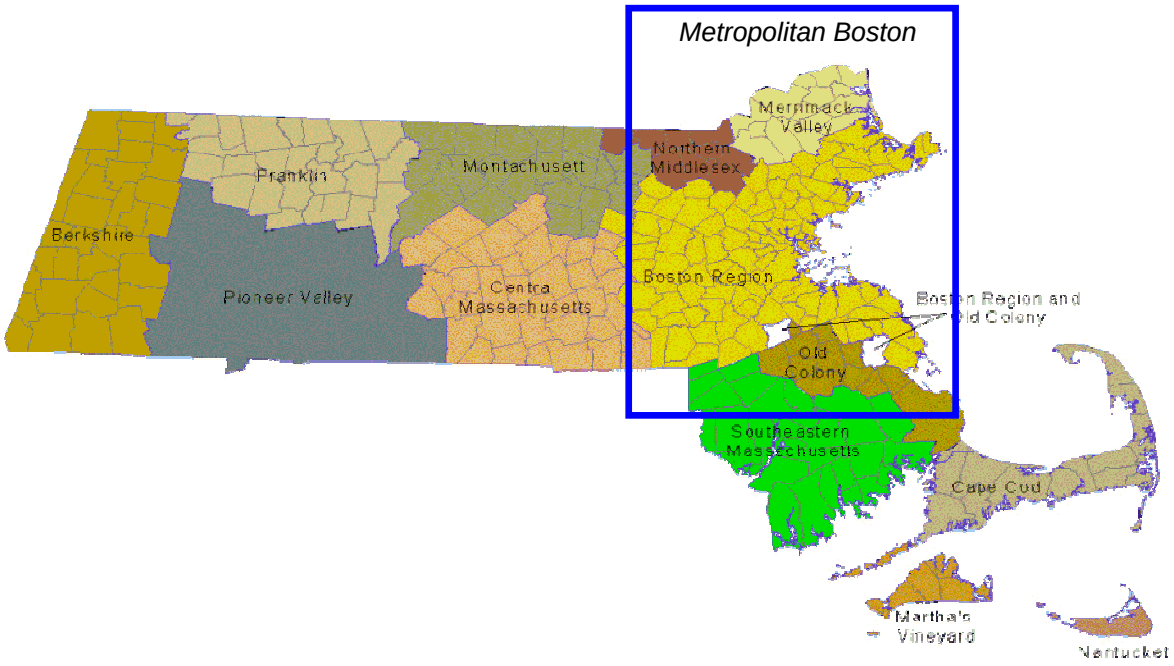
Commonwealth of Massachusetts

REGIONAL ITS ARCHITECTURE FOR METROPOLITAN BOSTON



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16. Abstract

This Executive Summary describes the development of the Regional Intelligent Transportation System (ITS) Architecture for Metropolitan Boston. The discussion provides background information on ITS and ITS architectures, explains the collaborative process used in Metropolitan Boston to develop the architecture and presents the important outcomes of the initiative.

Intelligent Transportation Systems (ITS) are applications of advanced technology in the field of transportation, with the goals of increasing operational efficiency and capacity, improving safety, reducing environmental costs, and enhancing personal mobility. Successful ITS deployment requires an approach to planning, implementation, and operations that emphasizes collaboration between relevant entities and compatibility of individual systems. At the core of this process is an "ITS architecture" that guides the coordination and integration of individual ITS projects. This ITS architecture is a framework that defines the component systems and their interconnections. In addition, developing an ITS architecture offers three important benefits to the region: improved interagency coordination, cost savings for transportation operations, and better services to the traveling public.

Key transportation agencies and other stakeholders in the region provided extensive input in the process, with many serving on a Guidance Committee. Their involvement included participating in meetings and workshops and reviewing project deliverables. Out of this process, with the help of these stakeholders, came an architecture that represents a vision of an integrated transportation system for the Metropolitan Boston region and the interagency relationships needed to support it.

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1. INTRODUCTION

This document describes the development of the Regional Intelligent Transportation System (ITS) Architecture for Metropolitan Boston. The discussion provides background information on ITS and ITS architectures, explains the collaborative process used in Metropolitan Boston to develop the architecture and summarizes the important outcomes of the initiative.

Intelligent Transportation Systems (ITS) are applications of advanced technology in the field of transportation, with the goals of increasing operational efficiency and capacity, improving safety, reducing environmental costs, and enhancing personal mobility. Successful ITS deployment requires an approach to planning, implementation, and operations that emphasizes collaboration between relevant entities and compatibility of individual systems. At the core of this process is an "ITS architecture" that guides the coordination and integration of individual ITS projects. This ITS architecture is a framework that defines the component systems and their interconnections. In addition, developing an ITS architecture offers three important benefits to the region: improved interagency coordination, cost savings for transportation operations, and better services to the traveling public.

The Commonwealth of Massachusetts, through the Executive Office of Transportation (EOT), has undertaken the development of a Regional Intelligent Transportation Systems Architecture for Metropolitan Boston. The Office of Transportation Planning (OTP) has led a Project Team consisting of the IBI Group in association with ConSysTec Corporation and Rizzo Associates. The consultant team also included an advisory panel consisting of James McGrail, Esq. of Nora Burke and Co., Paula Okunieff of Systems & Solutions, Inc., and Dr. Joseph Sussman of the Massachusetts Institute of Technology.

Key transportation agencies and other stakeholders in the region provided extensive input in the process, with many serving on a Guidance Committee. Their involvement included participating in meetings and workshops and reviewing project deliverables. Out of this process, with the help of these stakeholders, came an architecture that represents a vision of an integrated transportation system for the Metropolitan Boston region and the interagency relationships needed to support it.

2. BACKGROUND

Technology has influenced almost every facet of modern living, and transportation is no exception. By now, most drivers have seen electronic tolling that allows properly equipped vehicles to speed through toll plazas instead of waiting in line to collect a ticket or pay a toll. Drivers are also familiar with electronic signs on highways that provide information, such as warnings of accidents and delays. In many areas, travelers are able to obtain information on traffic conditions and transit operations via the internet or by phone.

These are just a few examples of what are referred to as *Intelligent Transportation Systems*, or *ITS*. Other examples of ITS are less obvious to the everyday commuter. Traffic signal operators, transit agencies, and public safety agencies agree to deploy compatible equipment so that buses and emergency vehicles can have priority when approaching a signalized intersection. Transit and other vehicles are equipped with Global Positioning Systems (GPS) so that their location can be known at all times. Some roadways have sensors installed so that potential icy conditions can be detected by a centralized monitoring system and appropriate measures can be implemented. All of these various examples, however, have one thing in common: the use of technology to get more productivity or value out of the transportation infrastructure and human resources.

With the enactment of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), there was a policy shift from building roadways to seeking multimodal solutions to congestion and other problems. ISTEA specifically promoted ITS as a tool in the transportation planning toolbox. By 1998, however, when ISTEA was reauthorized, there was a concern that the deployment of ITS initiatives lacked coordination, leading to the duplication of efforts and incompatibility of systems. The new law, the Transportation Equity Act for the 21st Century (TEA-21) included a provision that called for the coordination of ITS investments.

In 2001, the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) issued guidance on how this federal law was to be carried out around the country. FHWA's rule, "Intelligent Transportation System Architecture and Standards" and FTA's "National ITS Architecture Policy on Transit Projects" established that any ITS project funded by the Highway Trust Fund, including the Mass Transit Account, has to be consistent with a *Regional ITS Architecture*, which is to be adapted from a national template.

In this context, the word "architecture" refers not to a plan of physical construction, such as the architecture of a building or city, but instead to the relationship between transportation-related systems and institutions. An ITS architecture covers how systems interface and interact, as well as the institutional relationships that are required to support these interfaces. A regional ITS architecture, therefore, describes how a set of agencies will share responsibility and information for the vast array of technologies and systems deployed in a region.

As an example, a traffic signal may be owned and maintained by the municipality in which it is located, but it may be operated by a state highway department if it is adjacent to a roadway in the state's jurisdiction. At the same time, the municipality may agree to allow fire trucks, police cars, ambulances, or transit vehicles to use technology that enables such vehicles to trigger a green light at the appropriate time. Quickly, one can see that the technical and institutional issues surrounding this single traffic signal involve a variety of interfaces, interactions, and responsibilities. Should the signal happen to be on or near the boundary with another municipality, it is easy to see how the complexity would increase dramatically. A regional ITS architecture is intended to help all of these institutions collaborate on the deployment and management of these systems.

3. ARCHITECTURE DEVELOPMENT PROCESS

As the traffic signal example illustrates, the architecture of a single element or system can be quite complex, and this complexity quickly escalates when all systems within a region are considered. To address this challenge, the USDOT created the National ITS Architecture as a resource for ITS planning and implementation. The FHWA Rule/FTA Policy requires the use of the *National ITS Architecture* as a template in the development of regional ITS architectures.

The National ITS Architecture is not a system design or a plan for deployment; instead it is a model that provides a framework for ITS planning and integration. The building block of the National Architecture is a *market package*, which includes the set of components related to a specific function or "market," such as work zone management, parking facility management, demand-responsive transit operations, or emergency routing. For each of these market packages, the National Architecture includes all of the interagency linkages, or *interfaces*, considered likely. Because the National Architecture was designed to be comprehensive, a regional architecture should be a subset, including only those market packages and interfaces relevant to that region.

3.1 Constructing the Architecture

Developing a regional ITS Architecture begins with the strategic question of how to customize the National ITS Architecture to regional circumstances. On the one hand, it is necessary to generate an inventory of local ITS elements, both existing and planned. On the other hand, it is prudent to work backwards from the National Architecture, eliminating irrelevant market packages and interfaces and using the rest to organize the local inventory.

In Massachusetts, the process also requires addressing the complex question: what is *regional*? As ITS has already been deployed throughout Massachusetts, including both urban and rural areas, it was clear that it was important to include all parts of the state. As Exhibit 1 illustrates, the Commonwealth's 13 MPO planning areas were grouped into four regions for the purpose of creating regional ITS architectures.

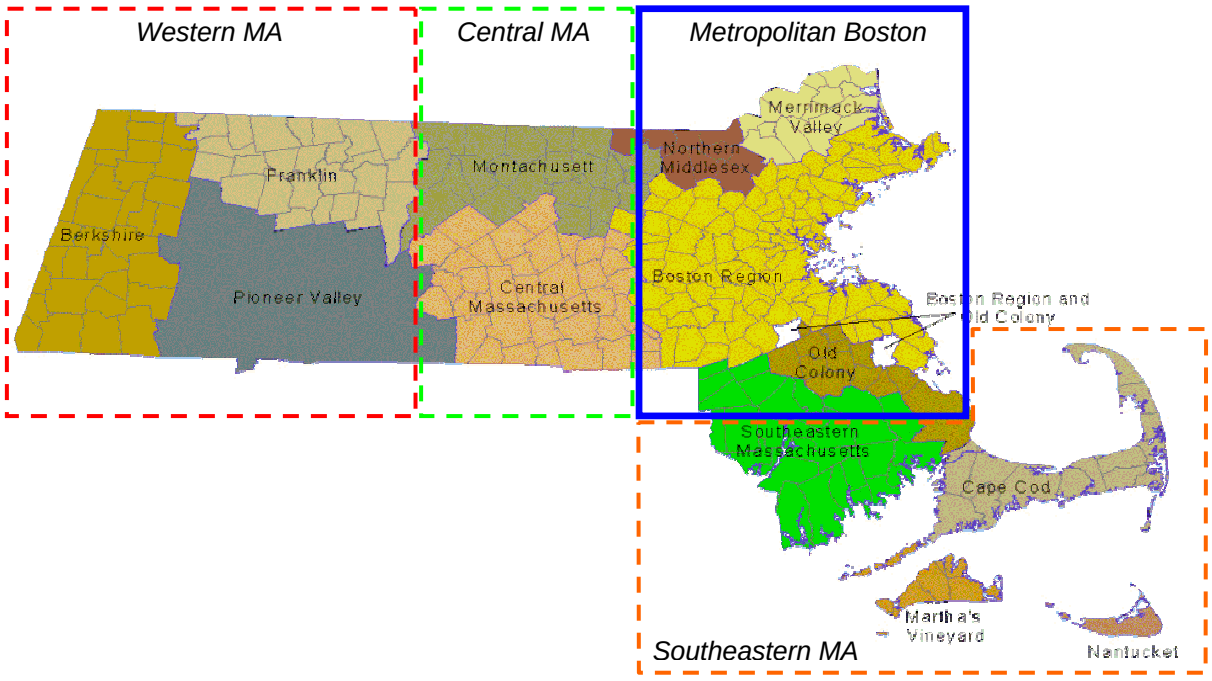

Exhibit 1: Study Regions

This Regional ITS Architecture was developed for the Metropolitan Boston area. For the purposes of this study, Metropolitan Boston was defined as the area generally within I-495, Boston's outer circumferential highway. Covering approximately 2000 square miles, the region includes the Boston, Northern Middlesex, and Merrimack Valley MPO planning areas, as well as portions of the Old Colony and Southeastern Massachusetts MPO planning areas.

To ensure consistency throughout the Commonwealth, the Executive Office of Transportation's Office of Transportation Planning (OTP) organized the development of four regional ITS architectures. In each region, the process was the same and was led by a guidance committee of liaisons from regional stakeholders. Throughout the architecture development process, this Guidance Committee provided input, reviewed documents prepared by the Project Team, and made critical decisions to achieve consensus about implementation approaches. Each Regional ITS Architecture reflects the unique characteristics of its region and stakeholders.

In the Metropolitan Boston region, numerous agencies were invited to participate in the initial meeting or were subsequently invited by the Guidance Committee to participate in the process. These agencies are listed in Exhibit 2.

Exhibit 2: Guidance Committee Invitees

Regional Planning Agencies ▪ Metropolitan Area Planning Council (MAPC) ▪ Merrimack Valley Planning Commission (MVPC) ▪ Northern Middlesex Council of Governments (NMCOG) ▪ Old Colony Planning Council (OCPC) ▪ Southeastern Regional Planning & Economic Development District (SRPEDD) **Transit Authorities** ▪ Brockton Area Transit (BAT) ▪ Cape Ann Transportation Authority (CATA) ▪ Greater Attleboro-Taunton Regional Transit Authority (GATRA) ▪ Lowell Regional Transit Authority (LRTA) ▪ Massachusetts Bay Transportation Authority (MBTA) ▪ Merrimack Valley Regional Transit Authority (MVRTA) **Municipal/Regional Agencies, Authorities, Commissions, and Organizations** ▪ Boston Emergency Management Agency (BEMA) ▪ Boston Transportation Department (BTD) ▪ City of Brockton	**State Agencies** ▪ Executive Office of Transportation (EOT) ▪ Massachusetts Emergency Management Agency (MEMA) ▪ Massachusetts Highway Department (MassHighway) ▪ Massachusetts Port Authority (Massport) ▪ Massachusetts State Police (MSP) ▪ Massachusetts Turnpike Authority (MassPike), including the Central Artery/Tunnel (CA/T) ▪ Metropolitan District Commission (MDC)[1] ▪ Registry of Motor Vehicles (RMV) **Federal Agencies** ▪ Federal Highway Administration (FHWA) ▪ Federal Transit Administration (FTA) ▪ Federal Motor Carrier Safety Administration (FMCSA)

[1] As of July 1, 2003, the Metropolitan District Commission (MDC) as an organization no longer exists. Functions formerly carried out by the MDC are being distributed among various state agencies. For the purposes of this document, however, "MDC" will continue to be used to refer to elements and functions previously under MDC control.

Following the kickoff meeting, the Project Team reviewed planning documents, including each MPO's Regional Transportation Plan (RTP) and Transportation Improvement Program (TIP). OTP then organized a series of input meetings during which members of the Guidance Committee and other stakeholders contributed to the comprehensive inventory of local ITS-related initiatives, including those already deployed, those ready for implementation, and those still in the planning stages. During this needs-assessment step, stakeholders also discussed the issues facing the region and other needs that shape transportation planning and spending.

Based on this input, the Project Team began assembling the relevant market packages, customizing the National ITS Architecture to regional circumstances. At a two-day workshop, the Project Team reviewed each and every market package diagram with the Guidance Committee, discussing with the committee how input from the previous meetings had been distilled into the diagrams presented. This prompted extensive feedback from the Guidance Committee, both at the meeting and during the subsequent review period. On the basis of that response, the Project Team made revisions and updated the market packages before assembling them into an architecture, which was made accessible to the Guidance Committee via an interactive website.

Exhibit 3: Needs Analysis Outcomes

During the needs analysis step, the Guidance Committee identified key regional needs and major themes for the Regional ITS Architecture. These findings helped shape the architecture to the unique circumstances of Metropolitan Boston.

Regional Needs

- Safety and Security
- Congestion Management
- Transit Demand
- Paratransit Efficiency
- Information Sharing
- Communications Infrastructure
- Operations and Maintenance
- Access to ITS Data

Major Themes

- Security
- Information Sharing
- Communications Infrastructure
- Operations and Maintenance

As the traffic signal example used earlier demonstrates, a regional ITS architecture can easily become large and complex when the many market packages that comprise the National ITS Architecture are taken into account. Navigating the architecture as a website, however, makes it significantly more user-friendly. Links allow a user to investigate common questions such as, "If my agency engages in a certain project or investment, what other agencies are involved?" Alternatively, an agency might simply want to know all of the other agencies to which it is linked in the architecture. A website provides a versatile medium for such searches.

Through this process of identifying existing and planned projects as well as general needs, preparing market packages, and then building and reviewing the architecture, the Guidance Committee has produced a regional ITS architecture that reflects the needs and priorities of the region. The Regional ITS Architecture for Metropolitan Boston is now available in an interactive format on the internet. The interface allows a user to view the architecture in multiple ways and varying levels of detail. The architecture is available on the Commonwealth's website at:

http://www.mass.gov/RegionalITSArchitecture

3.2 Building on the Architecture

The Regional ITS Architecture for Metropolitan Boston was constructed with extensive input from stakeholders around the region. Having developed an architecture, however, there are important questions that must be addressed: What does this mean for a transit authority, a highway department, or a metropolitan planning organization? How does the architecture influence the development of new plans or projects? When an agency begins work on a project that includes ITS elements, how should it take the architecture into account? To address these questions, the Project Team and the Guidance Committee developed two additional documents, an *Operational Concept* and an *Implementation Plan*.

3.2.1 OPERATIONAL CONCEPT

The Operational Concept describes the institutional relationships that must be established in order to address the interagency interfaces defined in the architecture. The purpose of the Operational Concept is to define the roles and responsibilities of the stakeholders in the implementation and operation of the component systems of the architecture. The Operational Concept details the requirements of each agency interface defined in the architecture, addressing the information to be exchanged, the roles of the interfacing agencies, and the operational agreements that will be required.

The presentation of the Operational Concept in the Final Report includes an inventory of all the interagency interfaces. Because there are hundreds of interfaces, the inventory is organized by function, such as *roadway management* or *emergency management*. The Operational Concept chapter also includes an analysis of current and future interagency relationships that might benefit from formalization through interagency agreements, samples of which are included in Appendix F of the Final Report.

3.2.2 IMPLEMENTATION PLAN

The Implementation Plan provides a strategy for achieving the integrated transportation system envisioned by the architecture. The Implementation Plan addresses the planned components of the architecture, identifying a series of initiatives that can be undertaken to implement these components. The Implementation Plan also considers prioritization of the identified multi-agency initiatives, identifying candidates for near-term and longer-term implementation. This prioritization is based on the needs analysis, the input received from the stakeholders throughout the architecture development process, and interdependencies among the initiatives. As Exhibit 4 shows, there are ten *Near-Term Multi-Agency Initiatives* recommended by the Guidance Committee for Metropolitan Boston.

Exhibit 4: Recommended Near-Term Multi-Agency Initiatives

Functional Area	*Initiative*
Multimodal	▪ **Event Reporting System:** Internet-based tool that serves as a centralized repository for information on events affecting the transportation network. ▪ **Expansion of the Massachusetts Interagency Video Integration System (MIVIS):** Expansion of video sharing and distribution system to allow sharing of real-time video feeds among a larger group of agencies. ▪ **Interagency Communications Network:** Communications network linking the region's roadway and transit agencies. ▪ **511 Travel Information System:** Public travel information system, covering the roadways and transit services in the region. ▪ **Planning Data Archive:** System for coordinating the planning data archives for the transportation agencies in the region.
Roadway	▪ **Remote MassHighway TOC Workstation (MassHighway and MEMA):** Back-up workstation for the MassHighway Traffic Operations Center at MEMA headquarters in Framingham. ▪ **Interface between MassHighway TOC and MassPike CA/T OCC:** Direct data interface between the MassHighway Traffic Operations Center and the MassPike CA/T Operations Control Center to support exchange of traffic data.
Transit	▪ **Traffic Signal Priority for MBTA Buses:** Extension of the signal priority system currently in place on the Silver Line to other bus routes in the MBTA system.
Parking	▪ **Logan Parking Management System:** Parking Management System for the parking facilities at Logan Airport. ▪ **ETC Integration at MBTA Parking Facilities:** Acceptance of the regional electronic toll collection transponders at MBTA-operated parking facilities.

3.3 Working with the Architecture

The FHWA Rule and FTA Policy include two important provisions that motivated the Project Team and the Guidance Committee to focus on how ITS and the Regional ITS Architecture can be integrated into the mainstream transportation planning process. First, the Rule/Policy requires that before the architecture is completed, there must be a process put in place for maintaining the architecture in the future, as needs evolve and implementation continues. Second, the Rule/Policy states that federal approval and funding cannot be given to a project with ITS elements unless it is consistent with the architecture. To address these requirements, plans for maintaining the architecture and for ensuring project consistency have been developed.

3.3.1 CONSISTENCY

> *"The final design of all ITS projects funded with highway trust funds shall accommodate the interface requirements and information exchanges as specified in the regional ITS architecture. If the final design of the ITS project is inconsistent with the regional ITS architecture, then the regional ITS architecture shall be updated." – FHWA Rule/FTA Policy*

In plain terms, this regulatory language means that if an agency makes a commitment in the architecture, such as sharing the data generated by a system it plans to deploy in the future, then when it actually begins developing that element as a part of a project, the project should be

consistent with the architecture. Consistency may be a matter of technical design or a matter of institutional coordination but the requirement essentially says that commitments should be honored. The language is very clear, however, that if there is a conflict, the architecture should be updated to accommodate the project.

The Guidance Committee and Project Team, working with the FHWA Rule/FTA Policy, developed a process for ensuring that consistency between projects with ITS elements and the Regional ITS Architecture would be addressed in the course of the existing regional transportation planning process. This process reflects the intent of the Rule/Policy that the relationship between a project and the architecture should be considered early and often and that collaboration and cooperation among planning partners should be maximized.

As noted, a major objective in addressing the consistency requirement was to develop a process that could be integrated seamlessly into the mainstream transportation planning process. As such, the process relies on existing collaborative relationships between each MPO and its local planning partners. This approach ensures that before a project reaches the Transportation Improvement Program (TIP), the Rule/Policy's intent of examining consistency early and often and maximizing collaboration will be fulfilled. In turn, when each MPO submits its TIP to the Executive Office of Transportation and when EOT submits the Statewide TIP to FHWA and FTA, all parties will be comfortable that the consistency requirement has been addressed.

In addition to this initial review in the early stages of the project development process, consistency with the architecture must be revisited as a project develops further in order to ensure that it has not been affected by changes to the scope of the project. Moreover, as a project progresses into the design stage, it must undergo a systems engineering analysis, as is typical of ITS projects and as is required by the federal Rule and Policy.

The bottom line is that by examining consistency early and often during the planning process and by maximizing collaboration and cooperation – all within the context of existing practices – the region can avoid any delays to federal funding and approval.

3.3.2 MAINTENANCE

The Regional ITS Architecture is a vision of the future transportation system, documented at one point in time. The architecture, like an MPO's *Regional Transportation Plan* (RTP), reflects the current situation and documents planned changes or investments. However, in order to remain relevant, the architecture has to be maintained. As regional needs evolve, as planned elements are deployed, and as other changes occur, the architecture must be updated to reflect those developments. Maintenance of the architecture is also motivated by federal requirements that require consistency between all federally funded projects with ITS elements and the Regional ITS Architecture.

The Office of Transportation Planning, which has led the initial development of the Regional ITS Architecture, will be responsible for the maintenance of the architecture. However, other stakeholders will be involved, as they have been throughout the development process. The maintenance strategy relies on two elements:

- **Periodic Architecture Updates**

  The maintenance strategy calls for the Regional ITS Architecture to be formally updated at the same frequency as an MPO's Regional Transportation Plan (currently a three year cycle). Since the RTPs will provide valuable input to the architecture, the architecture update process will be staggered to occur after the RTP update. In this way, it is expected that the revised architecture can incorporate new ideas and/or projects that are included in an updated RTP.

The Office of Transportation Planning will initiate the Regional ITS Architecture update process with a request for information from stakeholders in the region regarding new ITS-related projects, initiatives, or needs. OTP will also gather information from the stakeholders in order to evaluate the status of the architecture's implementation, identifying, for example, ITS elements or interfaces that have evolved from "planned" to "existing" or that are no longer relevant and should be removed.

Based on the information gathered through this process, OTP will generate a draft list of architecture modifications and distribute it to the stakeholders for review. OTP can then call a stakeholder meeting for the region to review the draft list. This meeting can also provide an opportunity to discuss emerging ITS issues. After the stakeholder review of the draft list, OTP will make any modifications necessary and release the updated architecture.

- **Interim Architecture Modifications**

The strategy also calls for interim architecture modifications that may occur at any point in the update cycle, outside of the formal update process. Just as project developments necessitate TIP amendments, it is anticipated that some modifications to the architecture will be needed during the interval between the periodic updates. Therefore, on the basis of project developments or other circumstances that require modifications, the project proponent will be responsible for drafting an architecture modification proposal and submitting it to OTP. The proposal will then be circulated to affected stakeholders for their review. It is expected that most architecture modifications, whether periodic or interim, will involve adding new ideas, dimensions, or stakeholders to existing market packages, interfaces, or functions.

4. CONCLUSION

The Regional ITS Architecture for Metropolitan Boston is the result of the significant efforts and contributions of the participants in the process and it provides a strong foundation and opportunity for moving forward with ITS planning and implementation in the region. This process of developing the architecture was motivated by the federal requirements and by the benefits of having a regional ITS architecture.

The first of these benefits is improved interagency coordination. The architecture development process addresses this objective not only in the recommendations that have come out of the architecture, but also through the process of developing the architecture itself. The establishment of the multi-agency stakeholder group that met throughout the architecture development process is a significant step towards coordinating ITS planning in the region. The numerous meetings and workshops of the Guidance Committee demonstrated the benefit of such a forum to exchange information on needs and project plans. The maintenance plan for the architecture offers an opportunity for this interaction to continue, with mutual benefits for all of the participants.

The second benefit is cost savings, which is addressed through the recommendations of the architecture. For example, coordination of investments and consideration of standards for interagency interfaces offer opportunities for cost savings, especially in terms of long-term maintenance and operational costs.

The third benefit is better services to the traveling public. The public has the potential to benefit from this process, as the architecture addresses needs and priorities that cut across agency lines and that are not able to be addressed through single-agency initiatives. The framework outlined by the architecture is for a regional transportation system that can provide the public with a seamless and consistent travel experience across multiple agency jurisdictions.

4.1 Recommendations

Through the process and from the results of developing the Regional ITS Architecture, including the Operational Concept and Implementation Plan, a number of recommendations should be considered as the region continues to move forward with deployment of ITS:

- Of the initiatives in the Implementation Plan, the ten “near-term” multi-agency initiatives identified by the Guidance Committee and shown in Exhibit 3 are vital for working towards the integrated transportation system envisioned by the architecture. Although not as urgent in the short term, the remaining “future” multi-agency initiatives are also important in that they provide the foundation for interagency coordination throughout the region.

- Formal agreements should be established for the interagency interfaces identified in the architecture. This includes existing interfaces as well as new ones. Existing informal agreements should be formalized in order to ensure that their benefits are maintained. This can be achieved through new agreements that document specific existing working arrangements. Operational agreements for new interfaces should be drawn up as these new interfaces are established. Proper documentation of the arrangement will be easiest in the planning stages and will facilitate implementation and operation in the long term.

- ITS architecture consistency should be incorporated into the existing MPO transportation planning process. While the process outlined in the Implementation Plan identifies times when the consistency issue should be addressed, consideration of the architecture throughout the project development process will ensure a satisfactory outcome.

- The Regional ITS Architecture should be updated to reflect the changing needs and priorities of the region. To make this work with the existing transportation planning process, it is recommended that the architecture be updated regularly to reflect the needs identified in the Regional Transportation Plans in the region. In addition, informal updates to ensure consistency with newly proposed projects should be done on an as-needed basis.

- The agencies and organizations that were represented on the Guidance Committee, as well as other relevant ITS stakeholders, should continue to meet and remain involved, not only in the maintenance of the architecture, but also in coordinating ITS in the region. The benefits of this working group that have been realized in the architecture development process should be built upon as the transportation system envisioned by the architecture takes shape.

4.2 Using the Architecture

This process has yielded a valuable tool for planners and operators of the region's transportation system and there are a number of ways in which the architecture should be used:

First, the architecture should be used by agencies as a framework for planning ITS projects, as it documents what they have planned, as expressed in the architecture development process. If it does not reflect the current plans, it should be revised so that it is up to date.

Second, agencies should use the architecture as a guide to how they should interface with other agencies. The ITS architecture documents the interfaces that are planned for development, as well as standards that are relevant to these interfaces. In addition, the Operational Concept details the operational arrangements that are required for managing these interfaces and provides a model for the interagency agreements that should be established.

Finally, the Regional ITS Architecture provides the basis for satisfying the federal architecture consistency requirement for projects with ITS elements. Therefore, it is vital that project proponents use the architecture as a guideline during project development, just as the FHWA and FTA will be using the architecture when considering whether to approve the project. It is also important that consistency with the architecture is revisited throughout the project development process and as part of the systems engineering analysis that is required of all ITS projects. Incorporating the architecture into the planning, design, and operations process will ensure that all stakeholders in the region are moving together towards the vision that they have created through this process.

To make sure that the Regional ITS Architecture for Metropolitan Boston is readily available to stakeholders, the architecture has been published on the Commonwealth's website at:
http://www.mass.gov/RegionalITSArchitecture