

Figure 13-4: Funding Steps for Systems Engineering Process

Early determination of risk leads to early determination of type of ITS project, which leads to an early determination of budgeting approach. The systems engineering Vee process concentrates more time and cost on the up-front engineering activities relative to the traditional road building process that typically concentrates funding and scheduling priorities to the construction (back-end) phase.

For more information on Systems Engineering, the reader is encouraged to access the FHWA/Caltrans *Systems Engineering Guidebook for ITS* website at: <http://www.fhwa.dot.gov/cadiv/segb/views/process/index.htm>.

### 13.4 GENERAL ITS RESPONSIBILITIES

This section describes ITS responsibilities, during planning and implementation of the project, from the perspective of four different roles:

- 1.) Regional/Metropolitan Transportation Planning Agency (RTPA/MPO)
- 2.) Local agency (including their consultants in a project management role)
- 3.) Caltrans Division of Local Assistance
- 4.) FHWA Project Engineer
- 5.) Communities

The user *should* read the section that corresponds to their role. The other sections are optional. For each role, the responsibilities are described for each of the three steps in the Roadmap below in Figure 13-5, which can be briefly described as Planning, Funding, and Implementation.

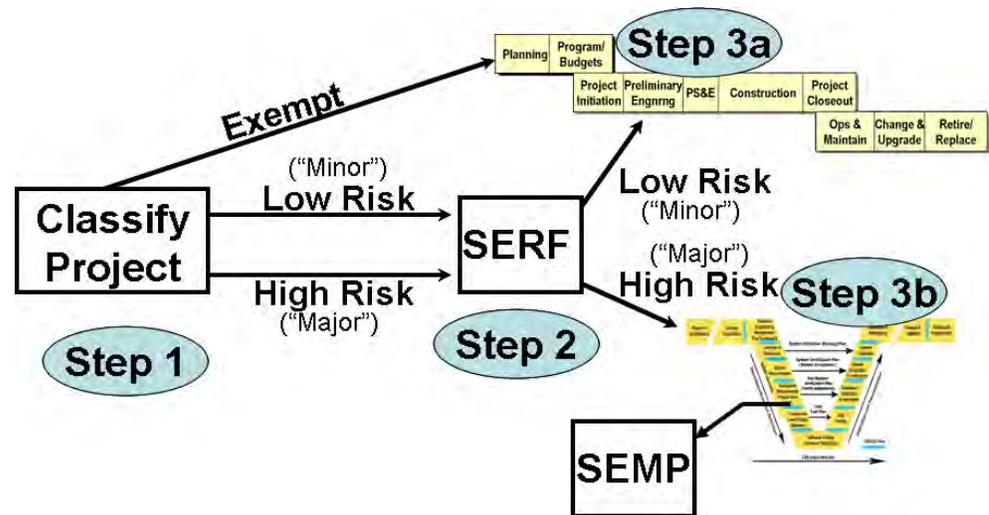


Figure 13-5: Steps to ITS Compliance

### 13.4.1 Regional/Metropolitan Transportation Planning Agency

#### Step 1 Roadmap Step 1

All ITS projects must be listed on the FTIP prior to obligation of funds. However, many ITS projects are not required to be listed individually, since they are classed as air quality exempt. Such projects may be lumped together in the FTIP. If a traditional roadway design project contains an ITS element, then the requirement for FTIP listing is determined by the overall project.

Because of this variation in project classification, projects with ITS elements may not be identified. For this reason, the MPO or RTPA is encouraged to coordinate with the local agencies (project sponsors) to “flag” ITS projects, or at least note the High-Risk (formerly “Major”) ITS projects, within their FTIP submittal to Caltrans/FHWA. This may be a symbol designation within the current FTIP format, a separate page listing, or some other reporting means.

By delineating operational improvements from the rest of the capital program, this gives FHWA ITS Engineers opportunity to make pre-authorization outreach visits to project sponsors to assess degree of education, technical assistance, and oversight that will be needed before the project reaches its funding year. This can reduce risk of project failure.

#### Step 2 Roadmap Step 2

The regional planning agency (RTPA or MPO), as owner/maintainer of the regional ITS architecture, will assist the ITS project sponsor (local agency) to address the architecture aspects of the Systems Engineering Review Form (SERF).

For more information on regional ITS architectures, the reader is encouraged to access USDOT ITS Architecture website at: <http://www.its.dot.gov/arch/index.htm>.

#### Step 3 Roadmap Step 3

As each ITS project is implemented, the regional ITS architecture will need to be updated to account for any expansion in ITS scope, and to allow for the evolution and incorporation of new ideas. When actually defined or implemented, a project may add, subtract or modify elements, interfaces, or information flows from the regional ITS architecture. Because the regional ITS architecture is meant to describe the current (as well as future) regional implementation of ITS, it must be updated to correctly reflect how the developed projects integrate into the region.

Updates will be submitted by the local agency project manager. This can occur at two points in time during project development process. The first time is upon documentation of the project architecture at completion of the High-Level (functional) Design. Additionally, during implementation, project architectures may change. If so, the project manager will submit those changes at project completion.

A regional ITS architecture maintenance process is documented in the region, and used to make any changes.

### 13.4.2 Local agency (include consultants in project management role)

#### Step 1 Roadmap Step 1

The local agency is responsible for submitting their projects to the MPO/RTPA for inclusion in the State Transportation Improvement Program for Federal approval (FTIP). For projects that include ITS elements, the local agency makes a **preliminary** classification of the project's risk as exempt, low, or high. It may take a number of months for the project to be added to the FTIP, so Step 1 should be performed well ahead of the expected project start date.

If the project is considered **Exempt**, then all activities of the traditional roadway project development life-cycle process will be followed. Exempt projects are not considered "ITS" for purposes of these procedures and no further ITS-specific action is necessary.

#### Step 2 Roadmap Step 2

To initiate federal funding of the ITS project, the local agency verifies that the project is listed in the FSTIP and submits to Caltrans District Local Assistance Engineer (DLAE) the "Request For Authorization To Proceed With Preliminary Engineering" (LAPM Exhibit 3-A and associated data sheets (LAPM Exhibit 3-E). This is often referred to as the "E-76 Package" and the process of submitting and approving it is often referred to as the "E-76 Process."

This PE request will often include the completed Field Review Form (LAPM Exhibit 7-B) and associated Data Sheets (LAPM Exhibit 3-C to 3-I). This Field Review Form will include ITS administrative and financial elements to be addressed when applicable. To accommodate agencies with limited staffing, the Field Review Form may be submitted separate from the request for authorization to proceed, but within four (4) months after the Federal PE authorization date. See Chapters 3, "Project Authorization" and Chapter 7, "Field Review," of the *LAPM* for more information.

The completed Field Review Form includes an ITS Systems Engineering Review Form (SERF) that is required for all ITS projects. The SERF (LAPM Exhibit 7-I) provides responses to the seven requirements for systems engineering analysis within 23 CFR 940 Part 11. The SERF will assist the local agency in determining if the project is Low-Risk or High-Risk. If the local agency does not have enough information to answer all seven questions, the project is probably high risk.

This determination of risk is delegated to the local agency (project sponsor). Completion of the SERF is an opportunity to verify (or perhaps change) the preliminary determination of risk made during project programming in the Roadmap Step 1.

If the ITS project is **Low-Risk** (formerly "Minor"), the response to the SERF will be complete and will document conformance to 23 CFR 940. If DLAE agrees that the project is Low-Risk, then the PE obligation and authorization process is used.

If the ITS project is **High-Risk** (formerly “Major”), response to some of the seven questions in the SERF can not be decided at this early stage. Responses in the SERF will identify the tasks when each question will be answered during the systems engineering process. PE is conditionally authorized after submittal of the initial request for authorization by the local agency. The condition specifies that a SEMP be approved and a Notice-to-Proceed (NTP) be granted by FHWA before the local agency may proceed with project implementation. Expenditures for such work prior to NTP are NOT eligible for reimbursement.

### **Step 3** Roadmap Step 3

**Step 3a** For **Low-Risk** ITS projects, the agency’s project development process used for regular roadway projects will be followed. These activities are denoted as Step 3a in the “Roadmap to ITS Compliance”. For purposes of these procedures, no further ITS-specific action is necessary. Refer to *Section 13.9 Procurement/Construction* for more information on procurement options.

**Step 3b** For **High-Risk** ITS projects, conformance to 23 CFR 940 will be completed in Step 3b of the “Roadmap of ITS Compliance” as the systems engineering tasks on the left side of the Vee process are undertaken (i.e., Concept of Operations thru High-Level Design).

If the project architecture - defined as part of the High-Level (functional) Design - adds, subtracts or modifies elements, interfaces, or information flows from the regional ITS architecture, these changes need to be submitted to the RTPA/MPO who maintains the regional ITS architecture. This can be done upon completion of the SEMP. In addition, if similar changes occur during implementation, the project manager should submit those changes at project completion.

Prior to the Component-Level Design task within the SE Vee process, the local agency submits to DLAE the Systems Engineering Management Plan (SEMP) and Systems Engineering process products. Upon receiving final SEMP approval and Notice-to-Proceed, the local agency may proceed with project implementation. Expenditures for such work prior to NTP are NOT eligible for reimbursement.

## 13.4.3 Caltrans Division of Local Assistance

### 13.4.3.1 District Local Assistance Engineer (DLAE) –

#### **Step 1** Roadmap Step 1

The DLAE has no responsibilities during Step 1.

#### **Step 2** Roadmap Step 2

The DLAE reviews the request from the local agency for PE authorization to assure satisfactory completion. For those local agencies that require additional time to process the Field Review Form, the DLAE will prepare and submit the E-76 for PE to Headquarters DLA Implementation.

Upon receipt of the Field Review Form, including the SERF, the DLAE verifies that the risk determination made by the local agency is correct. If the DLAE agrees that the project is **Low-Risk** (formerly “Minor”), the PE obligation and authorization process will be used and no further ITS-specific action is necessary.

If the project is determined to be **High-Risk** (formerly “Major”), the DLAE forwards the SERF to DLA Implementation and FHWA concurrently for review and approval. The DLAE verifies from the E-76 system that PE is conditionally authorized and that FHWA has obligated the funds before issuing authorization to proceed with PE. The condition specifies that a SEMP be approved and a Notice-to-Proceed (NTP) be granted by FHWA before the local agency may proceed with project implementation.

In the instance where the Field Review Form follows Federal PE authorization, further verification of the earlier determination of risk is performed. Where the information leads to a change in project type (Low to High or vice-versa), a corrected E-76 is submitted to DLA Implementation. In the instance of a Low- to High-Risk change, the corrected E-76 will either de-obligate the PE dollar amount for system design and implementation or will include a conditional statement that limits Notice-to-Proceed (NTP) to only the systems engineering tasks (Concept of Operations to High-Level Design) on the left side of the SE Vee.

**Step 3 Roadmap Step 3**

**Step 3a** For **Low-Risk** ITS projects, the project development process used for regular roadway projects will be followed by DLAE, noted as Step 3a in the “Roadmap to ITS Compliance.” Refer to *Section 13.9 Procurement/Construction* for more information on procurement options.

**Step 3b** For **High-Risk** ITS projects, the systems engineering tasks on the left side of the Vee process are undertaken (i.e., Concept of Operations thru High-Level Design). The Systems Engineering Management Plan (SEMP) is sent to DLA Implementation and FHWA concurrently for review and approval. The DLAE transmits the SEMP approval and Notice-to-Proceed from FHWA to the local agency. System implementation can begin with receipt of the Notice-to-Proceed. Expenditures for such work prior to NTP are NOT eligible for reimbursement.

**13.4.3.2 Headquarters DLA Implementation –**

**Step 1** HQ DLA Implementation has no responsibilities during Step 1.

**Step 2** For High-Risk ITS projects, DLA Implementation forwards the SERF to the FHWA ITS Engineer for review and approval. Upon notification of FHWA approval, DLA Implementation notifies DLAE, and PE may be authorized.

**Step 3b** DLA Implementation forwards the SEMP to FHWA for review and approval. Upon notification of FHWA approval and NTP granted, DLA Implementation notifies DLAE, who in turn notifies the local agency.

**13.4.4 FHWA ITS Engineer**

**Step 1 Roadmap Step 1**

The FHWA Project Engineer has no responsibilities during Step 1.

**Step 2 Roadmap Step 2**

If the project is a **High-Risk** (formerly “Major”) ITS project, the SERF is submitted to FHWA for review and determination of level of federal oversight of the systems engineering process.

The following information defines the FHWA oversight of the Systems Engineering (SE) process for **High-Risk** ITS projects. Please note that **this oversight is limited to the ITS portions of the project only**. General oversight for all other aspects of the federal aid process will continue to be handled through the *Caltrans/FHWA Joint Stewardship & Oversight Agreement*.

The FHWA oversight process is built upon the common SE practice of using "control gates" as a project-management tool. It assumes that implementation of the ITS project (or the ITS elements within a larger construction project) will follow a pre-determined sequence of steps, with each step (or "milestone") being judged by the project manager to be satisfactorily completed before substantive work begins on the next step.

FHWA will exercise its oversight responsibilities primarily via review of deliverable(s) produced at each of the milestones in the SE process (e.g. Concept of Operations, Acceptance Tests, etc.). They will do this in a manner that avoids unnecessary delays to the project. The action at each step will take ONE of the following forms: a.) Review and approval, b.) Review and comment, or c.) Information only. These terms are explained below.

- Review and Approval - FHWA shall receive the final version of the milestone document for review and approval. They will respond within one week -- whenever given at least two weeks advanced notice of the document's arrival. Otherwise, turnaround time will be two to three weeks. If they do not respond within the applicable time period the document is automatically deemed approved.
- Review and Comment - FHWA shall participate in the normal review process that the agency uses at the "final draft" stage of developing the milestone document. They will abide by the same schedule that is given to all other reviewers. If they do not provide comments within the given schedule, project work may proceed without them. Their comments will be treated as suggestions that will be given the same consideration as comments from other reviewers.
- Information Only - Upon completion of the milestone, the project manager shall email the associated document to FHWA. No "approval" by FHWA will be needed. Upon emailing the document, the project may begin the next task immediately (but not before).

This determination of level of oversight, along with SERF approval, will be transmitted to DLA Implementation and DLAE concurrently.

### **Step 3b** Roadmap Step 3b

Regardless of the level of oversight determined for each SE process milestone deliverable, the completed Systems Engineering Management Plan (SEMP) must always be submitted to FHWA for review and approval at completion of the system definition tasks (generally after the "High-Level Design" task). This approval and the Notice-to-Proceed will allow for the local agency to proceed with system design and implementation. Specific SEMP development and documentation guidance can be found at the "*Systems Engineering Guidebook for ITS*" website ([www.fhwa.dot.gov/cadiv/segb/](http://www.fhwa.dot.gov/cadiv/segb/)).

The FHWA review process can be expedited by documents being sent via email to FHWA simultaneously with distribution to Caltrans and/or other stakeholders involved in the project development. Paper copies are **not** required, unless the materials cannot be sent electronically.