

## Technical Assistance Brief



U.S. Department of Transportation

Federal Transit Administration

Office of Technical Assistance and Safety

## APTS Evaluation Guidelines

The Advanced Public Transportation Systems (APTS) Program was established by the Federal Transit Administration (FTA) as part of the overall U.S. Department of Transportation Intelligent Vehicle Highway Systems (IVHS) initiative. (For a description of the APTS Program, see APTS Technical Assistance Brief 1, Spring 1993.)

Many innovative applications of APTS technology are being implemented at sites throughout the U.S. in the primary focus areas of Smart Traveler technologies, Smart Vehicle technologies, and Smart Intermodal Systems. Real world testing is being conducted in urban and rural areas using technologies such as automated vehicle location systems, smart card systems, dynamic ride sharing systems, passenger information systems, high occupancy vehicle systems, and vehicle component monitoring systems.

Most of the activity is being sponsored by the APTS Program as operational tests; however, there are also some local initiatives to innovate that will provide valuable information for the APTS Program. Both the local initiatives and APTS sponsored operational tests will be documented through evaluation plans developed

from comprehensive national guidelines to assure compatible data sets.

The various operational tests are meant to serve as learning tools and as models for other locales throughout the country. For these tests to have value and broad application, a consistent, carefully structured approach to project evaluation will be undertaken.

The purpose of the APTS project evaluations is to examine the effectiveness of APTS applications in real-world environments in terms of factors such as costs, benefits, and market response. Projects will be assessed on the success in meeting basic objectives such as enhancing the quality of transit service to customers, improving system productivity, and meeting community goals.

The Volpe National Transportation Systems Center has been charged with the task of developing a set of APTS Evaluation Guidelines that provide a common framework and methodology for evaluating individual operational tests.

While all sites will be evaluated using the common guidelines, the guidelines are not intended to be all inclusive that is, they do not offer a suggested or preferred course of action for every conceivable situation that might arise. Since each operational site is unique, each site will require a tailor made evaluation plan based on the model Evaluation Guidelines. □

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# Evaluation Process

The evaluation process can be thought of as a link between the conduct of an operational test at a particular site and the understanding of its actual performance at that site. The quality of the evaluation process directly influences the accuracy of the operational test assessment and ultimately affects the applicability and transferability of test findings.

The evaluation process consists of four major phases: the evaluation frame of reference; evaluation planning; evaluation implementation; and potential evaluation spin-offs.

## □ Evaluation Frame of Reference

The evaluation reference establishes the background and description of (1) the operational test; (2) the APTS Program objectives; (3) local objectives, issues, and site characteristics; and (4) potential external influences.

## □ Evaluation Planning

The evaluation planning phase of the process transforms the evaluation frame of reference into a detailed, structured plan for conducting the evaluation. This plan contains the measures, data collection sources and requirements, and analysis/ derivation techniques needed to properly assess the costs, functional characteristics, efficiency, effectiveness, and other impacts of the equipment or service to be implemented.

## □ Evaluation Implementation

The evaluation implementation phase is the period during which the evaluation plan is executed. This includes recording of project implementation and operational history, collection and analysis of data related to project objectives, and recording of external factors that might influence the operational test findings and results. This phase culminates with the preparation of the final summary project report which discusses the attainment of project objectives, insights into important project issues, assessment of the influence of site-specific or external factors on project results, and lessons learned relative to the implementation and operation of APTS applications.

## □ Evaluation Spin-offs

Final evaluation reports will be widely disseminated so that other interested parties may share in the findings. While essentially documenting the history and effects of single projects, these evaluation reports also serve the broader function of increasing the understanding, and stimulating the application of APTS technologies in other localities.

Information presented in the reports will provide a basis for comparing the effects of a particular APTS application with those of similar projects and developing cross cutting studies. It is anticipated that the information from APTS evaluations will be valuable in the local planning process to help local decision makers determine which APTS technolo-

gies should be included on local Transportation Improvement Programs, State Implementation Plans, and Long Range Plans.

## □ Evaluation Responsibilities

The evaluation process is a cooperative effort among FTA, the local transit operator, the equipment manufacturer/supplier, the Volpe Center, and the evaluation contractor. The FTA has the overall authority and responsibility for the project and has final approval for the project summary report.

The local agency is responsible for the installation, operation, and maintenance of the system and for working with the evaluation contractor. Local agency staff will provide much of the data for the evaluation, as well as their observations of day to-day operations.

The equipment manufacturer/supplier is expected to finish non proprietary equipment installation requirements; hardware and software descriptions and specifications; and actual costs of equipment and installation.

The Volpe Center staff will provide overall evaluation guidance, direct the evaluation contractor, monitor the contractor's performance, and review the documents prepared by the contractor.

The lead role in the evaluation process belongs to the evaluation contractor who will prepare the evaluation plan, conduct the evaluation, and present the findings in a final report. □

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## Impact Measures

Each detailed evaluation plan will contain a listing of relevant measures to be considered in order to perform a thorough evaluation of the APTS operational test. Through an examination of these measures, the evaluation will be able to determine the extent to which the APTS field test has attained the initial objectives.

The measures have been organized into performance categories. These categories are: financial impacts, functional characteristics, user acceptance, transit system efficiency and effectiveness, and other impacts.

- Financial impact measures relate to the costs of implementation and operation of the APTS service or equipment. These include the fixed costs of hardware, software, and other equipment, as well as such variable costs as marketing, administration, operations, maintenance, and supplies.
- Functional characteristics measures are designed to assess equipment performance. Questions surrounding the accuracy, reliability, maintainability, adherence to specifications, and other equipment aspects will be examined.
- User acceptance measures are one means of assessing the objective of servicing the customer. Both objective measurements of APTS usage and

public perceptions of APTS applications are indicators of user acceptance.

- Transit system performance is typically viewed in terms of efficiency and effectiveness, both of which may be influenced by the APTS application and other technology. Efficiency is gauged by the manner in which vehicles, personnel, fuel, and financial resources are employed to produce transportation service. Specific measures include the cost of service delivery, worker productivity, and vehicle utilization. Measures of transit system effectiveness include cost and revenue effectiveness and non-financial aspects such as service utilization, service reliability and quality, revenue generation, safety, and security.
- In addition, other impacts associated with the use of an APTS application may occur. Such impacts may relate to the transit agency's personnel, organizational concerns, and administrative procedures; assistance in achieving community goals; assistance in responding to national mandates such as the Americans with Disabilities Act, the Clean Air Act, and other Federal legislation; traffic congestion mitigation; institutional relationships; new technology advancement; human factors. Both quantitative and qualitative measures are required to assess these issues. □

## Evaluation Planning Considerations

Once the relevant measures for project evaluation are determined, it is necessary to identify appropriate collection or derivation techniques, the frequency of collection, and the time period over which the data will be assembled.

A significant aspect of the evaluation process is determining the basic data collection and analysis design to be employed. In general, a single set of measurements (for example, measurements collected while the test is in operation) will be insufficient for assessing the impact of the test, since it will not provide a yardstick with which to interpret the data.

Given that the basic data collection/analysis design will generally be in the form of a comparison of multiple measurements, the type of comparison must be carefully selected.

The two main forms of comparison are *before vs. after* and *test vs. control*. Each type of comparison has limitations: the before-after comparison fails to show what portion of the change in the measure is due to external factors; the test-control comparison shows the difference between "after" measures but fails to indicate the degree of change from the before state to the after state. Therefore, it is desirable, where feasible, to conduct a before-after comparison in conjunction with a test-control comparison. □

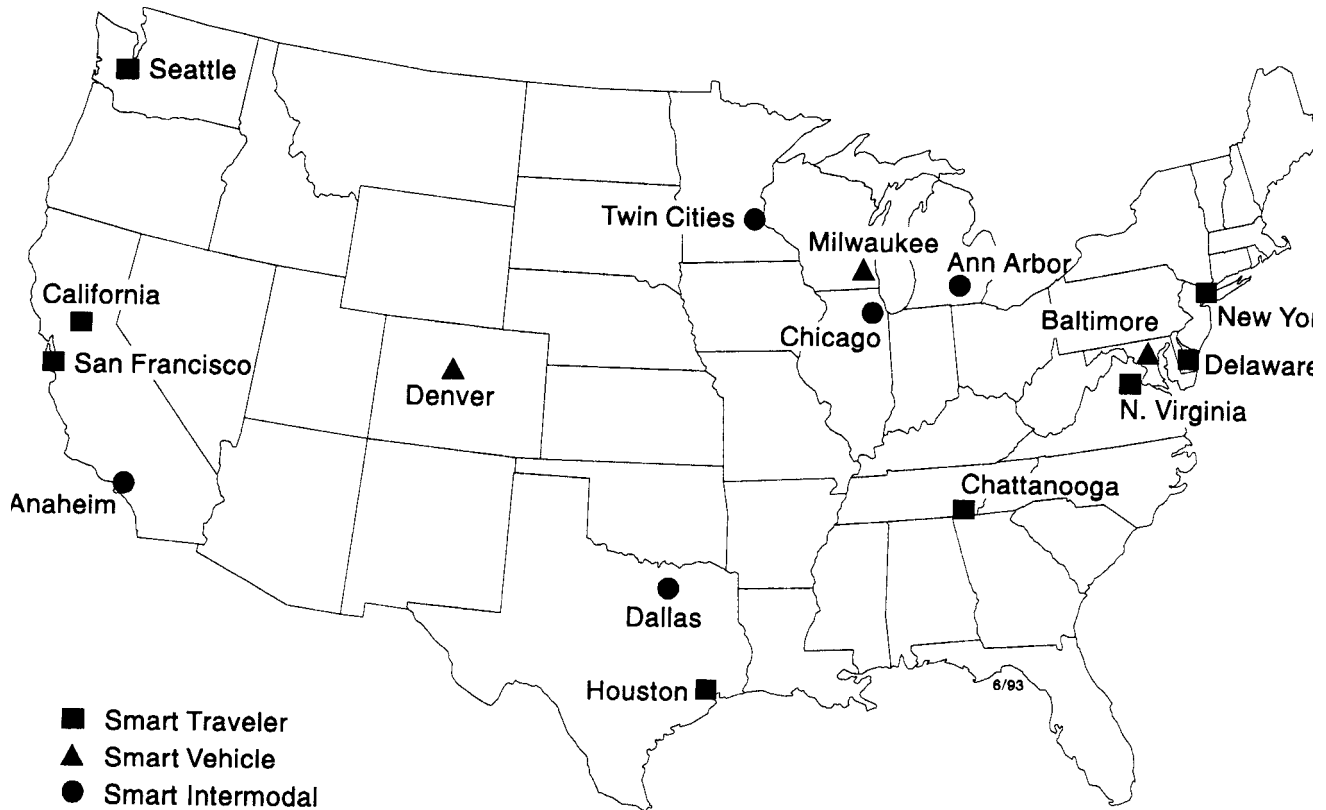
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## Evaluation locations

There are a variety of local initiatives and APTS operational tests being evaluated across the U.S. The evaluations cover all three focus areas of the APTS Program: Smart Traveler technology, Smart Vehicle technology, Smart Intermodal Systems. For more information: phone (202) 366-4995, fax (202) 366-3765.

### APTS OPERATIONAL TESTS



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