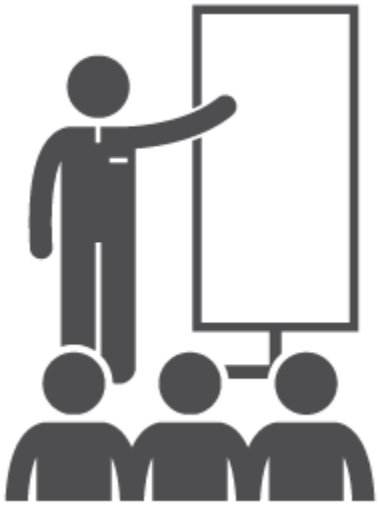
CAD and TMS Integration

Workshop Summary Report

"What Agencies Need to Do to Integrate Data from Computer-Aided Dispatch into Traffic Information Management Systems"

23-24 April 2018

Linthicum, Maryland



I-95 Corridor Coalition

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Executive Summary

What is CAD/TMS Integration?

Most traffic incidents get reported to law enforcement agencies first, via Public Safety Answering Points (PSAPs) that respond to 911 calls. Often incidents require response from multiple agencies. For example, a motor vehicle crash may require an ambulance dispatch for personal injury, law enforcement dispatch for investigation and possible arrests, and DOT incident response for traffic management and towing of the vehicles involved. Yet without integration, state DOT incident response and traffic management systems only learn of these incidents later, if at all, as dispatchers may be too busy to make multiple phone calls as they are addressing the incident. Integration of public safety computer-aided dispatch (CAD) systems with Traffic Management Systems (TMS) systems can advance both DOT and public safety agency priorities, including mobility, efficiency, and safety.

Through CAD/TMS integration:

- Deschutes County, OR, reduced incident response time by 30% and duration by 38%;
- Maryland improved clearance time by 34% along 64 miles of I-95.

This peer workshop brought together representatives from 19 state departments of transportation (DOTs) and one turnpike agency to discuss CAD/TMS integration. Agency representatives were encouraged to:

- Share the status of CAD-TMS integration efforts;
- Create a "data list" of key needed information from both law enforcement and DOT perspectives;
- Identify challenges and potential solutions, and
- Define a set of lessons learned, best practices, and implementation steps for agencies and the region/Coalition.

Participants included staff from 14 member DOTs, other DOTs at various stages of CAD/TMS integration, FHWA, state law enforcement agencies and consultants. The full list of participants is listed in Appendix C.

Status of Coordination between Public Safety Agencies and DOTs on Incident Management

All states in attendance reported some level of communication/coordination between public safety agencies and DOTs on incident management.

- All states were able to coordinate via voice, on radio and phone
- A few states had begun to coordinate by co-locating traffic management centers (TMCs) with PSAP or Law Enforcement Dispatch Centers
- Several states had "parallel" access, with the ability to access CAD data within that system, but having to manually import it into their TMS system

- Only 2 states (OR, and VA) had systems that automatically shared CAD data, although Maryland was within a month of piloting integration.

Barriers to CAD/TMS Integration

States cited the following barriers to CAD/TMS integration:

Institutional

- Lack of awareness of integration benefits
- Lack of executive champion/buy-in/push-back
- Lack of funding, particularly at law enforcement and public safety agencies
- Criminal Justice Information Services (CJIS) requirements for handling of sensitive law enforcement data from the U.S. Department of Justice
- Lack of MOUs/Operating guidelines (ad hoc programs)

Data/System

- Lack of common map/different map overlays
- Data elements – free text fields, figuring out which to include, one way vs. two way
- Data security/confidentiality

Action Plan

The following action plan was developed as a result of this workshop.

- Publishing this report, informing coalition members about the issue, state of practice, lessons learned, and success stories to help states make business case for funding.
- Providing a clearinghouse of interagency MOUs and other key documents.
- Providing implementation tools, including a "top ten" list of data elements and a checklist to help states rate their own stage of CAD/TMS implementation, and an action plan.
- Hosting an industry forum among CAD and ATMS vendors
- Trying to address Criminal Justice Information Services (CJIS) requirement concern for handling of sensitive law enforcement data with the U.S. Department of Justice

The Need for CAD/TMS Integration

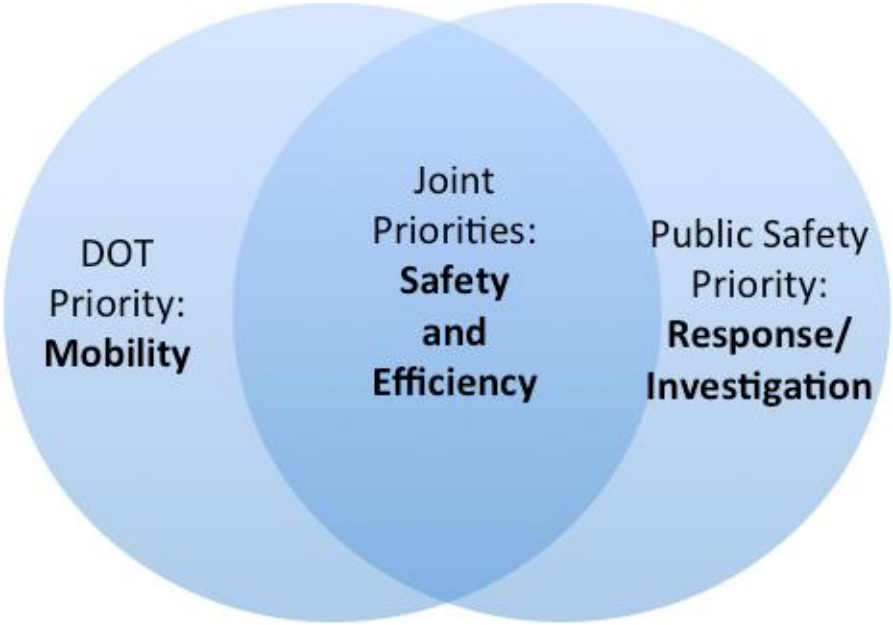
What is CAD/TMS Integration?

CAD/TMS integration is the ability to transfer information seamlessly between public safety computer-aided dispatch systems and DOT traffic management information systems. For a glossary of CAD/TMS integration terms, refer to Appendix A.

Why is CAD/TMS Integration Important?

Whether it's a fire on the roadway, flooding, or active police chase, DOTs benefit from learning about roadway incidents as quickly as possible. Most incidents that affect traffic are first detected by means of a public safety answering point (PSAP).

- Up to 88% of crashes in Virginia were reported first to Virginia's State Police
- 72% of Traffic Management Center events in Minnesota come from the state patrol (compared to 9% for TMC cameras).



That information is routed to public safety dispatchers but not to DOT traffic incident management personnel, or DOT information systems. Yet TMCs have traffic and transport-related resources that could enable quicker response and help manage scenes more effectively.

DOTs and public safety agencies share many common goals, but are often focused on (and evaluated by) different measures. DOTs prioritize mobility (short and long-term). Public safety agencies prioritize responding to and investigating the public safety incident. In addition to improving individual agency performance, CAD/TMS integration can help DOTs and public safety agencies achieve many common goals – including safety for first responders and for roadway users, and efficiency.

What Are the Benefits of CAD/TMS Integration?

<table>
<tr><th>Benefits to DOTs</th><th>Benefits to Law Enforcement</th></tr>
<tr><td>Situational Awareness
Find out about incidents faster via PSAPs.
Improve efficiency of response via better situational awareness (responders know what it is, how big incident is, and what they might need before they get to the scene).</td><td>Faster and More Effective Response
Engage DOT resources (traffic management, signage, diversion) more quickly.
Reduce call volume by getting quicker response/resolution.</td></tr>
<tr><td>Tracking
Collect more accurate incident data.
Build support for safety improvements by gathering data about where and when crashes occur, and how much they cost.</td><td>Reduced Work
Enable DOT forces to handle incidents without law enforcement aspect (e.g., removing dead deer, fixing pothole).
Have DOT handle traffic direction/diversion instead of public safety.</td></tr>
<tr><td colspan="2">JOINT BENEFITS</td></tr>
<tr><td colspan="2">Improve responder and road user safety by reducing secondary crashes via quicker response, shorter duration, and better traffic management.</td></tr>
<tr><td colspan="2">Collect and analyze data to show benefits of services provided.
Improved traveler information</td></tr>
</table>

What Data Elements Are Shared in Integrations?

Workshop participants identified the following kinds of data as useful for TIM:

- What is the incident?
- Where is the incident?
- When did it happen?
- When were lanes cleared?
- When was the scene cleared?
- What impact is it having/likely to have?
- What are you/we going to do about?
- What resources do you need to do it?
- What agencies are there?
- What agencies do you need to dispatch?

While TMS and CAD systems vary widely, Virginia DOT developed a "top ten list" of data fields and some of the nuances associated with importing them from CAD systems into TMS (see table on the following page). The table on the following page shows this top ten list, with the addition of timing factors (when were lanes cleared and when was the scene cleared) that are key performance measures for traffic incident management.

TOP TEN LIST OF DATA FOR INTEGRATION

Data Field	Possible Entries	Notes
Incident Type	Crash, spill, flooding, fire, etc.	Integration can be configured to send only certain types of incidents automatically.
Incident Location	Route (# and/or name); nearest mile marker or cross street, special facility if applicable.	Need to make sure CAD and TMS system use same maps, names, numbers, and abbreviations.
Incident detection source	911 callers, law enforcement, traffic incident management teams.	Helps determine if confirmed from onset – if reported by caller, not as reliable as if reported by responder.
PSAP Responder Status	Waiting, dispatched, on scene, clear.	Entry should distinguish between only PSAP clear or entire incident clear – will still be delays as long as someone or something is by the side of the road.
Lane impact (reported, confirmed, projected, updated as conditions change)	Number of lanes closed due to incident.	May be affected by traffic management decisions on scene.
Injuries/Fatalities	Reported and confirmed injuries/fatalities.	May need to encode fatality/injury info if TMS data shared publicly.
Agency on Scene Status	Fire, rescue, LPD – responding, on scene.	May be hard to track all responders if not all integrated.
Infrastructure damage	Bridge hit, guardrail damage, traffic signal damage, etc.	
Incident details	Tractor trailer, overturned, cargo spill (hazmat,)	Helps give sense of potential impact and duration.
Time of lane clearance	When were lanes cleared?	Key performance measure for TIM.
Time of scene clearance	When was scene cleared?	Key performance measure for TIM.

Stages of Communication/Coordination Among Public Safety Agencies and DOT Traffic Incident Management.

Many agencies have greatly improved coordination among transportation and public safety agencies. Prior to achieving integration of CAD/TMS data, most use other means of coordination, including voice or providing read-only access to other systems. While state systems and practices vary widely, the coalition established a provisional four-point scale to categorize where each state described its current level of communication/coordination.

Level I: Voice

Most DOTs initially coordinate with public safety agencies via voice, calling designated phone numbers or sharing radio systems. While voice coordination is definitely beneficial, it has a number of limitations:

- Law enforcement may not be able to take time away from response to promptly inform TMCs of incident status.
- TMCs may not get information quickly enough to dispatch resources that are needed.
- Voice-only integration doesn't allow for long-term data tracking or performance improvement.

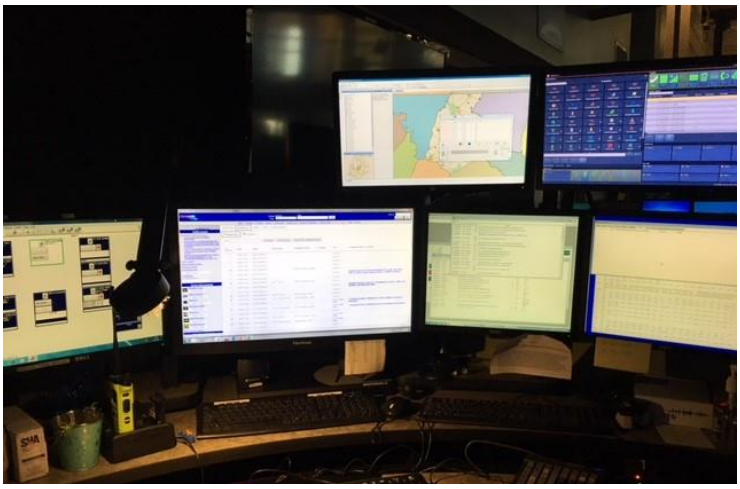
Level II: Co-location

Co-located TMC & PSAP in Maryland: (*Photo Courtesy Maryland State Highway Administration)*

The next level of coordination is when traffic management centers are co-located with PSAPs. This also allows for information sharing from CAD systems on an ad hoc, "over-the-shoulder" basis. A walk up the stairs or down the hall and particularly when they are sitting in the same room enables a conversation that can speed up handling of an incident.

Co-location is an improvement over voice-to-voice coordination, but still has many limitations:

- Information sharing is still not automatic; even if TMC and public safety staff are only separated by a sliding glass window, there's no guarantee that the window will open.
- Co-location doesn't allow long-term collection of data that can improve incident response.



Parallel systems can involve many screens.
(*Photo Courtesy Maryland State Highway Administration*

Level III: Parallel Systems

In some cases, TMC employees have "read only" access to CAD systems (and vice versa). While this allows automatic access, it does have some limitations compared to data integration:

- Parallel systems require TMC staff to focus on more than one screen at a time, or shift between two systems on a single screen, causing a loss of efficiency.
- TMC employees still have to create the incident in their own system, increasing the chances for errors and duplication.
- TMC staff need separate accounts and passwords, and must learn software for two systems.

Level IV: Data Integration

The final stage is having data automatically sent from CAD systems to TMS. This allows operators to see the incidents within their own system, as soon as they are created, and avoids errors that could be caused by manual entry.

Some of the many data sources and data users in Maryland's system.

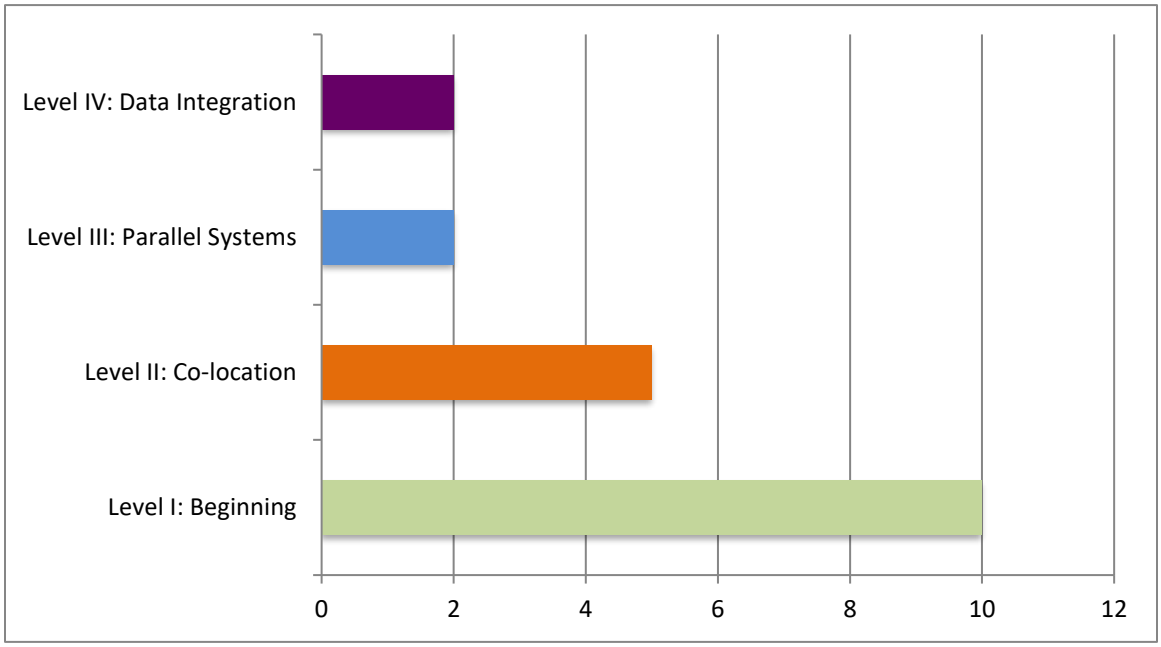
Each state's methods for transferring, housing, and accessing data differed depending on the underlying system. For example, integration with a single state police CAD network, with one server and software platform, is simpler than integrating with multiple local agencies, each with its own software and platform.

To complete integration, DOTs, public safety agencies, and their vendors must determine

- What data to transfer
- How the data will be transferred (what methods, how frequently does transfer occur?)
- Where data will be housed (which agency will maintain the server?)
- How data will be accessed (via a web-based client, or other protocol?

Case studies in the following section describe some alternative ways to handle integration and access.

Level of Communication/Coordination by State



Each workshop participant shared information about the status of coordination/communication between DOTs and public safety agencies in his or her state. Detailed information about each state's program is included in the table in Appendix B: State-by-State Summary of CAD/TMS Integration Status. The chart above shows that most states are still coordinating primarily via voice, although many have explored co-location. For the states that have integrated CAD data into TMS, each state has different architecture for its integration. The case studies on the next page describe approaches from three different states that were presented at the workshop.

State CAD/TMS Integration Case Studies

Virginia

Program Summary: Allows automated, real-time sharing of available information with 5 Traffic Management Centers (TMCs).

Extent/History: 4 of 5 TMCs integrated; Virginia State Patrol integrated in 2004. Multiple jurisdictions incorporated into regional integrations; statewide integration in 2011.

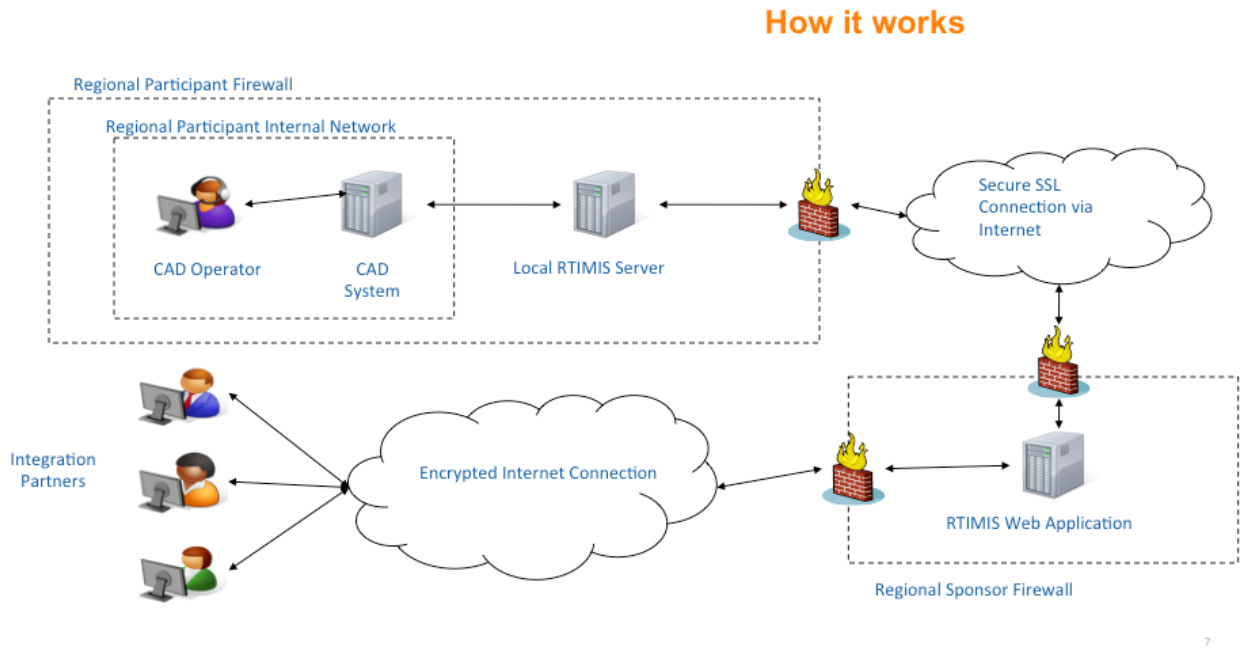
Key System Aspects: No CJIS-sensitive data transferred. Information is hosted on local Regional Traffic Incident Management Information System (RTIMIS) server, which TMS can access. PSAP and other third-party users connect via secure SSL connection over a web-based client.

Lessons Learned:

- Observe/collect data for 6 months first before integration (determine what info would be useful)
- Feed is limited by how many "form fields" (with constrained entries, not free text) are available in CAD
- Don't begin work until Memorandum of Understanding (MOU) is signed
- Projects that should take 90 days can take more than a year due to process/coordination with municipalities
- Jurisdictions vary in willingness/ability to share data/granularity of data
- Depth of integration matters; more data leads to greater success

Success Stories:

- Up to 88% of accident discovery was by CAD
- 34% reduction in clearance times on 67-mile segment of I-95
- Integration partners reduced their communication workload and improved situational awareness



Schematic of VDOT/CAD Integration (Courtesy Virginia Department of Transportation)

Oregon

Program Summary: Statewide integration of Oregon State Police (OSP) dispatch and Oregon Traffic Operation Centers; county-by-county integration of PSAPS via Oregon Interoperability Service (OIS).

Extent/History: Before 2009, Oregon DOT and OSP shared a CAD system. In 2009, Oregon created four Traffic Operations Centers (TOCs). Connected with Deschutes County, and conducted before and after study. OIS is now integrated with Wasco, Frontier, and Hood River, and seeking to integrate with additional PSAPs.

Key System Aspects: Information is shared from partner agency CADs to OIS. Agencies have ability to determine what is shared manually and what is "broadcast," and to whom. Operators can send out information that requires a mandatory response, or just an FYI. Operators can also text message other agencies. All TOCs users are CJIS-certified.

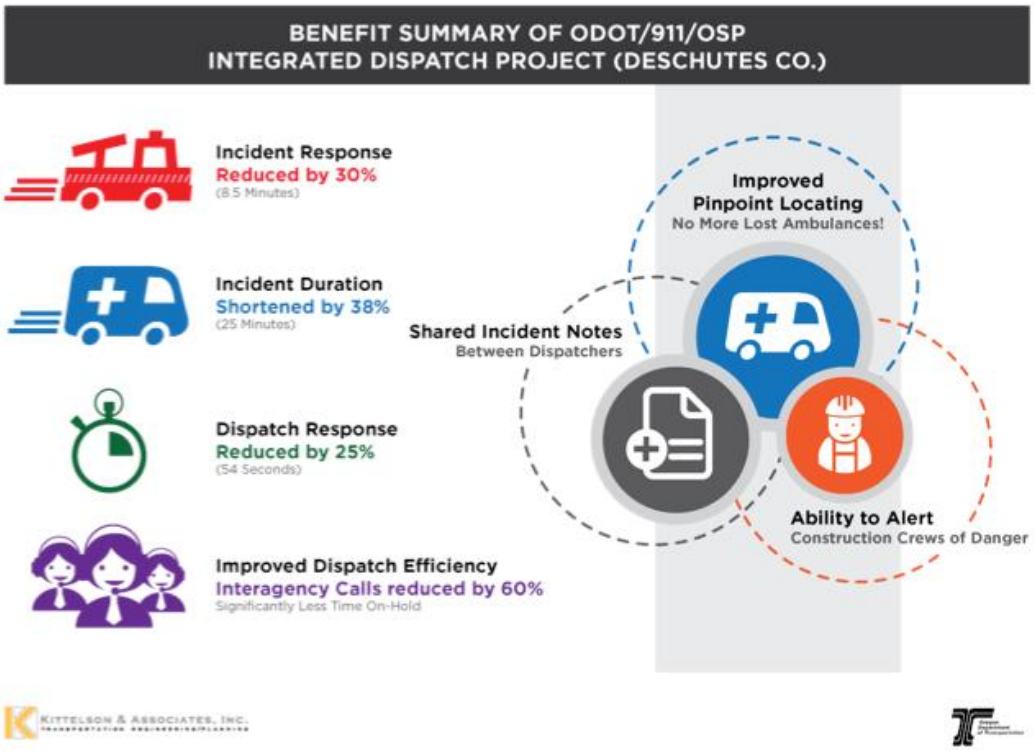
Lessons Learned:

- Lack of formalized program governance hampers progress (no agreement on who pays for what or how to do upgrades)

- Budget constraints for PSAP – no logical source of funding
- Targeted info broadcast – geographical area of responsibility – sometimes hard to determine audience
- Resistance/preference not to auto share/broadcast – means sharing is still not automatic, even though recipients have option to not accept messages as well
- Technical Issues
  - Message schema design complicated
  - Sync message separate process
  - Test Agency hard to use
  - Connection/onboarding kit needs improvement

Success Stories:

- Incident response reduced by 30% (8.5 minutes);
- Incident duration reduced by 38% (25 minutes);
- Dispatch response reduced by 25% (54 seconds);
- Interagency calls reduced by 60% (less time on hold);
- Improved pinpoint locating (no more lost ambulances); and
- Ability to alert construction crews of danger.



Maryland

Program Summary: Maryland has a robust TMS known as Coordinated Highways Action Response Team (CHART). Maryland State Police (MSP) have a permanent officer assigned to CHART office with additional troopers manning the Statewide Operations Center during morning and afternoon rush. The Traffic Operations Centers are located at MSP Barracks. MSP has had access to the Traffic Management System and cameras for many years. CHART is starting to use the Frederick regional CAD as a responding agency.

Extent/History: CHART program operates 24/7 in major metropolitan areas. Maryland has 157 law enforcement agencies covering 23 counties. A MOU for full system-to-system integration has just been signed with an expected integration date from CAD to Traffic Management System by summer 2018. (See Appendix D).

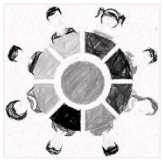
Lessons Learned:

- MOU helped to define terms of relationship
- DOTs generally have the ability to more easily spend money for safety initiatives than state police agencies
- Get involved in CAD procurement to make sure you understand the type of data the police pull in to their CAD and what you can and can't do with it

Key Barriers to CAD/TMS Integration (and Some Possible Solutions)

Participants identified both institutional and technical challenges to CAD/TMS integration. Some of the most significant barriers are described below.

Institutional Issues

Lack of Awareness of Benefits/Buy-in from Leadership 	**Barrier:** In many states, leadership is not aware of the potential benefits of CAD/TMS integration. **Solutions:** • Use "success stories" from other states to make the business case • Ensure that performance metrics important to both public safety agencies and DOTs are included in both pitch and plan • Identify champions in both DOTs and public safety agencies
Lack of Funding 	**Barrier:** Lack of Funding (especially on public safety side) **Solutions**: • Provide seed funding for public safety agencies for piloting process • Help public safety agencies demonstrate cost savings/efficiencies of integration
Coordination Among Other State Agencies 	**Barrier:** Coordination with state IT agencies, including procurement restrictions; coordination with homeland security and other stakeholders **Solutions:** • Create MOUs specifying terms of coordination • Seek agency-specific exemption to state IT requirements • Use public university as consulting resources • Coordinate/facilitate vendor-to-vendor conversations

Technical Challenges

Documentation Issues 	**Barrier:** • Field Names are different between CAD/TMS systems • Field Order is different - e.g., CAD may put time first, then location of incident, while TMS may reverse • Field Format is different (more free text format in CAD complicates information transfer – if dispatcher can put in free text, makes it harder to categorize) • Changes to closed events –ensuring that information to close events is received timely • Connection Information –How devices need to be configured to communicate with each other **Solution:** No panacea exists to resolve documentation issues, but agencies need to allow both internal and vendor time to resolve as part of the integration process.
CAD Operations Issues 	**Barrier:** Lack of a federal standard for mapping leads to inconsistencies in operations. Lack of operational training to process events consistently • Roadway Names (not consistent across systems). • Latitude/Longitude Accuracy • Street Addresses not consistent/reliable • Abbreviations may not be consistent **Solution:** Create mapping standards that are applied nationally
Lack of Consistent Map 	**Barrier:** CAD/TMS systems often use different underlying maps • May cause confusion as to location of incidents/cause duplication of incidents • Different maps make it difficult to show information as layers (choose whether to show levels of detail or not) **Solutions:** • Federal Mapping Standards need to be developed • Mapping Updates also need to be conducted on a consistent timeline so that people are using the most current information

Criminal Justice Information System (CJIS) Requirements 	**Barrier:** Users of CAD data are subject to U.S. Department of Justice requirements for Criminal Justice Information Systems (CJIS). **Solutions:** • Provide training to TMC operators and do background checks required for CJIS • Create fact sheet for DOTs on CJIS requirements; improve coordination with DOJ • Design integration so that data subject to CJIS requirements is not sent to TMS

Action Plan/Next Steps

In the final session, workshop participants developed suggested action plans for both the coalition and individual states for accelerating the pace of CAD/TMS integration.

Coalition Action Plan

Participants recommended that the coalition:

- Publish this report, including tools useful to states in implementation, and information on best practices, lessons learned, and benefits that can make the business case for integration.
- Create a clearinghouse of sample documents and tools, including data lists, MOUs, reports, and research;
- Develop fact sheet on CJIS and CAD/TMS integration, and reach out to the US Department of Justice to facilitate coordination; and
- Foster industry research by sponsoring a forum for ATMS/CAD vendors to discuss common issues.

Action Plan for States

For states, participants recommended the following actions to begin or accelerate CAD/TMS integration:

1. Identify Champion: Identify an internal champion/point-of-contact that can support this effort. States can use the data about CAD/TMS integration benefits, and customize to their state's context.
2. Establish Internal Working Group: The working group should establish goals (see below) and also examine data to determine what to integrate and how.
3. Create Goals: Each state's CAD/TMS integration may have different goals. Including goals and measures of importance to law enforcement and public safety as well as DOTs will lead to greater buy-in.
4. Develop MOUs: Create the basis for partnerships with other agencies
5. Conduct Outreach: Reach out to CAD and TMS Vendors to give early notice of goals/interest.
6. Assist in Request for Proposal (RFP) Development: As CAD and ATMS systems develop, and as integration is planned make sure agencies have a seat at the table as the RFP is developed (PSAPs in ATMS, DOTs in CAD)
7. Implement Integration: Make it so!
8. Track Data: Get data from before and after integration to document benefits and improve performance.

Appendix A: Glossary of CAD/TMS Acronyms

ATIS: Advanced Traveler Information System

CAD: Computer Aided Dispatch

CJIS: Criminal Justice Information System

MOU: Memorandum of Understanding

PSAP: Public Safety Answering Point

RFP: Request for Proposal

SOW: Statement of Work

SOP: Standard Operational Procedure

SSL: Secure Sockets Layer

TIM: Traffic Incident Management

TMS: Traffic Management System (also called ATMS; A = Advanced)

TMC: Transportation Management Center

TOC: Transportation Operations Center

XML: Extensible Markup Language

Appendix B: State-by-State Summary of CAD/TMS Integration Status

Summary: **Status of Communication/Coordination Among Public Safety Agencies and DOT Traffic Incident Management (as reported by attendees)**			
State	**Staging: How Advanced is Coordination/ Communication?**	**Staging: How Extended is Coordination/Communication?**	**CAD/TMS Vendor(s)**
CT	**Level II: Colocation.** Sharing redacted CAD at one TMC that is co-located; very little 2-way interaction. The other TMC is not co-located and has no access to CAD information.	2 TMCs in State. 99% of our highways are covered by state police; thus, CAD access by state Police would offer complete coverage	CAD: Nexgen TMS: IBI
DE	**Level IV: Advanced/Integrated.** Don't need co-location because systems already integrated (Evolved past that stage)	Fully integrated – county and municipalities as well. In DE more than 90 percent of the roads are State managed, and DelDOT is responder for nearly all types of modal incidents (even airplane)	Statewide CAD Vendor: Tyler/New World. Sussex County Vendor: Tritech CAD. No TMS
DC	**Level II.5: Colocation/Parallel Systems.** TMC co-located with police and fire.	DC is city/state (Cooperation with MD/VA?) Current ATMS Map interface has a RITIS GIS Layer to view Incidents in VA and MD.	TMS: Transcore CAD: Netviewer
GA	**Level I.5 - II**: **Rush Hour Co-location.** Trooper co-located during rush hour only; can get "over the shoulder" look.	1 TMC; trooper is located there.	TMS: Navigator
KY	**Level I: Beginning**. At one point co-located SP TOC with DOT, then went back. (Working on getting integration back together)		Same CAD for very many years; only a few upgrades. Now working on new system
ME	**Level I.5: Beginning.** 10 years coordinated via voice; CAD & TMS vendors have talked vendor to vendor about data items.	PUC's Emergency Services Communication Bureau is responsible agency, providing the infrastructure and delivering calls to State's 26 PSAPs, operated by state, county, and local agencies.	CAD: Spillman. Piloting TMS: Southwest Research (shared by FL, TX, TN, ME, NH, and VT)

Summary: Status of Communication/Coordination Among Public Safety Agencies and DOT Traffic Incident Management (as reported by attendees)			
State	**Staging: How Advanced is Coordination/ Communication?**	**Staging: How Extended is Coordination/Communication?**	**CAD/TMS Vendor(s)**
MD	**Level III.5: Colocation with some parallel access.** Co-located: State police have permanent officer assigned to our office with additional troopers manning the Statewide Operations Center during morning and afternoon rush. Our Traffic Operations Centers are located at MSP Barracks. MSP has had access to our Traffic Management System and cameras for many years and we are starting to use the Frederick regional CAD as a responding agency. An MOU for full system-to-system integration has just been signed with an expected integration update from CAD to Traffic Management System by this summer.	Coordinated Highways Action Response Team (CHART) program operates 24/7 in major metropolitan areas. Maryland has 157 law enforcement agencies covering 23 counties. Law enforcement agencies see us as force multipliers.	CAD Vendor: Caliber TMS: Developed for Maryland by General Dynamics IT (formerly CSRA, formerly Computer Sciences Corporation).
NJ	**Level I: Beginning.** Phone and radio – All on same data, same radios, little interface with rest of the world. CAD integration is an action item in TIM strategic plan, and NJDOT established a working group of NJDOT Traffic Operations and Central Dispatch Unit, State Police, NJ towing association, Transcom, & FHWA Division Office.	TMC is in a different county, with troopers who work for the toll road. DOT/Turnpike authority are integrated. Goal of working group is to start with integration between NJDOT and NJSP to cover the interstate highway system and move on to integration with local law enforcement systems (Paramus, Palisades).	TMS: Open Reach

Summary: Status of Communication/Coordination Among Public Safety Agencies and DOT Traffic Incident Management (as reported by attendees)			
State	**Staging: How Advanced is Coordination/ Communication?**	**Staging: How Extended is Coordination/Communication?**	**CAD/TMS Vendor(s)**
NY	**Level II: Some Colocation.** Trying to integrate state police, DOT, and thruway – still working with vendor, on GUI, who should see what (have MOU with thruway – to connect to CAD system – but not between state police and DOT)	11 DOT regions, 12 SP troops. Most of State police cars are dispatched by counties – (state doesn't have 911 centers). 2 PSAPs co-located with TMCs. Other TMCs built on back of failed state wireless program. DOT built nice TMCs but SP never moved in. 12-16 hour TMCs (state police take calls after that).	State police has 2 independent CADs, that can't talk to each other. Vendors not happy to integrate. CAD: Intergraph, Valor, Hi Tech
NC	**Level II: Advanced.** Co-located – TMC is co-located with highway dispatch. CAD dumps straight into TIM system – operators can click a button and create an incident from there (goes out to the world).		
OK	**Level II.5 - III: Some Colocation/Dual Systems.** Beginning CAD integration (gateway concept with SQL on the side so we don't have to deal with so many issues (we cover 69,000 square miles don't want to have to email down the line to a large distribution list). ATIS duplicates event off CAD. Most info coming from state police; some from OK City & Tulsa.	Virtual TMC – central TMC out of the main office. ATIS consoles all over the states + military bases (TINKER has two). Municipalities have TMC console 911 facility. OHP can control the pan-tilt-zoom functions of ODOT's ITS in OKC and Tulsa metro systems from communications centers when required. Realize the OHP makes most responses for traffic flow issues not related to surface issues. This feature is extremely beneficial and an example of interagency cooperation.	ESRI-driven. MOU in place CAD vendor will be ESRI plug and play

Summary: Status of Communication/Coordination Among Public Safety Agencies and DOT Traffic Incident Management (as reported by attendees)			
State	**Staging: How Advanced is Coordination/ Communication?**	**Staging: How Extended is Coordination/Communication?**	**CAD/TMS Vendor(s)**
OR	**Level III.5 - IV: Integrated.** Oregon interoperability service – all responding parties have same information. Deschutes/ODOT gathered data before connection and 6 mo. after. IRT reduced by 30%. Duration reduced by 38%. Dispatch response reduced by 25%. Improved dispatch efficiency – interagency calls reduced by 60%. Won national state CIO award in 2014. In 2015, transferred hosting OIS to OSP. Portland has their own info sharing for counties in metro area; trying to integrate with these eventually. Data now limited to certain call types – crash, fatal crash, road debris.	OSP/ODOT – 4 dispatch centers, OSP has 2. We are co-located with those 2 centers. Enterprise service bus shares between CAD system, and TOC. Also shares with some PSAP counties. Info sharing with 7 counties 911 agencies plus OSP. Calls to other agencies can be manually pushed as a call for service, requiring a response (so status of responders known). Before 2009, ODOT/OSP shared CAD system. Then ODOT decided to create TOCS – a more transportation-based system, with information sharing system between PSAPs, OSP, and ODOT (with Homeland security grants).	ODOT CAD System (Transportation Operation Center System – TOCS) is custom developed and maintained system. ODOT has a partnership with Oregon State University to make enhancements to the System. OSP CAD: Deschutes County CAD: HiTech (switching to Tyler). All other 911 PSAP connected to the OIS use OIS CAD system.
PA	**Level I: Beginning**. Still working with phone calls primarily; some integration locally. PennDOT/PTC coordinate with PennTime, via phone. Statewide TMC is co-located w/PA Emergency Management Agency's (PEMA's) Watch Center. There is a planned TIM training facility at Penn State.	1,200 local police departments. 67 county PSAPs. Some regional TMCs have limited counties' CAD integrated, but not standardized across the state. At this time, each region is responsible for own setup. PEMA shares access to Knowledge Center Software that has major incidents from a majority of county 911 dispatch centers.	ATMS Vendor: Q-Free's OpenTMS

Summary: **Status of Communication/Coordination Among Public Safety Agencies and DOT Traffic Incident Management (as reported by attendees)**			
State	**Staging: How Advanced is Coordination/ Communication?**	**Staging: How Extended is Coordination/Communication?**	**CAD/TMS Vendor(s)**
PTC	**Level I – I.5: Beginning.** Just starting to integrate CAD with GIS. There is also Emergency Notification System – duty officers enter in calls to this system.	TOCs dispatch and are CJIS-certified. Maine Turnpike & MD Trans Authority also dispatches on their facilities.	We have a CAD system, ATMS, ENS. Systems don't talk to each other. CAD system in 2010 (Intergraph version 9.3 – upgrading to 9.4 in June). Keeping current CAD; changing ATMS from MIST by Kapsch to IBI Group's system in 2019. Want everything on one map.
RI	**Level I.5 – II: Beginning/Intermediate.** (but co-located). Statewide CAD/RMS RFP 2016, pushed by RI Police Chiefs Association (RIPCA)– they didn't coordinate explicit CAD/RMS DOT or EMA system desires/needs but DOT helped fund it. RFP is regenerating. All cities and towns will be included.	One TMC, very small, 39 cities and towns. Co-located. (State Police Officer currently stationed inside RIDOT's TMC during peak travel periods).	ATMS: Currently no comprehensive ATMS, but TMC uses in-house software for TIM (Rhodeways) and other various isolated software applications that support TIM (e.g., VUEWorks). CAD – Currently none in place at DOT/Statewide level; RIPCA has short list of candidate vendors for RICAD/RMS as a result of original 2016 RFP.

Summary: Status of Communication/Coordination Among Public Safety Agencies and DOT Traffic Incident Management (as reported by attendees)			
State	**Staging: How Advanced is Coordination/ Communication?**	**Staging: How Extended is Coordination/Communication?**	**CAD/TMS Vendor(s)**
SC	**Level I: Beginning.** We're doing a lot for DPS – trying to make it equitable partnership. We give them video, run statewide safety campaigns on message boards. We share video w/ local agencies if they do SHARP2 TIM training. We close down cameras to public/media views on incidents. Hurricane evacuations come into play. In discussions with DPS/CAD coordinator for enhanced CAD integration, relative to lane closures, etc. w/out compromising Criminal Justice Information (CJI).	7 districts, 7 TMCs. 5 TMCs, only 24-hour TMC is Columbia. Other TMCs operate 12 hours per day, 7 days per week. Lost dual systems in Dec 2016 – FBI did CJIS audit and determined that as a non-law enforcement agency we (SCDOT) could no longer receive the full integrated CAD information. Had to remove DPS networks from our 5 TMCs, now only get public version – doesn't have on-scene or off-scene info. Now Public CAD call may stay in there for hours after initial entry, if event is a fatality/long investigation, etc.	ATMS: Siemens System (SC Term Palguide). CAD: Smartcop. We're able to go in on a view-only mode – and currently cannot extract data for lane closure, on-scene, off-scene, or DPS notes.
TN	**Level I: Beginning.** Radio systems are integrated. SP has CAD; not integrated with anyone.	2 of 4 TMCs co-located with PSAPs; still "behind glass."	THP's CAD vendor is Hexagon, formerly Intergraph. TDOT's TMS is developed in-house based upon a SWRI platform. SWRI can integrate with various platforms utilizing APIs.
VT	**Level I: Beginning.** Good time for this opportunity, AOT's Secretary was former DPS Senior leadership & maintains good relationships	2 CADs statewide (outdated, DPS just renewed w/ Spillman for 4 years, releasing RFI w/ in next year (scope will include integrations w/ AOT systems)	CAD: Spillman/Valcour

Summary: **Status of Communication/Coordination Among Public Safety Agencies and DOT Traffic Incident Management (as reported by attendees)**			
State	**Staging: How Advanced is Coordination/ Communication?**	**Staging: How Extended is Coordination/Communication?**	**CAD/TMS Vendor(s)**
VA	**Level IV: Advanced.** (Automated data sharing, only from CAD to DOT, but LE/911 has access through web client only). Info extracted automatically from CAD – regional sponsor firewall prevents CJIS problems. Immediate value to VDOT – up to 88% of accident discovery via CAD. 34% reduction in clearance time across 67 miles of I-95. For LE: Reduced communications workload/ROADI, improved situational awareness.	VSP integration in 2004; Albemarle 2005, Hampton Roads regional 2007; Nova, I-81. Statewide consolidation 2011.	Real-Time Traffic Incident Management Information System (RTIMIS)

Appendix C: Workshop Participants

Agency	Participant	Email Address
Concept Jeneration, LLC	Jen Mayer, Principal	jen@conceptjeneration.com
Connecticut DOT	Paul Krisavage (IBI)	Paul.k@snet.net
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Oklahoma State Police	Maj. Shawn Lockwood	Shawn.lockwood@dps.ok.gov
Oregon DOT	Matt Badzinski	Matthew.r.badzinski@odot.state.or.us
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Pennsylvania Turnpike Commission	Jeff Beard	jbeard@paturnpike.com

	Christopher Parker	cparker@paturnpike.com
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Tennessee DOT	Kevin Speakman	Kevin.speakman@tn.gov
Texas DOT	David McDonald	David.mcdonald@txdot.gov
Transcom	Bob Glantzberg	glantzberg@xcm.org
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Virginia DOT	Scott Cowherd	scott.cowherd@vdot.virginia.gov

Appendix D: Document Attachments

This section provides suggested resources for further learning about CAD/TMS integration.

Resources were identified by the workshop attendees.

CAD/TMS Integration – Sample Documents Attached

State	Document	
Maryland	MOU	SHA/State police
Oklahoma	MOU	DOT/State police
Oregon	MOU	DOT/State Police/Interoperability – 3 samples attached

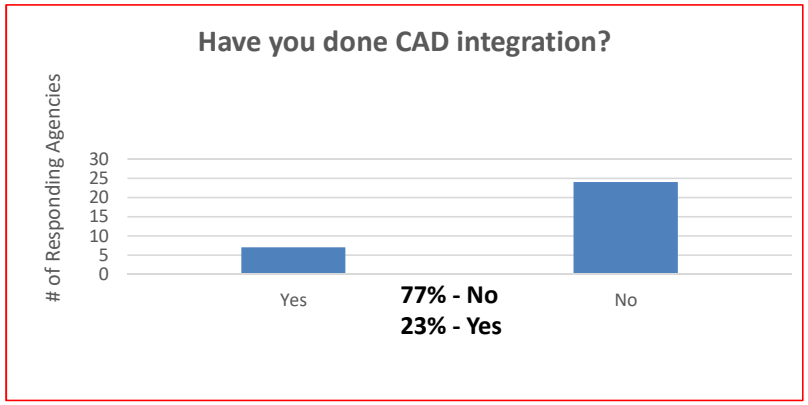
Research

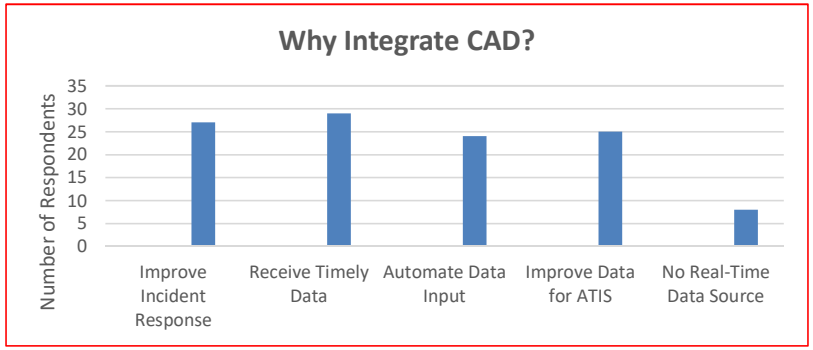
New Jersey	Notes	NJIT Workshop Notes

Appendix E: Pre-Workshop Webinar and Survey Results

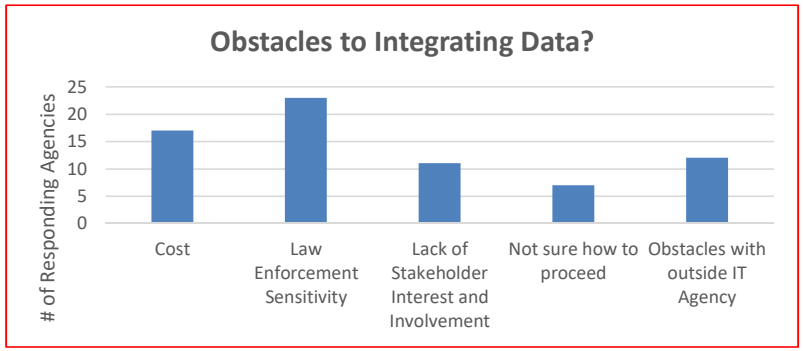
One hundred and twenty-seven participants from 35 states signed up for a webinar on CAD-TMS integration prior to the workshop. After the webinar, a survey was conducted of participants. Some summary results were presented prior to the first session. Results are attached.

Initial Webinar Polling Questions

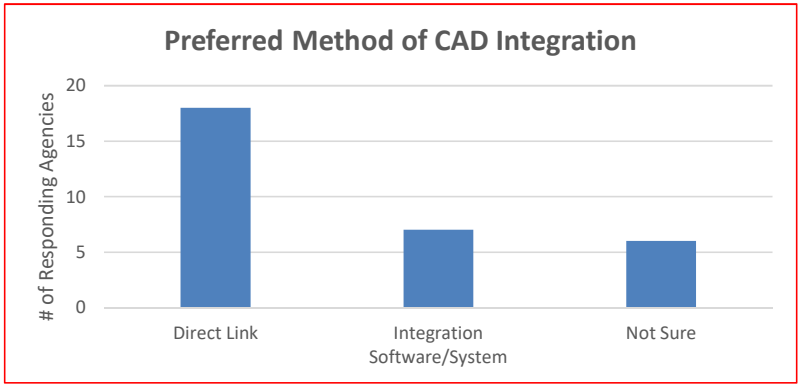




87% - Improve incident response and quicker clearance
94% - To receive timely data from incident responders
77% - To automate data input
81% - To improve data to populate our traveler information systems
26% - We had no real-time source for incident data in our current system



61% - Cost
82% - Law Enforcement Sensitivity
39% - Lack of Stakeholder Interest and Involvement
25% - Not sure how to proceed
43% - Obstacles with outside IT Agency



58% - A direct link to our ATMS and/or TMC system
23% - The use of an integration software/system
19% - Not Sure

Webinar versus National Survey