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the video

Project Development Operations

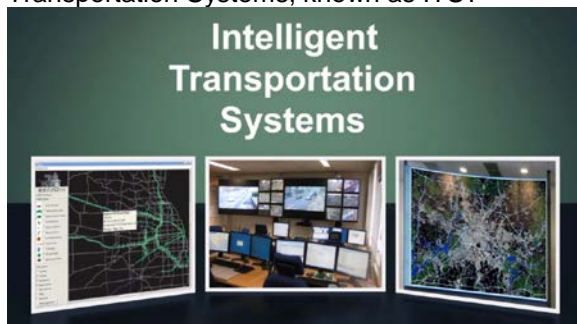
Purchasing Intelligent Traffic Systems (ITS) and Traffic Technology

www.fhwa.dot.gov/federal-aidessentials

LPAs can save time and money using the Systems Engineering Approach to develop and purchase ITS and traffic technology



What is your agency's approach to the purchase of traffic technologies and Intelligent Transportation Systems, known as ITS?



If your agency plans to borrow specifications from developers and others and then add extra features, your agency will risk misstating the ITS and traffic technology requirements. This often results in lost time and money and even worse, a system that fails to meet agency needs.

A smarter, more effective way to make purchasing decisions is to use the Systems Engineering Approach. A Systems Engineering Approach is also a must for Federal-aid projects.

The Systems Engineering Approach produces ITS and traffic technology requirements that your agency can use to evaluate and test the system. Using this approach, agencies learn about requirements by assessing how they will use the system. This written assessment is called a Concept of Operations.

In short, a written understanding of how your agency will use the system comes before its decision on which system to buy.

Let's look at the development of both the concept of operations and system requirements, along with how they aid the purchasing process.

When creating a Concept of Operations, your agency invests time in understanding and documenting what system users, both internal and external to your agency, will do with a system.



When actually writing the Concept of Operations, it's necessary to identify system users as the noun in the sentence and their task as the verb. For example, "The operator will monitor the status, reference information, or analyze and resolve a problem."

System requirements flow from the Concept of Operations and describe what the system has to do to support the user's needs and completion of tasks. System requirements may also address the size and speed of the communication system. When writing the system requirements, the system, or elements of the system, is the noun. For example, "The system shall provide a real-time display."

The goal is that each requirement is traceable to the Concept of Operations and is also clear, feasible, and testable. Test plans known as verification and validation plans demonstrate that the system fulfills requirements and supports operations.



During the procurement process, agencies share with prospective contractors the written system requirements and the verification plan that will be used throughout the project.

When using a competitive bid process, FHWA recommends that system requirements be included in the project plans and specifications. This sets the expectation that the contractor must meet the system requirements.

When an agency uses a request for proposal, or RFP, as the procurement method, proposers start with the written system requirements and explain how their approach fulfills each one. Agencies are then able to select the developer with the solution that best fulfills the requirements and meets their needs.



Both the competitive bid and RFP processes meet Federal requirements when purchasing ITS and traffic technology that do not include significant infrastructure construction. However, the systems engineering approach favors the use of the RFP because it allows agencies to review how the provider will fulfill the requirements before awarding the contract.

To illustrate the development and use of the Concept of Operations and system

requirements, let's look at an example of a user activity.

A transportation engineer receives a citizen's complaint about a broken traffic signal. While on the phone with the citizen, the engineer pulls up a display of the signal controller from her workstation, observes the operation of the signal controller, and checks for malfunctions. She either addresses the issue immediately using the system or determines the need for a field review.



To support this activity, the system must provide a real-time display that presents all the elements relevant to any operational problems and malfunctions that the operator can foresee.

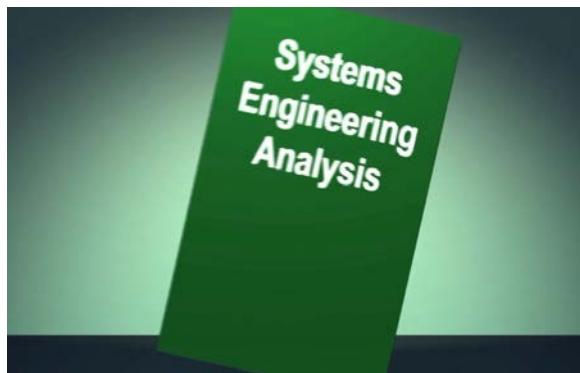
Additionally, the system needs to allow for control changes that might correct the problem, at least temporarily.

When presented with these requirements during the proposal process, the proposer can demonstrate how the implemented system fulfills the requirements.

Recipients of Federal funds are required to develop a systems engineering analysis when purchasing ITS and traffic technology.

For a small system, the analysis may take just a few pages, but it can be considerably longer for more complex systems.

Systems engineering analyses help agencies to identify and correct defects as early as possible.



If you'll be assisting your agency in the purchase of ITS or traffic technology, consider furthering your knowledge of systems engineering by reviewing the interactive guides and handbooks referenced at this Web site, or by taking a course through the National Highway Institute or other industry training.

Additional Resources

- The Systems Engineering Guidebook provides covering ITS-related systems engineering topics, forms, processes, example documents, and guidance
<http://www.fhwa.dot.gov/cadiv/segb/index.cfm>
- The Systems Engineering Handbook with basic tutorial of the systems engineering process as applied to ITS projects
<http://ops.fhwa.dot.gov/publications/seitsguide/>
- Model Systems Engineering Documents for Adaptive Signal Control Technologies
<http://ops.fhwa.dot.gov/publications/fhwahop11027/index.htm>
- Electronic Code of Federal Regulations for 23CFR940, ITS Architecture and Standards
<http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&sid=492fe3798b5bccb85ccafbe8e3f479ad&rgn=div5&view=text&node=23:1.0.1.11.50&idno=23>
- List of ITS courses and training from U.S. DOT's Research and Innovative Technologies Administration (RITA)
<http://www.pcb.its.dot.gov/courses.aspx>

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This Companion Resource is the script content for the video production of the same name.