ITS Field Operational Test Summary

Puget Sound Emergency Response Operational Test (PuSHMe)

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Introduction

The PuSHMe ITS Field Operational Test evaluated an advanced Vehicle Control & Safety System in the Puget Sound area of Washington State. The project combined the resources of government, private industry, and academia to implement and test a regional mayday system. A mayday system allows a driver to send a signal to a response center giving his or her location and the driver's need for assistance.

The test evaluated the technical performance of the systems and studied usability, marketing, and institutional issues. Testing occurred from November 1995 to May 1996.

Project Description

The project evaluated the simulated performance of the mayday system under actual field conditions. The project deployed two potentially competing systems developed by commercial vendors. Paid participants simulated emergencies by driving to specified locations and initiating several types of emergency calls. The test evaluated the effectiveness and response time of various steps in the call initiation and response process. In only one subtest did the calls go beyond the response center operator.

Test personnel conducted three types of performance tests. The User Group Deployment test covered the systems' operations in a variety of settings. The Simulated Service Delivery test tracked a mayday scenario from call initiation through the arrival of simulated emergency service (see Figure 1). The Specific Features tests focused on performance issues of the hardware, cellular networks, or the service centers. The tests also analyzed usability, marketing, and institutional issues.

The PuSHMe project simulated a real-life test environment to determine the operational, technical, and institutional requirements to proceed with the full-scale implementation of a regional mayday system. The test assessed the technical performance of the major components of the system. The primary goal of the test was to evaluate the technical, economic, and institutional feasibility of implementing a regional mayday system. A secondary goal was to determine the technical and institutional requirements and obstacles in implementing such a system.

To achieve these goals, test personnel conducted evaluations of four areas:

- System Performance — Did the system perform as designed? Did the system meet the service requirements?
- System Usability — Did users accept the system? Did users like the system?
- System Marketability — What kind of demand is there for the system? What public-private combinations of services can be economically delivered to satisfy the demand?

- Institutional Issues — Can authorities implement the system within the current institutional and social framework?

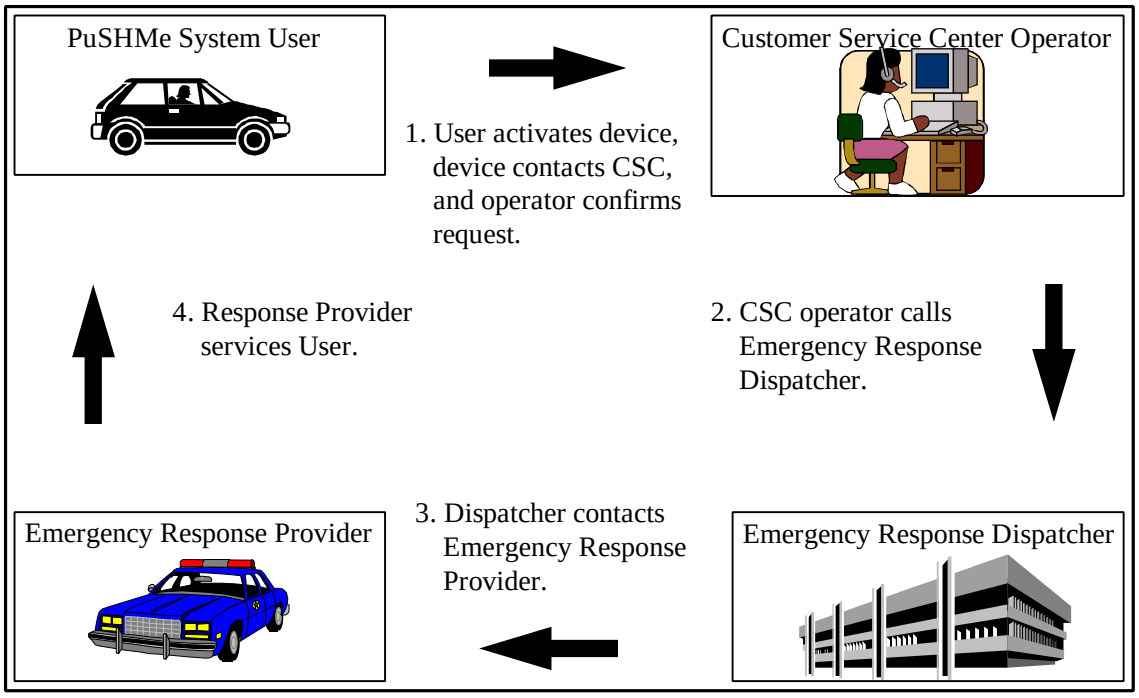

Figure 1: Overview of the Steps in Simulated Service Delivery

To answer these questions, test participants performed the technical tests and test personnel conducted surveys of participants. The participants surveyed included travelers using the in-vehicle devices as well as emergency response personnel (Service center call takers, police/fire dispatchers, etc.).

Results

The simulated nature of the test incidents affected data gathered for all aspects of the project evaluation. Response center operators knew what types of tests would occur and approximately when. The response providers also knew that they were not responding to true emergencies. The simulated nature of the test limited the test evaluator's ability to generate data that directly measured the impact of the PuSHMe system on motorist safety.

The results of the User Group Deployment test were positive. The two tested systems had an average success rate of 71 percent (88 percent for Motorola, 66 percent for XYPOINT). Test evaluators concluded that the systems could approach a 100 percent success rate. Users considered the response time rapid. Over 70 percent of the calls were verified within 2 minutes and only 13 percent required more than 5 minutes. Test evaluators also concluded that performance improved as test personnel gained experience and eliminated "bugs." They concluded that the time of day of the call did not have a great effect on the success rate or the response time.

Results from the Simulated Service Delivery test were divided according to the two systems tested. The time required to dispatch a service was about 6 minutes for the Motorola system and about 10 3/4 minutes for the XYPOINT system. The difference in the times of the two systems was due to the difference in interaction between the user and the response center operator. The Motorola system was voice-based while the XYPOINT system was text-based. Dispatchers and service providers considered that the quality of the information provided through the systems was about the same as the information they received through cellular 911 calls.

The results of the Specific Features tests differed according to the feature being tested. The results of the Dropped Carrier test demonstrate that the Motorola system was successful at re-connecting dropped calls 93 percent of the time under controlled conditions. The XYPOINT system did not have this function. The Topographic Interference test evaluated the ability of the GPS (Global Positioning System) to accurately locate the vehicle. This test showed that parking garages and "urban canyons" (in between buildings) interfered with or blocked the GPS signal and made it difficult for either system to correctly determine the vehicle's location. Both systems performed well at determining location when the terrain was open or wooded. Both PuSHMe systems were able to track a moving vehicle reasonably well in the Moving Vehicle test. In the Location test, the Motorola system was able to locate a majority (~55 percent) of the vehicles within 30 meters of the correct location. The XYPOINT system located approximately 60 percent of vehicle within 6 meters of the correct location. In the Remote CSC Operator test, Customer Service Center (CSC) Operators were able to determine the exact location of a vehicle in 60 percent of the trials and "very close" to the location in an additional 22 percent.

Users of both systems found them easy to use and felt more secure having such a system in their vehicles. The market analysis showed that purchase cost is an important factor in the marketability of the system -- functionality was a secondary consideration. The primary institutional issues surrounding the deployment of such a system involve the public/private partnership that must evolve to make such a system feasible.

Legacy

Test partners have used the information gained in the PuSHMe test in several ongoing efforts. The two commercial partners, Motorola and XYPOINT, have improved their products and plan to market them in the next year (1998). Motorola has licensed its technology to another company that will market the product in Seattle and several major cities. XYPOINT is continuing the rollout of its product in Seattle.

The Smart Trek Model Deployment Initiative (MDI) in the central Puget Sound Region has included the PuSHMe system as a component of the MDI. Smart Trek is one of four national MDIs that showcase a fully integrated Intelligent Transportation Infrastructure. The Smart Trek MDI has three primary components: information gathering and transportation management, information processing and fusion, and information distribution. The Smart Trek MDI uses PuSHMe technology as one of its information gathering components. [More information about Smart Trek is available at the website *http://weber.u.washington.edu/~trac/mdi/01a.htm*.]

Test Partners

David Evans and Associates

IBI Group

Motorola

Response Systems Partners

Sentinel Communications

University of Washington

Washington State Department of Transportation

Washington State Patrol

References

Haselkorn, M. et al, Evaluation of the PuSHMe Regional Mayday System Operational Test, Final Draft, June 1997