Integrated Corridor Management

Concept Development and Foundational Research

Technical Memorandum

Task 3.3 – Relationship Between Corridor Management and Regional Management

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16. Abstract

Task 3 involves overall foundational research to further the understanding of various aspects of Integrated Corridor Management ICM) and to identify integration issues needed to evaluate the feasibility of the ICM initiative. The focus of Task 3.3 and the purpose of this document (TM 3.3) is to compare and contrast Integrated Corridor Management and Regional Management, identifying the similarities, differences, and linkages between Integrated Corridor Management and Regional Management. It also addresses the relationships between Integrated Corridor Management and Regional Management and how these should be addressed when developing an Integrated Corridor Management System.

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Integrated Corridor Management (ICM)
Tech Memo 3.3 – Final Draft

Relationship Between Corridor Management and Regional Management

TASK OBJECTIVE

Task 3 involves overall foundational research to further the understanding of various aspects of Integrated Corridor Management (ICM) and to identify integration issues needed to evaluate the feasibility of the ICM initiative. The focus of Task 3.3 and the purpose of this document (Tech Memo 3.3) is to compare and contrast Integrated Corridor Management and Regional Management, identifying the similarities, differences, and linkages between Integrated Corridor Management and Regional Management. It also addresses the relationships between Integrated Corridor Management and Regional Management and how these should be addressed when developing an Integrated Corridor Management System.

BACKGROUND AND DEFINITIONS

The concept of Transportation Systems **Management** may be defined[1] as a "coordinated and integrated decision-making approach to (1) construction, (2) preservation, (3) maintenance, and (4) operations of transportation facilities with the intent of maximizing transportation system performance. The goal of transportation systems management is safe, reliable, predictable and user-friendly transportation. The operations aspect of system management includes: scheduled or recurring activities, such as preventive maintenance, signal retiming, and snow removal; planned disruptions, such as work zones; unscheduled or non-recurring disruptions, such as incidents, accidents, and unanticipated repairs; special events such as the Olympics, sporting events, or inaugurals; and real-time transportation system management, such as traveler information, ramp metering, and lane controls. **Operations** is further defined[2] as "the provision of integrated systems and services that make the best use of existing transportation systems in order to preserve and improve customer-related performance. This is done in anticipation of, or in response to, both recurring and non-recurring conditions. Operations includes a range of activities in both urban and rural environments, including: routine traffic and transit operations, public safety responses, incident management, snow and ice management, network or facility management, planned construction disruptions, and traveler or shipper information."

A related concept is that of an **Architecture**, which "defines a framework within which a system can be built. It functionally defines what the pieces of the system are and the information that is exchanged between them. Integration of these systems requires an architecture to illustrate and gain consensus on the approach to be taken by a group of stakeholders regarding their particular systems. An **ITS Architecture** defines the

[1] From Glossary available from websites of FTA Office of Planning; FHWA Office of Planning, Environment, and Realty; and FHWA Office of Operations.
[2] From Glossary available from websites of FTA Office of Planning; FHWA Office of Planning, Environment, and Realty; and FHWA Office of Operations.

systems and the interconnections and information exchanges between these systems."[3] Thus, the architecture provides the overall framework in support of management and operations, defining how the various systems and system elements interact (e.g., information flows) and work together to achieve management and operations goals.

Corridor Management

The concept of "**Integrated Corridor Management**" (ICM) is discussed and defined in a separate Technical Memorandum[4] as follows:

> "ICM consists of the operational coordination of multiple transportation networks and cross-network connections comprising a corridor, and the coordination of institutions responsible for corridor mobility. The goal of ICM is to improve mobility, safety, and other transportation objectives for travelers and goods. ICM may encompass several activities, for example:
>
> - Cooperative and integrated policy among stakeholders responsible for operations in the corridor.
> - Concept of operations for corridor management.
> - Improving the efficiency of cross-network junctions and interfaces.
> - Mobility opportunities, including diversion to alternate routes and modes.
> - Real-time traffic and transit monitoring.
> - Real-time information distribution (including alternate networks).
> - Congestion management (recurring and non-recurring).
> - Incident management.
> - Travel demand management.
> - Public awareness programs.
> - Transportation pricing and payment."

The various ICM operational approaches and strategies that can be applied to a corridor (and the associated the cross-network linkages and junctions) are described in Tech Memo 5.1-3. The following ICM approaches have been defined to identify segments of an "integration and coordination" spectrum:

- Information Sharing / Distribution.
- Improve Operational Efficiency of Network Junctions & Interfaces (e.g., signal priority for transit, multi-modal electronic payment, transit hub connection protection).
- Accommodate / Promote Cross-Network Route & Modal Shifts (e.g., modify arterial signal timing to accommodate shifted traffic, re-route buses around major incidents).
- Manage Capacity – Demand Relationship Within Corridor – "Real-Time" / Short Term (e.g., reversible lanes, convert regular lanes to HOV / transit / emergency, increase transit capacity by adjusting headways / number of vehicles, modify HOV restrictions, restrict / re-route freight movements, modify HOT & parking fees / transit fares).

[3] Regional ITS Architecture Guidance Document; "Developing, Using, and Maintaining an ITS Architecture for your Region; draft prepared by National ITS Architecture Team; October, 2001.
[4] Final Technical Memorandum – Task 3.1 : Develop Alternative Definitions; August 19, 2005.

- Manage Capacity – Demand Relationship Within Corridor – Long Term (e.g., low-cost infrastructure improvements, peak spreading, other TDM).

While these ICM approaches represent distinct segments along a spectrum of inter-agency cooperation and coordination needed to support integrated operations, they are not mutually exclusive; in fact, they tend to build upon one and another (in some cases being pre-requisites) as one moves along the spectrum.

Regional Management

Regional management and operations is defined and discussed in several references as follows:

- Per the FHWA website (www.fhwa.dot.gov), "regional management and operations (M&O) refers to the multimodal, cross-jurisdictional systems, services, and projects that are implemented to optimize the performance of the existing infrastructure. These systems, services, and projects are designed to preserve capacity and improve security, safety, and reliability of transportation systems. Regional M&O projects include a diverse range of activities as illustrated in the breadth of examples included in below:
    - Arterial management systems.
    - Work zone management systems.
    - Emergency management.
    - Electronic toll and fare collection.
    - Special event coordination.
    - Automated traffic enforcement.
    - Traffic incident management.
    - Road weather management.
    - Traveler information services.
    - Commercial vehicle operations.
    - Traffic detection and surveillance.
    - Freight management.
    - HOV/HOT facilities/lanes operations.

- The *Regional Planning for Operations Primer*[5] is an introductory document that discusses a formal collaborative activity called regional planning for operations, stating:" 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

[5] "Regional Transportation Operations Collaboration and Coordination, a Primer for Working Together To Improve Transportation Safety, Reliability, and Security", FHWA, Publication FHWA-OP-03-008, 2002.

integration to be effective and truly benefit those that use or depend upon the regional transportation system."

- FHWA Rule 940[6] and the associated FTA Ruling (FTA National ITS Architecture Policy Section 5.d.6) require the development of a "**regional ITS architecture**," which is defined in the rule as "a regional framework for ensuring institutional agreement and technical integration for the implementation of ITS projects or groups of projects." The aforementioned "Regional ITS Architecture Guidance Document" does not include the phrase "regional management," but it does address "regional integration" as allowing for the "sharing of information and coordination of activities among regional transportation systems to efficiently and effectively operate. A regional ITS architecture illustrates this integration."

COMPARISON

The definitions and descriptions of corridor and regional management and operations as provided above contain many of the same terms and concepts, including "integration," "institutional agreement," and "coordination of institutions." Moreover, many of the operational examples provided for both corridor and regional management are very similar, if not identical (e.g., incident management, traffic detection, traveler information / distribution, electronic payment services). Nevertheless, there are some significant differences between corridor and regional management, particularly when considering the various aspects of "integration" required for the coordination of multiple transportation facilities and modes and the collaboration of the agencies and institutions responsible for the management and operation of these networks. The foundational research for the ICM initiative has defined these integration needs as follows:

- **Operational integration** may be viewed as the implementation of multi-agency transportation management strategies, often in real-time, that promote information sharing and cross-network coordination and operations among the various transportation networks in the corridor and facilitate management of the total capacity and demand of the corridor.
- **Institutional integration** involves the coordination and collaboration between various agencies and jurisdictions (network owners) in support of ICM, including the distribution of specific operational responsibilities and the sharing of control functions in a manner that transcends institutional boundaries.
- **Technical integration** provides the means (e.g., communication links between agencies, system interfaces, and the associated standards) by which information and system operations and control functions can be effectively shared and distributed among networks and their respective transportation management systems and by which the impacts of operational decisions can be immediately viewed and evaluated by the affected agencies.

[6] Federal Register / Vol. 66, No. 5 / Monday, January 8, 2001 / Rules and Regulations, Department of Transportation, Federal Highway Administration 23 CFR Parts 655 and 940, [FHWA Docket No. FHWA–99–5899] RIN 2125–AE65 Intelligent Transportation System Architecture and Standards. FHWA Rule 940, which became effective in 2001, implements section 5206(e) of the Transportation Equity Act for the 21st Century (TEA-21), and requires ITS projects to conform to the National ITS Architecture and standards.

A related consideration is that of "physical integration" — in other words, the manner in which the various networks within a corridor or region are physically interconnected, thereby permitting movement among corridor networks and the regional transportation system.

The differences and similarities between regional and corridor management in terms of their respective integration needs are discussed below and summarized in Table 1 (at the end of this section).

Physical Boundaries

An obvious difference between a region and a corridor is the respective areas they cover. Per the previously referenced FTA Office of Planning / FHWA Office of Operations glossary, a "**region** (as defined for ITS) is the geographical area that identifies the boundaries of the regional ITS architecture." Per the aforementioned FHWA / FTA Rule addressing regional ITS architectures, a metropolitan region should be no less than the boundaries of the metropolitan planning area. The Regional ITS Architecture Guidance Document further defines a region by geographic area, providing the following region definition examples:

- One or more counties or political subdivisions.
- One or more municipalities (e.g. cities, townships).
- State DOT districts.
- Metropolitan Planning Areas.
- A corridor (thruway / turnpike).
- One or more states.
- A specific service region (e.g., tourist areas, transit agency) or conformity area (e.g., air quality)

A **corridor** – in the context of the ICM initiative – has been defined as a "largely linear geographic band defined by existing and forecasted travel patterns involving both people and goods. The corridor serves a particular travel market or markets that are affected by similar transportation needs and mobility issues. The corridor includes various networks (e.g., limited access facility, surface arterial(s), transit, bicycle, pedestrian pathway, waterway) that provide similar or complementary transportation function. Additionally, the corridor includes cross-network connections that permit the individual networks[7] to be readily accessible from each other."

A key attribute of a corridor (per this definition) is that it has no predefined size or scale. Other than the fact that corridors tend to be oriented in a particular (largely linear) direction and include multiple, adjacent networks with cross-network linkages, geographic attributes are considered very little when defining the boundaries of a corridor. Corridors are defined based primarily on operational considerations: the travel market or markets served by the corridor, the similar transportation needs and mobility issues associated with these markets, and the accessibility and interaction between the networks via their cross-network connections. In other words, the boundaries of an Integrated Corridor Management System (ICMS) depend on the operational goals and objectives for a corridor as determined by the stakeholders and the corresponding need and ability for the various corridor networks, and their respective cross-network connections, to function as an integrated system.

[7] The term "network" is used to denote a specific combination of facility and mode.

In summary, it may be stated that one or more corridors will likely be found within a region. In other words, **a corridor is a subset of a region.** (Note: One may also think of "Inter-Regional Corridors" such as I-95 or GCM; however, these corridors are different from sub-regional corridors in that they focus on cascading impacts along a continuous travel facility where complimentary alternatives to the facility are not constant and specific travel patterns and markets change over various segments of the corridor. At the same time, segments of an inter-regional corridor, such as I-95 between Washington, DC, and Baltimore, Maryland, may be considered a sub-regional corridor where ICM could be applied.)

Operational Integration

The aforementioned FHWA / FTA Rule addressing regional ITS architectures does not specifically mention "operational integration"; although both technical and institutional integration are discussed. The *Regional Planning for Operations* document indicates that "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." While the *Regional ITS Architecture Guidance Document* addresses operational integration on a regional basis as allowing for "sharing of information and coordination of activities among regional transportation systems to efficiently and effectively operate." As such, the emphasis of regional management appears to be sharing information, coordination, and collaboration between agencies; but not necessarily the cross operations of the various networks within the region as is the case with ICM, the definition of which includes the phrase "**operational coordination** of multiple transportation networks and cross-network connections comprising a corridor."

The various definitions of regional management included at the beginning of this Tech Memo include several examples (e.g., traveler information, incident management, special event management, emergency management, commercial vehicle operations, work zone management, HOV / HOT lanes). It is important to consider just what these various operational activities entail, and how they get accomplished from the corridor and regional perspectives.

Traveler Information

The sharing of information between agencies and networks is a common operational activity for both regional management and integrated corridor management; indeed, one of the ICM approaches is identified as "Information Sharing / Distribution." This activity involves the collection and processing of information from multiple sources to yield integrated information about current and future travel conditions, which is broadcast or disseminated to both pre-trip and enroute travelers, allowing them to make informed choices about when, where and how to travel.

The traveler information process extends well beyond a particular corridor, both in terms of where the information is obtained and how it is distributed. Information sharing among corridor networks and the dissemination of that information to corridor users should therefore be viewed as part of a broader, region-wide, advanced traveler information system (ATIS). That said, while this operational approach may be regional in scope, many users will nevertheless focus on traveler information for those corridors that serve their specific trip ends and meet their transportation needs. To facilitate individual corridor traveler trip needs, corridor traveler information must provide travelers with a means to compare their individual travel alternatives and assist them make their daily travel choices. This means that the corridor travel conditions must be presented in a way that is network and mode benign so that each alternative can be easily compared.

Incident Management

The FHWA *Traffic Incident Management Handbook* defines incident management as "the systematic, planned, and coordinated use of human, institutional, mechanical, and technical resources to reduce the duration and impact of traffic incidents, and improve the safety of motorists, crash victims, and traffic incident responders. This results from reducing the time to detect and verify a traffic incident occurrence; implementing the appropriate response; safely clearing the incident; and managing the affected flow until full capacity is restored. A traffic incident management program includes policies, strategies, and technologies integrated into a multi-agency, multi-jurisdictional environment aimed at reducing the occurrence and impact of traffic incidents." Several of the ICM operational approaches and strategies identified in Tech Memo 5.2 address these incident management activities.

The severity of most incidents in terms of their ability to reduce roadway capacity and transit service and the time to restore both is such that incident impacts are restricted to the network where the incident occurs and to any nearby adjacent networks to which users may shift to avoid the incident — in essence, a "corridor." The concept of "regional" incident management is appropriate only for major incidents, or incidents that result in a complete closure of one or more networks within the corridor, where the impact is so great that shifts can (and may need to) be accomplished on a regional basis – from one corridor to another corridor – without a significant travel time penalty to travelers. Moreover, in a broad sense of the term, such "major incidents" and the required response may also be considered in the context of emergency management and or planned special event management.

Planned Special Event Management

The FHWA reference document *Managing Travel for Planned Special Events* defines a planned special event as "a public-attended activity or series of activities, with a scheduled time and location that may increase or disrupt the normal flow of traffic. Planned special events include sporting events, concerts, festivals, and conventions occurring at permanent multi-use venues parades, seasonal festivals, and milestone celebrations at temporary venues. The term *planned* special event is used to describe these activities because of their known locations, scheduled times of occurrence, and associated operating characteristics." The FHWA reference further indicates that planned special events pose a unique and diverse set of challenges to stakeholders, including managing intense travel demand, mitigating potential capacity constraints, and influencing the utility associated with various travel choices. Such activities are addressed by the ICM operational approaches and strategies.

A planned special event represents a trip generator; therefore, the impact an event has on transportation system operations as a whole must be examined. As such, planned special event management tends to be regional in scope, but the concomitant operational activities and integration requirements involve integrated corridor management along multiple corridors. As noted in *Managing Travel for Planned Special Events,* "Unlike roadway construction activities or traffic incidents that impact travel within a single corridor, a planned special event impacts all corridors serving the event venue location." Therefore, a specific integrated corridor during a planned special event must be tuned to the planned special event, which involves implementing preplanned strategies and regional coordination.

Emergency Management

The FHWA Office of Operations / Emergency Management Web Site defines emergency management as “the process of preparing for, mitigating, responding to, and recovering from an emergency.” As noted in *Managing Travel for Planned Special Events*, ”emergencies, such as a severe weather event or other major catastrophe, represent special events that can induce extreme traffic demand under an evacuation condition.” Accordingly, emergency management is very similar to special event management in terms of the potential strategies that may be implemented to mitigate the impacts.[8] Per the definition of an “emergency,”[9] emergency management will generally be a regional (or even multi-regional issue). Regardless of the actual scope of an emergency, the corridor’s role is to support emergency management activities by operating to mitigate the travel impacts of the emergency such that emergency goals can be reached be it an evacuation or response to a catastrophic incident. The integrated corridor needs to be designed to support regional-level emergencies such as evacuations, in which case the corridor facilitates regional travel as well as response to local emergencies in a way that promotes the use of any unused corridor capacity to move travelers away from the affected area.

Managed Lanes

Managed lanes are certain lanes, typically on a freeway, set aside for a variety of operating strategies that move traffic more efficiently in those lanes. Specific examples of managed lanes include work zones, toll facilities, and HOV or HOT facilities and lanes, all of which are included in the earlier definition of regional management, as well as reversible lanes and variable speed control. Integrated Corridor Management includes several operational strategies to implement and modify managed lane mechanisms as necessary to increase the operational efficiency of the corridor (see Tech Memo 5.2).

Other Operational Activities

ICM includes other strategies, particularly those that improve the operational efficiency of network junctions and interfaces (e.g., signal priority and transit hub connection protection), that are not practical in a regional context because many networks within a region are not in close proximity, let alone adjacent to one another with cross-network linkages and junctions. Moreover, the destinations are quite disparate, except for those within a corridor.

Performance Measurement

Another operational consideration is that of performance measurement. Over the past several years, an increasing emphasis has been placed on the importance of performance measures with respect to transportation management and operations. Such metrics provide the basis for evaluating the transportation system operating conditions and identifying the location and severity of congestion and other problems. Performance measures also provide the mechanism for quantifying the operation of a

[8] The major differentiation is that “emergency” events occur at random and with little or no advance warning, thus differing from “planned” special events. The number and types of stakeholders (and associated institutional issues) will also be different, with emergencies often involving FEMA, Department of Homeland Security, the military, etc.

[9] FEMA defines an emergency as any unplanned event that can cause deaths or significant injuries to employees, customers or the public; or that can shut down businesses, disrupt operations, cause potential environmental damage, or threaten a facility’s financial standing.

system or network and evaluating the effectiveness of any operational strategies and technologies.

The *Regional Planning for Operations Primer* addresses performance measures as "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"; but the few examples provided focus more on component, function, and system-level measures. Very few metrics for measuring regional (corridor) operations are provided. Neither the regional architecture requirements identified in Rule 940, nor the process for developing a Regional ITS Architecture as described in the Regional ITS Architecture Guidance Document, directly address performance measures. As such, it may be concluded that Regional Management defers to the individual networks to measure performance, and the effectiveness is based on each individual networks performance – in other words, If the networks are performing, the region must be performing.

On the other hand, corridor-based performance measures are an integral part of the ICM initiative. As discussed in Tech Memo 3.4, such performance measures must be mode and network independent and applicable to a corridor as an integrated whole.

Summary

Summarizing the operational integration perspective, regional management focuses on sharing information between networks and their respective systems within a region, and the coordination and collaboration of the owners and operators of the region's networks. Corridor management builds upon this regional information sharing and coordination to provide integrated operations along the various corridors within the region. Moreover, these integrated operations apply to numerous scenarios, including incident management, special event management, emergency management, managed lanes and recurring congestion. In other words, corridor management takes the next step from integrated management at a regional level to integrated operations at a corridor level.

Technical Integration

Technical integration provides the means (e.g., communications links, interfaces, and standards) by which responsibilities are distributed and system control functions can be automatically shared between the network-based transportation systems. Technical integration is the primary focus of an ITS architecture, which defines the systems, interconnections, and information exchanges between these systems. It is the technical integration and corresponding architecture that provides the overall framework in support of management and operations.

As noted within the discussion of Operational Integration, the primary focus of regional management is information sharing between networks (and their respective systems) within the region. This emphasis on information sharing is also reflected in the requirements (per Rule 940) as to what a regional ITS architecture shall include as a minimum, as follows:

- "A description of the region;
- Identification of participating agencies and other stakeholders;
- An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the systems included in the regional ITS architecture;
- Any agreements (existing or new) required for operations, including at a minimum those affecting ITS project interoperability, utilization of ITS related

standards, and the operation of the projects identified in the regional ITS architecture;
- System functional requirements;
- Interface requirements and information exchanges with planned and existing systems and subsystems (for example, subsystems and architecture flows as defined in the National ITS Architecture);
- Identification of ITS standards supporting regional and national interoperability; and
- The sequence of projects required for implementation."

Given that integrated corridor management builds upon this regional information sharing, the technical integration required for an ICMS should also build upon the regional ITS architecture, particularly in terms of standards, interfaces, and communication links. However, several of the ICM strategies may require additional information and data flows than are not provided by the regional ITS architecture, such as more detailed data on current network operations, information on cross-network linkages, additional video images, data for command and control of ITS devices, and ICM response plan information (location, criteria for implementing and de-activating, specific actions and messages, distribution of responsibilities between the corridor network and agencies). Under these circumstances, corridor management will require a greater degree of technical integration as compared to the region. Moreover, the ITS architecture for the ICMS may need to be viewed as a "sub-regional" architecture: compatible with the regional architecture, but providing additional information flows and supporting enhanced operational functionality.[10]

To align the proposed ICMS with the Regional ITS Architecture and create a complementary sub-architecture for the ICMS, specific considerations to achieve this interrelationship include the following:

- The regional ITS architecture development process can serve as a key enabler in identifying the appropriate stakeholders, establishing champions, and initiating the institutional relationships that will sustain integrated corridor management. The list of agency agreements for the regional architecture can be the starting point for developing the agreements and procedures to be implemented at the corridor level.

- The system inventory, concept of operations, and requirements documents generated during the regional ITS architecture development process may serve as templates or information sources for the ICMS inventory of systems, concept of operations, and requirements.

[10] An example of this "sub-regional" concept involves the transportation operating agencies within New York City (NYC DOT, NYS DOT, MTA Bridges and Tunnels, NYC Transit, NYC Police), vis-à-vis TRANCSOM (Transportation Operations Coordinating Committee), the regional management entity. These NYC entities are members of TRANSCOM (along with other agencies in New York, New Jersey, and Connecticut). During the development of the NYC ITS Strategic Plan and subsequent agency projects, it was determined that, in light of the layout and configuration of the transportation networks within New York City as managed by these transportation entities (i.e., adjacent and overlapping, with numerous cross network linkages and junctions – that is, "corridors"), additional inter-operability (particularly during incidents, even minor ones) and information sharing was required. As the TRANSCOM regional ITS architecture and regional management functionality did not provide all these "corridor management" needs, a "sub-regional" architecture was developed to support the desired operations within the city.

- The regional ITS architecture development process results in specific standards and protocols for communications and information exchange between systems. These standards and protocols should serve as the foundation for defining the ICMS C2C linkages, interfaces, and standards. In essence, the ICMS should be viewed as a "sub-regional architecture" in this regard.
- In the event attributes of the regional ITS architecture have already been (or will soon be) implemented, be they technical (e.g., C2C linkages, regional information exchange clearinghouse), institutional (e.g., agreements, administrative frameworks and processes), or operational (response plans for major special events or emergency operations), the ICMS should incorporate and build upon these regional elements to the greatest extent possible. In other words, an ICMS should not "re-invent the wheel."

Institutional Integration

In a pluralistic society such as ours, with its numerous levels of government and organizational hierarchies, institutional integration, defined as the coordination and collaboration between network owners and operators, is where most of the difficulties in achieving the singular vision of a "seamless" transportation region or corridor lie. In essence, without institutional integration, operational integration and the supporting technical integration become more difficult, and the overall goals of regional management and integrated corridor management can never be fully satisfied.

Institutional integration requires the coordination and collaboration of the corridor "stakeholders," or the persons or groups with a direct interest (a "stake" as it were) in the management and operation of the corridor. Given that a corridor is an operational subset of the region, many of the regional stakeholders will also be corridor stakeholders; although their relative level of involvement and the specific agency representatives may differ somewhat, depending on the boundaries of the corridor(s) and the ICM goals. By definition, there should never be a scenario where a corridor stakeholder is not also a regional stakeholder.

Given that operational and technical integration for Integrated Corridor Management will likely be more complex — involving strategies for cross-network operations and shifts, additional information sharing requirements, and distribution of responsibilities for implementing strategies — as compared to regional management, the institutional issues and their resolution may also be more complex. These institutional issues and potential strategies are addressed in Tech Memo 3.4.

In summary, corridor management and regional management are **not** the same thing. The major differences lie in their size and how their respective boundaries are defined, the extent to which individual network operations and the cross-network linkages and junctions within a corridor are integrated together, and how this integrated corridor is managed and evaluated on a day-to-day basis. Similarities and parallels exist between regional and corridor management with respect to institutional integration and technical integration, but due to the enhanced and expanded operational features of corridor management, additional institutional and technical integration may be required within a corridor as compared to regional management. Moreover, corridor management and the associated integrated operations can be applied to numerous scenarios, such as incident management, special event management, emergency management, managed lanes, and recurring congestion. In other words, corridor management takes the next step from integrated management at a regional level to integrated operations at a corridor level.

Table 1: Comparison of Regional and Corridor Management

Attribute	Region	Corridor
Facility Types	Includes all surface transportation facilities such as streets, bridges, tunnels, transit routes, airports, ports, etc.	Several, if not all, of the facility types in a region. The corridor-specific facilities are distinguished by the fact that they serve the same or similar travel markets, are adjacent, and are readily accessible from each other.
Boundaries	Geographically defined (e.g., jurisdictional and agency boundaries, MPO).	No predefined size or scale. Operationally defined (travel markets and mobility needs, travel patterns, adjacent networks and cross-network linkages). In the context of the ICM Initiative, a region is comprised of several corridors; i.e., a corridor is a sub-set of the region.
Institutional	Crosses geographic, political and institutional boundaries.	Crosses geographic, political and institutional boundaries – though likely less than within the region.
Stakeholders	Agencies that manage and operate the transportation facilities. Also includes other agencies that are involved with these facilities or have an interest in regional transportation issues (e.g., law enforcement, emergency service providers, MPO).	Many if not all of the same "regional" stakeholders. No "additional" stakeholders (required by corridor management; but not for regional management); although the relative interest and involvement by stakeholders, and the actual stakeholder representatives, may differ.
Operational Focus	In general, information sharing and coordination of agencies that operate the various networks within the region, supporting regional management of individual network activities.	Builds upon regional information sharing and coordination to provide integrated operations along the various corridors within the region. This includes operational integration of adjacent networks and cross-network linkages on a daily basis (e.g., accommodating / promoting cross-network shifts, balancing the capacity-demand relationship).
Performance Focus	Network-based measurements (freeway, arterial, bus, rail). Indirect relationship to customer / user performance.	Common measurements across corridor networks. Direct relationship to customer or user performance.
Technical Focus	Regional ITS Architecture to support information sharing and regional coordination.	ICMS builds upon the regional ITS architecture, but may have additional information sharing requirements (e.g., command and control, response plan details).