

Hartford Region Regional ITS Architecture Update

Summarization Memorandum



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DRAFT CRCOG ITS Architecture Summarization Memo 2014-11-28	v0.01	11/28/2014	J. Baker	Initial Draft
DRAFT CRCOG ITS Architecture Summarization Memo 2014-12-1-pxc	v0.2	12/1/2014	P. Chan	QA
DRAFT CRCOG ITS Architecture Summarization Memo 2014-12-1	V0.3	12/1/2014	J. Baker	Draft Document
DRAFT CRCOG ITS Architecture Summarization Memo 2014-12-4	V0.4	12/4/2014	J. Baker	QA Documentation Added
Hartford Region Regional ITS Architecture Summarization Memo	V1.0	3/31/2015	J. Baker	Finalized

The Hartford Region Regional ITS Architecture is a roadmap for intelligent transportation systems (ITS) integration in the Hartford Region of Connecticut over the next 10 to 20 years. The Hartford Region encompasses the geographic area of the Captiol Region Council of Governments (CRCOG). The Hartford Region Regional ITS Architecture has been developed through a cooperative effort by the region's transportation agencies, covering all surface transportation modes in the Region.

This Hartford Region Regional ITS Architecture is an update of the Hartford Area Regional ITS Architecture, which was developed in 2004. This update is a result of regional transportation planning documents, including stakeholder inputs for the 2015 Hartford Region ITS Architecture Strategic Plan. The Hartford Region Regional ITS Architecture documents how stakeholders envision that each agency's systems will work together in the future and how that sharing of information and resources will help provide a safer, more efficient, and more effective transportation system for travelers in the Hartford Region.

The architecture is an important tool that can be used by:

- Planning agencies to incorporate integration opportunities and operational needs into the transportation planning process;
- Operating and implementing agencies to recognize and implement transportation integration opportunities in the Region; and
- Other organizations and individuals that use the transportation system in the Region.

The architecture provides an overarching framework that spans all of these organizations and individual transportation projects. Using the architecture, each transportation project can be viewed as an element of the overall transportation system, providing visibility into the relationship between individual transportation projects and ways to cost-effectively build an integrated transportation system over time.

Finding a Project in the Hartford Region Regional ITS Architecture

Stakeholders can find their projects in the Regional ITS Architecture through the *Inventory by Stakeholders* page on the Hartford Regional Regional ITS Architecture website. This page may be found by navigating to the *Stakeholders* or the *Inventory* tab on the website menu, then selecting the *Inventory by Stakeholder* page. For most municipalities, their inventory can be found under a generic stakeholder name, such as *Municipal or Regional Government* or *Municipal Public Works Department*.

The stakeholder should then be able to search the alphabetically organized list of stakeholders and find their organization. Under their organization is a list of ITS elements (ITS systems) that have been identified for their organization. Each of these ITS elements is a hot link, and can be clicked to view an ITS Element page that provides a description of the ITS elements, and a list of all other elements that their element may share information with. Each ITS Element page also contains a link to a Context Diagram. This diagram illustrates all the information exchange opportunities in the region for a single inventory element. If that element is going to be a project, then this diagram illustrates all the external information exchange opportunities for that element.

In addition, stakeholders will see a list of ITS Services for each ITS element. Service Packages represent collections of subsystems and terminators that exchange information (illustrated with architecture flows in the service package diagrams) to provide a specific ITS service. Service packages illustrate these specific services, and provide a simplified view of the ITS Architecture organized by a specific service.

For example, *ATMS01 – Network Surveillance* shows the connections between ITS elements that allow agencies to monitor roadways using traffic sensors and CCTV cameras. *ATMS03 – Traffic Signal Control* shows the connections between ITS elements that allow agencies to control traffic signals in the region. Service Packages are grouped by functional area:

- Advanced Traffic Management Systems (ATMS)
- Maintenance and Construction (MC)
- Advanced Public Transportation Systems (APTS)
- Advanced Traveler Information Systems (ATIS)
- Commercial Vehicle Operations (CVO)
- Emergency Management (EM)
- Archived Data (AD)

The service packages are customized to represent the operational concept for service delivery specific to this region. Each subsystem or terminator in a service package diagram is labeled with both its generic National ITS Architecture name and the name of the local stakeholder ITS system that participates in the customized service package. In this way the service package identifies the information exchange (using architecture flows) between specific stakeholders elements in the region to affect a particular ITS service or set of ITS services.

The analysis of architecture flows into and out of a stakeholder's elements is of particular importance, as it defines at a high level the information exchange requirements with other stakeholders that a stakeholder's element is involved. Stakeholders should appreciate the benefits of the information exchange. Alternatively, stakeholders may believe that additional information exchange relationships may be required to achieve some benefit. In either of these cases, the ITS architecture may require revision. The simplest way to provide your input is to click on the *Feedback* button on each page of the web site.

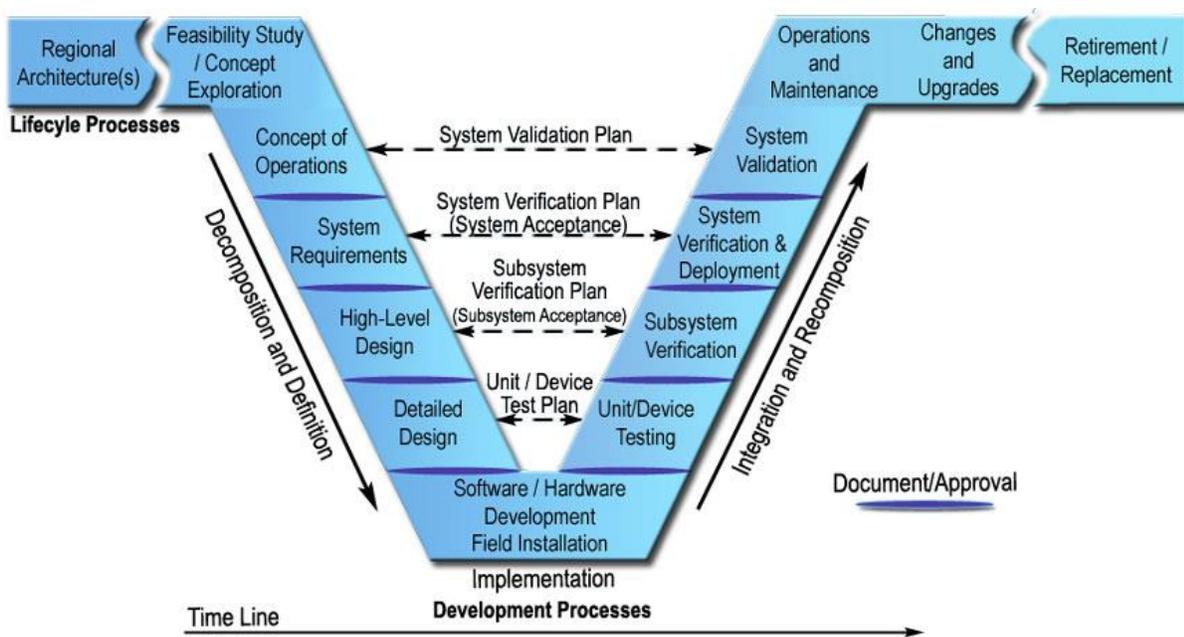
A stakeholder may also select *Services by Stakeholder* from the website menu to view all service packages for that the stakeholder's elements appears in, or select *Services* from the website menu to view other service package diagrams grouped by ITS Functional Area (e.g., Traffic Management, Public Transportation, Emergency Management, etc.).

High level requirements for each stakeholder's element can also be found on its ITS Element page, under Functional Areas.

Using the Hartford Region Regional ITS Architecture in Project Definition

Projects that emerge from the planning process can benefit from the use of the Hartford Region Regional ITS Architecture in their definition and development. Systems Engineering is a process for project development that considers the entire lifecycle of a project and emphasizes up-front planning and system definition. Systems Engineering is a requirement for the FHWA’s Final Rule 23 CFR 940 as part of federal funding compliance.

Systems Engineering is a multi-step and iterative process for developing an ITS project that supports standards use and implementation. The figure below shows the “Vee” diagram, which shows how each step of the process builds on the previous one. It stresses conceptual development and how the concept guides each of the key steps toward implementing and maintaining the system. This process typically applies to complex system design/integration/development efforts. The Regional ITS Architecture maps to the beginning of the Systems Engineering process shown in the “Vee” diagram.



The structure provides for a process that asks critical questions along the way to make sure that important steps or issues that could impact a project and the region are not overlooked. Systems Engineering is an effective risk management tool because by taking critical measures to identify project issues, benefits, risks and impacts, as well as going through a series of validation and approval points, there is less uncertainty about project objectives or expectations.

US DOT Rule 940 requires that aspects of this systems engineering process be used for ITS projects that are funded with federal funds. The ITS Architecture is most effective in the early phases of systems engineering processes. The table below lists the requirements for a systems engineering analysis as stated in US DOT Rule 940, and lists the corresponding section of the Hartford Region Regional ITS Architecture where this information may be found.

Systems Engineering Analysis Requirement	Regional ITS Architecture
Identification of portions of the regional ITS	Service Packages, ITS Elements, and Element

architecture being implemented	Interfaces
Identification of participating agencies roles and responsibilities	Operational Concept
Requirements Definitions	Functional Requirements
Analysis of alternative system configurations and technology options to meet requirements	Not covered
Procurement options	Not covered
Identification of applicable ITS standards and testing procedures	The architecture includes identification of applicable ITS Standards
Procedures and resources necessary for operations and maintenance	Not covered

Finding Service Packages, ITS Elements, and Element Interfaces for a project or an ITS element was discussed above. Operational Concepts, or roles and responsibilities, may be found for a stakeholder by selecting *Stakeholders* from the website menu, then *Operational Concepts*. This webpage provides all the roles and responsibilities for key stakeholders identified. To view the roles and responsibilities for a specific stakeholder, click on the stakeholder's name.

Functional requirements for an ITS element can be found next to Functional Areas on each ITS Element page, while functional requirements for an ITS service can be found by clicking on a Functional Area/Role under each service package diagram webpage. Applicable ITS standards can be found by clicking on an any architecture flow between two stakeholder elements at the bottom of each service package diagram webpage.

The architecture website provides more details on how to find the information required for the systems engineering analysis. The details can be found by clicking on *Resources* from the website menu, then clicking on *Systems Engineering Analysis*.