with the coordination of highway operations activities and only plays a support role during enforcement.

Wisconsin WisDOT TIME Program/STOC: Formal agreements between the STOC and LE regarding the TIME Program are not in place at this time. A TIM coalition is being organized where response associations, including LE, will be requested to sign a charter supporting the STOC's and TIME Program's goals and missions.

WisTransPortal/ATMS TIM Software: An MOU between WSP Bureau of Public Safety and Communications, BTO, and UW-Madison was developed toward the end of the implementation process to clarify data sharing, archiving, and system maintenance responsibilities. Similar agreements are being considered for

county agency partners. County partnerships with the STOC and TOPS Lab are often combined with agreements related to the use of the WisDOT fiber network.

Do you own/manage your data (e.g., travel time, speed data, and video)?

Illinois   **Video:** We own the video that we digitally record and save for 96 hours. As a policy, the agency does not archive video images unless the Maintenance & Traffic Division makes and approves a specific request. We do use video images for training purpose; on occasion, LE will request video preservation for investigative purposes.

I-Pass Data: The Tollway owns I-Pass data, including both the individual transaction data (which is not part of the TIMS/CAD systems) and the travel time data generated from I-pass transactions.

Remote Traffic Microwave Sensor[63] (RTMS) Data: The Tollway currently operates over 200 RTMS units throughout the system. Of these, 105 were installed under an Intelligent Transportation Infrastructure Program (ITIP) Grant (Transportation Technology Innovation and Demonstration [TTID] Program[64]) by Traffic.com[65]. The Tollway receives raw and finished data from these sensors.

When the Tollway expanded RTMS units system-wide, it amended the agreement with Traffic.com to make Tollway data available for use by Traffic.com. In exchange, Traffic.com uses its wireless communication system to retrieve data from all RTMS units installed on the system and makes the raw and finished data available in the same database as the initial RTMS units.

The Tollway has unlimited use of RTMS data regardless of the source. In accordance with the terms of the original ITIP grant and our agreement with Traffic.com, we are obligated to protect their data from commercial scraping by competitors.

Maryland   SHA gets its data from state-owned equipment and through public/private partnerships with a number of ISPs. Data management is conducted both in-house and by external organizations (e.g., , such as UMD).

As far as information sharing is concerned, it is the agency's policy to protect sensitive/confidential information; however, as much as possible, it will provide pertinent information to interested parties (e.g., other agencies, the media, and the public).

---

[63]   RTMS (Remote Traffic Microwave Sensor) Roads & Bridges, http://www.roadsbridges.com/rtms-remote-traffic-microwave-sensor

[64]   Transportation Technology Innovation and Demonstration (TTID) Program, Federal Highway Administration, http://ops.fhwa.dot.gov/travelinfo/ttidprogram/ttidprogram.htm

[65]   Traffic.com: Check traffic flows, jams and more in cities around the world, http://here.com/traffic

| Wisconsin | WisDOT TIME Program/STOC: WisDOT compiles brief clips of incident scene. They are used to debrief incidents during TIME meetings. Information collected at the STOC is compiled into a performance measures report. |

WisTransPortal/ATMS TIM Software: The STOC ATMS control room software manages real-time traffic data (e.g., travel times, speed data, and video). Video is archived at the STOC for three days. ATMS traffic detector data is archived at the University of Wisconsin's TOPS Lab WisTransPortal system. The WisTransPortal hosts InterCAD, TIA, Link, and the Wisconsin Lane Closure System, which represent extensions to the STOC ATMS, and archives data from these systems.

In what manner did you approach LE for it to "buy in" to your system?

Illinois We included District 15 in the original task force that guided the development of TIMS. However, this was more than just opening up the stakeholder list to include LE; the IM relationship had already existed between the agency and ISP. Therefore, the buy in for TIMS was an evolution of existing efforts, rather than a brand new initiative.

Maryland The benefits of TMC/LE integration were communicated to LE officials early on in the development of the CHART program. The CHART program's functional elements include traffic and roadway monitoring, IM, traveler information, traffic management, and emergency and weather operations.

These functional elements, more often than not, overlap with first responder and emergency management services, and it was considered beneficial to develop a statewide program that would facilitate better communication between transportation management and LE agencies.

Wisconsin WisDOT TIME Program/STOC: WisTransPortal TIM and 511 capabilities are presented to LE at TIME program meetings and other regional conferences and are included in TIME Program-related literature and handouts.

WisTransPortal/ATMS TIM Software: InterCAD data exchange is often discussed in parallel with WisDOT fiber network coordination as part of a broader ITS network/data sharing context. STOC performance measures reporting have been used to a lesser extent but are of potential value in demonstrating the benefits of enhanced data exchange and communications for TIM.

How did you approach training to include TIM with LE with the TMC?

Illinois The systems integrator who designed and built the TIMS system was also required to provide extensive training to both Traffic Operations technicians,

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

D-25

Central Dispatch Center telecommunicators, State Police Operations and Command staff, and select agency department chiefs who were provided a TIMS workstation to enable access to video images. Since the TOC is not open 24/7, the Central Dispatch Center has full TIMS functionality for overnight and weekend coverage. In addition, TIMS workstations were provided in the State Police Operations area for the watch commander's use. In retrospect, extensive training provided to State Police Operations staff and individual workstation users was unnecessary as their use is exclusively for access to video.

Maryland   Training is provided to staff based on SOPs that satisfy operations requirements, policies, and rules and regulations of both agencies. Cross-training activities, as mentioned, also serve to educate all parties involved in joint operations activities.

Wisconsin   WisDOT TIME Program/STOC: WisDOT's Emergency Traffic Control and Scene Management Guidelines and subsequent train-the-trainer materials focus on promoting a uniform response to incidents and providing the safest possible work zone for all responders, including LE. This training also provides information on the STOC and the benefits it can provide to LE.

How is your organizational structure composed with respect to your integration with LE and actions with TIM?

Illinois   District 15 headquarters is located within the Tollway Administration building, adjacent to the Central Dispatch Center. The State Police Operations Desk has TIMS camera access and full CAD functionality for both the watch commander and call takers (i.e., Tollway employees under Central Dispatch who receive calls from the public involving State Police or Tollway operations). The Illinois Tollway is not a 911 call center.

Maryland   Although the CHART program is a cooperative effort, participating agencies such as LE keep their own organizational structures. The CHART program has a centralized structure with the governing CHART board, a director, two deputy directors, and division managers to support the program's day-to-day activities. The SOC manages center and field operations, with support from the TOCs, which are collocated with MSP barracks.

The MSP, on the other hand, has a more decentralized organizational structure, where command is separated by jurisdictional boundaries, making it difficult to apply a centralized approach to TMC/LE integration. It is for this reason that the CHART board includes LE representatives to identify agency priorities.

Wisconsin   WisDOT TIME Program/STOC: WisDOT's Statewide TIM engineer is part of the BTO organizational structure and oversees TIME Program initiatives and

how they are relayed to response partners, including LE. The STOC control room operators regularly interact with LE through incident information sharing. WSP's liaison at the STOC enhances coordination between WisDOT BTO and WSP.

Implementation Issues

What staff did you use to employ your TMC/LE integration (e.g., consultant, in-house, or multi-agency collaboration)?

Illinois   The Tollway has a general consultant and traffic consultant who provide technical and operational support on a wide range of topics. These entities worked with in-house staff and the outside consultants who were employed to develop the CAD and TIMS systems and the integration of the two systems.

Internal Information Technology department staff manages all networking. The TIMS integrator manages and monitors the state of the interface regularly and through the system's alert monitoring tools.

Maryland   Both SHA and MSP use permanent staff to support the current arrangement. The CHART Systems Integration Team performed the necessary software upgrades and system integration.

Wisconsin   WisDOT TIME Program/STOC: WisDOT BTO and WSP staffs have assisted with integrating the STOC and LE operations. WisDOT and consultant staffs support the TIME program and continue to promote the STOC and LE collaboration.

WisTransPortal/ATMS TIM Software: The TOPS Lab (UW-Madison) developed InterCAD, TIA, and Link and hosts all three systems on the WisTransPortal.

- InterCAD—The InterCAD implementation involved additional development by the WSP CAD vendor (SunGard HTE), WSP in-house staff (to transmit CAD XML to TOPS), and the STOC ATMS vendor (Transcore), which imported InterCAD XML into Event Manager. County agency CAD integration typically involves direct contact between TOPS Lab IT staff and the CAD vendor.

- TIA—The TIA system merged two prior, similar incident notification systems that the STOC and WSP developed in-house.

- Link—Transcore developed Link, which was moved to WisTransPortal in 2006. It has subsequently undergone significant expansion and development.

Did you provide for a detailed implementation service, testing, and training of the proposed solution?

Illinois Yes. The Tollway required extensive acceptance testing of the TIMS and CAD systems, which included testing the system integration. The Starcom21[66] radio system was tested to a much higher degree than most comparable radio systems, which ensures that the system is reliable for use by LE and Highways.

Maryland The CHART workstations that LE personnel use are directly connected to the CHART network; the CHART Systems Integration Team provided the implementation, testing, and training. The resources used for implementation purposes were supported by CHART systems development funds. These are capital funds based on CTP allocations. Refer to page 53 for more information on CHART funding sources.

Wisconsin WisTransPortal/ATMS TIM Software: All WisTransPortal TIM software (i.e., TIA, InterCAD, and Link) was developed in close collaboration with the STOC and other project stakeholders. Proposed design and prototype implementations were provided throughout the implementation process. All three systems are captured in the WisTransPortal and WisDOT Statewide ITS architectures; however, the level of adherence to the systems engineering process varied by project.

- TIA—Two versions of the TIA software—a test and a production version—are currently deployed. The test version is used for training and enhancement testing. Two webinar training sessions were also provided for TIA at the initial rollout. The STOC developed a TIA training manual, which is linked to the online system. Training is now provided at the STOC and WSP as needed for new staff.

- InterCAD—This software includes capabilities for staged deployment and end-to-end testing. New capabilities were deployed in June 2012 to send live CAD XML messages to a second test server at the STOC in addition to the production ATMS. Since InterCAD works behind the scenes as a data exchange system, training is generally oriented to use of the dispatch CAD system or STOC event manager; however, STOC staff are provided an opportunity to discuss InterCAD business processes during WSP annual training events.

- Link—Enhancements to this software are added as needed and are deployed to a test environment prior to updating the production system. The STOC coordinates training and outreach.

---

[66] Welcome to Starcom21, Join the State-of-the-Art State of Illinois Communication Network, http://motorolastarcom21.com/

Describe any methodology, quality control system, and/or good practice initiatives that you would employ to facilitate project execution of your integration.

Illinois   The number one key is following the systems engineering process tailored to meet the desired outcomes. A key step in that overall process is stakeholder involvement. Those involved in the project must understand what is being accomplished, their role, and their responsibilities as early as possible. Conceptually, any integration of systems should make everyone's job easier. There may be cases where one of the stakeholders has to do something a little more difficult than before; however, this can be acceptable if the result is much bigger efficiencies with the other stakeholders.

By fully developing the requirements and following them through design, the integration should be easier and more stable. This must be followed by solid testing and burn-in testing prior to acceptance and full operation.

Maryland   Using a top-down approach for project execution during coordination activities is always a good practice to address tasks. Maintaining relationships with upper management helps with communicating the benefits of a specific project deployment and encourages greater participation and cooperation. The CHART board also facilitates this. The method used for project implementation and quality control depends on the type of project and agency SOPs. CHART also uses a systems engineering approach to manage/monitor a project's life cycle.

Wisconsin   WisDOT TIME Program/STOC: Regular stakeholder involvement and interaction help ensure that the system and integration techniques are understood and useful for outside agencies.

WisTransPortal/ATMS TIM Software: InterCAD is based on the IEEE 1512 ITS standard for Emergency Management Center data exchange[67]. InterCAD transforms native CAD message sets into IEEE 1512 prior to transmission to the STOC. InterCAD includes an automated e mail alert system that sends hourly notifications to TOPS, STOC, and agency staff in case of system or transmission failure. InterCAD and TIA both archive data in the WisTransPortal for subsequent research and analysis purposes.

The TIA incorporates the existing agency State Trunk Network GIS Linear Referencing System to locate traffic incidents. InterCAD GIS support is more limited due to the nature of incoming agency CAD messages; however, locating InterCAD events to the STN remains an important project objective.

---

[67]   IEEE 1512-2006 – IEEE Standard for Common Incident Management Message Sets for Use by Emergency Management Centers, IEEE Standards Association, http://standards.ieee.org/findstds/standard/1512-2006.html

The WisDOT ITS architecture captures all three systems. In all cases, stakeholder involvement is critical. This includes both business process development and technical involvement during design, implementation, and deployment.

How did you define the data that should be exchanged and when?

Illinois   Focused design meetings and interfacing definitions with consideration for each system's software architecture. The overarching goals were to be real-time and complete and to support TIM activities and reporting while not diminishing the CAD Dispatch System's performance or accuracy. In addition, because national standards were neither available nor mature relative to data structure, both vendors had to use the data that was already available from each system.

Maryland   The nature of the event determines the data to be exchanged. Traffic incident-related information is shared between both agencies. However, the LE officer on duty determines whether LE-specific information is shared (not in real time).

The MSP deployed a CAD system in late 2013. Sometime in the next two years, roadway "events" will be exported from the CAD, passed through the RITIS, and imported into CHART as an "external" event. MSP has expressed an interest in importing CHART data and video, which are already available to it through RITIS. The details of the specific data to be exchanged in the future have not yet been defined.

Wisconsin   WisDOT TIME Program/STOC: The selection of data to exchange between TIME/STOC and the stakeholders was based on identifying what would be most pertinent to others and what would aid discussion and further outreach and coordination efforts. The TIME Program shares information on specific incidents during TIME meetings and after-action reviews. Some of the data shared includes incident timelines, noted response agencies, information shared with the public and, where available, clips of incident videos.

WisTransPortal/ATMS TIM Software: The InterCAD data exchange was defined primarily based on the STOC control room's requirements and capabilities. Available data elements from the agency CAD were also considered, although in some cases (e.g., lanes affected), fields are defined in the InterCAD XML message set that is not generally available in the source CAD system. The InterCAD data model itself is based on the IEEE 1512 standard, which provides standard representations of data elements and structure to the data exchange process. TIA incident alert notifications and media releases were developed by combining and enhancing prior notifications sent by STOC and WSP. This process involved several coordination meetings between TOPS, STOC, and WSP. The WisDOT Office of Public Affairs also provided guidance. The TIA alert notifications are

subject to ongoing review and are modified as needed. Link traffic cameras tours are added based on ITS deployment schedules.

How does LE bring information into the TMC geographically and vice versa (e.g., district/state/region wide or latitude/longitude (lat/long) state plane co-ordinate system)?

Illinois   District/state/region wide—Information from within the district is brought in through CAD events generated for Dispatch through calls from the public, from field units and plazas, and the like. Information from the region is brought in through police dispatch centers to our dispatch center and from police outside the district to our center. That information is entered into CAD and automatically sent to TIMS if the traffic-impacting criterion is met. Expanding our geographic base enabled both TIMS and CAD to create events in locations outside our geographic jurisdiction.

Lat/long, state plane coordinate system—The CAD Geo System was built on a State Plane Coordinate System using MapInfo[68]. The TIMS System Geo Files were developed from a NavTeq Maps[69] database using lat/long. Both systems related location to milepost, so the users only need be concerned about milepost, route, and directions.

Maryland   District/state/region wide—As mentioned earlier, a real-time exchange of LE data does not exist. However, the TMC receives incident information from LE in a number of ways, including snap-page messaging/text messages to CHART Operations and the Web Emergency Operations Center (WebEOC). Operators on duty also monitor LE radios/scanners. Through these lines of communication, CHART receives statewide and regional updates on incidents/events related to fatalities, road closures, prison escapes, and other activities (e.g., special events) that affect the "health" of the state's highway network.

Lat/long, state plane coordinate system—The current TMC/LE arrangement does not employ the above coordinate system. However, future integration efforts will use lat/long data.

Wisconsin   District/state/region wide—InterCAD currently incorporates CAD XML messages from all seven WSP regional dispatch centers ("posts"). Waukesha, Milwaukee and Dane Counties were added in late 2012. STOC staff also use radio and phone communication to coordinate TIM activities with public safety agencies.

Lat/long, state plane coordinate system—InterCAD relies on information provided by the agency CAD systems. Locations are given in terms of a

---

[68]   MapInfo, Pitney Bowes Software, http://www.mapinfo.com/
[69]   NavTeq Maps, NavTeq, http://www.navteq.com/

mainline and cross-street or milepost description and, more recently, with GPS coordinates. STOC operators manually snap incident locations to the ATMS control room map, which is based on the WisDOT State Trunk Network GIS linear referencing system. The TIA incorporates the WisDOT STN for locating incidents to GIS. The STN is based on the state plane coordinate system; however, locations are readily translated to lat/long through pre-computed reference points. TIA GIS locations are stored for planning and analysis but are not used directly for the incident alert notifications.

How does your agency share information with LE and vice versa?

Illinois

Legal issues (i.e., nondisclosure agreements, privacy policies, and sensitive information)?

The issue of transfer of sensitive data generated through LE databases (e.g., NCIC) that might be attached to incidents being transferred from the CAD system to TIMS was overcome by the use of a filtering character so that TIMS does not see sensitive data. Additional filters ensure that TIMS receives only those incidents that have the potential to impact traffic. Because TIMS does not see administrative or investigative-type incidents, this helps LE maintain the confidentiality of those portions of its operation.

Any traffic-impacting incidents sent to the regional ATIS contain only location, type of incident, and basic incident information. No LE information other than the fact that they are on the scene is broadcast to the public through these incident portals.

How does your agency address the differing coding provided by LE?

All TIMS, Maintenance, and other Tollway units are trained in the use of approved 10 codes, although the entire operation has moved toward the use of plain language. Event types do differ between TIMS and CAD. Incidents sent from CAD to TIMS are converted through a table into a valid incident type that TIMS can use. CAD converts incidents that TIMS sends to it to the incident type TIMS EVENT. The CAD operator reviews the event and assigns it the appropriate CAD incident type.

How do differing standards and interoperability come into play with the differing agencies?

Communications Interoperability in Illinois is at a very advanced level. Illinois has a statewide radio communications system (Starcom21) that is used by ISP, IDOT, and the Tollway. The system has common channels in all state-owned and most other agency radios.

Illinois has the Illinois Radio Emergency Assistance Channel, a common VHF channel that is installed in nearly every public safety radio in the state. The Tollway uses the Illinois Radio Emergency Assistance Channel (IREACH) to coordinate responses with Fire Departments operating on or near the Tollway.

Relative to data, both vendors used what was available to them and found appropriate solutions, regardless of the existence or lack of standards.

Maryland

Legal issues (i.e., nondisclosure agreements, privacy policies, and sensitive information)?

Nondisclosure agreements, privacy policies, MOUs, and SOPs govern how both agencies share information and help identify roles and responsibilities. Coordination with, and through, agencies such as the Maryland Coordination and Analysis Center[70] aids in the proper handling of enforcement and sensitive information. The center coordinates federal, state, and local agency efforts to gather, analyze, and share intelligence information with LE, public health, and emergency response personnel. However, as mentioned earlier, CHART only provides support to enforcement activities through traffic management.

How does your agency address the differing coding provided by LE?

Since our TMC/LE integration is not real-time, the program does not encounter issues associated with coding. No direct sharing of ITS systems currently exists.

How do differing standards and interoperability come into play with the differing agencies?

Differing standards have not yet come into play. Once the program moves forward with its plans to facilitate the real-time exchange of LE data, an investigation of the applicable standards will be conducted.

Wisconsin

Legal issues (i.e., nondisclosure agreements, privacy policies, and sensitive information)?

WisDOT TIME Program/STOC: All video used during TIME meeting incident debriefs or after-action reviews are available for use by LE agencies. A policy has been developed that regulates the distribution of full video clips captured at the STOC. If the video has been archived, it can be distributed to outside agencies and the public after WisDOT BTO management has reviewed and approved the request.

---

[70]   Maryland Coordination and Analysis Center, http://www.mcac.maryland.gov/

WisTransPortal/ATMS TIM Software: A formal MOU between WisDOT BTO, WSP, and UW-Madison TOPS Lab has been developed for InterCAD and is pending final sign-off. This MOU governs data ownership, data archiving, and system responsibilities. The InterCAD online data-retrieval facility is password protected and includes administrative features to redact private information that may have been transmitted in error. In general, only traffic incident-specific attributes from the transformed IEEE 1512 XML are archived. Personal and vehicle information from the source agency XML is not retained. Since TOPS Lab is a part of a public university working as an agent of WisDOT, there has not been any need so far to develop formal nondisclosure agreements to work directly with the CAD vendors.

How does your agency address the differing coding provided by LE?

WisTransPortal/ATMS TIM Software: InterCAD translates agency CAD XML from the native CAD format into IEEE 1512 prior to subsequent processing and transmission to the STOC event manager. The translation components are handled by custom XSLT files that are developed during the specific agency integration process. The InterCAD system is designed to add additional agencies/XSLT translation files through the configuration settings (rather than modifications to the core source code). WSP provides CAD messages in Global Justice XML format,[71] resulting in a standards-to-standards transformation process within InterCAD. County CAD systems generally provide custom, proprietary formats.

How do differing standards and interoperability come into play with the differing agencies?

WisTransPortal/ATMS TIM Software: As described above, each agency typically provides CAD XML in a different format. The WSP message sets are based on Global JXDM; however, newer county CAD systems do not appear to follow a specific standard. The InterCAD system requires certain base data elements and defines three http/web service upload interfaces. CAD messages must also be provided in XML format to use the existing XSLT transform process to convert to IEEE 1512.

---

[71]   Information Technology Initiatives, U.S. Department of Justice – Office of Justice Programs, https://it.ojp.gov/jxdm/

Operational Issues

Identify any key success factors that should be met to maximize the likelihood of the success of your program and any measures to take these into account.

Illinois   People are key to any large program, especially when it involves major changes to how people operate. The people who plan, implement, and run a multidiscipline TIMS center should be people who:

- Can see the overall picture and how it should unfold over time

- Will advance the needs of their agency to make sure they are met, but not to the point of dominating the project

- Are able to balance potentially competing needs to come up with the best overall program

- Get along with others—most importantly!

Maryland   Although the CHART program's incident notification is near real-time, which is in itself a success factor, the agency constantly strives to improve how it handles the life cycle of incident operations. To address this, the incident timeline is used to assess performance and includes:

- An analysis of the time the incident actually occurs

- When it is detected

- How long it takes to respond

- How resources are managed

- How long it takes to clear the roadway

This analysis, which is done by the UMD, provides the agency with information related to best practices and ways to reduce incident durations.

Wisconsin   WisDOT TIME Program/STOC: To maximize the success of the TIME Program, ongoing coordination with response agencies is essential. WisDOT works with and regularly communicates with agencies through meetings. Regular participation from and support of response agencies is the only way to effectively expand the TIME Program and ensure that a consistent message is being conveyed statewide. Bringing for new TIME Program initiatives and regularly informing stakeholders of STOC activities promotes participation and shows joint information sharing. Continuing support from WisDOT BTO and WSP ensures that the program will succeed. Internal meetings to review the TIME Program initiatives and identify priorities are essential.

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

D-35

What do you consider some of your best tools/strategies/insights in promoting your program with the effective integration of LE and associated TIM?

Illinois
- Bridge institutional barriers without attacking individual identity
- Develop complementary procedures that foster win-win scenarios
- Seek early successes to build on
- Share success between involved parties
- Reinforce the 3 C's and the 3 E's through ongoing committee participation focused on safety, mobility, and efficiency

Maryland
Agency coordination to address education about the benefits of the TIM/LE integration can be referred to as one of the best strategies to promote the program. As mentioned, this is done via participation in regional coordination activities and public outreach using agency websites and other media outlets. CHART board meetings also serve to provide insight/updates associated with current or future initiatives.

One of the tools we use to promote the benefits of the program is the aforementioned annual performance evaluation, which provides information on the benefits (e.g., reduction in delays and user cost savings) of CHART Operations.

Wisconsin
WisDOT TIME Program/STOC: We conduct regular TIME meetings with consistent stakeholder involvement/interaction, distribute outreach materials to response agencies and the public, and present TIME and STOC information at statewide conferences.

WisTransPortal/ATMS TIM Software: We combine data exchange discussion with statewide fiber network (ITSNET) coordination, take advantage of TIME Program branding and presentation opportunities, and develop performance measures reporting.

What type of system training was involved in the integration of LE and TMC?

Illinois
Little—the integration brought the data in to each system in a manner that requires little custom use.

Maryland
System training involves instructions related to setting up user accounts, logging in, and accessing operations information (e.g., incident information, basic closed-circuit TV [CCTV] video viewing capabilities) from the CHART network. The CHART Systems Integration Team routinely provides this to CHART workstation users.

Wisconsin	WisDOT TIME Program/STOC: WisDOT's Emergency Traffic Control and Scene Management Guidelines train-the-trainer course is recommended for all responders, including LE, dispatchers and WisDOT staff.

WisTransPortal/ATMS TIM Software: Two TIA webinars were provided at deployment. STOC operators and WSP dispatchers also had (and continue to have) the opportunity to use the TIA test site for hands on training. InterCAD business process coordination is included with annual WSP training events. TIA and Link are discussed at local TIME program meetings and train-the-trainer events.

What are your documentation and administration procedures for integrating LE and TIM?

Illinois   Interface definition document

Maryland   Currently, documentation for administrative procedures is limited to SOPs for CHART Operations and special orders for LE/MSP for coordination and communications protocol; no actual data exchange agreements currently exist. However, additional documents (e.g., privacy policies and MOUs) will be required for the proposed real-time exchange of LE data, which may include sensitive information.

Wisconsin   WisDOT TIME Program/STOC: A formal request for copies of video captured at the STOC must be made to BTO. WisDOT then reviews the request and determines if the request meets set criteria for allowed video distribution.

WisTransPortal/ATMS TIM Software: An InterCAD Integration Guidelines document is provided to agencies at the start of integration discussions. This document covers high-level concept and technical details of the integration process, data requirements, and interfaces. Prior versions of this document have been included in agency CAD requests for proposals.

InterCAD integration generally involves initial high-level business process meetings between TOPS, STOC, and the agency. During implementation, TOPS works directly with the CAD vendor or agency IT staff. Testing, deployment, and maintenance plans are worked out during the integration process. The TIA includes a user manual that is linked to the online system. Media, local government, and others sign up for TIA notifications through an e mail request. These stakeholders learn about the TIA through a variety of ways.

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

D-37

Are there specific ancillary tools/strategies that would bolster your implementation strategy with regard to TIM, such as traveler information, verification, dispatching, and quick clearance/recovery methodologies?

Illinois   Operational improvements need not be delayed pending technological advancements. In the case of the Tollway, several integrated operational approaches and strategies were implemented prior to the development of the Tollway's first TOC and its integration to the CAD system.

- Traveler Information: Traveler Information is important, and the Tollway benefited by having the Gateway ATIS already in existence when the TOC–TIMS was built. This facilitated easy integration of Tollway travel and performance data into the regional ATIS and displayed on the Travel Midwest[72] website. TIMS automatically generates DMS messaging based on integrated response plans. The traffic technician need only approve the messages.

- Verification: Prior to TIMS, incident verification required the on-scene presence of a trained Tollway/ISP representative or two identical independent reports of an incident. Once in operation, we found that TIMS could confirm accurately and quickly the existence of incidents and, in some cases, more accurately identify an overheated vehicle that was reported as a car fire and vice versa. This quick verification/confirmation enables the Dispatch Center to accurately and quickly dispatch resources as needed.

- Dispatching: Central dispatching of both public safety and transportation by one dispatch center provides all telecommunicators (i.e., dispatchers) a broad understanding of both LE and transportation roles and responsibilities at incident scenes. Common communications platforms (e.g., radio and data) among all involved agencies would further enhance this. It can be as simple as shared radio channels and common e-mail lists to statewide radios systems, dispatch centers and TOCs.

- Quick Clearance/Recovery Methodologies: The existence of formal agreements covering incident responder activities of fire, ambulance, towing, and vehicle recovery achieved significant improvement in TIM response and on-scene coordination prior to the implementation of the TOC TIMS and subsequent integration of this system into CAD.

---

[72]   Travel Midwest , Lake Michigan Interstate Gateway Alliance, http://www.travelmidwest.com/lmiga/home.jsp

Maryland   All of these strategies are used for the agency's IM activities. These strategies are collectively employed during the IM life cycle, and lessoned learned during operations contribute to the enhancement of existing tools or approaches.

Wisconsin
- Traveler Information: InterCAD incident data that is activated in the STOC ATMS is automatically sent to the 511 Traveler Information system. WisDOT communication managers also use Twitter to provide further information and open two-way communication with the public. TIA is oriented toward the media, public safety, TIM responders, and other traffic management organizations.

- Verification: Incident verification is a challenge. In metropolitan areas, traffic cameras may provide capabilities. In the absence of cameras, STOC operators rely on InterCAD patrol car status information (e.g., dispatched and on-scene) or may need to call the agency or dispatch center for confirmation.

- Dispatching: Dispatch/communications centers are not all aware of the STOC or do not fully understand the purpose of calling information in to the STOC. Improved coordination with agencies that are not actively reporting incident information to the STOC would increase data reliability and assist with providing traveler information.

- Quick Clearance/Recovery Methodologies: Accurate GPS/location information is an important requirement. This is especially critical for incidents that are in outlying parts of the state that may not be familiar to STOC operators.

How is your TMC integrated with LE (or any other emergency response partner) now, and how does TIM fit into the integration role?

Illinois   This has been answered throughout this questionnaire.

Maryland   As stated earlier, MSP has access to the CHART network via workstations and the Internet. In addition to this, LE can access regional information from RITIS and CapWIN, which includes a one-way communication flow from CHART to the system.

LE agencies enter enforcement and incident information into WebEOC, which was designed to be a "one-stop shop" for emergency management data; CHART monitors this system. The agency's TOCs are also located at various MSP barracks, which also aids in coordination and communication.

Wisconsin   WisDOT TIME Program/STOC: Response agencies are encouraged to coordinate and communicate with the STOC for incidents that occur on the state highway system.

WisTransPortal/ATMS TIM Software: WSP has a full-time liaison staff person at the STOC who provides shared project management of WisTransPortal TIM software. Several counties have direct access to the WisDOT traffic cameras or aggregate camera tours via the fiber network (ITSNET). Other agencies use the Link system to access aggregated camera tours over the web. InterCAD currently integrates WSP CAD data into the ATMS control room software. We expect to add three counties (Waukesha, Milwaukee, and Dane) to the system in 2012. Waukesha is in final testing and is expected to go live June 2012; Milwaukee and Dane counties are expected to go live late in 2012. The Milwaukee County InterCAD integration represents an upgrade to an existing automated feed that has been operational since approximately 2004.

How do you address the continuity of your program's operations and maintenance?

Illinois For both CAD and TIMS systems, the Tollway required that the successful firm provide a proposal for long-term system maintenance and upgrades. On acceptance, the Tollway entered into multiyear agreements for CAD and TIMS Systems maintenance and upgrades.

Maryland The Annual Operations Budget (Fund 14) supports operations and maintenance (O&M) in the amount of $9 million per year. (See our answer on page 53 for more details.)

Wisconsin WisDOT TIME Program/STOC: We address it via regular review of the TIME program between WisDOT and consultant staff and with ongoing communication and coordination with our response partners.

WisTransPortal/ATMS TIM Software: TOPS Lab has ongoing WisTransPortal TIM software maintenance and enhancement contracts with BTO. For InterCAD, continuity, operations, and maintenance require ongoing coordination with existing public safety partners and the STOC ATMS vendor.

How did you address public safety collaboration in addressing your proposed integration with LE?

Illinois This was accomplished through the task force that guided the development and implementation of TIMS and the TIMS/CAD Integration.

Maryland The day-to-day activities of both agencies are driven by one fundamental principle: the safe and efficient movement of people and goods along the state's highways. This includes LE and the security of statewide infrastructure. This was the driving force of the cooperative effort.

Wisconsin WisDOT TIME Program/STOC: We promoted the benefits of collaboration to the

LE agency itself.

WisTransPortal/ATMS TIM Software: We addressed funding and implementation constraints, fostered management-level business process coordination at the start of the integration effort, and incorporated integration efforts into new system development projects (e.g., CAD modernization requests for proposals. It is much easier to integrate InterCAD during design and deployment of a new system than to retrofit the data exchange onto an existing system.

Were there any legislative (federal/state) requirements that needed to be addressed? If there were, how did you address them?

Illinois   No.

Maryland   It is federally mandated that all ITS projects follow a systems engineering analysis. As a result, a systems engineering approach is applied to all tasks throughout the project life cycle. In addition, all projects funded by federal dollars must conform to the Maryland Statewide ITS Architecture to promote regional interoperability and prevent the implementation of dead-end technologies.

Were any collaborative efforts being made on behalf of each party's typical governmental liaison (Department of Justice for LE, FHWA for the TMC)?

Illinois   No.

Maryland   Information related to any collaborative efforts by governmental liaisons to launch the program's TMC/LE integration is not available. However, the CHART program interacts with the FHWA's Delaware-Maryland (DelMar) Division[73] to obtain guidance on issues related to funding and/or U.S. Department of Transportation-mandated regulations, which may have an impact on the TIM/LE operations effort. This also includes systems engineering (SE) analysis and regional ITS architecture standards and requirements. The MSP liaison coordinates LE-specific issues and sits on the CHART board. The agency also coordinates with other state DOTs, MPOs, LE, and local government agencies to address operational issues affecting the NCR.

---

[73]   Delmar Division, Federal Highway Administration, U.S. Department of Transportation, http://www.fhwa.dot.gov/demddiv/

Performance Measures

What are the primary objectives from both the TMC's and LE's perspectives?

Illinois

LE's primary objectives, which parallel the Tollway's, are the safety of the motoring public and those using the Illinois Toll Highway System (e.g., all first responders). The TMC often allows first responders to gain valuable information prior to their actually being on the scene, which enables valuable resources to be requested expeditiously. The TMC is a great asset that allows for the timely clearance of all incidents that occur on the roadway. As a result, traffic delays are shortened and secondary incidents are significantly decreases. The less time first responders spend on the scene of an incident, the less chance they have of becoming personally involved in an incident, therefore increasing their safety. We want to reduce response times, reduce incident duration, and save lives, time, and money.

Maryland

The primary objectives from both the TMC's and LE's perspectives lie within the realm of incident notification and response. Although both agencies have different business practices, the common goal of clearing the roadway in a timely fashion creates a safe environment for operations personnel and the traveling public.

Wisconsin

- Reduce time lapse between incident occurrence and notification of the STOC

- Enhance coordination and communication among responding agencies

- Improve accuracy, reliability, and timeliness of incident data

- Enhance STOC capability to disseminate traffic incident information to the public, the media, and other stakeholders

- Improve on-scene TIM safety and operations

- Develop a traffic incident database archive

How did you address these primary objectives?

Illinois

We address them through education, traffic safety meetings, communication, and common goals. The very first thing that was done was establishing the relationship and providing each other support. Years ago, the Tollway started providing trucks with arrow boards (when one was available) to protect the state police when they were in a live lane. The state police saw the value of this protection and started asking for this protection all the time. Simple acts like this helped the relationships grow. Fire departments have always used their trucks to provide protection to the incident area. When the Tollway started responding with arrow board trucks and creating a protected incident zone (and

in some cases a formal lane closure), the fire departments saw that they could position their vehicles differently to better address the incident. By building the relationships and making everyone's job easier, all parties saw the value of integrating their systems and supported the overall project (without the need for specific performance measures).

Maryland   We used coordination efforts to address TIM/LE objectives and assess them by using performance measures and analyses that were developed based on best practices and lessons learned. The results of these analyses help the program operate more efficiently and enhance its existing services.

Wisconsin   WisDOT TIME Program/STOC:

- Developed WisDOT's STOC Annual Performance Measures Report and compiled data in 2010 and 2011, which allowed WisDOT to review information being compiled at the STOC and through the TOPS Lab

- Distributed performance measures information and a final report at regional TIME meetings, which allows responders to review how the data that comes into the STOC is used

- Proposed direct coordination with Milwaukee County Sheriff's Office to identify goals

WisTransPortal/ATMS TIM Software:

- InterCAD reduces notification latency through automated CAD-to-ATMS data exchange.

- InterCAD, TIA, Link, and 511 enhance coordination among responders.

- Incident data quality continues to be a challenge; however, automated data exchange with GPS locations provides an opportunity to reduce human error.

- InterCAD and TIA enhance STOC capabilities to provide data to 511, the media, other agencies.

- Better incident monitoring at the STOC via traffic cameras, InterCAD, and TIA benefits scene management and coordination.

- InterCAD and TIA data are archived in the WisTransPortal for subsequent research and planning.

How would you define a successful partnership with regard to TIM through the integrated communication between TMCs and LE?

Illinois   We would define it as saving lives, reducing incident impacts, and the desire to work together to accomplish more. The success between the Tollway and the ISP is evident in the reduction of incidents and crashes, improved system performance, and collaboration between the two operating entities. A common trust and mutual respect has evolved over several years.

Maryland   As previously mentioned, an operations environment where both agencies possess the ability to communicate in real time, with secure access to pertinent incident/emergency management data would represent a successful integration of LE with TIM. (See our response to the first question in this questionnaire on page 3).

Wisconsin   WisDOT TIME Program/STOC: We would define it as increasing information sharing between LE agencies and the STOC and setting goals through collaboration of WisDOT and LE agencies.

How is success measured in your program?

Illinois   Many performance measures are used internally and externally. None of them in particular is used above and beyond the others. However, the following are some of the measures that are more frequently referenced:

- Number of crashes

- Number of secondary crashes

- Incident duration

- Incident response time

- Incident clearance time

- Percent of incidents over 90 minutes in duration

- Congestion due to incidents

- Average lane blockage time

- Percent of time TIMS is first on the scene

Success is measured in overall reduction of traffic crashes with an emphasis on reducing personal injury and fatalities. Success is also measured in the reduction of incidents on the roadway involving first responders. The changes in education, engineering, EMS, and enforcement that have occurred as a direct result of the

current program are also important.

Maryland   We measure success by the objectives, performance measures, and strategies contained in the SHA business plan and the results of the CHART performance evaluation. Letters from the public—the state's customers—submitted through the agency's Customer Care Management System also provide information about the program's performance.

Wisconsin   WisDOT TIME Program/STOC we gathered baseline information for WisDOT's STOC performance measures report in 2010 and 2011. Specific performance measure goals were established in 2012 through further analysis of the previously collected data and that gathered in 2012.

WisTransPortal/ATMS TIM Software: Performance measures to show specific benefits from WisTransPortal TIM systems are still under investigation. WisTransPortal TIM software performance is tracked in terms of usage statistics and system availability. The Link system, in particular, is monitored for spikes in usage during weather events, for example, which provides a proxy indicator of perceived value.

How would you define effective performance-measurement data collection?

Illinois   The biggest keys are consistency and completeness. Make sure to maintain your data generators so there are no gaps. Continue to build more and expand your system to the point where you have some coverage (even if it is not as dense as you want) on the entire system. If you cannot get the data all in one database, at least have key fields where you can easily combine them later.

Maryland   Effective performance measurement and data collection is represented by the selection, tracking, and analysis of data that directly relate to agency priorities, objectives, and strategies. The data collected should provide information pertinent to the performance of the integration effort, with emphasis on the strengths and weaknesses of the program. This provides all parties involved with the opportunity to enhance existing services or make changes, where and when needed.

Wisconsin   WisDOT TIME Program/STOC:

- Accurate identification of additional response agencies

- Accurate roadway clearance times are provided to the STOC.

- WisDOT response personnel communicate incident information to the STOC.

WisTransPortal/ATMS TIM Software:

- Accurate location information is available, in particular the ability to locate incidents to agency GIS/linear referencing system.

- Accurate incident duration information is available, in particular the ability to measure incident response and clearance times.

- Traffic impact information is available, in particular the lanes affected.

- Incident history is available from incident occurrence to clearance.

- Information is available to link incident records to subsequent traffic information (e.g., to correlate an incident record to a follow-up lane closure due to a bridge hit, reconstruction activity, or vehicle recovery operation).

- Information is available to link incident records to other traffic datasets (e.g., work zone information, crashes, and EMS records).

- Information is archived in database format.

What performance measures should be included within integration of LE and Transportation?

Illinois   The result still needs to be response time, clearance time, and number of crashes. Related measures could be items such as number of DMSs used for crashes and time to notifying the media for major events—those measures that demonstrate how the transportation side is using the data more quickly. The LE side will show up in the primary measures.

Maryland   The performance measures to be included as part of any TMC/LE integration will depend on the proposed program's goals or objectives. The CHART program's objectives and performance measures revolve around safety and mobility, and a few examples of these performance measures are:

- Number of incident responses

- Average incident duration

- User cost savings

- Reduction in:

    - Incident response time

    - Incidents

    - Secondary incidents

Delay Performance measures used to analyze the incident life cycle (occur-

rence-detection-response-clearance) should also be included as part of TMC/LE integration efforts.

Wisconsin

- System performance: TIM system availability and usage in terms of long-term trends and during key events

- General statistics: incident occurrences by region/corridor, incident type, incident duration, incidents requiring WisDOT response, and work zone impacts to traffic

- Traffic and safety impact: lanes affected, arrival and clearance times, and agencies involved

- STOC analysis: time to distribute information, time for incidents to be reported to the STOC, and what agencies are reporting incidents to the STOC

- Data integration: incidents in or near work zones and other operational considerations

- Trend analysis: general statistics over time for given regions, corridors, and agencies

- Device reliability: device up-time and time to repair devices

- Traveler information: information provided via 511 system and DMS usage

What kinds of data analytics are performed to address performance of your integration and how you address communication and TIM?

Illinois   The proof is in the operations. The managers of the two centers work together daily. If something is not working, they address it immediately (if possible). Additionally, operations managers get together weekly to review various performance measures and discuss any of the previous week's incidents that may warrant some attention or modifications to operations. This is based more on comments from staff and issues addressed during incidents than it is on an extensive, back office study of the regression trends of a performance measure.

Maryland   UMD largely conducts data analysis of the program's performance. The analysis focuses on factors such as the number of incident responses, reduction in incident duration, and the potential of secondary incidents. The estimated benefits (e.g., user-cost savings and emissions reduction) of the CHART program and its operations are also included in the performance evaluation and other studies.

Wisconsin   The STOC generates a performance measures report with initial TIM measures. This report was enhanced in 2012 to include additional performance measures. Goals will be set for particular measures to begin identifying trends and perform

analyses.

WisDOT has developed a mobility, accountability, preservation, safety, and service dashboard that provides information on data and identifies goals for specific areas within all of WisDOT.

What information do you wish that you have, that you currently don't, that would help you to determine performance of your integration? What statistics does your agency maintain?

Illinois   Our system is already fairly mature. We have a good number of sensors. Our systems are integrated. We are already looking at numerous performance measures. We have several groups (internal and external) that review operations. It is less about what new information we need and more about how we can better use the information we already have.

Maryland   Our wish list includes LE CAD/AVL data, real-time exchange of LE-related emergency response data, and additional data/information associated with the incident life cycle to determine ways of enhancing operations activities to reduce incident duration. Refer to page 46 for a list of what SHA currently tracks.

Wisconsin   WisDOT TIME Program/STOC:

- Better reporting of data from outside response agencies

- Better knowledge of which agencies contact the STOC regularly

- Examples of statistics maintained: quantity of field equipment, traffic incidents, emergency transportation operations events, calls into the statewide incident notification system, WisDOT immediate priority calls requiring prompt response from WisDOT personnel, DMS usage, field device maintenance tickets, 511 usage, and travel lanes closed for maintenance or special events

WisTransPortal/ATMS TIM Software:

- Better data quality from CAD, in particular location information and lanes affected

- Better integration of InterCAD data with the WisDOT STN linear referencing system (related to the location information mentioned in the previous point)

- Multiple sources/human resources to cross-check incident data accuracy (e.g., InterCAD incidents versus traffic cameras versus detector data)

What is the defining metric with regard to success with regard to the expected project impacts of integration?

Illinois   The defining metric has to be a measure of improved operations. An initial study of incident response times before and after the CAD-TIMS integration showed a 24% to 40% reduction in response times. This became the impetus to move toward the more efficient handling of incidents.

Maryland   From an operations perspective, reduction in delay is the defining metric for TMC/LE operations. Addressing nonrecurring congestion contributes to a reduction in delay and, as a result, fewer incidents on the roadway, which has a number of safety benefits. Considering this, the agency is currently working on expanding its emergency operations to include all the major routes within the state. The agency's work on this task will provide a better picture of how many incidents occur statewide versus how many incidents the CHART program actually responds to and will help to determine how the agency conducts business in the future.

Wisconsin   One defining metric would be the number of incidents reported to the STOC. The STOC is typically notified of incidents by LE, and increasing this number indicates that LE agencies are more willing to share information with the STOC and better understand the benefits of this collaboration.

What "lessons learned" feedback have you found within your agency?

Illinois   Establishing and maintaining relationships between transportation and LE (i.e., State Police) is most critical to success. These relationships must be at all levels, from command staff to patrol trooper and from managerial/supervisory to the equipment operator who responds to an incident with an arrow board. This relationship core then must be expanded to include all external incident responders: fire, ambulance, towing, recovery, coroner, and potentially others. Internally, a relationship must be maintained between traffic, dispatch, communication, and other operating entities within the agency to facilitate communication, cooperation, and coordination when major incidents occur.

Maryland   Apart from the valuable information gained from technical performance measure data, the CHART program prepares "after action" assessments of coordination during IM and special events, which helps to find new ways of improving its services. In addition, as previously mentioned, the agency gets feedback from other agencies and the public through CCMS.

Wisconsin   WisDOT TIME Program/STOC: We want to continue promoting coordination between WisDOT and outside agencies. We have found that end users do not understand the purpose of performance measures.

WisTransPortal/ATMS TIM Software: InterCAD integration is best conducted as part of a new CAD modernization project. Many CAD vendors have not implemented CAD-to-ATMS data exchange processes, although CAD-to-CAD exchanges are becoming more common.

Providing clear and complete data and interface requirements is helpful. CAD dispatcher and STOC operator requirements are not the same. For example, CAD systems do not generally capture lanes affected information.

Business process meetings are important to discuss objectives and potential training requirements for effective data exchange. TIA end users occasionally complain about information overload. Link end users often request access to individual camera feeds.

How would you rate the safety benefits of the following on a scale of 1 (highest) to 5 (lowest): public safety, data sharing, reduction in accidents/incidents, delay savings, and traffic throughput?

	Illinois	Maryland*	Wisconsin
Public Safety	2	1	1
Data Sharing	5	5	3
Reduction in accidents/incidents	1	2	1
Delay Savings	3	3	2
Traffic Throughput	4	4	3
*A key element that is not shown relates to the safety of operations personnel, which would be ranked as a 2, after the highest priority, which is public safety.			

How do you document your system component of performance?

Illinois   Based on data provided by CAD-TIMS, reports are generated weekly, monthly, quarterly, and annually. Weekly reports track basic elements such as the number of incidents and crashes, response times, and lane-blockage clearance times for personal injury and property-damage only. Monthly reports to the executive director report on numerous performance factors well beyond incident management. The TOSC subcommittee reviews monthly speed and crash data reports to consider enforcement and maintenance strategies. A quarterly report is sent to the governor's office on transportation technology innovation, delay, and congestion percentage. Annual reports are produced and analyzed for longer-term trends.

Maryland   As a cooperative program, CHART documents its activities as part of an incident/event timeline. This documented timeline includes when the incident

occurs, when it is actually detected, response time, resources on the scene, and the event's overall duration. This, in addition to the agency's technical and research efforts, is used to evaluate the performance of operations coordination and communication.

Wisconsin   WisTransPortal/ATMS TIM Software: WisTransPortal TIM software system statistics (usage and availability) are collected monthly. The STOC is generates a monthly performance measures report that includes TIA history. Archived InterCAD data is not used at this time for performance measures.

How does LE document its performance?

Illinois   Since District 15 is a department at the Tollway, it has a dual reporting requirement. It is held to internal Tollway performance reporting and separately must report to the Department of State Police. A primary focus of the ISP on Illinois roadways is to decrease traffic fatalities.

Maryland   Currently, MSP has no internal means of documenting performance in regards to response times, roadway closures, and lane clearance. MSP relies on CHART and UMD to analyze data and provide an overview of performance. MSP is currently in the implementation stage of a new statewide CAD/RMS that, when fully functional, will have the capabilities to better document performance.

Wisconsin   Not sure.

Define the significant benefits realized from this multiagency cooperation.

Illinois   In general, it is in the continuing evolution of our working relationship. We are collectively able to address operational concerns big and small—from simple signing improvements and modifications to enforcement, to large system-wide programs. The benefits are seen in the reduction of crashes and congestion, and improvement of safety, mobility, and speed of response and reduced clearance times. Integrated dispatch and interoperable communications using the Starcom21 system (for Tollway, State Police, and towing) and the IREACH channel (Tollway and fire) support much quicker transfers of accurate information than most agencies normally see. This translates to faster response times and reduced incident times.

Maryland   A number of significant benefits are realized from the program's operations, which, as mentioned before, include information related to, for example, reduction in incident duration and reduction in delay. Statistics (by calendar year) commonly reported by our agency are available in the following tab

Measure	Calendar Year								
	2001	2002	2003	2004	2005	2006	2007	2008	2009
Assists	16,274	19,062	20,455	21,412	20,681	23,290	20,790	19,045	17,820
Incident Responses	9,313	13,752	18,068	19,127	20,515	16,883	16,962	15,296	16,435
Total Assists & Responses	25,007	32,814	38,523	40,539	41,196	40,173	37,752	34,341	34,255
Response Time (Min)	13.84	13.10	11.5	11.38	11.47	11.51	11.62	9.84	9.91
Avg. Incident Duration (Min)	29	28	40	38	21.9	22.9	25.1	24.9	28.4
Detection by SHA Patrols (%)	64.9	54.1	50.9	52.5	51.2	54.2	51.4	39.0	39
Detection by Police (%)	28.7	29.9	28.3	25.8	26.5	25.2	25.6	19.0	21
Reduction in Secondary Incidents	1,136	720	695	468	742	835	749	783	839
Reduction in Delay (million veh-hr)	25.8	30.0	26.8	25.9	28.7	37.5	36.0	31.7	32.4
Annual User Cost Savings ($Billion)	0.403	0.468	0.527	0.518	0.864	1.092	1.119	0.981	1.006
Fuel Consumption Savings ($Million)	4.35	5.06	5.39	4.38	9.68	12.67	17.37	20.98	16.67
Savings due to Emissions Reduction ($Million)	28.43	33.04	35.21	28.59	41.11	41.37	39.66	36.24	37.06

CHART Summary of Stats

Wisconsin   The benefits include:

- Response agencies are beginning to be aware of the benefits of coordination with the STOC.

- Additional information is being shared between the STOC and external agencies.

- Internal operations in the control room are improving.

- They will lead to the identification of goals to improve the system, mobility, and dissemination of traveler information.

What were your expectations prior to initiating an overall integration with your TMC/LE and with the resultant TIM?

Illinois   We expected positive results.

Maryland   As previously mentioned, a full-scale/overall integration of TMC/LE operations has not yet occurred. However, agency expectations revolved around efficient highway operations, with emphasis placed on safety and mobility through enhanced agency coordination, cooperation, and communication.

2010
19,299
16,945
36,244
10.15
27.6
20
9
N/A
41.65
1.375
28.37
47.94

Wisconsin   We expected:

- Improved communication, coordination, and relationships between the STOC and LE

- Improved quality and quantity of data recorded at the STOC

- External agencies to have better knowledge of the benefits of the STOC

- Improved STOC control room operations

Can you briefly describe the positive or negative safety attributes of the following:

- **Improvement of mobility**

- **Personnel safety**

- **Training**

- **Education of the public**

- **Reduction in clearance times**

- **Enhanced documentation of the IM procedures**

- **More timely and accurate incident information**

- **Reduced traffic congestion**

- **Reduction of secondary incidents**

- **Reduced response times**

Illinois   Improvement of Mobility—Reductions in nonrecurring congestion caused by incidents improves system throughput and enhances mobility. In addition, a high level of accurate information communicated to customers can improve their driving behavior; however, this is difficult to quantify and measure.

Personnel Safety—Dispatching of resources can occur quickly and accurately. Responder safety is enhanced by:

- Positive on-scene traffic control guidance by the transportation agency as initial primary responsibility (as opposed to LE or fire/ambulance setting traffic devices or closing more lanes than needed to protect the scene)

- Using devices such as arrow boards and message boards that are far more effective (and safer) than cones, spotters, or the array of flashing lights on various response vehicles that distract, but do not guide.

Training—Consistent training and retraining of all responders results in all on-scene personnel clearly understanding each other's role and provides for

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

D-53

efficient handling of incidents, reducing on-scene time (and therefore exposure), thereby enhancing safety. Additionally, reduced incident and distraction reduces the spawning of secondary or tertiary crashes. Through the network of CCTV cameras, many incidents can be viewed and evaluated to identify dysfunctional on-scene behavior, allowing training to be focused and timely.

Education of the Public—TMC communication to the media and other agencies during incidents, as well as direct communication with motorists through DMSs, keeps the active traveler and general public aware of incidents that may impede their travel. Motorists can make educated travel decisions to use an alternate route or alter their driving behavior due to a known condition ahead. This has a direct impact on reducing traffic backups, reducing secondary crashes, and enhancing incident responder safety. The Tollway displays travel times on all DMSs as a default message. This regular communication to the motorists creates a level of expectation and awareness among drivers.

Reduction in Clearance Times—For every minute a live lane is blocked, the resulting congestion (i.e., recovery to normal) can range from four to nine minutes. Clearing lanes quickly can directly reduce queues and resulting congestion.

More Timely and Accurate Incident Information—This leads to more accurate and timely messaging to customers, which in turn can result in improved operator awareness and altered driving behavior and reduced secondary crashes or increased speeds through the area of congestion.

Reduced Traffic Congestion—Both the travel time and buffer indexes have been reduced after completion of the Congestion Relief Program. It is difficult to separate the reduction due to capacity improvements from the reduction due to improved operations and IM.

Reduction of Secondary Incidents—Secondary crashes on the Tollway have been reduced from 25% in 2002 to less than 5% in 2011. This is a significant reduction and safety improvement when you consider that statistically, secondary crashes are more severe in terms of injury, than primary crashes.

Reduced Response Times—As noted earlier, post-TIMS-CAD implementation resulted in an initial 24% to 40% reduction in response times to incidents. Response times have continued to decline, particularly when TIMS cameras are available to confirm the nature of the incident.

Maryland   Improvement of Mobility—Improved mobility is a sign of reduced congestion, which may be a result of a reduction in incidents, and indicates that driving conditions on the state's highway system is safe and efficient. Improved mobility

also has economic and environmental benefits.

Personnel Safety—Incident reduction contributes to personnel safety as field operations staff spend less time in vulnerable locations (e.g., busy highways and intersections).

Training—Cross-training contributes to staff education and efficient operations, making the working environment (e.g., incident scene) safer for personnel and the public at large.

Education of the Public—Public education programs help to relieve driver frustration and reduce incidents that occur due to nonrecurring congestion. This also contributes to fewer secondary incidents, which can result in a safer operations environment for all.

Reduction in Clearance Times—Reduced clearance times restore the highway system to normal operating conditions and produce similar safety benefits to the previously listed items.

Enhanced Documentation of the IM Procedures—The documentation of IM procedures helps operations staff to quickly formulate IM strategies and solutions. Examples of these documents include freeway incident traffic management plans and agency SOPs.

More Timely and Accurate Incident Information—Traveler information dissemination can significantly reduce the impact of incidents on mobility and safety. Timely information provides participating agencies, the media, and road users with information related to, for example, the severity of events, status of highway operations, and possible detours.

Reduced Traffic Congestion—As previously mentioned, reduced traffic congestion would result in fewer incidents and secondary incidents, which makes the roads safer for travelers, as well as for agency staff.

Reduction of Secondary Incidents—The reduction of secondary incidents through efficient operations and traveler information dissemination, like the other factors discussed above, has significant safety benefits.

Reduced Response Times—As previously mentioned, reduced response and clearance times help to reduce the occurrence of secondary incidents/accidents and contributes to safety on the highway system.

Do you perform a self-assessment or evaluation of your TIM practices as promoted by the TMC/LE integration?

Illinois   Internally, we review performance on all incidents weekly. We discuss operational concerns monthly, both as a large group and as a smaller group focused on incidents. Any identified issues are addressed immediately.

Maryland   As stated earlier, the assessment of the CHART program's TIM operations is done via an independent evaluation, which UMD conducts annually. This evaluation assesses the benefits of CHART operations to the state of Maryland in terms of calculated user cost savings and reductions in delay, secondary incidents, and emissions. UMD has worked with CHART for the past 11 years to produce this performance evaluation.[74]

Wisconsin   The TIME Program and its stakeholders complete the FHWA TIM self-assessment annually.

Resources

What type of funding was used to establish your program?

Illinois   The third-generation CAD redevelopment and the TOC-TIMS development and implementation were both capital initiatives, recommended by the Maintenance & Traffic Division of the Engineering Department, and approved as part of the annual budget process.

Maryland   The funding used to establish SHA's CHART program was obtained from a combination of federal and state sources. The main source of funding for CHART is allocated to the program through Maryland DOT (MDOT) CTP and the related CHART Deployment Plan. MDOT releases the CTP yearly, and it includes ongoing and future capital investments for all modes of transportation for the next six-year period. The Office of CHART & ITS Development, being part of MDOT, is responsible for contributing its portion of the six-year capital investment program within the CTP.

ITS projects/deployments to be funded through the MDOT CTP are taken from the agency's strategic planning documents and are presented in the CHART Deployment Plan. This plan is completed prior to the end of each fiscal year (June 30), when funding is allocated to the CHART program through the MDOT CTP. Each year, CHART uses the Deployment Plan to augment the identification of ITS deployments to receive funding for the next six years. Its primary purpose is to document detailed information on CHART projects to receive funding through the CTP. As a result, the CHART Deployment Plan

---

[74]   CHART 2013 Evaluation, SHA/CHART Input and Analysis, http://chartinput.umd.edu/

directly coincides with the CHART projects for the MDOT CTP.

Project information within the Deployment Plan is organized into three funding categories. These categories are as follows:

- Fund 86—The Fund 86 category is the CHART program's major capital program funding source. It supports ITS field deployments, planning and development, and network O&M tasks. This is also the source of funding for the MSP liaison, who facilitates the coordination of TMC/LE-related operations activities.

- Program 8 (CHART Major IT Capital Projects)—This category supports all the activities used to design, build, test, and accept modules or releases of the CHART operating system as identified in the multiyear CHART Business Area Architecture.

- Program 3 (CHART Federal ITS Projects and Grants)—This category provides "pass-through" funds for federal ITS projects allocated to local ITS programs and agencies through MDOT and MD SHA.

Fund 86, Program 8, and Program 3 combined are referred to as the CHART Capital Program, which is a budget based on CTP allocations and CHART Operations/Network Development.

The TOCs, mentioned earlier, are supported by the state's Annual Operations Budget (Fund 14), which covers the costs associated with staffing, equipment, incident/emergency response, and device maintenance costs.

The MD SHA also receives federal funding for ITS deployments from the following sources:

- Department of Homeland Security (e.g., Urban Area Security Initiative grants)

- American Recovery and Reinvestment Act (stimulus project grants)

- Funding for the I-95 Corridor Coalition, of which MD SHA is a member

- Funding opportunities published in the Federal Register (not guaranteed)

Wisconsin   The WisTransPortal, including InterCAD, Link, and TIA, were developed primarily through federal ITS earmarks. Ongoing O&M is through a combination of federal and state funding sources.

How are the projects programmed in respective planning documents (e.g., Transportation Improvement Plans)?

Maryland   Leadership determines the direction in which the program heads. This leadership is the CHART board, which is composed of officials from federal, state, county, and LE agencies. The board determines what the program's priorities should be, and ITS projects are developed to support these priorities or objectives. ITS projects are then included in the agency's strategic planning documents for deployment and/or implementation.

What type of funding is used to keep the program operating?

Illinois   IM is accomplished by numerous entities within the Tollway, most noticeably the Maintenance and Traffic Division. This and other activities are encompassed within several cost centers that comprise the division's $50 million operating budget.

Maryland   As previously mentioned, the state's annual operations budget (Fund 14) supports the program's operations cost. The CHART program's current operations budget is $9 million and includes funding for the agency's operations staffing, device maintenance, and incident/emergency response, patrol, and other coordination.

Wisconsin   Ongoing WisTransPortal TIM software O&M is funded through remaining federal ITS earmarks and a combination of federal and state funding sources.

How are funding splits determined between the agencies?

Illinois   The program described herein is wholly funded by the Illinois Tollway

Maryland   The current LE arrangement does not requires funding splits between SHA and MSP. The CHART program is a cooperative effort among agencies (MD SHA, MDTA, and MSP) and is supported by the funding sources mentioned previously (see page 56).

Wisconsin   WisTransPortal/ATMS TIM Software: WisDOT BTO is the primary sponsor for InterCAD, Link, and TIA. For InterCAD, agencies are responsible for implementing the CAD XML export and transmission to the WisTransPortal. As such, it is generally more cost effective to include this integration with a new CAD modernization project.

Are agencies allowed to "soft" match with their own staff time instead of the "hard" match?

Illinois   Not applicable.

Maryland   The Office of CHART & ITS Development does not practice this kind of match

(soft versus hard). Labor costs are built into the annual operations budget to cover staff time.

How are future expenses predicted and budgeted into the program?

Illinois   The Tollway entered into multiyear maintenance and upgrade contracts with the CAD vendor and TIMS systems integrator to provide daily operating support and maintenance. These agreements provide a mechanism to issue task orders to each for the system enhancements and upgrades the agency determines are desirable. Such upgrades or expansions are typically funded by a capital account that undergoes annual scrutiny and approval.

Maryland   Refer to our answers beginning on page 56; they identify the agency's funding sources, budget, and priorities based on leadership direction and oversight.

What is the budgeting planning horizon?

Illinois   The Tollway adopts both O&M and capital budgets annually. Special program budgets are defined over multiple years depending on the program, for example:

- The Congestion Relief Program ($5.8 billion) began in 2005 and will conclude in 2015.

- The Move Illinois Program began in 2012 and will extend through 2026 with total budget expenditures of $12 billion.

- By trust indenture, the Tollway is required, at minimum, to develop and approve a 10-year capital improvement program.

Maryland   There are no current plans to increase the budget used to support the agency's LE integration activities. However, plans to enhance the amount and type of data being exchanged between SHA and LE agencies do exist and will be addressed through the development of ITS projects under the guidance of the CHART board.

Wisconsin   WisTransPortal TIM software maintenance contracts generally have two-year durations. TOPS started a new contract in September 2012 that covers O&M costs through most of 2014.

Is there a joint business plan for the program to plan for the future?

Illinois   In addition to the above programs, the Tollway develops a five-year ITS plan to guide the deployment, development, and enhancement of ITS technology and systems. The five-year planning horizon is due to the rapid changes in technology. We view ITS as a toolset that, when used in conjunction with an integrated operational strategy, can result in improved safety, mobility, and

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

D-59

efficiency.

Maryland   SHA manages its operations activities via its own business plan. The agency's business plan tracks the performance of incident- and emergency-management activities (including the agency's LE operations coordination).

Wisconsin   WisTransPortal/ATMS TIM Software: The TOPS IT program periodically reviews WisTransPortal O&M costs and resource planning with WisDOT BTO.

How do you plan to sustain the program over time (e.g., staffing and capital improvements)?

Illinois   We have been successful in demonstrating and documenting the benefits of our integrated approach to IM and the ITS systems that support these efforts. This year the Tollway announced the Move Illinois Program that will rebuild I-90 from its eastern terminus with the Kennedy Expressway westerly to Rockford (62.5 miles). The agency plans to position this corridor to be one of the first Smart Corridors that incorporates V2V and V2I and incorporates multimodal accommodations for future bus rapid transit, rail, and managed lanes going forward. This 15-year program is budgeted at $12 billion, and ITS, and safe, efficient operations are supported considerations in the program.

Maryland   The current Annual Operations Budget Fund 14 supports the program. As previously mentioned, this support currently amounts to approximately $9 million per year.

What are the critical steps/actions/activities that need to be performed to successfully sustain your program?

Maryland   Securing adequate funding to support operations, staffing, and equipment maintenance on a yearly basis is critical for the continuation of the TMC/LE arrangement and CHART operations as a whole.

To what extent do you use federal funds?

Illinois   The Illinois Tollway is funded through tolls collected and, as such, is a pure user fee system—no tax dollars support Tollway operations. The Tollway has sought and received limited federal grants, such as the ITIP Grant (TTID Program) we received in 2002. This funded the installation and operation of 105 RTMS systems on a major portion of the Tollway. We also have a planning grant to study and report on multimodal opportunities along the I-90 corridor that is planned for reconstruction beginning in 2013.

Maryland   The CHART program is 80% federally funded and requires a 20% state match.

[75]   Move Illinois: The Illinois Tollway Driving the Future, http://www.illinoistollway.com/move-illinois

| Wisconsin | WisTransPortal TIM software has been funded primarily through federal grants, although future operating costs are expected to draw from state resources as well. |

What types of federal-aid program funding have you used?

| Illinois | None to my knowledge. |

| Maryland | As described in our answer on page 56, both direct and indirect (e.g., grants) federal funding are used to support the program. |

To what extent have you developed an alternative funding source?

| Illinois | We have explored and implemented public/private partnerships with NBC Chicago and Fox television. In exchange for providing access to Tollway video, the Tollway receives advertising and other media considerations. |

As noted earlier, the Tollway received a TTID Grant and is currently in the eighth year of a 10-year agreement with Traffic.com/NavTeq Traffic that provides revenue reinvestment funds. This fund had accumulated more than $850,000; a portion of these funds is currently being used to fund installation of RTMS over the remainder of the Tollway system. We anticipate being fully instrumented by the end of the year. It is currently unknown whether this agreement will be continued and whether revenue sharing will be retained in the future.

| Maryland | Alternative funding sources are limited to grant applications (e.g., federal and state). |

What are the keys to developing alternate sources of funding?

| Illinois | There needs to be measureable value in the product or service. |

| Maryland | Monitoring the availability and status of potential funding sources (federal and otherwise) is essential. Eligibility for alternate sources (e.g., grants) is also an important consideration. |

How do you keep agencies engaged in the process?

| Illinois | The Tollway has an integrated approach to this issue:

- Element 1—Multifaceted response within Maintenance

- Element 2—Effective interaction between all incident responders

- Element 3—Integrated communication systems

- Element 4—Incorporation of internal systems

- Element 5—Integration to regional traveler information system

We have 11 locations operating 24/7 to handle routine and emergency maintenance and incident management. Every Maintenance employee is cross-trained as an incident responder and is empowered to respond to an incident.

As part of our approach, we work to bridge institutional barriers and establish complementary procedures so that we can effectively communicate, coordinate, and cooperate. All responders focus on safety; however, we worry about the traffic, and they worry about the crash.

As has been mentioned earlier, we are using IREACH and a third-generation CAD system, which was first implemented in 2003. In addition, we use a computerized incident notification system, a statewide radio system and can dispatch ISP and Tollway operations and emergency response personnel.

The Tollway's TOC integrates many systems (e.g., road weather information system, construction activity, and road condition reporting) and operates TIMS to:

- Generate travel times

- Detect incidents and generate incident response plans

- Operate a DMS system (39 DMSs); portable, changeable message signs belonging to the Tollway and to contractors; and more than 700 surveillance cameras

- Communicate to the public and the media via the Gateway Traveler Information System and an ATMS e-mail system

The most important element of IM is communication, which follows detection and confirmation and precedes response and clearance.

Maryland   The dedicated funding sources mentioned on page 56 are provided annually to support the CHART program, and funding is secured through progress reports and justifications. Compliance with federal/state regulations to obtain funding (e.g., systems engineering and ITS architecture) is also a key requirement. As far as alternate funding sources are concerned, agencies that offer these opportunities do not commit to providing continuous funding. Separate applications have to be completed for each potential grant.

Emerging Technologies

How were issues regarding integration and standardization of equipment handled?

Illinois   This is ongoing. One of the main reasons Illinois went with the Starcom21 system was to acquire a standards-based radio system. As a result:

- All state and most other radios in this system have a common interoperable channel package

- State (i.e., ISP, Tollway, and IDOT) dispatch centers have similar configurations with common channels

- User radio equipment is common between agencies

Maryland   The MSP uses the current CHART network. As a result, no standardization of equipment was required for the LE integration effort.

Wisconsin   WisTransPortal/ATMS TIM Software: InterCAD converts all CAD messages sets to the ITS IEEE 1512 standard for use by the ATMS event manager. As an XML/web service-based messaging system, InterCAD is very loosely coupled and does not place any constraints on the type of server equipment or software at the various endpoints.

STOC CCTV deployment is based on a single-vendor solution. Agencies with direct access to the STOC traffic cameras are provided with the necessary hardware decoders and video software.

In other respects, the WisDOT fiber network (ITSNET) is a complex, heterogeneous network that is managed through ongoing monitoring and maintenance contracts.

How are equipment upgrades performed?

Illinois   In the case of TOC-TIMS, a systems integrator was required as part of the 10-year maintenance program to advise the agency about hardware and software performance and viability. The integrator also managed the warranties for various hardware and software products acquired as part of the TOC-TIMS. This O&M contract contained projected capital expenditures in anticipation of hardware and software upgrades and changes; given the rapid changes in technology, this provision has proven quite beneficial. We regularly monitor and discuss current system performance and upgrades.

Regarding the radio network, the Starcom21 contract with the state includes system infrastructure upgrades at part of the monthly user fees.

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

D-63

Maryland   As previously mentioned, in-house staff (CHART Systems Integration) performs upgrades/enhancements to the CHART network.

Wisconsin   WisTransPortal/ATMS TIM Software: Changes to the STOC ATMS hardware and fiber network are coordinated through a configuration management group and are performed by a combination of onsite technical staff and maintenance contractors.

TOPS Lab/UW-Madison IT staff performs WisTransPortal hardware upgrades. TOPS also maintains a set of Link video encoder servers onsite at the STOC and WisDOT statewide regional offices. TOPS installs and upgrades these servers; however, troubleshooting is shared between TOPS and STOC IT staff.

In general, equipment upgrade processes vary by device and contractor. WisDOT owns and manages the WisTransPortal fiber network components through an outside contractor, although changes to this network include coordination with multiple groups, including the UW-Madison fiber group. A different contractor maintains other ITS field devices (e.g., CCTV cameras and controller cabinets). All of the contractors work together since the ATMS, WisTransPortal, fiber network, and ITS field devices are part of the same operations system.

Do you purchase equipment or use resources available under another agency's contract?

Illinois   The State of Illinois uses central management services to coordinate and control statewide procurement. Two years ago, the State Ethics Commission was injected into the process. Procurement of any goods or services can be a lengthy process. Procurement is less cumbersome if the procurement is covered by a statewide master contract.

Maryland   CHART procures its equipment using existing Maryland Department of Information Technology contracts. Equipment purchases for system upgrades or software builds are covered by these existing contracts, which were set up using a competitive bid process in accordance with the Code of Maryland Regulations and MDOT internal guidelines.

The workstations LE uses were procured using the contracts mentioned above. The CHART program also assists with the purchase of MSP motorcycles for field operations and enforcement.

Wisconsin   WisTransPortal/ATMS TIM Software: WisTransPortal hardware is paid for through WisDOT-sponsored projects and is purchased by TOPS through UW-Madison purchasing mechanisms, with the exception of fiber network equipment. The WisDOT fiber network contractor installs and monitors the fiber devices.

The WisTransPortal also leverages university networking, firewall, offsite backup services, and other IT resources. The WisTransPortal servers were relocated to a campus-wide data center environment in August 2012 that provides physical security, cooling, backup power, network redundancy, and other IT resource benefits.

TOPS Lab occasionally purchases hardware through WisDOT projects for offsite installation, such as Link video encoder servers, which are located at the STOC and SW regional office.

The University has well-defined guidelines for purchasing IT equipment using federal and state grants; however, a range of equipment deployment options still exist based on a particular project scope and budget.

What do you consider the best practice in integrated communication with LE and TIM?

Illinois   Best practice in integrated communication is stable, operates in real time, and is a shared, standards-based system (i.e., the Starcom21 system in Illinois, is considered a best practice as defined by the Department of Justice's SAFECOM Interoperability Continuum).

The Tollway has operated internal, integrated communications systems since the late 1950s. This includes integrated dispatching of LE and Highway Maintenance, as well as an internal carrier-grade network that supports all voice, data, and video in use at all Tollway sites.

A common dispatch center has been used at the Tollway almost since its inception. Dispatching State Police and Highway Maintenance from a combined center has several advantages, including:

- The same dispatchers are cross-trained and work in both the LE and Highway Maintenance operations, resulting in a high level of knowledge of how both sides work.

- Rapid response, coordination, and communication occur within the same center, as opposed to messages being transferred between centers; this avoids the inevitable translation errors and delays.

- Outside resources (i.e., fire, EMS, and towing) are used efficiently. There are no duplicate calls for services and, more importantly, calls for service are not overlooked between centers.

---

[76]   SAFECOM Program, Department of Homeland Security, https://www.dhs.gov/safecom-program

Adding a dedicated TMC within the last 10 years has leveraged the inherent efficiencies of a combined dispatch operation. The resulting overall system actually multiplies the efficiencies (i.e., "the whole is greater than the sum of its parts").

The Tollway has operated microwave and fiber optic systems to carry internal communications since the late 1950s, including voice and data. The Tollway also has numerous tower sites to support communications along the Tollway, for two-way radio and microwave links.

The network in place today is a high-capacity IP network that gives the Tollway great flexibility to place ITS equipment at any location along the Tollway easily and at lower costs than using commercial service providers. One example is the CCTV cameras installed on most Tollway towers. These give us very good views of critical traffic points and are important in monitoring traffic flows. This is an example of leveraging resources already in place (e.g., towers and network) to reduce costs to implement new technology for ITS functions.

The Tollway is fortunate that before Starcom21, both ISP (LE) and Tollway Maintenance were dispatched from the same central dispatch. Even though LE was on a separate frequency, information flow was facilitated initially by the dispatch center. In recent years, both Maintenance and ISP managerial staff were given dual-frequency radios to enable direct communication.

Maryland   CHART has limited experience with traditional forms of TMC/LE integration and is not in a position to make an authoritative statement about best practices. However, the collocation of traffic and LE operations has proven to be quite successful. Although a real-time exchange of LE information does not currently exist, incident notification and agency coordination have facilitated an improved operations effort.

Wisconsin   WisDOT TIME Program/STOC: Best practices include regular communication and coordination with LE agencies and ensuring LE agencies recognize that the TIME Program and WisDOT respect and appreciate the time and effort required to support TIM.

WisTransPortal/ATMS TIM Software:

- Strive for a standards based approach (e.g., the IEEE 1512)

- Leverage/incorporate agency-wide GIS/linear referencing systems

- Incorporate distributed, loosely coupled technologies (e.g., XML/web services)

- Understand each other's business, including strengths and weaknesses, and

how TIM communication achieves a common goal

What standards were used to govern your communications?

Illinois   We used NTCIP protocols and standards for all communication. In addition, operational standards and procedures were developed compliant with accepted national standards.

We reviewed IEEE 1512 and NTCIP C2C[77] standards provide input. The integration maximizes key data and need, independent of standards.

- National Incident Management System[78]

- Incident Command System[79]

- APCO Project 25[80], a set of standards that define the operation of a digital trunked radio system

- The Illinois Statewide Communications Interoperability Plan[81]

- The Illinois Tactical Interoperability Communications Plan[82]

Maryland   The CHART program implements projects that employ a number of nationally recognized ITS Standards (e.g., NTCIP and IEEE).

Wisconsin   WisTransPortal/ATMS TIM Software: InterCAD converts all agency CAD messages into IEEE 1512. The WSP CAD system provides CAD data in GJXDM[83] format.

What types of communications tools were available with regard to implementing your mutual information network?

Illinois   The Starcom21 statewide 800 MHz digital trunked radio system was available. A wide range of national and state interoperability channels in the VHF, UHF, and

---

[77]   NTCIP C2C: NTCIP Center-to-Center Standards Group (Standard Activities Group), The National ITS Architecture 7.0, Research and Innovative Technology Administration, U.S. Department of Transportation, http://www.iteris.com/itsarch/html/standard/ntcipc2c.htm

[78]   National Incident Management System, Federal Emergency Management Agency, U.S. Department of Homeland Security, http://www.fema.gov/national-incident-management-system

[79]   Incident Command System, Federal Emergency Management Agency, U.S. Department of Homeland Security, http://www.fema.gov/incident-command-system

[80]   Project 25, Spectrum Management, Association of Public-Safety Communications Officials, http://apcointl.org/spectrum-management/resources/interoperability/p25.html

[81]   Illinois: A State of Interoperability, http://www.state.il.us/iema/SCIP/SCIP.pdf

[82]   Illinois Tactical Interoperable Communications Plan (version 1.4), October 2009, http://www.state.il.us/iema/SCIP/TICP.pdf

[83]   The Global Justice XML Data Model, Information Technology Initiatives, Office of Justice Programs, U.S. Department of Justice, http://it.ojp.gov/jxdm/

700/800 MHz frequency bands were available, as was the Tollway's internal fiber optic/microwave communications network.

Maryland   Aside from existing systems (e.g., CHART network, MSP radios, and scanners), the agency participates in resource-sharing programs such as networkMaryland[84], which facilitates multiagency communication efforts. (More information about the agency's resource-sharing program is available at the link provided in the footnote.)

Wisconsin   WisTransPortal/ATMS TIM Software: InterCAD data is transmitted from agency CAD systems to the TOPS Lab WisTransPortal over the Internet via secure HTTP. The transformed IEEE 1512 XML is transmitted from WisTransPortal to the STOC ATMS over the WisDOT fiber network (ITSNET).

Link video is transmitted from the STOC and statewide regional office to the TOPS Lab WisTransPortal over the WisDOT fiber network. The Link video is subsequently streamed over the Link system website.

The WisTransPortal leverages existing College of Engineering and campus-wide networking and other IT resources.

How are new technologies evaluated and selected for implementation?

Illinois   New technologies are selected based on their utility and functionality toward safety, mobility, and efficiency goals and their cost-likely benefit.

Maryland   New technologies are selected based on the specific operational needs set in motion by strategies and priorities identified by agency leadership (e.g., SHA leadership and CHART board).

Wisconsin   New technologies are researched and reports on performance are reviewed prior to recommendation for implementation. A beta test is highly recommended prior to implementation of a practice.

Are there technologies that you can describe that may enhance your program?

Illinois   Active video technologies—Given the number of traffic surveillance cameras we operate, we are anxious to test video incident-detection systems.

Vehicle-to-roadside initiatives (connected vehicles) will support detail-level management and communications for incident response.

The Tollway had plans to rebuild and widen a 62.5-mile segment of the I-90 corridor beginning in 2013, and plans to install infrastructure that will position

---

[84]   networkMarylandTM, Maryland Department of Information Technology,
http://doit.maryland.gov/support/pages/networkMaryland.aspx

the corridor to become the first or one of the first Smart Corridors, incorporating V2V and V2I technology. To support such an advancement, we are currently exploring the establishment of corridor power and communication grids and installing conduit systems now to accommodate ITS deployments in the near term, possibly for managed lanes, and ultimately dedicated short-range communication devices in the future.

Maryland   Limitations currently exist in the area of incident detection and response. There is a time lag between when an incident occurs and when it is detected and responded to. The agency would benefit from technologies such as automated incident-detection systems, TMC and LE AVL/CAD data, and in-vehicle mayday systems that would automatically alert the appropriate agencies of an emergency. Having a common statewide radio system would also be valuable to the development of the program and its day-to-day operations.

Wisconsin   Better use of online training development software and enhanced crash reconstruction technology

The following are additional questions that were asked of the New Jersey and Wisconsin agency representatives. Each question is followed by a compilation of answers from each state. When an agency did not answer a question, that agency's state is not listed.

With your successful program, do you have procedures/processes in place for a succession plan?

New Jersey   NJDOT does not currently have procedures and processes in place for a successful plan but we are working towards this goal by building succession planning into our IM program for employees who participate in our IM initiatives. In addition, we are working to document these IM procedures in the next year or so to reach this plateau.

We do train our employees informally through the following practices, policies, and initiatives:

- Quarterly IM meetings

- Regularly scheduled incident command courses

- On-site experience at incident scenes with trained IM Response Team members. Our team members are trained to respond to incidents that have a major affect on transportation and they provide technical, logistical, and IM support to the incident commander. The team's goal is to keep the traffic safely moving by:

- Setting up traffic safety devices, demarcating diversion routes, and warning motorists

- Safely and quickly restoring lanes of traffic

- Facilitating necessary repairs and reopening the roadway

- Webinars related to IM

- Conducting post-incident review evaluations pertaining to major incidents that affect New Jersey's highways (e.g., the place crash that occurred on I-287 in December, 2011)

- Ongoing outreach with NJSP and local LE

- Review of New Jersey Highway Incident Traffic Safety Guidelines for Emergency Responders

- Ability to work with NJSP and local LE to develop traffic diversion route text and maps for all state highways and interstates on a county-by-county basis to be used during all major incidents that completely close a roadway for an extended duration. These diversion plans help improve traffic flow and management through better communication and more efficient use of available resources.

Wisconsin We attempt to ensure adequate staff redundancy in all aspects of traffic operations, IT, and TIM, although it is often a challenge given existing human resource constraints.

TOPS and STOC IT staff maintain internal Wiki sites to document system O&M procedures.

TOPS Lab maintains ITS as-built plan/inventory information for WisDOT STOC in a third-party spatial database (SpatialINFO) that is hosted on the WisTransPortal.

Based on your success to date, if you had to initiate an ingestion or integration program today, how would go about starting your program and beginning the necessary relationships/technology?

New Jersey
- **Stakeholders:** Identify stakeholders and begin the communication process to determine where the gaps are in our program. This would include conducting a gap analysis.

- **Champion**: Select a champion who has the knowledge, leadership, and passion to do what it takes to ensure that work progresses to accomplish the goal at hand. Find agencies/groups that support this cause to assist with

fulfilling the goal. The champion will have to consistently follow up to ensure that program goals are met. For example, NJDOT was fortunate to have the Delaware Valley Regional Planning Commission (DVRPC) initiate the first IM Task Force (NJ 42/55, I-76/676/295) in 2001, and this task force continues to operate successfully today.

- **Partnership with LE:** Build a partnership with LE and other emergency responders statewide.

- **Policies/procedures oversight committee**: Create an IM operations group task force to ensure that all stakeholders have buy-in and are willing to develop and implement the policies and procedures to achieve program success and durability.

- **Resources:** Provide the necessary resources (e.g., equipment, training, and outreach) for interested parties to want to participate and help promote and carry out the program.

- **Performance measures:** Document statistics before and after program implementation to measure success and/or areas that will require improvement

- **Outreach/cooperation/buy in:** Grow the program gradually; do not try to take a giant step initially. Once it becomes more mature, begin to implement regional task forces first and then statewide (e.g., as indicated earlier, New Jersey started with the NJ 42/55, I-76/676/295 Task Force in southern New Jersey). Engage stakeholders and give them a role so that they feel responsible and want to participate. They can help NJDOT create and implement an MOU between the state and the task force. NJDOT will need to lead initially to get the program off the ground by facilitating the meetings, establishing agendas, providing equipment and funding, and ensuring follow-up to keep program momentum moving forward.

Wisconsin
- Start by defining requirements for handling event information in the ATMS system.

- Consider the archive database design and performance measures objectives at the start when designing the data collection interface. (Using IEEE 1512 and XSLT for agency CAD XML conversion has worked well.)

- Schedule business process meetings at the start of the integration and have a complete integration guide to provide to agencies and CAD vendors.

How are you ensuring the sustainability of your program with regard to future/

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

D-71

continued funding and loss of a champion/management or technical lead?

New Jersey
- Funding—Funding is achieved through various FHWA-authorized programs. The program will be maintained as long as federal funding is available. Knowing what the situation is with the state budget (similar to other states)—our IM Program would be in jeopardy without federal funding.

- Loss of Champion/Management or Technical Lead—Our program was instituted in 1994 by Kurt Aufschneider. In 2006, Jim Hogan assumed Aufschneider's position, maintaining continuity. When Hogan left in July 2011, Dennis Motiani assumed responsibility for the state's IM Program. Thus far, the program's transition and championship/management have been seamless—the program has survived and been maintained.

- NJDOT has worked hard to groom its Traffic Operations directors to oversee the IM Program and to continue fostering partnerships with LE, emergency responders, and other stakeholders so that the program enjoys continued success. In addition, NJDOT has an MOU with the NJSP to carry out statewide IM activities. The agreement does allow for seven troopers (six regional coordinators [divided geographically] and one unit supervisor, whose office is located at NJDOT), who work directly with NJDOT to respond to large-scale incidents along our state highways to mitigate the impact to the regional transportation network. NJSP also works with its NJDOT partners to conduct outreach, provide instruction in Incident Command System and IM System courses, and to develop countywide traffic diversion routes.

- New Jersey is extremely fortunate to have buy-in from the MPOs, which have become champions for IM. They will do their best to help the department ensure that the IM program remains in existence. We cannot emphasize enough the MPOs' value to the IM program, specifically DVRPC, which championed the first regional task force (i.e., NJ 42/55, I-76/676/295 IM Task Force in South Jersey). DVRPC is now taking the lead on a second regional task force: the Burlington County IM Task Force, which had a kickoff meeting in April 2012.

Was there any cathartic moment/movement that accelerated the integration of your TMC/SOC with LE (and perhaps with the fire departments as well)?

New Jersey
Program Origin

In 1995, NJDOT and the NJSP entered into a partnership and developed a statewide IM program to manage our transportation infrastructure and restore the lanes of traffic in a safe and expeditious manner. It is a systematic tool used for the command, control, and coordination of a highway emergency response.

It allows agencies to work together using common terminology and operating procedures for controlling personnel, facilities, equipment, and communications at a single incident scene.

Since the program's inception, NJDOT and the NJSP have worked hard to improve the state's IM process so that delays can be minimized. The average total incident duration in this state has declined from an average of 2.75 hours in 1995 to the current average of approximately 50 minutes in 2012.

Catastrophic Event

In February 2001, a major crash occurred on State Highway 42 during a heavy snowstorm. The initial crash involved a small SUV that crossed the center median and was struck head on. The driver was ejected and suffered fatal injuries. Due to this fatality and the snowfall, traffic backed up and the slippery road conditions resulted in numerous additional crashes. Eighty-four vehicles were involved, including two buses (one was empty and one had passengers). Thirty-six people were transported to the hospital. NJSP completed 26 separate accident reports/investigations, and Route 42 was shut down in both directions for 10 hours. The entire area was in gridlock.

Many problems were cited, including poor communication between two county communications centers and no consistency in resources dispatched. A member of NJDOT's/NJSP's IM Unit was responsible for identifying the need to bring everyone together. He solicited help from DVRPC to gather the appropriate groups for a meeting.

Expanding on your successful integration with LE, have you addressed other critical first responders? If so, how did you establish and foster integration with fire? If not, have you identified any procedures to establish this relationship? In addition, have you identified any obstacle(s) that seem insurmountable?

New Jersey   We have addressed other first responders (fire safety, the Medical Examiner's Office, the New Jersey Department of Environmental Protection [for incidents involving hazardous substances], towing associations, and others) in addition to LE via the following:

- Guidelines issued/reviewed: In cooperation with NJSP and the Department of Community Affair's Fire Safety Office, we conducted outreach on the Highway Incident Traffic Safety Guidelines for Emergency Responders[85.]

---

[85]   Highway Incident Traffic Safety Guidelines for Emergency Responders, State of New Jersey, June 1, 2010, https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCsQFjAA&url=http%3A%2F%2Fwww.respondersafety.com%2FDownload.aspx%3FDownloadId%3D08607e04-7bd7-468b-a538-3d21b8267e0f&ei=yUd5UrXxNZStsAS4rYHYBA&usg=AFQjCNGrRdBjF6Za1Bujl4YONwkVGbheBg&bvm=bv.55980276,d.cWc

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

D-73

- IM Operations Group reconvened: This group first met in April 1993 to foster the development of an IM Program for the State of New Jersey. The group was established as a multidisciplinary working group of operationally oriented response agencies and support agencies whose goal was to enhance the state's IM program from a policy and operations perspective and to both provide for the safe, efficient, and intelligent movement of traffic in NJ through an equal partnership with its members and integrated alliances.

After a lapse of several years, this task force was reconvened in 2010. The current membership includes:

- Division of Fire Safety (Department of Community Affairs)
- New Jersey Police Traffic Officers Association
- New Jersey Division of Highway Traffic Safety
- New Jersey Board of Public Utilities
- New Jersey Department of Health and Human Services (Emergency Medical Services Unit)
- Garden State Towman's Association
- New Jersey Fire Chiefs Association
- New Jersey Association of Chiefs of Police
- Office of New Jersey State Medical Examiner
- Federal Highway Administration
- New Jersey Turnpike Authority
- South Jersey Transportation Authority

- **Meetings with the Medical Examiner's Office:** Several meetings have been held with the Medical Examiner's Office to determine if it can assist in the expeditious clearing of incidents on New Jersey roadways. Unfortunately, it only has jurisdiction over some—not all—of the state's counties. Thus, it becomes difficult to enforce statewide guidelines regarding the expeditious removal of the deceased from incident scenes on the state's highways.

- **Towing Incentive Program on the horizon:** A meeting was held with some of the IM Operations Group members to discuss a towing incentive program for New Jersey.

- **Outreach to fire safety:** In addition to partnering with New Jersey's Office of Fire Safety on the distribution and review of the Highway Incident Traffic

Safety Guidelines, NJDOT has joined forces with the Office of Fire Safety at the annual Firemen's Convention. Held in September, the EMT classes that are conducted and supported by personnel from both agencies and in concert with the NJSP, both Fire Safety and NJDOT have provided outreach at the State Police Academy each year.

Overall, the partnerships formed by the IM Operations Group have led to the continuance of a successful statewide IM Program in New Jersey.

Some of the obstacles that have been encountered include:

- **Fire safety:** New Jersey is a "home rule" state, which does create issues with efficiency during incidents.

- **Medical Examiner's Office:** As indicated above, the Medical Examiner's Office does not have jurisdiction over all New Jersey counties; therefore, there are inconsistencies in policies and how incidents are handled when a medical examiner is on the scene.

- **EMS:** Some are paid and some are volunteers. This also creates inconsistencies in how incidents are handled.

- **911 dispatchers:** NJDOT and NJSP are in the process of reaching out to New Jersey's 911 centers to educate them on our Statewide IM Program and to partner with them, where feasible, in the efficient handling of incidents.

- **Move-It-Law:** The Move-It-Law (Quick Clearance), which has been adopted in other states, has yet to become law here in New Jersey. This law would benefit the efficient clearing of incidents from our roadways.

Wisconsin   The TIME Program encourages the participation of all response agencies, including fire, EMS, emergency management, towing and recovery, maintenance/public works departments, and transportation professionals. Similar to LE, WisDOT is working to identify other methods to engage these response partners and increase participation in the TIME Program.

Incorporating fire/EMS data exchange into InterCAD is a future objective. However, the nature and benefit of this data exchange is less understood than the public safety context.

Are you successful in receiving additional funds in promoting your program(s)?

New Jersey   Yes. We are fortunate that FHWA has endorsed our statewide IM program. It is represented at most of our meetings and is an IMOG member. The IM program in New Jersey would be jeopardized if FHWA did not provide monetary support.

Wisconsin

2011 Executive Summary

WisDOT's STOC functions as a traveler-focused performance-driven network of partnerships and technologies used to monitor, operate and maintain traffic management and traveler information systems and corresponding field devices on Wisconsin's roadways on a 24/7 basis.

The Performance Measures Report is the foundation for continued, on-going WisDOT traffic operations performance measurement and reporting. In 2010, the first performance measures report was compiled for the purpose of establishing a baseline and the 2011 report provides initial comparisons between these first two years of data collection. In 2012, efforts will focus on utilizing the data to establish goals that support the mission of the STOC. In addition, efforts will be made to align the report with WisDOT's Mobility, Accountability, Preservation, Safety and Service (MAPSS) performance measurement initiative, which was rolled out in late 2011.
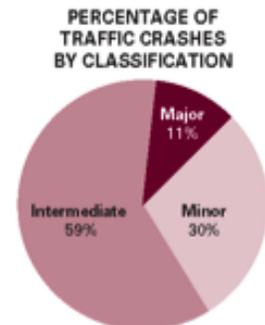
TRAFFIC INCIDENT NOTIFICATION

State highway incidents reported to the STOC.

5,335 ↑

TRAFFIC CRASHES

Roadway Clearance Time is the time between the first recordable awareness of an incident by a responsible agency and the first confirmation that all travel lanes are available for traffic flow. Incident Clearance Time is the time between the first recordable awareness of an incident by a responsible agency and the time at which the last responder has left the scene.

	CRASH CLASSIFICATION			
	MINOR < 30 minutes	**INTERMEDIATE** 30 minutes – 2 hours	**MAJOR** > 2 hours	**TOTAL**
Total Number of Traffic Crashes	945	1,885	356	3,186
Average Roadway Clearance (Minutes) [Sample Size]	14 ↓ [219]	42 ↑ [723]	207 ↑ [159]	61 ↑
Average Incident Clearance (Minutes)	16 ↓	56 ↑	324 ↑	74 ↑

PERCENTAGE OF TRAFFIC CRASHES BY CLASSIFICATION

Major 11%
Intermediate 59%
Minor 30%

STATEWIDE INCIDENT NOTIFICATION PROCESS (SINP)

All calls to the STOC and the percentage requiring immediate response by WisDOT personnel.

Total Calls	3,282
Percent Immediate Priority	54.0%

EXTENDED DURATION INCIDENTS (EDIs)

Any incident that impacts the Interstate or US 41 and closes one direction of travel for 2 hours or more or both directions of travel for 30 minutes or more.

Total Number of EDIs	67
Average EDI Clearance Time	4:36

EMERGENCY TRANSPORTATION OPERATIONS (ETO) EVENTS

An ETO response is necessary when an exceptional event disrupts the normal flow of traffic on a state highway, requiring a response beyond normal daily operating procedures/capabilities

FEBRUARY 1-2 / Blizzard
Statewide; impacted/closed multiple state highways

JULY 5 / Downed power lines
SE Region; construction zone – I-94 at College Avenue; all lanes blocked and an incident occurred on the alternate route

JANUARY 17 / Traffic crash
SW Region; I-90/94 WB at US 12 (Mirror Lake Bridge); roadway closed for 17 hours

JULY 20 / Traffic crash
NE Region; US 41 NB at County J; newly constructed overpass struck and severely damaged

NOTE: Where applicable, an arrow indicates if the value increased or decreased compared to 2010.

2011 *Executive Summary,* continued

FIELD EQUIPMENT	CAMERAS	DETECTORS	DMS	PCMS	HAR	RAMP METERS
Devices as of Dec. 31, 2011	210	247	62	195	13	141
Percent Expansion	11%	7%	17%	10%	0%	2%

511 SYSTEM

Real-time traveler information system that can be accessed via the phone system, website or Twitter alerts.

Total 511 Twitter Followers	1,357
Total 511 Tweets	3,524
Total 511 Website Visits	1,378,945 ↑
Total 511 Phone Calls	231,671 ↓

511 WEBSITE VISITS AND PHONE CALLS
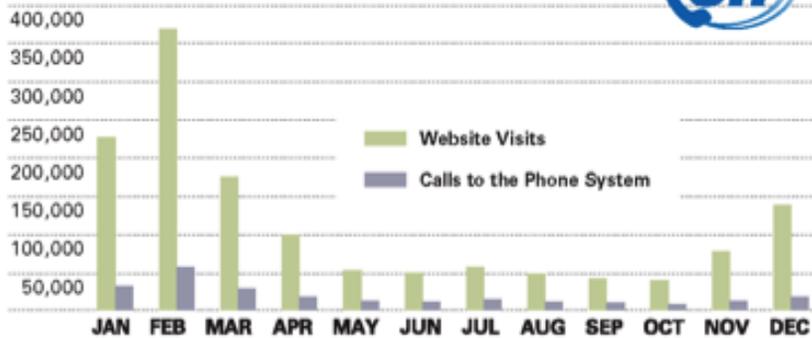
511 regional Twitter accounts were activated in March 2011.

DYNAMIC MESSAGE SIGNS (DMS)

Messages posted on the DMS by STOC operators, not including travel times or scheduled messages. — 4,158

FREEWAY SERVICE TEAM (FST) ASSISTS

Contracted tow service that provides assistance to disabled motorists within some major work zones on state highways. — 5,931

FST SERVICES

*Comment cards are handed out to each motorist that an FST driver assists. Of the 930 responses received, **94.7%** of individuals rated the overall program as **excellent**.*

SERVICE	TOTAL	%
Towed from shoulder/median	2,038	29.1%
Assisted with flat tire	1,108	15.8%
Provided fuel	805	11.5%
Checked welfare	643	9.2%
Provided traffic control	551	7.9%
Other	1,857	26.5%
TOTAL	**7,002**	**100.0%**
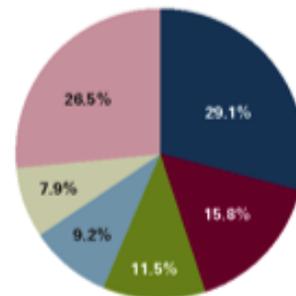
NOTE: Where applicable, an arrow indicates if the value increased or decreased compared to 2010.

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

D-77

Scan Itinerary

The scan tour was broken down into two one-week travel schedules. The primary focus was to maximize the time of both scan tour participants and the scan team members. Arora and Associates scheduled and coordinated what would end up being predominantly an East/Midwest week and a West week, respectively. While the specific travel schedules were both hectic and intense, they were coordinated to provide maximized time with each host agency, and ample time for the team to compare notes and analyze their findings throughout. The scan tour schedule/ itinerary was as follows:

Week 1

- New Jersey DOT
- Delaware DOT
- Maryland SHA
- FHWA
- Illinois Tollway Authority

Week 2

- Kentucky Transportation Cabinet
- Wisconsin DOT
- Oregon DOT
- Washington DOT

The following sections detail the various agencies that were represented at each of the scan tour's participant locations. These lists serve as a starter list of potential stakeholders for any agency in the early stages of creating its TIM program and/or the collaborative efforts with corresponding agencies.

Delaware

- Delaware Department of Transportation
- Management Group
- Incident Management Group
- Emergency Management Group
- Traffic Operations/TMC Group
- Information Technology Group

Illinois

- Illinois State Toll Highway Authority
  - Management Group
  - Incident Management Group
  - Emergency Management Group
  - Traffic Operations/TMC Group
  - Information Technology Group

- Illinois State Police

Kentucky

- Kentucky Transportation Cabinet
  - Management Group
  - Incident Management Group
  - Traffic Operations/TMC Group
  - Information Technology Group
- Kentucky Office of Homeland Security

Maryland

- Maryland State Highway Administration
  - CHART Operations
  - CHART Management
  - CHART Maintenance
  - CHART Office Maintenance
  - Motor Carrier Division
- Maryland State Police
- Maryland Transportation Authority
- Maryland Transportation Authority Police
- Federal Highway Administration
- Delaware Department of Transportation
- Carroll County Department of Public Works

New Jersey

- New Jersey Department of Transportation
  - Incident Management Group
  - Emergency Management Group
  - Traffic Operations/TMC Group
- Federal Highway Administration
- New Jersey Turnpike Authority

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

E-3

- New Jersey State Police

- New Jersey Division of Fire Safety

- New Jersey Department of Environmental Protection

  - Emergency Management Group

- Delaware Valley Regional Planning Commission

- Delaware River Port Authority

- Garden State Towing Association

- Local Fire Companies

Oregon

- Oregon Department of Transportation

  - Management Group

  - Incident Management Group

  - Traffic Operations/Traffic Management Center Group

  - Information Technology Group

  - Application Development Group

- Oregon State Police

Washington

Vancouver

- Washington Department of Transportation

  - Management Group

  - Incident Management Group

  - Traffic Operations/Southwest Region Traffic Management Center Group

- Washington State Patrol

Olympic

- Washington Department of Transportation

  - Management Group

  - Incident Management Group

  - Traffic Operations/Olympic Region TMC Group

- Washington State Patrol

Tacoma

- Washington Department of Transportation
    - Headquarters/Statewide Intelligent Transportation Systems Planning
    - Management Group
    - Incident Management Group
    - Traffic Operations/ Traffic Management Center Group
- Washington State Patrol

Wisconsin

- Wisconsin Department of Transportation
    - Management Group
    - Incident Managemment Group
    - Traffic Operations/Statewide Traffic Operations Center (State Traffic Operations Center) Group
    - Information Technology Group
- Wisconsin State Patrol
- University of Wisconsin
    - Traffic Operations and Safety Laboratory

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

E-5

E-6

Host Agency Key Contacts

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

F-1

Delaware

> **Gene S. Donaldson**
> TMC Operations Manager
> Delaware Department of Transportation
> 169 Brick Store Landing Road
> Smyrna, DE 19977
> Phone: (302) 659-4601
> Fax: (302) 659-6128
> E-mail: gene.donaldson@state.de.us

Federal Highway Administration

> Paul Jodoin
> Traffic Incident Management Program Manager
> Emergency Transportation Operations
> Office of Operations, Federal Highway Administration
> Department of Transportation
> 1200 New Jersey Avenue, SE
> Washington, DC 20590
> Phone: (202) 366-5465
> E-mail: paul.jodoin@dot.gov

Illinois

> **John L. Benda**
> General Manager of Maintenance & Traffic
> Illinois State Toll Highway Authority
> 2700 Ogden Avenue
> Downers Grove, IL 60515
> Phone: (630) 241-6800, Ext. 3903
> E-mail: jbenda@getipass.com

Kentucky

> Jeff Bibb
> Director, Division of Incident Management
> Office of Highway Safety
> Kentucky Transportation Cabinet
> 200 Mero Street
> Frankfort, KY 40622
> Phone: (502) 564-2080, Ext. 4340
> E-mail: jeff.bibb@ky.gov

Maryland

Sgt. Michael Tagliaferri
Maryland State Police
SHA Liaison
7491 Connelley Drive
Hanover, MD 21076
Phone: (410) 582-5616
Fax: (410) 582-9880
E-mail: mtagliaferri@sha.state.md.us

Michael Zezeski
Director, Office of CHART & ITS Development
Maryland State Highway Administration Transportation
7491 Connelley Drive, SOC
Hanover, MD 21076
Phone: (410) 787-5859/ (410) 582-5605
E-mail: mzezeski@sha.state.md.us

Egua U. Igbinosun
ITS Development Manager
Office of CHART & ITS Development
Maryland State Highway Administration
7491 Connelley Drive
Hanover, Maryland 21076
Phone: (410) 787-5873
Fax: (410-582-9880
E-mail: eigbinosun@sha.state.md.us

New Jersey

Dhanesh (Dennis) Motiani
Executive Director, Transportation Systems Management
New Jersey Department of Transportation
1035 Parkway Avenue
Trenton, NJ 08625
Phone: (609) 530-4690
E-mail: dhanesh.motiani@dot.state.nj.us

BEST PRACTICES SUPPORTING TRAFFIC INCIDENT MANAGEMENT (TIM) THROUGH INTEGRATED COMMUNICATION BETWEEN TRAFFIC MANAGEMENT CENTER AND LAW ENFORCEMENT AND EFFECTIVE PERFORMANCE- MEASUREMENT DATA COLLECTION

F-3

Sal Cowan
Director of Traffic Operations
New Jersey Department of Transportation
1035 Parkway Avenue
Trenton, NJ 08625
Phone: (609) 530-4690
E-mail: salvatore.cowan@ dot.state.nj.us

Oregon

Galen E. McGill, PE
Oregon Department of Transportation
ITS Manager
800 Airport Road SE
Salem, OR 97301
hone: (503) 986-4486
E-mail: galen.e.mcgill@odot.state.or.us

Kelle Forbes
Oregon Department of Transportation
ITS Operations Coordinator
800 Airport Road SE
Salem OR 97301
Phone: (503) 986-6568
E-mail: kelle.forbes@odot.state.or.us

Washington

Vince Fairhurst
State Incident Response Program Manager
Traffic Operations Division/State ITS Operations Group
310 Maple Park Avenue SE, POB 47344
Olympia, WA 98504-7344
Phone: (360) 705-7287
Fax: (360) 705-6826
E-mail: fairhuv@wsdot.wa.gov

Bill Legg
State ITS Operations Engineer
Washington State Department of Transportation
310 Maple Park Avenue SE, POB 47344
Olympia, WA 98504-7344
Phone: (360) 705 7994
E-mail: leggb@wsdot.wa.gov

Ron Vessey, PE
ITS Field Operations Engineer
Maintenance and Operations Division
HQ Traffic Design and Operations
Washington State Department of Transportation
310 Maple Park Avenue SE, POB 47344
Olympia, WA 98504-7344
Phone: (360) 705-7948
E-mail: vesseyr@wsdot.wa.gov

Wisconsin

Paul S Keltner, PE
State Traffic Operations Supervisor
Wisconsin Department of Transportation
Bureau of Traffic Operations
Statewide Traffic Operations Center
433 W. St. Paul Avenue, Suite 300
Milwaukee, WI 53203-3007
Phone: (414) 227-2141
E-mail: paul.keltner@dot.wi.gov

Steven Parker, PhD
Information Technology Program Manager/Principal Investigator
University of Wisconsin-Madison/TOPS Laboratory
Department of Civil and Environmental Engineering
B243 Engineering Hall
1415 Engineering Drive
Madison, WI 53706-1691
Phone: (608) 265-4921
Fax: (608) 262-5199
E-mail: sparker@engr.wisc.edu