

ITS Field Operational Test Summary

San Diego Smart Call Box

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Introduction

The San Diego Smart Call Box ITS Field Operational Test evaluated the feasibility and cost effectiveness of using enhanced roadside call boxes for data collection, processing, and transmission. Smart Call Boxes are an improved version of devices used as emergency call boxes in California. The test examined using the smart boxes for traffic census data collection, incident detection, hazardous weather reporting, changeable message sign (CMS) control, and video (CCTV) surveillance. The evaluation focused on cost effectiveness compared to other methods.

The test had two goals:

- Evaluate the cost effectiveness of smart call boxes
- Document and discuss the institutional issues encountered.

The tests were conducted at numerous sites on the interstate and state highway system of San Diego County, California (see Figure 1). The test took place from September 1995 to June 1996.

Project Description

To improve motorist safety and emergency response, CalTrans (the California Department of Transportation) has installed an emergency phone system (call boxes) along many of the highways in the state. Motorists can use these phones, located at regular intervals, to connect directly to emergency dispatch centers. This Field Operational Test explored the possibility of using the established call box infrastructure to gather and transmit additional traffic and weather information.

The test planned to conduct five subtests, one for each data processing and transmission task. The project actually tested functional systems for traffic census data collection, hazardous weather reporting, and CCTV surveillance. Test partners canceled the changeable message sign subtest when the tested call box system proved incompatible with the California CMSs. The installed incident detection systems did not function properly.

The information collected by the call box installations was transmitted to the CalTrans District 11 Transportation Management Center.

The test had several objectives related to the project goals. Test evaluators attempted to determine the relative effectiveness of smart call boxes compared to a baseline system of conventional telephone lines and controllers. They also wanted to determine the projected life-cycle costs of the two systems and the tradeoffs between the systems. The ultimate objective was to determine which system is best for each task. The evaluators attempted to determine whether any institutional issues encountered have the potential for affecting the performance of similar systems.

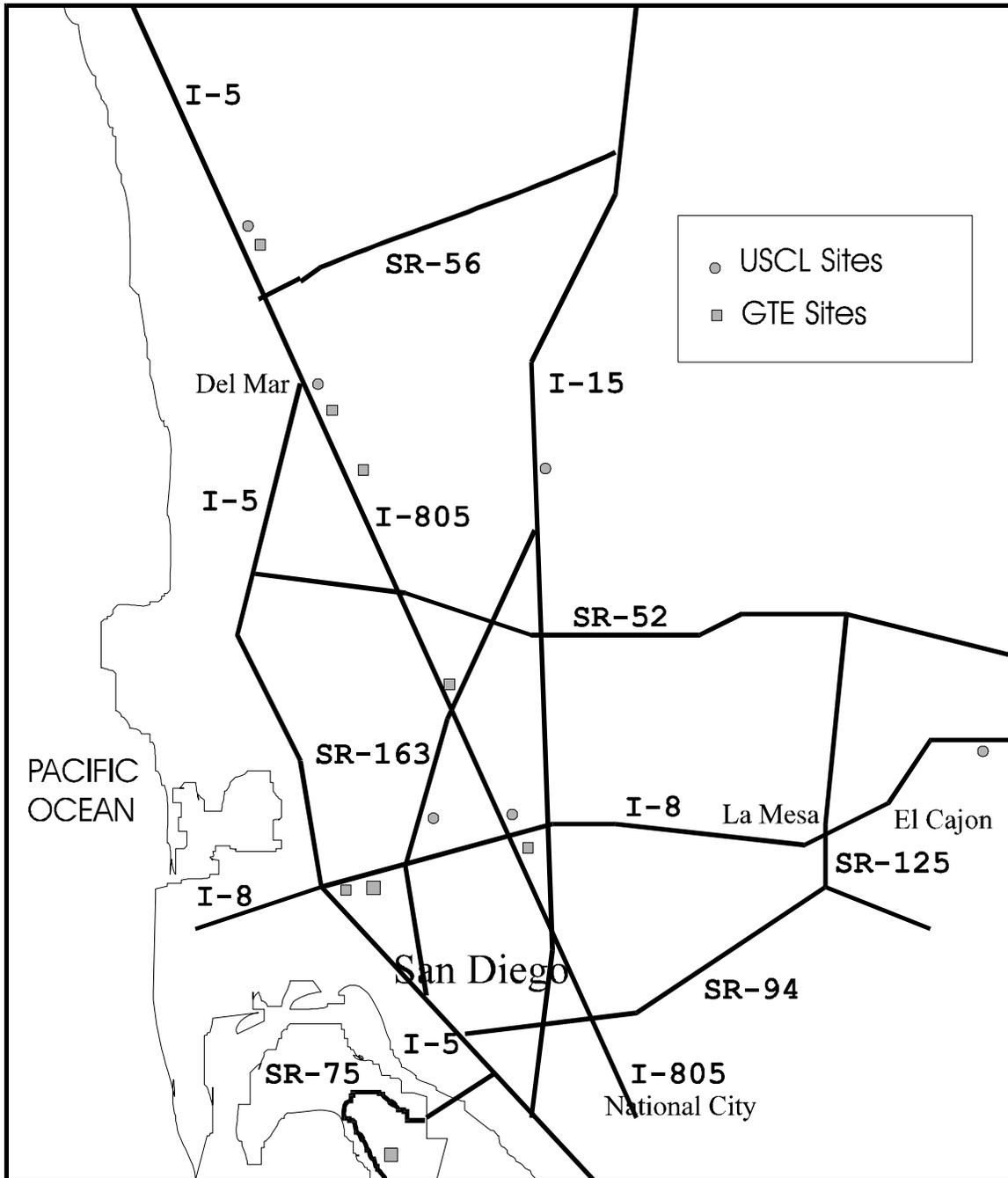


Figure 1: Smart Call Box Field Test Sites

Results:

The evaluation found the smart call box concept to be feasible but not necessarily optimal. Smart call box systems will often be cheaper to deploy than hardwired systems. Smart call box systems, however, did not necessarily prove to be superior to other wireless systems.

The planned tests encountered problems. Most test equipment experienced varying periods of three conditions: operational, operational with problems, and non-operational. Test personnel

were not able to control changeable message signs using the tested call box system because the CMSs used in California proved incompatible. Therefore, Test personnel canceled the CMS subtest. Test personnel installed call box-based incident detection systems but these systems did not function properly. In the video (CCTV) subtest, the installed system could not remotely control the pan-tilt-zoom capabilities because of communication and system integration problems.

Test personnel encountered significant system integration problems. The design of portions of the system to be located at the TMC was considered to be outside the scope of the test. Therefore, test personnel made use of existing data collection components or used the simplest possible means. Problems also arose because the call boxes (owned and operated by the partners) ran software provided by the vendors. Evaluators were not sure if some data integration problems resulted from basic incompatibilities or from the project staff's lack of familiarity with the software. These problems led to reduced usefulness of some of the data or delays in integration of the field data with the TMC data.

For the three successful subtests, evaluators estimated cost savings. Evaluators noted that using Smart Call Boxes to control field devices in the three successful tests could result in substantial per site savings over other alternative control options. The possible capital cost savings ranged from about \$1,500 to as much as \$103,000.

Evaluators noted several institutional issues that need to be resolved prior to full-scale deployment of smart call box systems. Future systems must be rigorously tested and include design enhancements, improved reliability, and lower maintenance costs. Any agency considering deployment of such a system should prepare detailed deployment plans. The agency should also resolve other important issues, such as ownership, financing, and maintenance. Evaluators also cited inadequate involvement of the partner agencies and the potential users of the system in the development of system designs. The organizational structure of the test partnership and the cumbersome contracting procedures of the partners resulted in major delays that had a negative effect on the outcome of the subtests. Evaluators suggested that the project manager and the vendors be included as partners to overcome some of these problems.

Legacy

The results of this test led to a decision to prepare a proposal for pilot deployment of a small scale smart call box system in the San Diego area. The deployment would install systems to collect traffic census data, detect low visibility conditions, monitor wind speed, and verify CMS messages by CCTV. The deployment plan would provide for further testing and system development.

Other smart call box projects are currently in progress in California. In the San Bernadino-Riverside area, call box systems are monitoring traffic census data and weather conditions. In Sutter County, systems are collecting traffic census data and detecting low visibility conditions.

Test Partners

California Department of Transportation

California Highway Patrol

Federal Highway Administration

San Diego Service Authority for Freeway Emergencies

San Diego State University

References

Banks, J. H., and P. Powell, Smart Call Box Field Operational Test Evaluation, Summary Report, May 1997.