

# **Regional Transportation Operations Collaboration and Coordination**

**A Primer  
for Working Together  
to Improve Transportation Safety,  
Reliability, and Security**



U.S. Department of Transportation  
**Federal Highway Administration**

**Notice**

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## **Note From the Director**

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### ***Office of Travel Management, Office of Operations, Federal Highway Administration***

More than ever, the safe, reliable, and secure operation of our Nation's transportation systems depends on collaboration and coordination across traditional jurisdictional and organizational boundaries. Nowhere is this more apparent than in our metropolitan regions where numerous jurisdictions, agencies, and service providers are responsible for safely and efficiently operating various aspects of the transportation system. Many of these operations activities in a metropolitan region must cross agency and jurisdictional boundaries to be successful. They may include traffic incident management, emergency management, communications networks, traveler information services, response to weather events, and electronic payment services. These regional operations activities depend on collaboration, coordination, and integration to be effective and truly benefit those that use or depend upon the regional transportation system.

In this light, the Federal Highway Administration's Office of Travel Management is pleased to present this primer on Regional Transportation Operations Collaboration and Coordination. The idea behind this document is based on the realization that for regional operations activities to be effective, those managers directly responsible for operating the system on a day-to-day basis must collaborate and coordinate continuously. They need to agree on a shared operations vision, a concept for how regional activities should be operated over time, what measures to use to assess effectiveness, and how to make improvements to achieve desired expectations in operating performance.

The need for regional operations collaboration and coordination to achieve safe, reliable, and secure transportation was an important theme at the National Dialogue for Transportation Operations Summit, held in Columbia, Maryland, in October 2001. The Summit brought together over 240 professionals representing academia, planning, engineering, safety, transit, bicycles and pedestrians, and freight, as well as elected and appointed officials from local and regional governments. The summit was complemented by a very successful working group sponsored by the Federal Highway Administration and the Federal Transit Administration, on "Linking Planning and Operations." This working group met three times over a 15-month period with a charge to envision ways to make transportation planning and transportation operations work better together to benefit transportation users. The participants represented professionals in the transportation operations, transportation planning, and public safety communities from local, regional, State, and Federal agencies.

This introductory document encourages and enables regional operations collaboration and coordination for transportation managers and public safety officials from cities, counties, and States within a metropolitan region. These managers and officials may include traffic operations engineers and managers, transit operations managers, police officials, fire officials, emergency medical services officials, emergency response managers, and port authority (e.g., air and water) managers. The primer can help these managers and officials understand what regional operations collaboration and coordination means, why it is important, and how to get started. In many cases, this document will also help those local, State, or regional agencies currently engaged in some aspects of regional operations collaboration and coordination

build on what they are already doing well and work toward addressing broader regional transportation operations and public safety issues.

As envisioned in this document, regional operations collaboration and coordination is a deliberate, continuous, and sustained activity that takes place when transportation agency managers and officials responsible for day-to-day operations work together at a regional level to solve operational problems, improve system performance, and communicate better with one another. The document provides guidance on the five key elements that are associated with successful regional operations collaboration and coordination activity—structure, process, products, resources, and performance measures to gauge success.

Finally, the development of this primer was guided by three important principles:

1. The value of regional operations collaboration and coordination results from having formalized and sustained activity between operators and service providers in metropolitan areas regarding regional operations policies and projects that cross agency and jurisdictional lines.
2. Where regional operations collaboration and coordination takes place, institutionally, is not the question. What gets done is the important challenge. The focus is on improving operational performance for safe, reliable, and secure transportation systems across a region to better serve the customers.
3. The regional operations collaboration and coordination activity must be closely linked to the metropolitan transportation planning and decision-making processes governed by Federal law. Stronger links between operations and planning will result in meaningful programs and investments as well as improved service to the customer across modes, agencies, and jurisdictions.

We believe that regional operations collaboration and coordination can be a beneficial activity, especially in any metropolitan region confronting the pressures of operating transportation systems in the face of growth in demand, congestion, incidents and emergencies, weather, and customer service requirements. We look forward to working with organizations, agencies, and interest groups to advance the ideas presented in this primer.



Jeffrey Lindley  
Director  
Office of Travel Management

# Making the Case for Regional Transportation Operations Collaboration and Coordination

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## **C**onsider the Possibilities for Safe, Reliable, and Secure Transportation . . .

During incidents and emergencies, transportation system operators and public safety officials improve response times and decision-making by effectively coordinating and communicating with each other.

During a major highway reconstruction project, public transit services and traffic operations successfully work together to manage demand.

Under the spotlight of special events, public transit services, traffic operations, and public safety services move goods and people and minimize negative effects on the community by coordinating transportation operations and travel demand management.

Freeway ramp meters work together with arterial signal systems to balance demand throughout the regional network.

Traffic signals coordinated across multiple jurisdictions manage mobility and demand to meet community needs.

Road users hear reliable, timely, and relevant news about weather conditions and traffic situations thanks to a regional traveler information service that seamlessly delivers information across jurisdictions, agencies, and modes.

Customers move easily between travel modes and across jurisdictions because of a multijurisdictional and multi-agency electronic payment service strategy for transit, parking, and tolls.

Hazardous materials moving through an urban area are electronically identified, monitored, tracked, and coordinated by regional traffic management and public safety agencies to ensure safe, secure, and efficient intermodal movement.

Real-time information about regional transportation system conditions and performance shared across agencies and jurisdictions enables better management of resources.

Regionally accepted system performance standards and performance measures drive transportation resource investment decisions.

## What Can Make This Happen?

These outcomes can be made possible when agency department heads or managers, responsible for day-to-day operations, work together to solve operational problems, improve system performance, and communicate successfully with one another through deliberate collaboration and coordination. Regional operations collaboration and coordination builds key relationships among the agencies and jurisdictions responsible for delivering transportation and public safety services in a metropolitan region, including traffic operations engineers and managers, transit operations managers, police officials, fire officials, emergency medical services (EMS) officials, emergency managers, and port authority managers, as well as private sector representatives such as port and gateway operators and traffic reporting media. These relationships lay the foundation for effective regional transportation systems and services that cooperate in all situations, under a range of conditions, and with other related systems, for the good of the ultimate customers—those who depend upon the regional transportation system.

Serving the public well and planning for performance excellence at the level of a regionwide system requires more than just the installation of equipment and completion of projects. This primer provides a reasonable framework to link the actions of the many transportation operators and service providers in a metropolitan region.

## About This Document

This primer was written for transportation professionals and public safety officials from cities, counties, and States who are responsible for day-to-day management and operations within a metropolitan region. It is intended to help agencies and organizations, and the operations people within them, understand the importance of regional collaboration and coordination, how it happens, and how to get started. This document may also be of interest to agencies such as metropolitan planning organizations (MPOs) already involved in regional collaborative efforts by helping them build on previous success.

Following this brief overview of the meaning and importance of regional collaboration and cooperation are four main sections as follows:

- *The Practice of Regional Transportation Operations Collaboration and Coordination.* This section provides a framework and associated steps for successfully moving from theory to practice. The framework consists of five elements—structure, process, products, resources, and performance—that, when taken together, help a region begin and/or evolve toward continuous collaboration and coordination regionwide.
- *Transportation Operations Regional Collaboration and Coordination and the ITS Architecture Development Process.* The process of developing a regional ITS architecture can be the impetus for new or more effective collaboration and coordination. In the same way, regional operations collaboration and coordination can provide a platform for initiating ITS architecture development in a region that has not begun the process. This section describes the synergistic interplay of these two processes in improving regional operations.
- *A Self-Assessment—Where Are You in Regional Collaboration and Coordination?* Agencies can use this self-assessment tool to determine if they are starting from the beginning or building upon existing efforts to create and sustain effective collaboration and coordination within their regions.
- *Applications of Regional Transportation Operations Collaboration and Coordination.* This section presents examples of how some regions are already benefiting from greater collaboration and better coordination. The examples show the positive effects of this regional teamwork on transportation system performance.

## What Does Collaboration Mean to Transportation Operations?

*Strategic Thinking—The Key to Regional Transportation Operations Collaboration and Coordination*

Collaboration on regional operations policies and projects by operators and service providers in metropolitan regions is essential for the following reasons:

### **Domestic Security.**

The events of September 11, 2001, focused national attention on the need to respond to attacks on our homeland, both real and threatened, especially in densely populated urban areas. The extraordinary response to this crisis shown by regional transportation and public safety agencies proved key in saving lives and evacuating those in imminent danger. This sobering experience reminds us of the importance of regional planning for operations in planning responses to such events. Since September 11, many metropolitan areas have developed or refined homeland security initiatives that respond to a variety of threats, including nuclear, biological, and chemical, and that address first response, command and control, communications, emergency evacuation, consequence management, and continuity of operations.

*Example:* In the aftermath of September 11, New York City's transportation system continued to function well due to coordination among not only the city's agencies, but also those of the region around it. An intricate system of communication among more than 400 agencies in the region ensured, for example, that road, bridge, and tunnel closures were coordinated and drivers remained informed, ultimately maintaining the flow of roadway traffic throughout the region.

1. Collaboration enables regional strategic development of projects and policies that have regional effects on users, including activities such as incident management, advanced traveler information services, public safety/EMS/security, special events, electronic payment services, and performance measures.
2. Collaboration among operators and service providers helps answer questions like:
  - How should our transportation system operate over the next 5 years to ensure its safety, reliability, and security?
  - How should the elements of our transportation system integrate and evolve over time?
  - What stakeholders should be at the table sharing information and making operations decisions?

- Who is accountable for improved system performance and what measures should be used for determining that improvement?

System operators within a metropolitan region are most likely to achieve measurable improvement in the safety, efficiency, and quality of service that customers experience in their day-to-day use of a regional transportation system when they work together to develop strategies and tactics. The successful conception, development, implementation, and execution of these regional strategies and tactics may be used to achieve a new level of interjurisdictional/interagency functionality in the transportation system. Collaboration should go beyond solving a problem. Its purpose should be that of combining the knowledge, expertise, and information of many agencies across jurisdictions to produce and operate an efficient regional transportation system.

Building on existing ad hoc relationships, agencies and jurisdictions within the region can use a common framework for setting expectations, managing resources, sustaining relationships, and establishing responsibilities. The action steps provided by this framework will be used in developing the structures, processes, products, resource plans, and performance measures necessary in a regional approach to collaboration, strategic thinking, and information sharing. The combination of knowledge, expertise, and information that results when agencies successfully collaborate offers the following advantages:

- Well-developed relationships among key agencies and jurisdictions,
- A shared vision among operators and public safety providers for regional transportation system performance,
- A regional concept of operations,
- Information sharing on a regular basis, and
- Integration of regional systems and organizational processes.

Strategic policies, programs, procedures, protocols, and projects of regionwide scope and benefit, such as traffic incident management programs or emergency response/management plans, usually depend on integration and/or interoperability for optimum performance. They therefore require regional collaboration and coordination. By concentrating on issues that cross agency and jurisdictional boundaries, disparate operators and service providers work together to improve the services they

**Regional operations collaboration and coordination within a metropolitan region helps to:**

- Shape, develop, manage, and evolve policies, programs, procedures, protocols, and projects
- Enable the elements of the transportation system to work better and together for all customers across modes, functions, and jurisdictions

provide. Whether the task is as broad as homeland security or as specific as electronic payment services, the approach will prove integral to defining visions and goals for ongoing, strategic regional transportation operations.

Regional collaboration takes into account the activities of a diverse array of non-transportation entities (e.g., public safety officials, major employers, chambers of commerce, convention and visitors' bureaus, port authorities, and special interest groups) that routinely affect or depend upon transportation. Whether it is an emergency management plan or next year's Mardi Gras that system operators face, collaboration and coordination encourages a regional perspective regarding transportation system performance rather than focusing on narrower issues involving single components of the system or a limited set of stakeholders.

By collaborating to define a regional strategy and performance standards and the evolution of the system, operating agencies can better develop a seamless transportation system. Potential benefits of a regional operating strategy include a single form of payment for transit that crosses many jurisdictions; regional traffic information provided to travelers in a uniform format; reduced delay of traffic around construction projects; and coordinated highway incident response and related traffic management.

Regional operations collaboration and coordination is an ongoing, iterative effort. Collaboration often initially occurs due to a specific need or problem of regional significance such as special event planning, major reconstruction, a natural disaster, or a hazardous material incident. Having addressed the problem, regions may recognize the value of regional collaboration for improving performance (better working relationships and procedures, improved communications, reduced delays). With the application of new technology and better

information-sharing procedures, collaboration and coordination can lead to an integrated regional transportation system where agencies routinely work together to make the region's transportation system work better for all customers—travelers, employers, businesses, commuters, public safety agencies and many others. Figure 1 shows this progression from problem solving to performance improvement, leading eventually to a focus on regional transportation system integration.

For example, following Hurricane Floyd, the North Carolina Department of Transportation (NCDOT), working with other regional transportation and public safety organizations, developed plans for providing timely information to travelers during emergency evacuations by using variable message signs, highway advisory radio, and other real-time communication media. Seeing the value of this traveler information system, NCDOT expanded this regionwide effort to use the same systems to notify travelers about planned or ongoing reconstruction activities on several bridges that link the barrier islands of North Carolina's Outer Banks. The collaboration that began with an emergency evacuation not only resulted in improved performance of the emergency evacuation procedures, but also provided a forum and a precedent for expanding this regional teamwork to include operations during reconstruction projects.

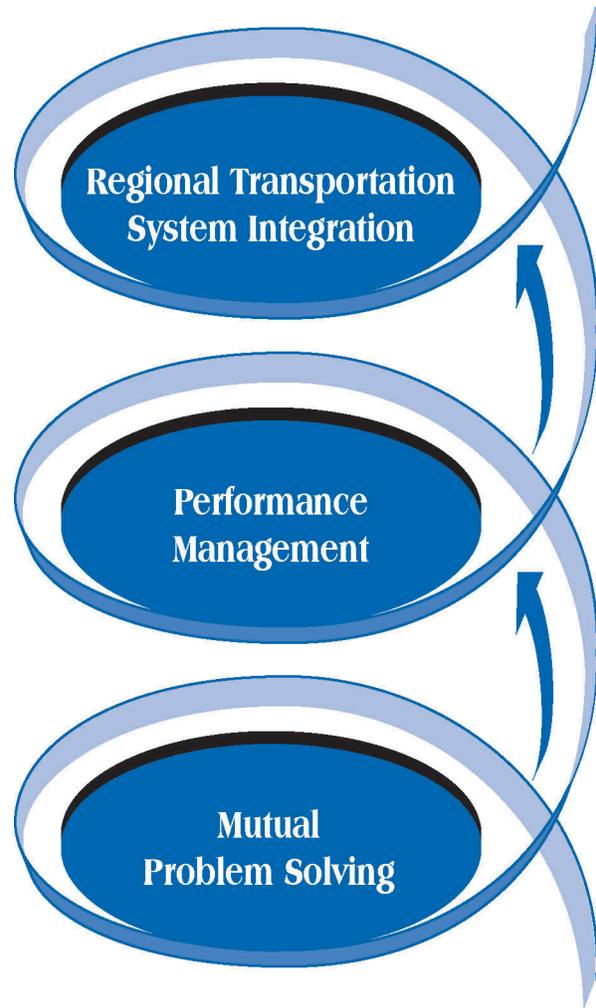


Figure 1. Regional collaboration and cooperation evolves from a focus on problem solving to a focus on integrated transportation systems.

# The Practice of Regional Operations Collaboration and Coordination

## Overview

The five major elements shown in figure 2 form a framework on which managers with day-to-day responsibilities for providing transportation and public safety services can build sustained relationships and create strategies to improve transportation system performance. The intent of the framework is to help institutionalize working together as a way of doing business among transportation agencies, public safety officials, and other public and private sector interests within a metropolitan region. The framework is important because in most regions, institutional barriers exist that make collaboration difficult. These barriers include resource constraints, internal stovepipes in large agencies, and the often narrow jurisdictional perspective of governing boards. The framework is intended to guide operators and service providers in overcoming these institutional barriers.

The framework creates *structures* through which *processes* occur that result in *products*. It implies a commitment of *resources* needed to initiate and sustain regional collaboration and coordination and for implementing agreed upon solutions and procedures. The collaborative spirit is motivated by a desire for measurable improvement in regional transportation system *performance*. The five elements of the framework are interactive and evolving. A brief description of each element follows.

The regional *structure* that supports collaboration and coordination within a region is the set of relationships, institutions, and policy arrangements that shape the activity. It provides the “table” at which operators and service providers sit with public safety and other key transportation constituencies. This “regional table” may range from an ad hoc loose confederation to a formal entity with legal standing and well-defined responsibilities and authorities. It may be facilitated by or emerge from existing entities or be newly formed.

*Processes* are the formal and informal activities performed in accordance with written or unwritten, but collaboratively developed and accepted, policies involving multiple agencies and jurisdictions in a region. Processes describe how the “regional table” works to achieve its objectives.

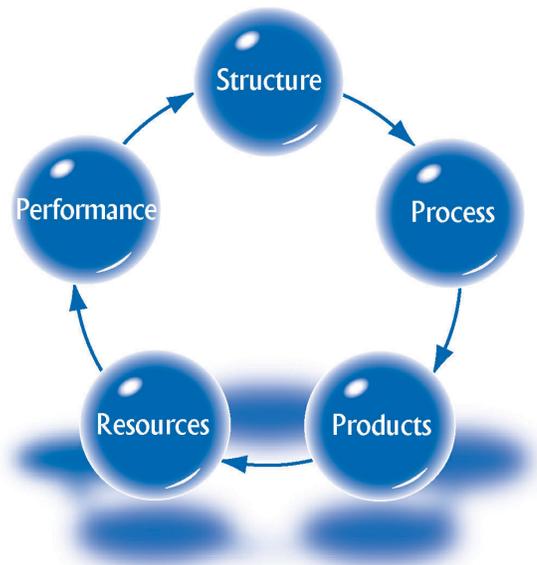


Figure 2. The framework for regional collaboration and coordination is formed by five major elements.

The *products* of collaboration and coordination are the results of processes. They include a regional concept of operations, baseline performance data, current performance information, and operating plans and procedures that inform regional entities (public and private sector) about how the regional transportation system must operate over time (including planned improvements).

*Resources* govern what is available within the region for sustaining and implementing the regional concept of operations and other operations plans on an ongoing basis, not just plans for special events, issue resolutions, or the completion of specific projects. The resources include staff, equipment, and dollars.

The *performance* element comprises how performance will be measured, and individual and collective responsibilities for monitoring and improving regional transportation system performance. Regional performance objectives, which are established collaboratively, most commonly address public safety, mobility, security, economic development, and environment.

This document includes a self-assessment tool in which all of the elements are summarized, so that the reader can shape collaboration and coordination operations in a regional context with a better understanding of what already exists to build on and what is needed to move forward.

## Structure: The Table for Regional Operations Collaboration and Coordination

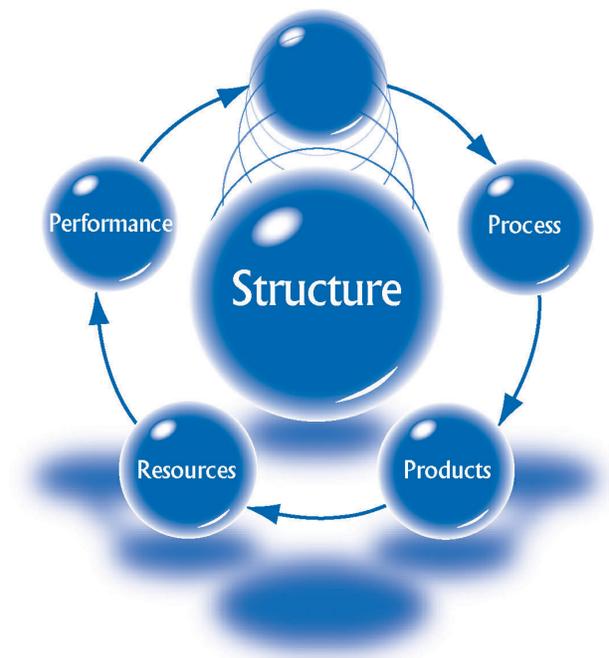
Structure consists of the relationships that enable regional collaboration, coordination, and related communication. It functions as the table (literally and figuratively) around which operators and service providers meet to discuss regional needs and possibilities for improving transportation system operations. Furthermore, it combines formal and informal arrangements through which individuals, organizations, and jurisdictions engage to develop regional solutions and strategies.

These mechanisms range from ad hoc/informal relationships to formal structures with legal standing. They include personal relationships among leaders and staff members of key operating agencies and neighboring jurisdictions who recognize common problems and opportunities and agree to work together to improve regional transportation systems performance. These structures may evolve into a broad-based regional partnership among public and private sector interests across multiple jurisdictions. Several examples illustrate the variety of structural approaches to regional collaboration and coordination:

- Ad hoc arrangements based on long-term relationships or immediate needs emerge during major reconstruction projects or roadway incidents where agencies agree to collaborate in the time during and after the event, but no formal, long-term agreements govern the collaboration.
- Formal, multiagency partnership agreements are often used for single or recurring special events (such as for political conventions or Independence Day celebrations), and full-time staff are dedicated to planning for operations prior to the event. Formal, multiparty agreements may remain in place after the event.

Legal entities, such as Houston's TranStar, Vancouver's Translink, and the New York City region's TRANSCOM, were formed to improve management of each region's transportation system. These organizations are managed by governing boards and work through partnerships with regional agencies to continuously address a range of operations issues.

To be effective, the regional operations collaboration and coordination effort must be linked to the regional



transportation planning process. Often, what passes for regional transportation operations collaboration is directed primarily or solely toward installing a project, solving a problem, or preparing for a special event. For regional collaboration and coordination to work, it must be part of an ongoing, intentional, focused effort to improve system performance by identifying needs and opportunities and collaborating on strategies and solutions that lead to strategic investments.

### Action Steps for Regional Operations Collaboration and Coordination—*Structure*

- Identify key constituencies (e.g., employers, shippers, developers, communities) who support better transportation systems performance.
- Enlist regional champions/leaders who are committed to working together (and encouraging others to work with them) in support of better system performance.
- Develop a vision for regional transportation system performance that is shared by operators, service providers, and planners.
- Establish operations as a regular item on the regional planning agenda.



## Who Participates?

At one level, the question of who participates refers to institutions, agencies, and organizations that initiate, facilitate, convene, and support regional collaboration and coordination activities. Within a metropolitan area, this will likely vary—it may be the State, the MPO, or even a city or a county agency, depending on factors like the scope of need, the range of responsibility, desired outcomes, and availability of resources.

At another level, that same question refers to the collective representatives of collaborating agencies and organizations (e.g., traffic, transit, police, fire, emergency management). Together, they address problems and opportunities of regional significance that demand improved information sharing, effective communications, integrated systems, and efficient use of resources.

Nontraditional stakeholders also need a voice in regional transportation operations. These stakeholders can include chambers of commerce, boards of trade, tourism and visitor agencies, the towing and recovery industry, major shippers and carriers, and major employers (or groups). These stakeholders may serve on advisory boards, task forces, or other entities that provide input to regional collaboration and coordination activities.

Participants must find value in the improvements to regional transportation system operations and performance that result from their collaborations, or they are unlikely to continue their efforts. The owners and operators of transportation system elements, in particular, must

perceive individual or collective value in working together in such an effort while simultaneously retaining control of the systems that they own, operate, or manage.

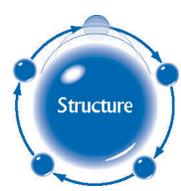
Experience shows that little happens unless someone or some group of people is committed to making it happen. The initiators of the kind of regional collaboration needed may be elected officials or senior agency officials. Often, planning for a special event, incident management, or major disaster provides the initial incentive for elected officials and agency leaders to champion regional collaboration. Such champions then become catalysts for bringing others together around the benefits realized through prior experience. They provide the motivational spark to keep individuals, agencies, and private sector entities from falling back into functional and jurisdictional stovepipes.

## The Range of Organizational Approaches

Determining the most appropriate organizational approach for regional collaboration and coordination depends on the needs of the region, existing institutional relationships and processes, and the vision of regional transportation operating agencies and service providers. The organizational structure will vary, but may begin as an ad hoc arrangement among a few people or organizations and evolve to more formal arrangements. Table 1 illustrates this range of approaches.

### **Cross-Jurisdictional Signal Coordination in Phoenix**

- The East Valley Task Force was formed by transportation specialists from five different Arizona jurisdictions to identify areas for improvement and establish standards for interagency/interjurisdictional coordination.
- Regional traffic signal coordination was achieved through careful planning and increased coordination.
- Participants understand that the future of their transportation system depends on maintaining and updating coordination and communication efforts. (For more, see page 33.)



**Table 1. Range of organizational approaches.**

<b>Less Formal</b>		<b>More Formal</b>		
Ad hoc arrangements based on near-term issues and personal relationships and interests	Informal working groups that meet regularly to address topics of regional significance	Formally established joint working group with assigned responsibilities	Funded entities with full-time staff and well-defined responsibilities related to collaboration	Legal entities with dedicated resources, authorities, and governing boards that represent agencies and jurisdictions

## Processes: Facilitating Collaboration

Processes are formal and informal activities performed in accordance with written or unwritten policies agreed to in a collaborative fashion, involving multiple agencies and jurisdictions in a region (e.g., for information sharing, incident management, freeway management, emergency response).

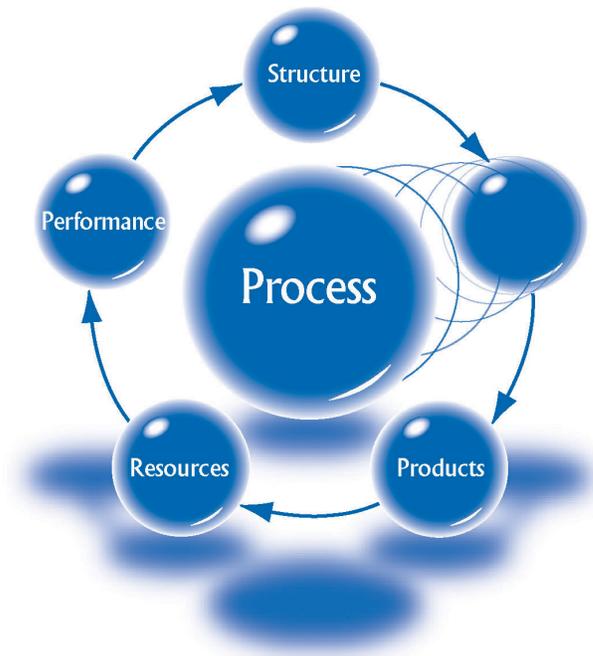
The process aspect relates to the ways options are created and decisions are made to improve system performance. An effective approach ensures that investment decisions include full consideration of operations strategies along with capital improvements; operations activities are addressed from a multimodal corridor perspective; and operations thinking addresses other regional economic, environmental, and mobility objectives. The process for collaboration and coordination does not end when a project is completed or installed.

### Information/Data Sharing—Critical to the Success of Collaboration

Information/data sharing is critical to effective regional operations collaboration and coordination. Information/data sharing is a collaborative effort to identify problems, coordinate activities, and make a case for investment needs that includes anecdotal evidence, historical data, current conditions, and supporting analysis. The shaded areas of figure 3 show aspects of information/data sharing on which regional collaboration primarily relies. The information needed to support collaboration is available only if stakeholders agree on ways to capture, archive, and share real-time performance data.

Regional collaboration and coordination relies on information about current transportation system operations and their projected performance under various potential scenarios. The strategic thinking associated with regional collaboration requires data accumulated over time that can be mined to discover relationships, trends, and opportunities, and that can then be acted upon.

Analyses depend on meaningful performance data and a reliable estimate of future requirements based on historical trends and knowledge of future needs. These analyses enable operators regionwide to evaluate options for achieving agreed-upon performance levels. The information generated by the analysis is used in outreach and education efforts to bring all stakeholders to a common



plan or concept of operations. The regional concept of operations drives decision-making (e.g., roles and responsibilities, multilateral operating agreements, standards, and protocols) among jurisdictions and agencies that enables the operators to implement improved practices.

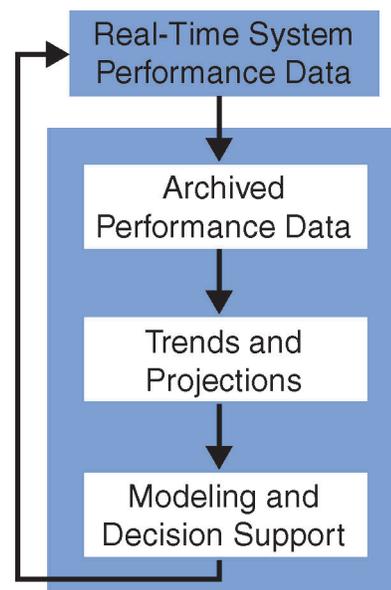


Figure 3. Aspects of information/data sharing on which regional collaboration primarily relies.



Some specific examples of how metropolitan regions are collecting, sharing, and using information to improve regional transportation operations include:

- The San Diego Association of Governments created an integrated data collection and dissemination system to be shared by all transportation agencies in the region to coordinate incident management and public safety activities.
- CapWIN’s integrated wireless network allows transportation agencies to communicate directly with each other as well as receive real-time and historical information. (For more, see page 29.)
- TRANSCOM’s operations depend on real-time and archived data shared among the involved agencies. The Operations Information Center collects and disseminates real-time incident and construction information to members and affiliated agencies, 24 hours a day, and maintains a database of construction projects. (For more, see page 25.)
- The Southern California ITS Priority Corridor network provides a resource for traveler information by enabling the integration of traveler information from several sources. It also enables contingency control during emergencies by providing network links among the four Caltrans traffic management centers (TMCs), allowing one TMC to take control for another if needed. (For more, see page 26.)

### Range of Process Interactions

Regional collaboration and coordination helps move regions along a spectrum from little to no information

### Action Steps for Regional Operations Collaboration and Coordination—Processes

- ❑ Make investments decisions based on the best combinations of capital investments and operations strategies (performance-based planning).
- ❑ Ensure that the solutions (project) selection process and criteria provide a level playing field for operational improvements and investments. Tools are available to show the benefits of operational improvements.
- ❑ Address operations activities (e.g., incident management, traveler information) in multimodal corridor planning.
- ❑ Use operations performance audits (e.g., corridor-wide) as a tool for guiding investment choices.
- ❑ Leverage operations to achieve regional goals (or meet other commonly sought outcomes).

sharing and collaboration, to ad hoc relationships built around specific issues or events, to more formal collaborative relationships with mutually agreed-upon objectives and strategies, and finally, in some instances, to joint ownership and control of transportation facilities and services. This spectrum, illustrated in table 2, shows some of the ways that a region’s public and private sector entities may interact.

Table 2. Range of process interactions.

Less Formal Processes	←————→	More Formal Processes
<p><b>Coordinating</b></p> <ul style="list-style-type: none"> <li>• Informal information sharing</li> <li>• Common use of terms</li> <li>• Coordinated actions</li> <li>• Coordinated service delivery</li> </ul>	<p><b>Cooperating</b></p> <ul style="list-style-type: none"> <li>• Regional information sharing</li> <li>• Regional performance measurement</li> <li>• Regional operating policy development</li> <li>• Regional concept of operations development</li> <li>• Regional ITS architecture development</li> </ul>	<p><b>Collaborating</b></p> <ul style="list-style-type: none"> <li>• Shared regional operations vision</li> <li>• Formal institutional partnering</li> <li>• Integration and interoperability planning</li> <li>• Joint project development</li> <li>• Shared use of resources</li> </ul>

## Products: Outputs to Chart the Course and Outcomes to Measure Progress

In the regional collaboration framework, products encompass the use of data, information, plans, and outputs that result from structure and processes. These products inform regional entities (public and private sector) about the operation of the regional transportation system over time (including planned improvements). This aspect also includes intermediate products such as studies, evaluations, and pilot tests that support regional collaboration activities. Some products may be the result of information-sharing processes (e.g., traffic monitoring, travel time data, volume counts) discussed in the previous section.

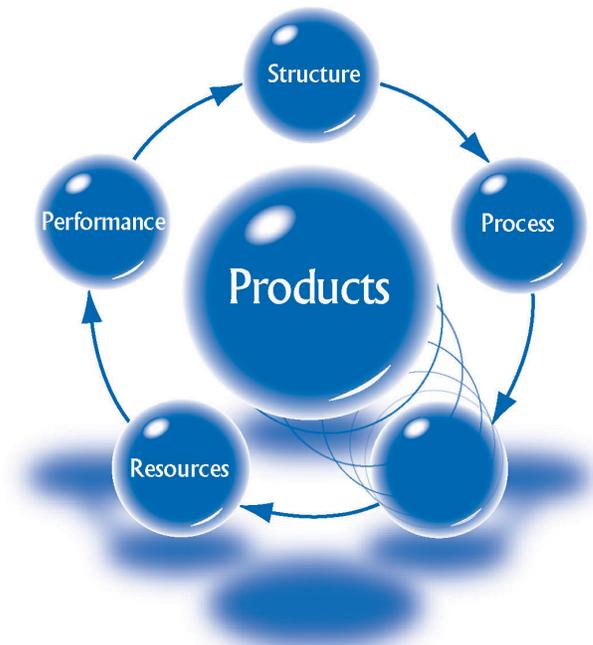
### Shared Regional Vision and Strategy

Developing a strategy is fundamental to regional collaboration, and strategy begins with vision. A shared vision among operators and service providers expresses how the region's transportation system needs to operate. Since this vision is the product of a collaborative process, it lays the groundwork for a regional strategy that includes goals and objectives for the region.

The vision is the precursor to other regional products, including a regional concept of operations, regional performance measures, and a variety of plans and procedures that involve regional operating agencies and service providers. The regional goals and objectives, which flow from the regional vision, along with the appropriate performance metrics, articulate the strategy—the what and the how of achieving the overall objectives of the regional community.

### Regional Concept of Operations

A regional concept of operations is a primary product of regional operations collaboration and coordination. It is a regional strategy for achieving the shared vision of operators and service providers. It defines regional expectations (what is to be accomplished) over time, processes (how it will be accomplished), and resources (investments in time, money, staff, and equipment) for better operations and system performance. It also addresses how agencies and jurisdictions work together to achieve better system performance and operations. The regional concept of operations combines the range of plans, processes, data, and analyses through which performance expectations will be accomplished.



#### Action Steps for Regional Operations Collaboration and Coordination—Products

- Provide a current conditions baseline to calibrate long-range planning.
- Develop a regional concept of operations that sets performance expectations for regional operators (priorities, projects, improvements, processes, performance, resources).
- Get buy-in for the regional operations implementation agenda from public safety providers and agencies that operate elements of the transportation systems.
- Make the regional operations implementation agenda a necessary input into the transportation improvement plan/long-range plan (TIP/LRP).
- Use market research as the common link between operations (customer feedback) and planning (planning input).



The regional concept of operations contains the operators' collective expectations for the following matters:

- **Regional Operations**

- How do we want functions of mutual interest to be managed and operated over the next 5-7 years?
- How will we achieve integration and interoperability for optimum performance?
- How will we develop strategic policies, programs, procedures, protocols, standards, and/or projects that have regional benefit and significance?
- What are our performance expectations?
- How will better regional operations contribute to regionally defined goals and vision?

- **Regional Processes, Relationships, and Standards of Performance**

- How is information obtained, managed, and shared?
- Does a regional intelligent transportation system (ITS) architecture exist? If not, will one be required? When and how?
- Is regional operations collaboration and coordination consistent with the process for developing the regional ITS architecture?
- Are there regional performance standards?
- What policies, projects, architecture, standards, protocols, and measures will achieve performance expectations?
- How do agencies and systems work together when necessary?

- **Investments for Evolution, Adaptability, and Agility**

- How do systems evolve over time and what resources (staffing, equipment, funding) are needed to sustain and meet performance expectations?
- How will we achieve a regional vision for operations in regard to resources, investments, priorities, pathway, etc.?

### **Performance Benefits of a Regional Concept of Operations**

- It addresses the 24-hours-a-day, 7-days-a-week operating needs of transportation systems, taking into account welfare-to-work and access to jobs, sporting and other special events, the needs of shippers and goods movement, periods of maintenance and reconstruction, periods of adverse weather, natural disasters, public safety, incidents and emergencies, shopping, recreation, and tourism.
  - It facilitates the collaboration and information sharing required across agencies and jurisdictions to address crosscutting issues such as incident management and emergency response, electronic toll and fare collection systems, traveler information systems, commercial vehicle operations, and traffic signal systems.
  - It creates faster, more coordinated responses to incidents and emergencies.
  - It allows for seamless, integrated transit fare payments throughout a region—e.g., it allows the Metro Transit System running from Virginia to Maryland to operate seamlessly across jurisdictions.
  - It facilitates the sharing of data and information.
  - It allows operating agencies to work toward system integration and interoperability.
  - It anticipates and manages demand under a variety of conditions and events.
- How does the system adapt to changes in external circumstances that affect system performance or performance expectations (security, natural disasters, special events)?
  - How does the system respond to unanticipated conditions or demands?



### **Process Benefits of a Regional Concept of Operations**

- It develops, achieves consensus on, and puts into practice the use of performance measures to support a customer service mission.
- It looks to the future for resources to sustain and meet those performance expectations.

Examples of products that have emerged from regional collaboration and coordination are:

- TRANSCOM's concept of operations is important to governing how the member agencies, as well as other agencies involved, interact with each other and share information. TRANSCOM maintains planning documents such as a multiyear strategic plan, an annual business plan and budget, an information and communication systems plan, and a technology programs development plan. (For more, see page 25.)
- The Southern California ITS Priority Corridor management concept of operations calls for decentralized information sharing and an open system architecture that supports technical information sharing and the integration of different systems. This concept lies behind the strategy to "develop once, deploy many times," thus allowing for cost sharing among the agencies. (For more, see page 26.)
- Maricopa Association of Governments (Phoenix, AZ) developed a Regional Concept of Transportation Operations to provide the "big picture" of the region's desired state of transportation operations and management and the institutional commitment to get there.
- Metropolitan Transportation Commission (MTC) in the San Francisco Bay Area's Regional Concept of Operation focuses on freeway management in this multijurisdictional region where congestion and long daily commute trips through multiple jurisdictions are common and freeway expansion is unlikely.

### **Investment Benefits of a Regional Concept of Operations**

- It helps decision-makers understand what resources will be needed to sustain and evolve technologies so that operators and planners can take advantage of their full range of capabilities.
- It creates the vision for operating the elements of the transportation system so they work better and together. The vision and the plan for achieving the vision are critical to ensuring future funding to sustain and improve the system.

### **Range of Products**

The range of products that emerges from regional collaboration and coordination activities mirrors the range of processes discussed previously. As relationships (structure) and processes become more formalized, the resulting products are more formal in content and structure, have greater standing among the region's operators and service providers, and guide the decisions and actions of regional stakeholders. Note in table 3 that, as the products move from "less formal" to "more formal," the less formal products continue to be produced and used by the region's transportation stakeholders (providers and users).



Table 3. Range of services.

Less Formal Products	←————→	More Formal Products
<p style="text-align: center;"><b>Informal</b></p> <ul style="list-style-type: none"> <li>• Ad hoc reports and databases</li> <li>• Loosely coordinated project plans and operating schedules</li> <li>• Ad hoc regional meeting (e.g., task force or working group) agenda and minutes</li> </ul>	<p style="text-align: center;"><b>Cooperating</b></p> <ul style="list-style-type: none"> <li>• Regional information repositories</li> <li>• Regional performance metrics and assessments</li> <li>• Regional operating policy agreements</li> <li>• Regional concept of operations</li> <li>• Regional ITS architecture</li> </ul>	<p style="text-align: center;"><b>Collaborating</b></p> <ul style="list-style-type: none"> <li>• Shared regional operations vision statement</li> <li>• Formal agreements among institutional partners</li> <li>• A regional operations improvement agenda (to guide investment and resources allocation)</li> <li>• Integration and interoperability standards and protocols</li> <li>• Joint project plans</li> <li>• Joint budgets and resource plans</li> </ul>

## Resources: Linking Needs to Sources

Regional operations collaboration and coordination relies on activities and relationships that can occur only if individuals and organizations commit appropriate funding, staff, and possibly equipment. Implicit in this statement is the allocation, and possibly sharing, of resources that enables a region's operators, service providers, and other stakeholders to improve system performance. Operations must be viewed as a resource priority to participating organizations. This element of the framework governs the availability of resources for achieving a regional vision, implementing an agreed-upon strategy, putting into practice a regional concept of operations, and implementing operations plans on an ongoing basis. Regardless of the organizational model that evolves, the key to a sustained commitment of resources lies in ensuring that all participants see the benefits of their contributions, both to the system and to their own agency or interest group (see the Action Steps below).

### Funding Sources

Regional collaboration depends on the availability and commitment of resources to fund the concept of operations<sup>1</sup> and other agreed-upon actions. Most funding for operations will come from individual agency budgets. This may involve agreements to share key resources (equipment and personnel) across jurisdictional boundaries or among operators or service providers; agreements on acquisition and procurement that ensure interoperability and standard protocols for communications and data exchange; or potentially, the identification of capital investments in operations-related infrastructure (networks, operations centers, sensors) to be deployed on a regional basis or in conjunction with other capital improvement projects. Funding for such projects requires that operating agencies and service providers have a role in the region's capital planning process and that regional planners share an operating vision. The allocation of capital resources to operations improvements must complement or augment capital investments in expanded capacity.

<sup>1</sup> See the "Products" section for a more detailed discussion of the regional concept of operations.



Several examples illustrate the range of approaches to funding regional operations collaboration and coordination:

- AZTech, which began as part of a Metropolitan Model Deployment Initiative, has emerged as a funded entity made up of 40 public and private organizations that collaborate to coordinate regional operations activities. (For more, see page 33.)

#### Action Steps for Regional Operations Collaboration and Coordination—Resources

- Ensure linkages to the overall regional transportation planning process for needed investment in operations.
- Use available funds to support convening activity for operators and planners.
- Ensure that everyone at the regional collaboration and coordination table perceives a return on investment of time and other resources.
- Make resources sufficiently available and flexible to effectively fund regional planning for operations activities and initiatives.



- The Baltimore Regional Operations Coordination (B-ROC) Project was initiated by the Metropolitan Baltimore ITS Partnership to the Baltimore Regional Transportation Board, the Baltimore region MPO. A regional operations coordination committee, B-ROC was formed to enhance mutual support and resource sharing between operating agencies. (For more, see page 31.)
- Agreements between Maryland’s Coordinated Highways Action Response Team (CHART) agencies provide the resources necessary to manage the transportation system effectively. For instance, the Maryland State Highway Administration (MdSHA) funds items necessary for the Maryland State Police (MSP) in return for full-time MSP staff at the Statewide Operations Center (SOC). CHART also has agreements with the media to receive real-time views of traffic incidents and delays from traffic helicopters owned by local stations in exchange for allowing stations to patch into live closed-circuit television feeds from the SOC. (For more, see page 28.)

**Dedicated Staff**

Effective collaboration and coordination among regions depends on the availability of qualified staff and related resources to do the work needed to support the

regional collaboration and coordination effort. This will require purposeful job descriptions that translate into full time equivalents (FTEs) dedicated to collaborative activities. Interagency or interregional positions may be needed to facilitate the collaboration among organizations or jurisdictions. It is also necessary that those who work in these positions perceive a return on investment of their time dedicated to coordination and collaboration.

**Range of Resource Strategies**

How regional collaborative processes are funded and staffed reflects a region’s commitment to and vision for the effort. Typically, when a few individuals or organizations see a need to solve a problem or improve performance (incident management or emergency evacuation) or when agencies agree to work together on a project of regional importance (ITS regional architecture or special event planning), resources may then be applied in the form of in-kind contributions from participating organizations or through program funds administered by a single agency on behalf of all participants. As the collaborative activities mature, participating entities (including both public and private sectors) may choose to pool resources and eventually align with, or form, entities that assume responsibility on behalf of participating agencies and jurisdictions. These entities should also establish positions with authority, accountability, and responsibility for coordinated operations. Table 4 illustrates the range of resource strategies.

**Table 4. Range of resource strategies.**

Less Formal	←————→	More Formal
<p><b>In Kind</b></p> <ul style="list-style-type: none"> <li>• Individuals commit to periodic meetings to address issues of regional significance.</li> <li>• Agencies assign staff members and other resources (equipment, facilities) to support collaboration efforts on an ongoing basis.</li> </ul>	<p><b>Pooled Resources</b></p> <ul style="list-style-type: none"> <li>• Jurisdictions and public and private organizations pool funds, people, assets, and other resources to sustain collaboration.</li> <li>• Agencies and jurisdictions commit resources (people, assets) to be used in regional operating activities (e.g., mutual assistance agreements).</li> </ul>	<p><b>Funded Entity</b></p> <ul style="list-style-type: none"> <li>• Jurisdictions and public and private organizations allocate funds to support a regional entity responsible for regional collaboration.</li> <li>• Entities are formed and funded to own and operate assets (e.g., transit systems, maintenance vehicles, emergency response assets) on behalf of multiple jurisdictions.</li> </ul>

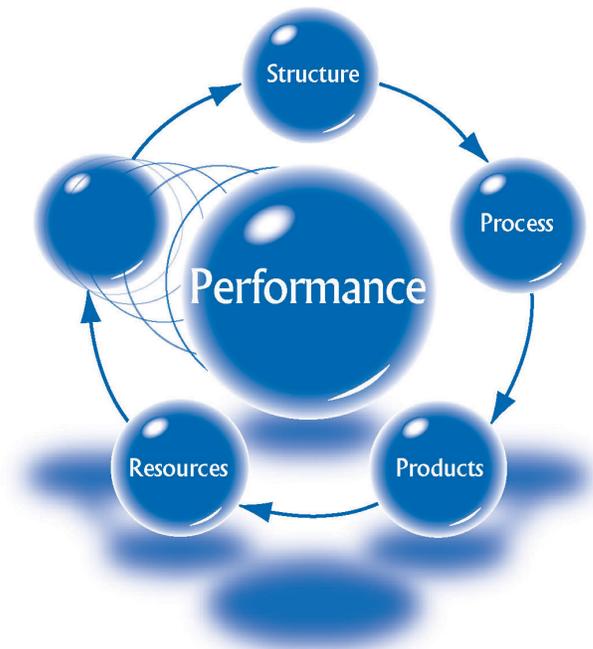
## Performance Improvement: Monitoring and Improving Regional Operations

Performance improvement addresses regional performance objectives and how they will be measured, including public safety, mobility, security, economic development, and environment. There may also be some intermediate performance objectives that address the success of regional cooperation.

Performance measures are a key to assessing the success of a region's effort to collaborate and coordinate and to identifying areas where improvement is needed or possible. The first step related to performance improvement is finding a general consensus that performance measures are needed if regional transportation system performance is to improve. Given this consensus, performance measures relevant to system users must be developed and accepted as meaningful methods of assessing both the short-term and long-term operation of the regional transportation system. Because regional operations collaboration and coordination is a constantly evolving process, the performance measures themselves may change, resulting from changes in institutional relationships, technology applications, and policy and procedures. So that the region's operators and service providers understand whether regional goals are being met, they should regularly report on and discuss whether performance measures accurately reflect a successful regional vision of transportation system operation as part of the process of collaboration and coordination.

Several regional operations entities have established performance standards, and routinely monitor and report how well the system is operating. Some examples are given below:

- AZTech established standards for interagency coordination, giving the region a sense of expected levels of performance. Smart Corridor components linked to the AZTech server allow information sharing among agencies and jurisdictions. Traffic signal controllers, surveillance equipment, and detection devices were installed or upgraded to allow for the collection of information. Information is shared through workstations installed at traffic operations centers (TOCs) in each jurisdiction. (For more, see page 33.)
- Montgomery County, Maryland's real-time and archived data are shared, linked, and made accessi-



ble to local agencies and departments, and are delivered to system users through the Advanced Traffic Information System (ATIS). (For more, see page 32.)

- To maintain efficient system performance, the San Antonio Medical Center Corridor Project restricts the use of the incident response traffic signal plans and variable message signs to more severe incidents. (For more, see page 35.)

### Action Steps for Regional Operations Collaboration and Coordination—*Performance Improvement*

- Agree on expected levels of performance and the need for improvement.
- Develop and accept relevant regional performance measures.
- Provide regular status reports on regional transportation system operations performance.
- Share, link, and provide system managers and system users with access to real-time and archived system performance data.



The measures selected to assess operations performance depend upon the availability of accurate, meaningful system data. Performance data can range from highly subjective user opinion surveys to detailed collection and analysis of real-time system data. No single type of data is adequate to judge end-to-end system performance. Relying solely on user surveys to assess system performance, for example, yields little insight into specific ways to improve system performance. Conversely, detailed measurement of specific attributes of individual system components (e.g., signal system reliability) may result in a focus on inappropriate responses. Since no single metric is likely to be sufficiently robust to convey all measures of interest to the region’s operators, service providers, and system users, multiple approaches to performance measurement are typically preferable over a single metric.

### Range of Metrics and Measures of Performance

Performance improvement depends on reliable and meaningful performance metrics (what parts of performance to track, e.g., delay) and related measures (how to measure them, e.g., probing vehicles’ transit time). Performance measurement and improvement are most readily accomplished at the component level (e.g., operational availability, failure rates, units deployed, personnel assigned). Component level performance measures may not, however, be the most adequate indicators of transportation system performance. Functional performance measures provide a better indication of how well specific services are provided from the customers’ perspectives (e.g., on-time arrival rates for transit vehicles, average travel time between two points in a corridor). At the system level, performance measures (e.g., total average delay/day, customer satisfaction surveys) should relate to the region’s transportation system overall performance. Table 5 illustrates the range of metrics and measures of performance.

**Table 5. Range of metrics and measures of performance.**

Less Formal	←————→	More Formal
<p><b>Component Level</b></p> <ul style="list-style-type: none"> <li>• Failure rates</li> <li>• Readiness</li> <li>• Capacity</li> <li>• Coverage (e.g., motorist assistance or call boxes)</li> </ul>	<p><b>Function Level</b></p> <ul style="list-style-type: none"> <li>• On-time arrival rate</li> <li>• Average point-to-point delay time</li> <li>• Ridership statistics</li> </ul>	<p><b>System Level</b></p> <ul style="list-style-type: none"> <li>• Customer satisfaction</li> <li>• Total average delay (regional)</li> <li>• Incident rates</li> </ul>

# Regional Transportation Operations Collaboration and Coordination and the Regional ITS Architecture Development Process

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## The Relevance of the Regional ITS Architecture

**I**ntelligent transportation systems (ITS) enable better operations and improve system performance. ITS utilizes information, communication, sensor, and control technologies to achieve improved levels of performance and safety on America's highways. ITS provides seamless information services and communications networks for transportation services and emergency services. ITS may be electronics, communications, or information processing systems used individually or in combination to improve the efficiency or safety of a surface transportation system.

Regional collaboration and coordination requires sustained, long-term commitment to improving regional transportation system performance through collaborative planning and a regional approach to operations. Institutional mechanisms are needed to develop and think through how, where, and when the regional ITS architecture can be applied. The collaborative process provides institutional mechanisms for using and maintaining (Steps 5 and 6 of the ITS regional architecture process) the regional ITS architecture effectively as part of an overall regional operations strategy. In this sense, regional collaboration and coordination has the longer-term, broader agenda that leverages the regional ITS architecture to improve transportation systems performance in the region.

Where collaboration among agencies and regions is absent or minimal but an architecture development process is underway, the ITS architecture process can jump-start regional collaboration by providing the forum and the momentum for bringing together organizations whose participation in the regional effort is critical. This regional teamwork, which an existing ITS architecture will only start, requires that operators and service providers jointly develop a vision for regional operations and a strategy for achieving the vision. Based on experience to date, leadership for developing the ITS architecture may come from either an operating agency (e.g., State DOT) or a regional planning body (e.g., the MPO). If, however, regional transportation operators (State DOTs, public safety agencies, departments of public works, transit authorities) want to work together and no

current regional ITS architecture development process exists, the fundamentals and framework presented in this document can serve as the starting point for initiating regional collaboration. Initially, if collaboration and coordination is to become the primary mechanism for achieving institutional integration, operating agencies will: gather and engage stakeholders; identify operational needs and strategies; develop a regional concept of operations; and implement the necessary regional model and interagency agreements.

Regional collaboration may well bring with it the perceived need for an ITS regional architecture, especially when regionwide electronic information sharing is desired. If so, this collaboration can serve as a platform for initiating the architecture development process.

## Defining the Regional ITS Architecture

The regional ITS architecture has been defined as “a regional framework for ensuring institutional agreement and technical integration for the implementation of ITS projects in a particular region.”<sup>2</sup> The regional ITS architecture serves to broaden the scope of operations. In the past, transportation agencies focused on the implementation and operations of single technology components. The ITS architecture moves this focus to the implementation and operations of a complete, regional system. Therefore, the architecture process, which is being applied in numerous major metropolitan areas across the country, embodies the idea of regional collaboration and coordination. Not only can it facilitate collaboration and coordination, but it also offers unique opportunities for synergy. The Regional ITS Architecture Development Process Guidance Document<sup>3</sup> outlines a systems engineering process for developing a regional ITS architecture that incorporate the following steps.

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<sup>2</sup>“Regional ITS Architecture Development Process Workshop,” prepared by National ITS Architecture Team, U.S. Department of Transportation, Washington, DC, January 2002.

<sup>3</sup>Regional ITS Architecture Guidance: “Developing, Using, and Maintaining an ITS Architecture for your Region,” Publication No. FHWA-OP-02-024, prepared by National ITS Architecture Team, U.S. Department of Transportation, Washington, DC, October 12, 2001.

### *Steps in the Development of a Regional ITS Architecture:*

#### Step 1: Getting Started

- Identify Need
- Define Region
- Identify Stakeholders
- Identify Champions

#### Step 2: Gathering Data

- Inventory Systems
- Determine Needs and Services
- Develop Operational Concept
- Define Functional Requirements

#### Step 3: Defining Interfaces

- Identify Interconnects
- Define Information Flows

#### Step 4: Implementing the Architecture

- Define Project Sequencing
- Develop List of Agency Agreements
- Identify ITS Standards

#### Step 5: Using the Architecture

#### Step 6: Maintaining the Architecture

The regional ITS architecture development process results in either a specific ITS project or a series of integrated, interoperable projects. The architecture, a living construct that will facilitate collaboration, integration, and interoperability, emphasizes systems and how systems are deployed.

## **Leveraging the Regional ITS Architecture Process**

The regional ITS architecture development process can serve as a key enabler in identifying constituencies, establishing champions, and initiating the institutional relationships that will sustain regional collaboration and coordination. The process requires actions similar to those required to develop other agreements and procedures to be implemented at the regional level. For example, the processes used to inventory systems, develop operational concepts, and define functional requirements can also be applied to traffic incident management, traveler information systems, advanced freeway management, and emergency evacuation.

The regional ITS architecture development process results in specific standards and protocols for communications and information exchange. These standards and protocols can serve as the foundation for broader agreements among regional partners that involve other resources and processes. The concept of operations developed during the architecture development process may serve as a template for a more comprehensive regional concept of operations that includes functional areas and responsibilities well beyond those addressed in the regional ITS architecture.

Although the ITS architecture development process does not address resources explicitly, the sequencing of projects and activities needed for regional integration and interoperability imply significant resource commitments.

The regional ITS architecture can help guide the projects and electronic infrastructure needed to integrate regional operations. Regional collaboration and coordination identifies ongoing staff, equipment, and other resource needs for regional interoperability and integration.

The regional ITS architecture development process focuses primarily on performance measures related to implementing technology-related projects associated with the ITS architecture. Fortunately, many of the projects likely to emerge from the regional ITS architecture development process will provide the infrastructure needed to measure regional transportation system performance in a meaningful way. In fact, the ITS architecture development process can serve as the forum for identifying performance measures that have widespread support among the region's operators and service providers.

Table 6 illustrates how the process of developing the Regional ITS Architecture can help leverage regional operations collaboration and coordination and vice versa.

**Table 6. Interactions of the ITS architecture development and regional operations collaboration and coordination processes.**

<b>Regional Collaboration Framework Element</b>	<b>Related Regional ITS Architecture Development Process Steps</b>	<b>How Regional Operations Collaboration and Coordination Leverages the Regional ITS Architecture</b>
<b>Structure</b>	Identifying needs, defining the region, identifying stakeholders, identifying champions	The regional ITS architecture development process initiates relationships and institutional mechanisms that are important to ongoing planning for operations.
<b>Process</b>	Inventorying systems, developing alternative operational concepts, defining functional requirements, identifying interconnects, defining information flows	The regional ITS architecture process can shape the institutional interactions that lead to regional operating models and interagency agreements in other areas of regional interest.
<b>Products</b>	Project sequencing, ITS standards, interagency agreements, concept of operations, defining information flows	The regional ITS architecture may provide guidance documents to support a regional concept of operations and the development of regional policies, programs, protocols, procedures, plans, and projects.
<b>Resources</b>	Not addressed	The regional ITS architecture can help guide the projects and electronic infrastructure needed to integrate regional operations.
<b>Performance</b>	Project implementation (tracking); identifying interconnects and defining information flows	The regional ITS architecture helps set the target by providing the infrastructure needed to acquire performance data and improve systems performance.

## **A Self-Assessment—Where Are You in Regional Collaboration and Coordination?**

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**T**his document describes a strategic way of thinking built around the sharing of precepts and action steps by public partners responsible for day-to-day operations. By following these precepts and action steps, a region can blend motivation, commitment, and strategy to reach a vision shared by operators and service providers of how the region’s transportation system should perform under a variety of conditions. Regional collaboration and coordination is not about determining the best projects to solve a problem. It is about combining the knowledge, expertise, and information of many agencies across jurisdictions to produce and operate an efficient regional transportation system.

Table 7 includes questions for each of the five areas of the framework for collaboration and coordination. Together, they outline action steps that will enable planners, operators, and service providers to assess progress in planning for operations and charting a course to better transportation system performance regionwide. No region is likely to answer every question affirmatively—and perhaps some regions do not need to do so. What is important is that the guidance suggested in these five areas will prove useful to planners, operators, and service providers in assessing where they are and determining what they need to do next.

**Table 7. Action steps for regional operations collaboration and coordination—Self-Assessment.**

<b>Structure</b>	<b>Process</b>	<b>Product</b>	<b>Resource</b>	<b>Performance</b>
<ul style="list-style-type: none"> <li><input type="checkbox"/> Are there linkages to key constituencies (e.g., employers, shippers, developers, communities) to build support for better system performance?</li> <li><input type="checkbox"/> Are there champions/leaders in the region who are committed to working together (and encouraging others to work with them) to gain support for better system performance?</li> <li><input type="checkbox"/> Is there a vision shared among operators, service providers and planners?</li> <li><input type="checkbox"/> Is operations a regular item on the regional planning agenda?</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Are investment decisions made based on the best combinations of capital investments and operations strategies (performance-based planning)?</li> <li><input type="checkbox"/> Do the solutions (project) selection process and criteria yield a level playing field for operational improvements and investments, and are tools available to show benefits of operational improvements?</li> <li><input type="checkbox"/> Does the region do corridor planning (multimodal), including operational elements (e.g., incident management)?</li> <li><input type="checkbox"/> Are operations performance audits (e.g., corridor) used as a tool for guiding investment choices?</li> <li><input type="checkbox"/> Does the region leverage operations to achieve regional goals (or meet other commonly sought outcomes)?</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Does operations provide a current conditions baseline to calibrate long-range planning?</li> <li><input type="checkbox"/> Does a regional concept of operations set performance expectations for regional operators?</li> <li><input type="checkbox"/> Do public safety providers and agencies that operate the elements of the transportation systems acknowledge the regional operations implementations agenda?</li> <li><input type="checkbox"/> Has a regional operations action agenda been acknowledged as a necessary input into TIP/LRP?</li> <li><input type="checkbox"/> Does the region use market research as the common link between operations (customer feedback) and planning (planning input)?</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Are there linkages to the overall regional transportation planning process for needed investment in operations?</li> <li><input type="checkbox"/> Does the region use planning funds to support convening activities for operators and planners?</li> <li><input type="checkbox"/> Are resources sufficiently available and flexible to provide effective access to funding for operations?</li> <li><input type="checkbox"/> Does everyone at the table see a return on investment of time and other resources?</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Is there a consensus on the need for performance improvement?</li> <li><input type="checkbox"/> Have performance measures been developed?</li> <li><input type="checkbox"/> Is there an operations performance-based status report?</li> <li><input type="checkbox"/> Are real-time and archived data shared, linked, and made accessible to system managers and delivered to system users?</li> </ul>

# Applications of Regional Operations Collaboration and Coordination Planning for Transportation Operations

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Several regions around the country are already practicing elements of framework for collaboration and coordination described in this document. These regions continue to realize improvements in various aspects of their transportation system due to the long-term strategic and collaborative efforts made by various agencies in the region. The following case studies demonstrate how these regions have applied the framework. Many of the case studies detail Metropolitan Model Deployment Initiatives related to ITS. These initiatives were the first steps toward planning for operations, and as regions have recognized the benefits from doing so, they have continued to expand their collaborative interagency, interjurisdictional efforts.

Each case study includes a summary of the application and a breakdown of how the effort follows some or all of the action steps in the framework discussed in the primer. While several of the studies do not follow each element of the framework directly, they still serve to give a concrete picture of what it means to plan regionally for operations.

The following case studies are presented:

- TRANSCOM's Regional Approach to Operations
- Southern California ITS Priority Corridor
- Maryland CHART
- Capital Wireless Integrated Network (CapWIN)
- Baltimore Regional Operations Coordination (B-ROC) Project
- Montgomery County ATIS
- Cross-Jurisdictional Signal Coordination in Phoenix
- San Antonio's Advanced Warning to Avoid Railroad Delays (AWARD) Project
- San Antonio Medical Center Corridor Project
- Phoenix's Roadway Closure and Restriction System (RCRS)
- Ventura County Fare Integration

## TRANSCOM's Regional Approach to Operations<sup>i</sup>

TRANSCOM was created in 1986 to facilitate region-wide coordination of construction projects in New York, New Jersey, and Connecticut. Since then, its role has expanded to include the distribution of traffic and incident information and the management of regional ITS programs. The intent of TRANSCOM is to enable the collaboration of multiple planning and operating agencies to improve transportation throughout the three-state region. These agencies share traffic, incident management, and construction information through the use of sophisticated software. The communication among the agencies helped facilitate the management of the transportation system on September 11, 2001. TRANSCOM has adhered to the principles of regional operations collaboration and coordination since it began, and continues to evolve to improve one of the most complicated transportation systems in the Nation.

### Structure

- TRANSCOM has linkages with 16 member agencies, including major State and city DOTs, toll authorities, transit authorities, and State police, as well as more than 100 other entities, including local governments, police, fire, emergency services, and planning organizations. All entities work together to build support for better system performance.
- TRANSCOM was formed by the region's transportation leaders; its 16 member agencies act as champions committed to cooperation and support for better system performance.
- Both planners and operators participate in TRANSCOM's activities, thereby creating a shared vision for the region's transportation system.
- Operations is a regular item on the TRANSCOM planning agenda for one of the most complex and congested urban transportation environments in the Nation.

### Processes

- TRANSCOM was formed to provide a forum to collectively address traffic, incident management, and construction issues, and to determine collaborative, multimodal approaches to solving the region's transportation problems.

### Products

- TRANSCOM's concept of operations is important to governing how member and other involved agencies interact and share information. All agencies involved acknowledge the concept of operations and understand that the legitimacy of TRANSCOM depends on their acceptance of TRANSCOM standards.
- TRANSCOM maintains planning documents such as a multiyear strategic plan, an annual business plan and budget, an information and communication systems plan, and a technology programs development plan.

### Resources

- TRANSCOM leverages the resources of multiple agencies to collect and disseminate incident and event information.
- TRANSCOM's agencies collaborate to bring transportation funding into the region.
- Agencies would not be willing to participate in TRANSCOM if they did not see a return on investment of their time and resources.

### Performance

- TRANSCOM acknowledges the need for performance measures and expects to develop them in the future.
- TRANSCOM's operations depend on real-time and archived data shared among the involved agencies. The Operations Information Center collects and disseminates real-time incident and construction information to members and affiliated agencies 24 hours a day, and maintains a database of construction projects.

<sup>i</sup> "Organizing for Regional Transportation Operations: New York/New Jersey/Connecticut TRANSCOM," prepared for U.S. Department of Transportation by Valerie Briggs and Keith Jasper, August 2001.

## Southern California ITS Priority Corridor<sup>ii</sup>

Severe congestion and extreme air pollution have plagued the Southern California region for many years. No major additions are planned for the freeway network, and no increases are expected in transit utilization, so local transportation managers have been forced to turn to technical- and operations-based solutions to the region's transportation problems. As one of the Nation's four designated ITS Priority Corridors, the Southern California region receives Federal funds for ITS strategic planning and deployment. The ITS Priority Corridor Steering Committee, a partnership of 16 public entities, was formed to oversee the program, which allows:

- Multijurisdictional collaboration of multiple MPOs and state and local transportation agencies;
- Stakeholder participation;
- Movement from a major planning to an operations initiative;
- Integration of extensive ITS infrastructure, enabling the sharing of data and control among traffic management centers; and
- Generation of value-added regional traveler information.

As a result of corridor-wide ITS strategic planning and design carried out by the Priority Corridor Steering Committee, an intermodal transportation management and information system will be implemented that allows for the integration of legacy and future transportation management systems. This system will continuously evolve to fit with future transportation management initiatives.

### Structure

- Members of the Priority Corridor Steering Committee include Caltrans, the California Highway Patrol, six county transportation authorities/commissions, two MPOs, one air quality management district, and three regional ITS strategic planning subcommittees. Other participants include FHWA, the Federal Transit Administration (FTA), and local transportation agencies.
- Because the Priority Corridor decision-making process was conducted outside the bounds of traditional transportation funding processes, the participants have had to work hard to sustain political buy-in and acquire champions for their programs.
- Because the operators and planners involved with the Steering Committee share a common vision for the improvement of Southern California's transportation system through integrated ITS systems, they have agreed to expand the scope of the program to include all modes and all roads from Los Angeles to the Mexican border.
- The Priority Corridor has fostered new relationships among planners and operators, and promotes a common understanding of each other's missions that has resulted in the movement of the regional initiative from major planning to operations.

### Processes

- Because it enables the integration of traveler information from several sources, the Priority Corridor network provides a resource for traveler information. The network also links the four Caltrans TMCs, thereby enabling contingency control during emergencies so that one TMC can take control for another if needed.
- The Priority Corridor Committee assesses the value of ITS projects on a regional or corridor-wide basis.

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<sup>ii</sup> "Organizing for Regional Transportation Operations: Southern California ITS Priority Corridor," prepared for U.S. Department of Transportation by Valerie Briggs and Keith Jasper, August 2001.

## Southern California (continued)

**Products**

- The corridor management concept of operations calls for decentralized information sharing and an open system architecture that supports technical information sharing and the integration of different systems.
- The agencies that operate the transportation systems in Southern California acknowledge the concept of operations. The concept of operations creates the strategy to “develop once, deploy many times,” thereby allowing for cost sharing among the agencies.

**Resources**

- All groups involved in the Priority Corridor see a return on investment of their time and resources because they are now able to access each other’s data, share the costs of system upgrades and new technology applications, and communicate better among planners and operators.
- Funding has been made possible through Federal grants, to continue through 2002.

**Performance**

- The integration of the various agencies’ ITS infrastructures in the Priority Corridor enables data to be shared, linked, and made accessible to operators and planners throughout the region.

## Maryland CHART<sup>iii</sup>

Formed to manage increasing traffic to and from the Maryland shore, the Coordinated Highways Action Response Team (CHART) built on its initial success and is now a multijurisdictional and multidisciplinary program. The mission of CHART is to “improve real-time operations of Maryland’s highway system through teamwork and technology.” CHART relies on a communications infrastructure, a closed-circuit television system for traffic monitoring, and complex interfaces to existing and new detection systems to support the 24/7 monitoring and control activities of its Statewide Operations Center (SOC) and Traffic Operations Centers (TOCs). CHART uses the information collected in these centers to provide motorists with information through variable message signs, traveler advisory radio transmitters, and the highway advisory telephone system. CHART plans eventually to add a media interface to the SOC to allow the media access to high-quality, real-time traffic video. CHART also takes part in the I-95 Corridor Coalition to coordinate with other relevant agencies in case of regional incidents along the I-95 corridor.

### Structure

- Agencies such as the Maryland State Highway Agency (MdSHA), Maryland State Police (MSP), and the Maryland Transportation Authority, along with other Federal, State, and local agencies cooperate to improve real-time operations of Maryland’s highway system.
- The members of CHART are committed to working together, as indicated by their mission statement.

### Processes

- The CHART program includes activities such as traveler information, incident management, traffic monitoring, and traffic management. MdSHA cooperatively funds joint needs.

### Products

- A concept of operations shapes interagency cooperation in information sharing and management of the Maryland highway system.

### Resources

- Agreements between the CHART agencies provide the resources necessary to effectively manage the transportation system. For example, MdSHA funds necessary items for MSP in return for full-time MSP staff at SOC. Through agreements with the media, CHART receives real-time views of traffic incidents and delays from traffic helicopters owned by local stations in exchange for allowing the stations to patch into live closed-circuit television feeds from SOC.
- Agencies see a return on investment of their time and resources.

### Performance

- The CHART system hub is SOC, supported by existing satellite TOCs, which provide Statewide coverage allowing information distribution based on geographical needs and operations management from several different locations.
- CHART plans to integrate all radio communications, local government communications, and traffic signal systems activities to improve their incident management capabilities.

<sup>iii</sup> CHART on the Web, [www.chart.state.md.us](http://www.chart.state.md.us)

## Capital Wireless Integrated Network (CapWIN)<sup>iv</sup>

CapWIN, an integrated transportation and criminal justice information wireless network, is a concept that is being developed as a result of the need for improved coordination and information sharing among public safety and transportation agencies and organizations in Maryland, Virginia, and Washington, DC. Currently, agencies in the DC region do not have the means to communicate directly with each other in a mobile environment. Whenever incidents occurred, responders rely on their own communication centers as intermediaries in passing messages to other responders. With CapWIN, agencies will be able to communicate directly with each other and can access information for use in planning and implementing traffic control during major incidents. Law enforcement and emergency medical services will also use CapWIN to share critical information across counties and regions and improve response to emergencies.

The transportation-related benefits of CapWIN include:

- Reduced traffic delays;
- Increased customer satisfaction;
- Shared historical information among agencies;
- Improved resource allocation through real-time information;
- Increased worker safety in construction zones;
- Improved response to natural and man-made disasters;
- Increased transportation and public safety assistance through increased information; and
- Reduced duplication of expenditures on technology.

### Structure

- Incident management responders in the Washington, D.C., region, such as law enforcement, fire and rescue, EMS, transportation agencies, motorist assistance services, information service providers, and the media are committed to working together to improve communication among themselves to improve coordinated response to emergencies.
- User groups play an active role in developing the strategic plan and all other aspects of the project.

### Processes

- As a result of CapWIN, improved voice and data communications help in achieving the regional goal of improving transportation and law enforcement agencies' traffic incident response capabilities.
- The Coordination Working Group provides a forum for all interested parties to coordinate their respective activities to minimize overlap of initiatives and to pool resources.

### Products

- With input from all agencies involved, a strategic plan has been developed outlining function needs, system requirements, security requirements, information priorities, implementation strategy, and a long-term business plan that addresses ongoing operations and maintenance.
- Memorandums of understanding have been developed with each participating agency for the maintenance and long-term requirements of the network.

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<sup>iv</sup> CapWIN, [www.capwinproject.com](http://www.capwinproject.com)

## CAPWIN (continued)

### Resources

- Involved public safety and transportation agencies are interested in developing partnerships that will allow them to share limited resources in working toward the common goal of improving safety for their customers.
- CapWIN creates guidelines and standards in public safety and transportation communication systems in order to protect agencies from investing in costly technologies that are actually useless because they are incompatible with other agencies' systems.
- These improved systems are seen as a return on investment of time and resources.

### Performance

- The integrated wireless network allows transportation agencies to communicate directly with each other and thereby share real-time and historical information in a way useful to improving system performance.
- Data collected will be put in a meaningful, relevant, and understandable form readily accessible for use, regardless of location in national, State, or local databases.

## Baltimore Regional Operations Coordination (B-ROC) Project<sup>v</sup>

The initiation of the B-ROC Project resulted from a recommendation by the Metropolitan Baltimore ITS Partnership to the Baltimore Regional Transportation Board (BRTB), the MPO for the Baltimore region. Formed as a regional operations coordination committee, B-ROC first met in September 2000 to focus on enhancing traffic management operations through coordination among jurisdictions, agencies, modes, and facility types. The overall project has been divided into two phases. The first phase involves developing a framework for the enhanced coordination of regional transportation-related operations. The second phase involves the implementation of projects.

B-ROC addresses coordination issues such as:

- Incidents and congestion without boundaries;
- The need to resolve conflicting goals and missions among operating agencies;
- The need to enhance mutual support and resource sharing among agencies; and
- The need to decide lines of authority.

### Structure

- More than 20 jurisdictions and agencies participate in B-ROC, with the goals of enhancing operational coordination for traffic incident management among jurisdictions, agencies, modes, and facilities, and to develop a regional framework for operations. These agencies include police, fire, and public works from several Maryland cities and counties, as well as various Maryland transportation agencies and other Federal, State, and local organizations.

### Processes

- B-ROC strives to promote interagency coordination across modes and jurisdictions to facilitate better intermodal planning and incident response.

### Products

- The first phase of B-ROC comprised the development of a framework for enhanced coordination of regional transportation-related operations.
- The project will define operations goals, objectives and needs, functional requirements for operations, an operations framework, and an implementation plan that includes a prioritized list of projects.

### Resources

- B-ROC was formed to enhance mutual support and resource sharing among operating agencies.

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<sup>v</sup> Presentation made to Linking Planning and Operations Working Group, December 2001.

## Montgomery County ATIS<sup>vi</sup>

Montgomery County created its Advanced Traffic Information System (ATIS) program to manage its transportation system using advanced integrated technologies for traffic surveillance, signal control, incident detection, transit fleet management, and traveler information. As a byproduct of this program, the traveler information system was implemented, targeted to the needs of county residents and travelers. Information from the system is disseminated by cable television, radio, variable message signs, telephone, and the Internet.

Montgomery County has practiced integrated traffic and transit operations since 1996. Through an open architecture design, local transportation agencies share data, which is used for ATIS. The intermodal county data collection system provides information on transit schedules, fares, and routes, in addition to traffic information. The county is currently installing a fiber optics network to integrate all public communications requirements, thus providing cost-effective countywide connectivity and integrating the many different systems of county agencies and departments.

### Structure

- Montgomery County ATIS was implemented by the county government to manage growing congestion.
- Local transportation agencies and departments share information through an open architecture system.

### Processes

- Montgomery County leverages operations to achieve congestion reduction in the region.

### Resources

- Participants see a satisfactory return on investment because data coordination and integration allow agencies to provide better information to system users.
- Resources are sufficiently available and are being used to improve the system through the installation of a fiber optic network.

### Performance

- Real-time and archived data are shared, linked, and made accessible to local agencies and departments, and delivered to system users through ATIS.

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<sup>vi</sup> "Traveler Information Systems, A Primer," prepared by Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, January 2000.

## Cross-Jurisdictional Signal Coordination in Phoenix<sup>vii</sup>

Part of the AZTech Metropolitan Model Deployment Initiative (MMDI) effort was to coordinate traffic signals across jurisdictions in the East Valley of Phoenix. That signal integration helped form Smart Corridors that allow smooth progressions across jurisdictions.

In order to accomplish integration across jurisdictions, the East Valley Task Force (composed of transportation specialists from the five jurisdictions in Phoenix) established standards for coordination and communication among agencies and jurisdictions. A communications infrastructure was implemented to allow information flow between jurisdictions, and a regional traffic control and management plan was developed to aid integration.

The project was considered a success due to the many operational benefits achieved. These benefits include increases in average travel speeds during peak periods, decreases in number of stops, decreases in crash risks, and reductions in fuel consumption. Furthermore, interagency communication was substantially increased, allowing for a multijurisdictional system with regional goals. This coordination and cooperation is expected to have a long-range positive impact on traffic operations in the East Valley.

### Structure

- The East Valley Task Force was formed by transportation specialists from the five jurisdictions in Phoenix to identify areas for improvement and establish standards for interagency and interjurisdictional coordination.
- Regional traffic signal coordination was achieved through careful planning and increased coordination efforts.

### Processes

- The Smart Corridor project, designed to improve efficiency in the Phoenix region's transportation system and make commuting across jurisdictions easier for travelers, is used as leverage to achieve interagency communication and coordination.
- Data collection, involving traffic counts, turning-movement data, and global positioning system satellite receivers, was done before and after signal timing changes to calculate travel time, delays, and vehicle accelerations. The data showed that the project had several operational benefits, including increased travel speed and decreased delays.

### Products

- Before starting the project, the East Valley Task Force established standards for interagency coordination and developed a regional traffic control and management plan to aid in technical integration among agencies. The plan included traffic signal timing plans for the Smart Corridors and coordination procedures for traffic management between jurisdictions.

### Resources

- Each of eight regions involved in the project share the development and operating costs.
- Each region benefits from maximized efficiency for travelers and increased communication among agencies. The communications infrastructure developed for the project allows sharing of real-time traffic operations information that is instrumental to the initiation and achievement of regional goals.

### Performance

- Establishing standards for interagency coordination provided expected levels of regionwide performance.
- Smart Corridor components linked to the AZTech server allow information sharing among agencies and jurisdictions. Traffic signal controllers, surveillance equipment, and detection devices were installed or upgraded to allow for the collection of information, which can be shared through workstations installed at TOCs in each jurisdiction.

<sup>vii</sup> "Cross-Jurisdictional Signal Coordination in Phoenix and Seattle," *Lessons Learned from the Metropolitan Model Deployment Initiative—Removing Barriers to Seamless Travel on Arterial Streets*, FHWA-OP-01-035, U.S. Department of Transportation, March 2001.

## San Antonio's Advanced Warning to Avoid Railroad Delays (AWARD) Project<sup>viii</sup>

The AWARD project was developed as part of San Antonio's MMDI to handle intermodal traffic problems by providing advance information on train crossings to operators at the Texas DOT TransGuide Control Center, emergency service providers, and travelers. The system's purpose was to eliminate traffic backup on freeway ramps and interruptions of freeway operations by passing trains at at-grade highway-rail intersections.

AWARD places acoustic and Doppler radar sensors on poles in city or State rights-of-way along a railroad track to detect the presence, speed, and length of trains prior to their arrival at grade crossings close to freeway exits. The sensors send data to the TransGuide Control Center, where computers calculate train passing time and duration. Using variable message signs, traveler information kiosks, web sites, and in-vehicle navigational units, TransGuide operators alert motorists to potential delays and alternative routes.

The system was considered a successful proof-of-concept. In this case, however, train delays were found insufficient to warrant system implementation. As traffic increases in the San Antonio area, the system may one day be needed, and the components will already be in place.

### Structure

- San Antonio expected the AWARD project to improve freeway system efficiency by eliminating delays caused by at-grade highway/rail intersections.
- Because railroads hesitated to participate in the project, San Antonio modified it to focus on traveler information and placed detectors on city or State rights-of-way.

### Processes

- Field interviews were used to determine the effects of traveler information provided by AWARD on traffic patterns at an AWARD deployment location.
- The Queens University Synthetic Origin and Destination Generator and INTEGRATION modeling programs were also used to determine AWARD's impact.

### Resources

- Resources were pooled with other MMDI projects, thereby reducing some AWARD fixed costs.
- Using MMDI program funds, Texas DOT funded the operation and maintenance of AWARD.

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<sup>viii</sup> "Advanced Warning for Railroad Delays in San Antonio," *Lessons Learned from the Metropolitan Model Deployment Initiative—Providing Enhanced Information to the Public*, FHWA-OP-01-038, U.S. Department of Transportation, March 2001.

## San Antonio Medical Center Corridor Project<sup>ix</sup>

As another part of the MMDI, the San Antonio Medical Center Corridor Project was designed to link the region's freeway and incident management system with a newly developed and deployed arterial management system to reduce delays, improve safety, and enhance customer satisfaction. Through the use of freeway-based video and loop detector stations, incidents are detected or confirmed. Real-time information is sent to the TransGuide Freeway Operations Center, where incident management plans are created, and the appropriate actions taken. Incident information is also transmitted to travelers through lane control signs and variable message signs detailing incident type, expected delay, and alternative routes. In addition, the incident information is shared with the City of San Antonio's TMC, which can implement one of several predetermined incident-response signal plans to divert travelers from the impacted freeway to appropriate arterial roads.

While the system reduced incident-related delay, it also presented significant institutional and operational challenges. Those challenges, which concerned the integration of transportation agencies having diverse operating philosophies, budgets, priorities, and constituents, were addressed as follows:

- Local agencies were challenged to think regionally and recognize travelers' concerns for quick, safe, and efficient movement through the entire transportation network.
- A peer-to-peer, permissive operating philosophy was adopted, in which management decisions are generated regionally but instituted locally.
- The project offered unique incentives such as allowing the City of San Antonio to co-locate their Medical Center Corridor arterial management center within the Texas DOT TransGuide Center.

In addition, the operation of the system's incident response signal timings and the appropriate use of the system's variable message signs posed potentially thorny problems. The signal timing plans were designed to respond to severe delays on the freeway that caused high diversion to the arterial roads. Use of the plans during times of low diversion could actually increase delay. Similarly, variable message signs could cause increased

delay if used during minor incidents that generated relatively little delay. The following steps were taken to avoid trouble:

- Use of signal plans and variable message signs was restricted to severe incidents.
- Use of video surveillance was restricted to arterial operations personnel, who could monitor impacts of signal timing changes in real time and turn plans on and off as appropriate.
- San Antonio made a commitment to continually update and broaden the breadth of the incident signal plans.

It is clear that, when solutions to institutional and operational challenges are carefully planned and managed, significant benefits can be realized.

### Structure

- The Medical Center Corridor was developed and is operated by Texas DOT, the City of San Antonio, and the region's EMS providers.
- The corridor was designed so that incidents could be identified, responded to, and managed in a coordinated, seamless fashion. It is envisioned that the corridor will provide faster, safer, and more fuel-efficient travel.

### Processes

- System integration was planned to improve the regional transportation system for travelers by reducing delay, crash risk, and fuel consumption.
- Using the INTEGRATION microsimulation model, it was found that, when optimal deployment is achieved, benefits could be significant. Reductions were found in delay, crash risk, and fuel consumption. Furthermore, it was found that delay is more substantially reduced through an integrated system than through various components acting in isolation.

<sup>ix</sup> "San Antonio's Medical Center Corridor," *Lessons Learned from the Metropolitan Model Deployment Initiative—Reducing Delay through Integrated Freeway and Arterial Management*, FHWA-OP-01-034, U.S. Department of Transportation, March 2001.

## San Antonio (continued)

### **Products**

- Incident response plans are formulated from information received at the TransGuide Freeway Operations Center. These plans are used to dispatch appropriate responders.
- Predetermined signal response plans can be implemented as needed. San Antonio has made a commitment to continuously update and expand the plans' scope to maintain maximum efficiency on arterial roads.

### **Resources**

- Costs were shared among agencies involved in the Medical Center Corridor Project. Freeway component installation costs were kept low by conducting much of the deployment during major highway reconstruction. Arterial operations and maintenance costs are kept low as well by locating the operations center within the existing TransGuide Operations Center, thus taking advantage of centralized staffing and maintenance plans.

### **Performance**

- To maintain efficient system performance, use of incident response signal plans and variable message signs was restricted to more severe incidents.
- Management decisions are created regionally but implemented locally.

## Phoenix's Roadway Closure and Restriction System (RCRS)<sup>x</sup>

RCRS was developed to provide integrated information about the status of maintenance activities, road construction, special events, traffic speeds, and incidents on major highways and local roads in Phoenix. Initiated under the Phoenix MMDI, the project's goal was to provide information to allow travelers to plan more efficient travel. The system is an expansion of the Highway Closure and Restriction System (HCRS).

RCRS required integration of local and regional systems. To achieve this integration, participating agencies were provided with AZTech computer workstations with which they can manually enter information about travel conditions within their boundaries. The information is provided to travelers through the AZTech Trailmaster Web site, kiosks, and a toll-free phone number.

The outcome of RCRS has been a more regional approach to the reporting of traveler information. Institutional barriers have been disbanded and interjurisdictional communication increased among Arizona DOT districts and their local partners due to the high level of communication required for system integration. As a result of the careful planning and coordination among jurisdictions, the system has been highly successful.

### Structure

- By reaching out to AZTech municipal partners, Arizona DOT championed the inclusion of local traffic system information.
- The success of the system depended on careful planning and coordination among the Phoenix jurisdictions.

### Processes

- Focus groups were formed to analyze the positive and negative aspects of RCRS.
- Web-site usage statistics were studied to determine the success of the system.

### Products

- At no charge, Arizona has offered to license to any other State transportation agency the system software it used to fuse old HCRS data with new RCRS data.

### Resources

- Because RCRS was an upgrade of an existing system, resource requirements were significantly lower than those required for a new system.
- Local municipalities in the Phoenix region can now share infrastructure, leading to equipment cost-sharing.
- Costs are shared among an additional 15 AZTech MMDI projects, 8 planned additional traffic operations centers, and 2 fire dispatch centers.

### Performance

- System performance data can easily be obtained by studying the Web site and phone system usage statistics.

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<sup>x</sup> "Phoenix's Roadway Closure and Restriction System," *Lessons Learned from the Metropolitan Model Deployment Initiative—Providing Enhanced Information to the Public*, FHWA-OP-01-36, U.S. Department of Transportation, March 2001.

## Ventura County Fare Integration<sup>xi</sup>

Between January 1996 and October 1999, an automated, integrated transit-fare collection system was field tested in Ventura County, California. The purpose of the system was to create a seamless fare payment system across transit agencies in the region. It was hoped that the system would encourage, accommodate, manage, and assess travel patterns of passengers among transit systems. In addition, the transit agencies involved hoped to improve data collection and reporting processes.

The payment card system was devised based on smart card technologies and called the Smart Passport. The Ventura County Transportation Commission (VCTC) coordinated the project. The benefits that VCTC hoped to achieve were:

- Regional payment system coordination;
- Seamless regional travel;
- The concept of “one account” or one payment device for regional transportation; and
- Cost sharing among partners.

Due to problems with the system, the project did not realize the expected benefits, but instead resulted in a list of lessons learned to be applied to any future implementations of the system. The field test was considered to be a positive step toward regional, multiagency coordination.

### Structure

- Initial support came from eight transit operators interested in an integrated fare system, a seamless transit system, and improved data collection and reporting processes. These operators were already cooperating to devise an integrated transit system before the Smart Passport project.
- In coordinating the project, VCTC gained the support of participating agencies and operators by discussing the potential benefits of the system.

### Processes

- The project was closely monitored to determine its benefits and needs for improvement. Although the benefits could not be quantified, lessons learned were compiled for use in future integrated fare card systems. The lessons learned will allow decision-makers to better understand critical issues and potential benefits before investing.

### Products

- VCTC and the participating agencies signed memorandums of understanding stating that VCTC would act as lead agency and would be solely responsible for contractual and financial issues.
- Surveys were conducted to determine users' opinions of the Smart Passport.
- As a result of the project, a set of issues was identified that transportation planners and service providers need to examine before planning or implementing a multiagency fare collection system.

### Resources

- The project was funded by Caltrans and USDOT.
- As a result of the project, VCTC recognized that staff resources must be commensurate with the project's scope. This means that more managerial, technical, and administrative staff would be needed for any future implementation of the system.

### Performance

- All agencies involved agreed that system performance measurements should have been established during the planning phase of the project, and these measurements must be applied regularly throughout the project to monitor performance.

<sup>xi</sup> “Ventura County Fare Integration—A Case Study,” September 2001. Prepared by Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, September 2001.



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