THE BENEFITS OF REGIONAL COLLABORATION IN MANAGING NETWORK TRANSPORTATION OPERATIONS

Wayne Berman
Office of Operations
Federal Highway Administration
US Department of Transportation
Washington, DC 20590

ABSTRACT

Regional collaboration has become an essential element in providing safe, reliable and efficient transportation systems. This paper illustrates the benefits of regional collaboration between agencies and jurisdictions with respect to transportation network operations by showcasing some of the best examples of regional collaboration and coordination in the U.S. today. The five case studies highlighted range from a simple collaboration between four road maintenance agencies between three counties to a multi-state wireless network that integrates transportation and criminal justice information for a multitude of agencies. Common benefits identified include: savings in procurement, expanded service area coverage, new funding opportunities, and formalized regional operations structures. Challenges to regional collaboration and performance measures used to evaluate these programs are also discussed.

BACKGROUND

The operation of transportation networks not only affects traffic on roadways, it also impacts economic growth, public safety, security and the environment. In light of this, it is important that the planning and operation of these networks involve regional coordination and collaboration from numerous jurisdictions, agencies and service providers. Common partners include departments of transportation, departments of public works, transit agencies, planning organizations, and public safety/security agencies.

Indeed, there has been a paradigm shift in transportation planning and operation from the traditional focus on single a single or jurisdiction to regions over the last decade. Some of the hurdles identified in advancing regional collaboration among stakeholders are the lack of common goals and visions, difficulty in sustaining collaborative efforts and realization of the benefits in collaboration among the participating agencies.

This paper focuses on the benefits of regional collaboration with respect to better management of road network operations. The following case studies showcase some of the best examples of regional collaboration and coordination in the U.S. today. Benefits that have been quantified are highlighted where available. Performance measures identified for future evaluation are also included.

The case studies highlighted in this paper range from a simple collaboration between four road maintenance agencies in three counties to a multi-state wireless network that integrates transportation and criminal justice information for a multitude of agencies. The first case study is SEMSIM, a regional collaboration among four road maintenance agencies in southeastern Michigan to coordinate snow removal technology and operations. The second case study is the Metropolitan Detroit Incident Management Coordinating Committee, an informal advisory group that makes recommendations for improving traffic incident management in the Detroit metropolitan area. The third case study is AZTech, a 40-member partnership of public and private agencies committed to improving travel by integrating intelligent transportation system technology throughout the Maricopa County region. The fourth case study is Kansas City SCOUT, a bi-state freeway management system that allows regionwide freeway monitoring and response from a centralized transportation operations center. The fifth case study is CapWIN, a multi-state, multi-agency wireless communications network connecting federal, state and local public safety and transportation agencies.

CASE STUDIES

SEMSIM

The Southeast Michigan Snow and Ice Management (SEMSIM) partnership is a regional collaboration formed among four road maintenance agencies in southeastern Michigan. The idea was conceived during a conversation between Managing Directors of the Road Commission for Oakland County (RCOC) and the Wayne County Department of Public Services who were both upgrading the AVL systems on their maintenance vehicles. They decided to invest in the same technology in order to save money on procurement and installation. This led to collaborating on operations, and bringing the City of Detroit Department of Public Works and the Road Commission of Macomb County on board as well. Together these four agencies formed SEMSIM in 1998 with the goal of outfitting 10 vehicles per agency with a common maintenance vehicle management system by Winter 2000.

RCOC is the lead agency in the SEMSIM partnership, and has individual contracts with each partner. As the lead agency, RCOC is responsible for securing Federal funding, paying contractors and buying parts. The project is financed with 80% Congestion Mitigation and Air Quality (CMAQ) funding and 20% matching contributions from the four agencies. No other staff or resources are explicitly shared. Each partner owns, manages and operates its own fleet, and retains control over road maintenance within its own jurisdiction. Operations and decisions are still localized; the SEMSIM collaboration simply facilitates information and resource sharing.

The physical features required for this project consist entirely of system-based technology upgrades that allow each agency to better monitor and communicate with its own fleet as well as its partners'. No physical facility was built, and no new vehicles

were purchased for this project. Technology upgrades include in-vehicle status sensors that monitor the location, direction, speed, plow position, and salt application rate. New computerized salt spreaders automatically adjust the application rate based on the speed of the vehicle, improving the efficiency of salt application. GPS receivers improve communications by allowing two-way text messaging between vehicles and control centers.

The Suburban Mobility Authority for Regional Transportation (SMART), the regional transit agency, is an important stakeholder in the SEMSIM partnership. SMART provides the radio system that serves as the communications "backbone" for SEMSIM. Data are continuously fed from the in-vehicle units to computers at the control centers via the SMART radio system. SMART shares its radio system with SEMSIM free of charge, and receives real-time information about which roads have been salted and plowed in return. This benefits transit riders because SMART dispatchers can make informed route and scheduling decisions in adverse weather conditions.

Using a web-based map interface, partners can track snowplow locations and monitor treatment activities for all partner agencies, which facilitates sharing. For example, if RCOC sees that another county's snowplow is closer to an area that needs to be plowed in Oakland County, it can ask that county for permission to use its snowplow for the job. Agreeing to let snowplows cross-jurisdictional boundaries on an ad hoc basis allows for faster, more efficient plowing of roads. Before SEMSIM existed, there was no sharing of information or equipment between jurisdictions.

Regional collaboration has also opened up dialogue and improved relationships between partners. Periodic meetings keep communication lines open and ensure sustained collaboration. Before collaboration, agency counterparts may not have known each other, now they do not hesitate to pick up a phone to ask for advice or discuss an issue, and not only inter-jurisdictional issues. Informal sharing and exchanges also occur as a result of collaboration. For example, RCOC had a radio/computer expert who lent a lot of technical support to partner agencies during implementation of the first phase. Then when the City of Detroit changed from front-mounted plows to underbody scrapers, which RCOC had long been using, RCOC sent their operators to train Detroit workers. RCOC benefits from having well-trained operators on-hand in Detroit, and Detroit benefits from existing expertise by using the same technology as RCOC.

To date, SEMSIM has successfully integrated approximately 300 vehicles into the maintenance vehicle system, with a goal of all 500 vehicles by 2006. The main challenges they have encountered involve hardware and technology; collaboration itself has been fairly straightforward. Once they have equipped all of the existing partner vehicles, cities within Oakland and Macomb counties will be able to join SEMSIM. Some cities have already expressed interest in having their city roads included in the SEMSIM system.

SEMSIM is focusing on quantifying their savings using the large data set that now exists as a result of this project. The main performance measures being used to evaluate the

program are reduction of salt use, which is expected to be 20%, and timesavings in clearing routes.

Future plans for the program include installing in-vehicle computers to better monitor vehicle maintenance needs. This is expected to reduce the cost of vehicle maintenance and prolong the useful life of the fleet. SEMSIM partners are also looking into real-time dynamic routing, which would identify the most efficient treatment routes given equipment availability at any time. There is also a desire to find more non-winter applications to make the program more cost effective. This would include pothole patching, street sweeping, lawn mowing, and road grading – all of which are responsibilities of these agencies.

Detroit Metro

The Metropolitan Detroit Incident Management Coordinating Committee is an ad hoc advisory group made up of public agencies and private interests with the purpose of improving response to traffic incidents. It was formed in 1992 as a result of an incident management workshop where participants from fire, police, and transportation agencies, and the metropolitan planning organization (SEMCOG) collaborated to develop a incident management program for the metropolitan Detroit area. This was formalized by the "Blueprint for Action", which outlined twelve recommendations, and a lead agency, estimated cost and timeframe for completion for each recommendation.

Committee membership is open to any interested party from the public or private sector. Committee members meet every four to six weeks. Federal and state agencies include FHWA, Michigan Department of Transportation (MDOT), Michigan State Police (MSP), and Michigan State University (MSU). Other public agencies include SEMCOG, Road Commission for Oakland County (RCOC), Road Commission for Macomb County (RCMC), Wayne County Roads, and the cities of Detroit and Troy. Private partners include AAA Michigan, Emergency Road Response, and the media.

The Blueprint for Action has led to four major improvements to incident management response in the metropolitan Detroit area to date. First was the integration of the Michigan State Police (MSP) dispatch operations with the MDOT ITS Center (MITSC) in Detroit. This allows MSP dispatchers to view all of the CCTV cameras available on the metropolitan Detroit freeway system. This access improves emergency response by enabling dispatchers send fire and ambulance responders to the scene of an incident before state police officers arrive. Further integration has occurred with the microwave link connecting the MITSC in Detroit with the Road Commission for Oakland County (RCOC) traffic operations center (TOC). This allows for shared CCTV video, system integration and coordinated operations between the two TOCs.

The second improvement was the expansion of the freeway surveillance system from approximately 32 miles in downtown Detroit to over 200 miles of CCTV camera and VMS coverage in the metropolitan area. Third was the expansion of the Freeway

Courtesy Patrol from one van assisting motorists on I-75 in downtown Detroit to over 30 patrol vehicles operating on nearly all of the metropolitan Detroit freeways. The Committee is looking to further improve dispatching, extend service hours and expand service coverage. Lastly, the Committee played a major role in revising the abandoned vehicle time limit legislation from 48 hours to 18 hours. Removing these vehicles faster makes the freeways safer and reduces the risk of secondary crashes.

The Committee has developed a matrix to identify responder responsibilities for various levels of incident on metropolitan Detroit freeways. This matrix provides the basis for a joint operations strategy among incident response organizations. The matrix defines five incident levels – ranging from lane restrictions to full freeway closure – and the responsibility of each responder group – from police, fire, and emergency medical to road maintenance and hazardous material. The Committee will develop response roles, data and video requirements, and response and clearance performance measures as part of this matrix.

In early 2004, the Committee established six subcommittees to produce periodic reports on specific areas to the larger Committee. The traffic incident management planning subcommittee will update the Blueprint for Action, recommend incident management projects, provide support for the Great Lakes ITS funding program, and provide a national perspective on incident management activities. The arterial traffic management subcommittee will resolve boundary issues and integrate freeway and arterial operations. The courtesy patrol operations subcommittee will develop and update operating guidelines, review proposals for system expansion, and review data and technology needs relating to freeway courtesy patrol operations. The freeway operations committee will develop an outreach program to broaden representation of local fire and police, report on performance and benefits of freeway operations improvements, and develop incident management procedures. The abandoned vehicles subcommittee will suggest legislative action to further reduce abandoned vehicle time limit to four hours, coordinate with freeway courtesy patrol, review existing tag/removal procedures, and improve the system for removing abandoned vehicles from roadsides. The tow desk subcommittee will establish a tow desk at the MITSC that will have an exclusively assigned officer to handle tow operations.

The major challenge that many Committee members face is managing multiple regional collaboration efforts. Many of the same players are collaborating on different projects. These agencies are struggling with whether it is more effective to build on existing committees or establish new ones. There is concern that multiple committees overcomplicate things and cause redundancy, creating more roadblocks to collaboration than benefits.

AZTech

The concept for AZTech began in the early 1990s when traffic engineers in Maricopa County, Arizona wished to synchronize signal lights across multiple jurisdictions. Their objective was to implement inter-jurisdictional signal timing on their arterials. Since Arizona Department of Transportation (ADOT) owns and operates the signal intersections at freeway on-ramps, ADOT was included to synchronize lights from arterials to freeways.

The major physical components of AZTech are the AZTech server, eight Smart Corridors, a fiber optic network system, and center-to-center communication equipment. The AZTech server is a central database that fuses information from various sources and produces multimodal traveler information. The Smart Corridors are large-scale arterial street signal coordination and traffic detection systems that integrate seven jurisdictional traffic operation centers. Traffic detectors, closed-circuit television cameras, and changeable message signs were implemented along these Corridors. Traffic data from the participating jurisdictions are shared via the communication network administered by the AZTech server.

AZTech participants use inter-governmental agreements between ADOT and each city to address issues of responsibility for operation and maintenance of equipment. These agreements cover the transfer of funds, staffing, local funding, and operations and maintenance of AZTech equipment commitments, and leasing of some fiber optic lines. MMDI provided funds for the fiber optic connections between cities. The municipalities operate and maintain the equipment and communication links. Cities apply jointly to MAG for regular Federal funding in 80% of AZTech projects. The other 20% comes from County and Federal earmarks.

The operational arrangement of the Smart Corridors is a peer-to-peer permissive control traffic management scheme. Each jurisdiction retains control of its own signals, but coordinated signal timing plans for various pre-determined scenarios can be implemented with consensus from participating jurisdictions. Real-time traffic information is shared between the participating cities, MCDOT and ADOT, and traffic signal timing can be changed across jurisdictional boundaries via the communication network.

MCDOT was designated the official procurement agency for AZTech. MCDOT was determined to be more flexible in its procurement process and ability to work with local participants than ADOT. MCDOT is responsible for developing requests for proposal and contract negotiations. The County provided one procurement officer, as well as the AZTech Program Manager, to coordinate this work. The other agencies are also responsible for procuring selected technologies, but have the option to use MCDOT as the procuring agency or procure products and services themselves and be reimbursed by AZTech. The AZTech participants noted benefits from using one primary procurement agency to ensure that all products are compatible, no efforts were duplicated and costs were minimized through quantity discounts.

The sharing of costs and information through the AZTech server among multiple projects allowed for economies of scale, thereby making individual projects more affordable for participating agencies. The integration of ITS projects into an overall program under the AZTech umbrella provided a critical mass of multiple agencies. This heightened the awareness of ITS among local officials that individual ITS projects would not have been likely to accomplish.

The AZTech Evaluation Report also contained a partial signal re-timing evaluation study that quantified some of the benefits on a 5.7-mile section of the Scottsdale/Rural Road Smart Corridor, which contains 21 signals and passes through two jurisdictions. Three signals in Tempe were re-timed to match the Scottsdale cycle length. A GPS-equipped "floating car" field study was used to measure speeds and stops along the corridor. The re-timing was found to improve mainline travel speed by an average of 6.2% and reduce average stops by 4.2%. The impact was greatest in the southbound PM peak period, with average speed increasing 31% and average stops falling 19%. Fuel consumption and emissions estimates were made based on second-by-second speed and acceleration trajectories. The projected impacts were mixed: 1.6% reduction in fuel consumption, 1.2% increase in CO emissions, and no significant impact on HC or NOx emissions. Positive impacts were again amplified in the southbound PM peak period, where the largest increases in speed and reduction in stops were observed. Safety impacts were also estimated based on the speed profiles of the floating cars and data from the national crash database. The overall crash risk was predicted to drop by 6.7% overall, and by 20% in the southbound PM peak direction.

Computer simulation allowed assessment of these impacts for the entire corridor, including side streets. Simulation studies indicated that the improvements from partial signal re-timing in each of the above areas were not statistically significant when applied at the corridor level. Additional simulations were conducted for facility-wide optimized coordination plans. The results indicated that inter-jurisdictional optimization yielded the best performance, reducing delay by 20% and stops by 10% in the AM peak, over the baseline. This is compared to the 16% reduction in AM peak delay when signal optimization within each city was not coordinated between jurisdictions. Therefore, more benefits can be expected as AZTech expands its inter-jurisdictional signal timing coordination.

Overall, AZTech has shown clear benefits of both institutional collaboration and ITS integration, without any negative effects. The scope of AZTech was broadened as a result of workshops that were conducted following the completion of the MMDI project. An Executive Committee and Operations Committee were formed and meet regularly to guide future collaboration. Local fire and police departments and emergency services were added as AZTech partners. AZTech hopes to also include the medical community and the airport in the near future.

New collaborations led to work groups focused on emergency and evacuation management, expanded incident management programs, shared emergency traffic response teams, joint telecommunications projects, shared regional advanced signal

system contracts, and integrated TMC systems. Regional forums were also established to identify priorities in traveler information deployment and expansion, and operations and ITS research. More recent collaboration between MAG and AZTech resulted in the MAG-led RCTO completed in 2003.

Kansas City SCOUT

The Kansas City SCOUT is a bi-state freeway management system formed by Kansas and Missouri State DOTs in 1997. The SCOUT system employs closed circuit television (CCTV) cameras, vehicle detection equipment, dynamic message signs, highway advisory radio (HAR), and ramp metering. Fiber optic cable, capable of carrying real-time data and video transmissions, will feed data from these field devices to SCOUT operators at the new regional Traffic Operations Center (TOC) located in the MoDOT District Office. KDOT and MoDOT have an MOU in place, and are currently working on a more formalized operations guide. They also have long-standing relationships with local departments of transportation, emergency services and police.

The primary advantage of SCOUT is to allow regionwide freeway monitoring and response from a centralized location. Prior to the formation of SCOUT, each state had motorist assist vehicles that patrolled freeways in their jurisdictions during peak commute periods. SCOUT allows both states to monitor freeways from the TOC using CCTV cameras mounted on freeways and dispatch patrollers when incidents arise. This will eliminate the need for continuous patrolling, and reduce the time to detect and clear incidents. While each State continues to run its own patrol program independently, there is more informal coordination and information sharing between the two groups as a result of collocation. The new TOC has been operational since January 2004, and operates 24/7.

The collaboration of SCOUT will also improve traveler information in this region. While both states will continue to own and operate variable message signs on freeways, SCOUT is helping them communicate more effectively. Permanent dynamic message signs and moveable changeable message signs in both sates will be coordinated with respect to placement and messages displayed to eliminate confusion and create a seamless information network for motorists. Performance measures will include incident response time, incident clearance time, and travel time reliability.

CapWIN

The Capital Wireless Network (CapWIN) project was conceived to create a seamless communication bridge between various incident management responders in the National Capital region (Washington D.C.). Before CapWIN, in order to transmit a message from one agency's response unit to another, responders had to communicate with their respective communication centers to request that they phone their counterpart agency communication center to relay a message to their responding mobile unit. Fragmented and indirect communication added unnecessary delay in situations in which every second

counts. The concept for CapWIN was to have multiple mobile data platforms communicating seamlessly across the network regardless of their jurisdiction or geographical location. The result was a web-based application that can operate on any IP network, allowing vehicle-to-vehicle text communication and remote, in-vehicle database access for law enforcement, transportation and safety agencies, fire departments and emergency response teams. CapWIN's end-users include federal, state and local police, fire, and EMS vehicles, as well as state DOT service patrols.

To avoid potential "turf issues" and overcome any perceived fear, participating agencies decided to have day-to-day operations managed by a third party. It was determined that the Center for Advanced Transportation Technologies at the University of Maryland would serve as the operations center for CapWIN, contributing management and staff support to the project. The university was considered an unbiased participant who was less threatening to agencies working together and sharing high-security information for the first time. There are thirteen university employees dedicated to the CapWIN project, whose salaries are paid by the project. The university is responsible for all system integration and procurement, as well as day-to-day operation and management.

Given the scale and nature of the CapWIN project, its potential benefits are significant and far-reaching. One valuable benefit already realized by the agencies is avoiding investment in costly technology that is incompatible with other agency systems. The improved systems are seen as a return on investment of time and resources. On-scene access to local and national databases provides better information when critical and timely decisions must be made. Additionally, more effective and efficient multi-agency operations help with major events such as terrorist attacks, fires, large scale Haz-Mat incidents, presidential inaugurations, state visits, and major sporting events. Table 1 provides a summary of some of the pertinent benefits to regional collaboration in network transportation operations.

Table 1. Potential Benefits of CapWIN

Benefits	**Performance Measures**
Reduced Dispatch Efforts	Reduced dispatch time per case
Quicker Communication	Reduced staff time per case
Inter-jurisdiction Information Flow	Detailed messages between participants
Improved Highway Management	Improved traffic flow
Maintains a Log	Number of messages

Once the full system is deployed, it is expected that a robust, data-oriented evaluation will be performed. Table 2 lists the performance measures that relate to transportation operations. One inherent problem in evaluating these performance measures is that many are aggregate measures that may not directly attributable to CapWIN or any single specific source.

Table 2. Potential Performance Measures of CapWIN

Safety
- Reduction in secondary crash rates

Congestion Improvement
- Reduction in travel time delay
- Reduction in travel time variability
- Improved incident clearance times
- Improved incident queue return-to-normal flow times
- Reduced average queue length at incident sites
- Increase in customer satisfaction levels
- Better traveler information disseminated

Productivity Measures
- Reduced costs for other communication systems
- Improved vehicle utilization and better fleet performance
- Cross-training and inter-agency cooperation increases

TANGIBLE BENEFITS OF REGIONAL COLLABORATION

Each example of regional collaboration has its own unique set of motivations, objectives and benefits. However, there are several common benefits that were found in the case studies above. Most of these benefits reflect an increase in productivity or cost effectiveness for the agencies involved. The tangible benefits of regional collaboration include:

- **Facilitation of information and data sharing** – Sharing data and information is often the first step in collaboration. It allows agencies to communicate better and develop strategies to work together more effectively. *SEMSIM's first task was to share vehicle location and treatment activity information across agencies. Future plans involve using data to plan treatment strategies, and conduct post-event analysis that can help reduce the costs of future winter maintenance operations. Sharing environmental data with the SMART transit agency allows their dispatchers to make scheduling and routing adjustments during winter storms.*
- **Technology upgrades and compatibility** – Technology upgrades often initiate collaboration, which leads to integrated, compatible systems across multi-modal and/or multi-jurisdictional boundaries. *This was the case with SEMSIM, in which system upgrades to road maintenance vehicles were the original motivation for collaboration between Oakland County and Wayne County. This led to involvement by the City of Detroit and Macomb County to integrate the technology of all four agencies into a common system.*

- **Savings in procurement** – Collaboration produces economies of scale, which reduces equipment costs through quantity discounts. *Both SEMSIM and AZTech report saving in procurement by having one agency purchase equipment for the group.*
- **Faster response time** – Collaboration coordinates operations of related agencies to provide better, faster service and response time. *Detroit Metro's Incident Management Committee successfully revised state legislation for abandoned vehicles from a 48-hour time limit to 18 hours. Removing these vehicles prevents secondary accidents, and frees up lane blockage from causing congestion or preventing emergency vehicle access. SCOUT's freeway management system allows constant monitoring on freeways from CCTV cameras, which can detect an incident much faster than the old method of patrolling the freeways by car.*
- **Extended hours of service/operation** – Collaboration and collocation combines funding, equipment and staff resources to allow for longer hours of service and often 24/7 operations. *The new SCOUT regional TOC collocates KDOT and Missouri DOT operations and plans to have 24-hour operation by Fall/Winter 2004.*
- **Expanded service area coverage** – Collaboration moves agencies away from jurisdiction-specific operation toward a regionwide, multi-jurisdictional approach that provides the public with a seamless transportation system over a larger area. *Detroit's Incident Management Committee has expanded the freeway surveillance system from 32 miles in downtown Detroit to over 200 miles of CCTV camera and VMS coverage across the metropolitan area. They have also expanded the Freeway Courtesy Patrol from one van assisting motorists on one freeway in downtown Detroit to over 30 vehicles operating on nearly all of the metropolitan Detroit freeways.*
- **New funding opportunities** – Collaboration enables agencies to finance much larger projects, or those that they may not be able to afford on their own, through pooled resources, joint applications and access to new Federal funds. *Many regional collaborations begin as pilot programs and demonstration projects, and Federal funding is often available to initiate them. All of the case studies mentioned in this report were mostly or fully funded using Federal dollars.*
- **Centralized operations** – Many collaborative efforts combine separately functioning TOCs or systems into one centralized operations center or single interface. *Both SEMSIM and CapWIN created web-based architecture to enable their agencies to access information remotely. This allows previously disconnected networks to communicate seamlessly with real-time information, and allows new agencies to be easily added in the future.*
- **Formalized regional operations structures** – Collaboration can lead to a formal Regional Concept for Operations document, or a new regional organization. *AZTech and MAG's on-going collaboration led to the recently completed Regional Concept for Transportation Operations.*

CHALLENGES TO REGIONAL COLLABORATION

While there are clear benefits to regional collaboration, there are also frequent challenges that many agencies face in their collaborative efforts. The following are some of the common challenges agencies reported and some of the ways they are dealing with them.

- **Multiple, overlapping committees involving the same key players** – Agencies report participating in several different committees with many of the same players in the region. The challenge is to find ways to minimize redundancy and complication without sacrificing the effectiveness of collaboration. *Agencies in the Detroit Metro area feel that too many committees overcomplicate working relationships. They are taking a closer look at where they can build on existing committees rather than create additional ones.*
- **Finding a champion** – Many of the successful collaborations report one or more champions who were committed to seeing the project through. Many say that the collaborations would not have had the same success without the vision and investment of these individuals or organizations. *The ITS Directors at Virginia DOT and the Maryland State Highway Association became the champions of a multi-jurisdictional communications bridge among agencies in the Capitol area and are credited as being the catalysts for the formation of CapWIN.*
- **Voluntary participation** – Some agencies do not participate because they lack staff or funds to commit to a regional project or they do not see the direct benefit to their agency. *In the case of SEMSIM, it was easier to bring the Detroit Public Works and Macomb County Road Commission on board once the plans for technology procurement and installation had already been laid out.*
- **Lack of stable/secure funding** – Many of these projects have high start-up costs because they are oriented toward technology improvements. Collaboration often opens up new Federal funding opportunities, particularly for pilot programs and demonstration projects. Once the projects are underway, however, agencies must allocate their own funds to keep projects going. *Many projects, including SEMSIM, report linking the benefits of collaboration to air quality improvements in order to secure Federal funding.*
- **Technology integration –** Because regional collaboration is often technology-focused, many projects report hardware and system integration as their biggest challenge. This can be particularly difficult, and often costly, when trying to integrate older technology with newer technology into a common system. *Although upfront costs of integration may be high, the long-term benefits can be significant and far-reaching once systems are fully integrated. CapWIN considers their improved system a return on investment of time and resources by preventing investment in incompatible technology by member agencies.*

- **Quantifying Benefits** – Data collection and analysis required to quantify benefits consume valuable time and resources that these projects simply cannot spare. Because funding is often limited and needed to carry a project to the next phase, funds for evaluation reports are not always available right away. *Many of these projects, including SEMSIM and CapWIN, are introducing technology that allows agencies to track and store data more easily. This will make it less time consuming and costly for them to quantify benefits. Other projects, particularly federally funded ones, need to have money set aside for evaluation at the time funding is awarded to ensure that evaluations are completed.*

MEASURING THE PERFORMANCE OF REGIONAL COLLABORATION

Most agencies participating in regional collaboration recognize the importance of measuring performance. On-going or periodic evaluation not only helps justify the need for additional funding, it also helps guide future collaborative activities. Unfortunately, evaluation of these programs is often put off, especially when funding is limited. While only a few of the projects highlighted here had completed evaluation reports, all had identified performance measures that would be used to evaluate their programs in the future. The following are performance measures identified by agencies for evaluating regional collaboration.

Congestion Improvement

- Reduction in travel time/delay (AZTech, CapWIN)
- Increased in travel time reliability (CapWIN, SCOUT)
- Improved incident clearance time (CapWIN, Detroit Metro, SCOUT)
- Improved incident queue return-to-normal flow times (CapWIN)
- Reduced average queue length at incident sites (CapWIN)
- Increase in customer satisfaction levels (CapWIN)
- Better traveler information disseminated (CapWIN)

Productivity

- Increased hours of service/operation (SCOUT)
- Expanded area of coverage (SCOUT)
- Reduction in dispatch time/Streamlined communication channels (CapWIN, Detroit Metro, SCOUT)
- Reduction in time to clear travel routes (SCOUT, SEMSIM)
- Improved vehicle utilization and better fleet performance (CapWIN, SEMSIM)
- Cross-training and inter-agency cooperation increases (All)

Cost Effectiveness

- Savings in procurement (AZTech, SEMSIM)
- Savings in labor costs (SCOUT)
- Reduced costs for other communication systems (CapWIN)

Safety

- Reduction in number of traffic accidents (AZTech)
- Reduction in secondary crash rates (AZTech, Detroit Metro)
- Improved incident response time (CapWIN)

Environment

- Reduction in fuel consumption (AZTech)
- Reduction in vehicle emissions (AZTech)
- Reduction in salt use (SEMSIM)

CLOSING

The case studies presented in this report demonstrate the range of collaborative activities that various agencies in multiple jurisdictions can engage in. These case studies also provide an initial look at the tangible benefits that have been reaped by agencies involved in regional collaboration. In addition, they support advancing better management of network operations from a regional perspective. The benefits illustrated in these case studies highlight the importance of regional operations collaboration coordination in allowing advanced ITS technology to be utilized to its fullest extent.