Concepts of Use

Thurston Regional Intelligent Transportation System Architecture

Thurston Regional Planning Council

July 2018

Acknowledgements

Concept of Use

1. Purpose

Thurston Regional Planning Council, with support from a team from Federal Highways Administration (FHWA) and Iteris, Inc, undertook an update of the regional Intelligent Transportation System (ITS) architecture in late 2017 through 2018. The ITS architecture was conducted with input from local and state transportation partners.

Ultimately, the value of the regional ITS architecture will be measured by how it is used to plan, program, and implement successful ITS projects. The purpose of this Concept of Use (ConUse) is to put architecture use in focus at the beginning of a regional ITS architecture update to ensure the benefits of architecture use are realized once the architecture update is completed.

In this document, the content and features of the regional ITS architecture are viewed from the perspective of the prospective architecture users. The ConUse visualizes the regional architecture outputs and envisions how the outputs will be used to support transportation planning and project development. Through this process, it identifies the required architecture content, the types of outputs that best support the intended use and supporting documentation and tools that enable productive use of the architecture.

2. Federal Requirements

Federal Highways Administration (FHWA) Rule 940 and an equivalent Federal Transit Administration (FTA) policy specifies the requirements for regional ITS architecture development, use, and maintenance. Section 940.5 of the rule defines the underlying policy for architecture use, specifying that all ITS projects must adhere to the regional ITS architecture. It also specifies that the architecture should be developed consistent with the transportation planning process.

Section 940.9 defines the requirements for the content of the regional ITS architecture. It positions the architecture as a bridge between planning and project development, stating:

> *A regional ITS architecture shall be developed to guide the development of ITS projects and programs and be consistent with ITS strategies and projects contained in applicable transportation plans.*

Section 940.11 then specifies the requirements for project implementation including the requirement to identify the portion of the regional ITS architecture associated with each ITS project. The final design of all ITS projects is required to accommodate the interface requirements and information exchanges as specified in the regional ITS architecture.

3. Goals and Objectives

Stepping back from the regulatory requirements, the purpose of developing and using a regional ITS architecture is to illustrate and document regional integration of ITS projects so that planning and deployment can progress in an organized and coordinated fashion. The regional transportation system is itself composed of many different systems that are planned, implemented, and operated by multiple jurisdictions and agencies. Each of these agencies must be able to effectively use the regional ITS architecture for optimal benefits. To achieve the anticipated benefits, the following objectives must be met:

- The architecture is easy to understand and easy to navigate.
- The architecture content is accurate and current.
- The architecture supports development of the long-range transportation plan and programming documents.
- The architecture includes enough detail to support project scoping and implementation.
- Clear guidance is available to support each prospective user.
- Users find it easy to document and report needed architecture changes.

4. Architecture Users

Before we can develop a Concept of Use, we need to identify who the users are and also identify other roles that are necessary to facilitate architecture use. Table 1 lists types of user roles and more specifically identifies who the users and support staff are in this region.

Table 1: Architecture Users

Roles	Users
Transportation Planners	Local and State transportation partners (agency planners)
Project Sponsors	Local and State transportation partners
Project Managers	Local and State transportation partners
Architecture Owner	Thurston Regional Planning Council
Architecture Maintainer	Thurston Regional Planning Council
Process Owners	Thurston Regional Planning Council
Oversight	FHWA Division Office, WSDOT Local Programs

5. Architecture Use in Planning/Programming

Regional Transportation Plan

The architecture will be reviewed and updated as needed and at a minimum as part of the Regional Transportation Plan (RTP) update that occurs every four years. Goals and objectives that are developed for the RTP that are related to operations will also be included in the architecture and the relevant objectives will be mapped to service packages. The complete list of ITS service packages will be reviewed by TRPC staff as operational strategies are identified and prioritized. The prioritized strategies that are included in the RTP will be mapped to the architecture.
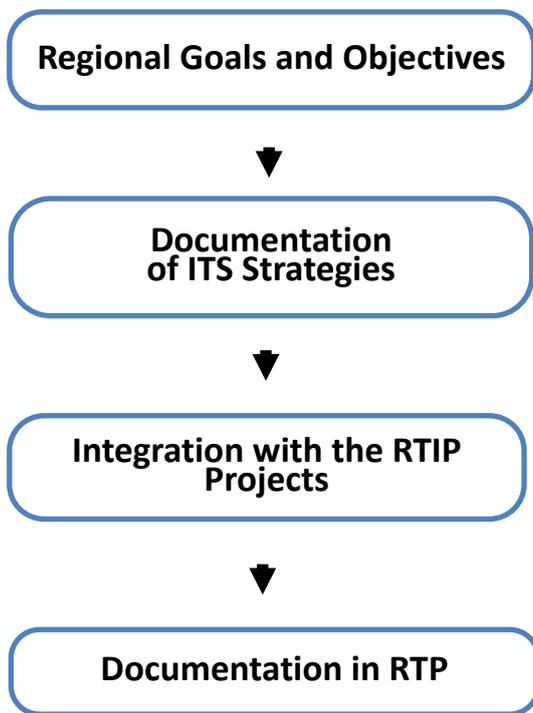
Regional Transportation Improvement Plan

ITS projects being considered by local partners for submission in the four-year Regional Transportation Improvement Plan (RTIP) and State Transportation Improvement Plan (STIP) or six-year Appendix A to the RTIP, should be identified in the ITS Architecture. As projects change in scope and design as they go from concept to reality, local jurisdictional staff will be given a streamlined process to:

1) Confirm that their project is contained within the Regional ITS Architecture structure, or
2) Propose an amendment to the Regional ITS Architecture to ensure consistency.

Regional Planning Process   **Regional Architecture Use**

Regional Goals and Objectives	• The ITS architecture update will be based on regional goals and policies from the RTP. • The operations-related goals and policies in the RTP will be tied specifically to the architecture.
Documentation of ITS Strategies	• Operations-related strategies from the RTP and local plans will be documented in the architecture and tied to service packages. The list of service packages from the architecture will be reviewed to cross-check the list of operations strategies that are considered.
Integration with the RTIP Projects	• ITS projects submitted to the RTIP will be documented in the ITS Architecture, either as projects or in a more conceptual manner. This should include, to the maximum extent possible, planned projects included in Appendix A. • The regional ITS architecture is envisioned as a living document, and will therefore be able to be amended in a timely fashion.
Documentation in RTP	• A brief summary of the regional ITS architecture will be included in the RTP.

Architecture Use in Planning/Programming	
Who	TRPC, WSDOT and other agency planning staff will use the architecture. The architecture maintainer (TRPC) will facilitate this use, providing the interface to RAD-IT software and facilitating the use of service packages. The FHWA Division Office ITS specialist and planning representative will provide oversight.
What	Service packages will be mapped to activity-based objectives. Service packages will be used to identify operational strategies. ITS projects included in the RTIP will be included in the architecture either as projects or in a more conceptual manner. A summary table of RTIP projects will indicate whether or not the project is included in the ITS Architecture. A brief summary of the regional ITS architecture will be included in the RTP. Broadly defined projects (or service packages) will also be included in the architecture to represent initiatives, programs, and longer-term projects. Inventory and interface information, sorted by stakeholder will be used to identify projects that were not anticipated during the last architecture update.
Where	The mappings to planning objectives and strategies and list of projects will be included in the RAD-IT database, as will the inventory and interface definitions. This data will be published as an architecture web site and an ITS strategic plan.
Why	The architecture, RTIP, and RTP will be integrated to the maximum extent possible, showing coordinated planning from vision to implementation.
When	The architecture will be reviewed and updated as part of the RTP update cycle. The project sequence will be updated to support RTIP development.
How	The updated architecture will include "Use in Planning" guidance that will define how the architecture is used to support long range planning and programming.

6. Architecture Use in Project Implementation

ITS projects may be funded through a variety of federal funding sources, including those funds programmed out by TRPC. Project applicants should ensure that the project is consistent with the ITS architecture (either included as a project or consistent at the more conceptual level), or request an amendment to the ITS architecture to ensure consistency, as the initial project is scoped out. In this manner, once the project is funded and submitted to the RTIP it will be contained within the ITS Architecture.

As part of obligating federal funding for each ITS project, a Systems Engineering Analysis Worksheet (Appendix 41.53 of the July 2018 Local Area Guidelines (LAG) manual or equivalent is completed to ensure the systems engineering requirements will be met for the project.   Question 7 in this form asks applicants to identify the portion of the regional ITS architecture that is included in the project.

The worksheet that is completed is included as an addendum to the Project Scoping Report for State projects and the Field Review Package for local agency projects. The Worksheet must be completed prior to submitting a construction authorization request and must be kept in the project file for the entire document retention period of the project. The form is also used to gauge the risk associated with the ITS project. Projects that are designated as high risk require a systems engineering process and the architecture is used in subsequent steps in this process at the discretion of the project manager. More information on systems engineering requirements can be found on FHWA's website in the document "System Engineering for Intelligent Transportation Systems." https://ops.fhwa.dot.gov/publications/seitsguide/index.htm.

Architecture Use in Project Implementation	
Who	Project managers and technical staff use the architecture. The architecture maintainer will facilitate this use, providing the interface to the RAD-IT software and facilitate RAD-IT use.
What	All components of the architecture may be used, depending on the nature of the project. Inventory, stakeholders, ITS services (service packages) and interfaces are used for all ITS projects. Roles and responsibilities, functional requirements, and ITS standards information are also used for higher risk projects that require a more comprehensive systems engineering process.
Where	All required components are included on the architecture web site. The RAD-IT Database is also available to support additional use and customization for more complex projects.
When	The architecture is used for project scoping when regulatory response is completed as part of the initial funding request to FHWA. Additional use occurs during the early project development phases when concept of operations, requirements, and high-level design are defined. As new ITS services (service packages) are considered within a region, the service packages and interface/flow diagrams are useful for facilitated discussion with stakeholders.
Why	Regulatory response is referenced in the FHWA/WSDOT Stewardship Oversight Agreement and detailed in the Local Assistance Procedures for ITS projects. Any established project tracking and management system (record of involvement) also identifies the checkpoints in time when specific deliverable for ITS projects are required. The FHWA stewardship agreement requires use and maintenance of the regional ITS architecture.
How	The ITS Architecture web site prominently features guidance for architecture use in project implementation as described in the narrative.

7. Needs Identification

7.1. Key Architecture Components Supporting Architecture Use

Architecture Component	Planning/Programming	Implementation
Scope:	X	
Needs/Connection to Planning:	X	
Stakeholders:	X	X
ITS Elements (Inventory):	X	X
ITS Services (Service Packages):	X	X
Operational Concept:		X
Functional Requirements:		X
Interfaces/Information Flows:	X	X
Standards:		X
Projects:	X	X
Project Sequencing:	X	
Agreements:		X
Maintenance Plan:	X	X

7.2. Needed Architecture Outputs

The following table identifies the architecture outputs that will be created or updated as part of the architecture update.

Output	
RAD-IT Database	
Web Site	
Documents	

7.3. Needed Supporting Documentation and Tools

The following table identifies the supporting documentation and tools that are needed to support effective use of the architecture. These support items will also be created or updated as part of the architecture update.

Supporting Product	
Executive Summary	

Architecture Roadmap	
User Guide	
Process Documentation	
Checklist	
Issue Reporting Facility	