Controlled Field Testing

Puget Sound Help Me (PuSHMe)
Operational Test
Task 2 Technical Memorandum

Final Report – August 1996

Prepared for the

Federal Highway Administration
Washington State Department of Transportation
Washington State Patrol

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1.0 INTRODUCTION

Safety is a major goal of the National ITS Program. To promote safety, the Federal Highway Administration (FHWA) funded a series of Field Operational Tests to evaluate two low-cost emergency and assistance communications and rapid response devices and supporting services. This type of mayday service allows a motorist to report an incident to a service center which alerts a service provider who dispatches aid to the scene. Mayday services can meet the national ITS goal of improving safety by "improving [emergency, medical] and roadway service response, reducing the number of fatalities and the severity of injuries resulting from a collision, and reducing the number of pedestrian and vehicle collisions secondary to an incident."[1]

The purpose of this Technical Memorandum is to document and analyze the controlled field testing of the Puget Sound Help Me (PuSHMe) project conducted in Seattle, Washington. The intent of the controlled field testing was to concurrently develop and evaluate the procedures for training and conducting the two operational and five specific tests for both systems.

1.1 PROJECT ORIGIN

The Puget Sound Help Me Operational Test originated in 1993 when the FHWA released a request for participation in the Intelligent Transportation Systems (ITS) Field Operational Test. This request sought offers from the public and private sectors to form partnerships to conduct operational tests in support of the National ITS Program.

Operational tests serve as a transition between research and development (R&D) and full scale deployment of ITS technologies. An operational test integrates existing technology, R&D products, institutional, and perhaps regulatory arrangements to test new technological, institutional, or financial elements in a real world test. The tests permit an evaluation of how well newly developed ITS technologies work under real operating conditions and assess the benefits and public support for the product or system.

The request called for the U.S. Department of Transportation (USDOT), through the FHWA, to create cooperative ventures with a variety of public and private partners including State and local governments, private companies, and universities. The request indicated a need to advance the National ITS Program in the area of emergency notification and personal security (driver and personal security). Evaluation was

1 National ITS Program Plan, USDOT, Fuller, Robertson, eds. March, 1995.

deemed to be an integral part of each operational test and critical to the success of the National ITS Program.

In response to this request, David Evans and Associates, Inc. (DEA), the IBI Group, the Advanced Technology Branch of the Washington State Department of Transportation (WSDOT) and the Washington State Patrol formed a partnership to conduct an operational test of an Emergency Notification and Personal Security system. The University of Washington was asked to provided an independent evaluation. Negotiations with several technology providers resulted in the participation of XYPOINT and Motorola.

1.2 PROJECT PARTNERS AND ROLES

The PuSHMe project team consisted of a consortium of three public agencies, five private corporations and an academic institution. The Federal Highway Administration (FHWA), the Washington State Department of Transportation, and the Washington State Patrol sponsored the project, provided support and approved the various work elements. The private sector contributed approximately 18 percent of the budget. DEA was the prime contractor and had overall management responsibility. The IBI Group, Inc. assisted DEA with project implementation, integration, administration, and management. In addition, IBI Group led selected technical activities primarily associated with system integration and interfaces between the two technology providers and the University of Washington. Motorola and XYPOINT were the technology providers and provided emergency notification devices and customer response center systems. RSPI provided response center experience and expertise.

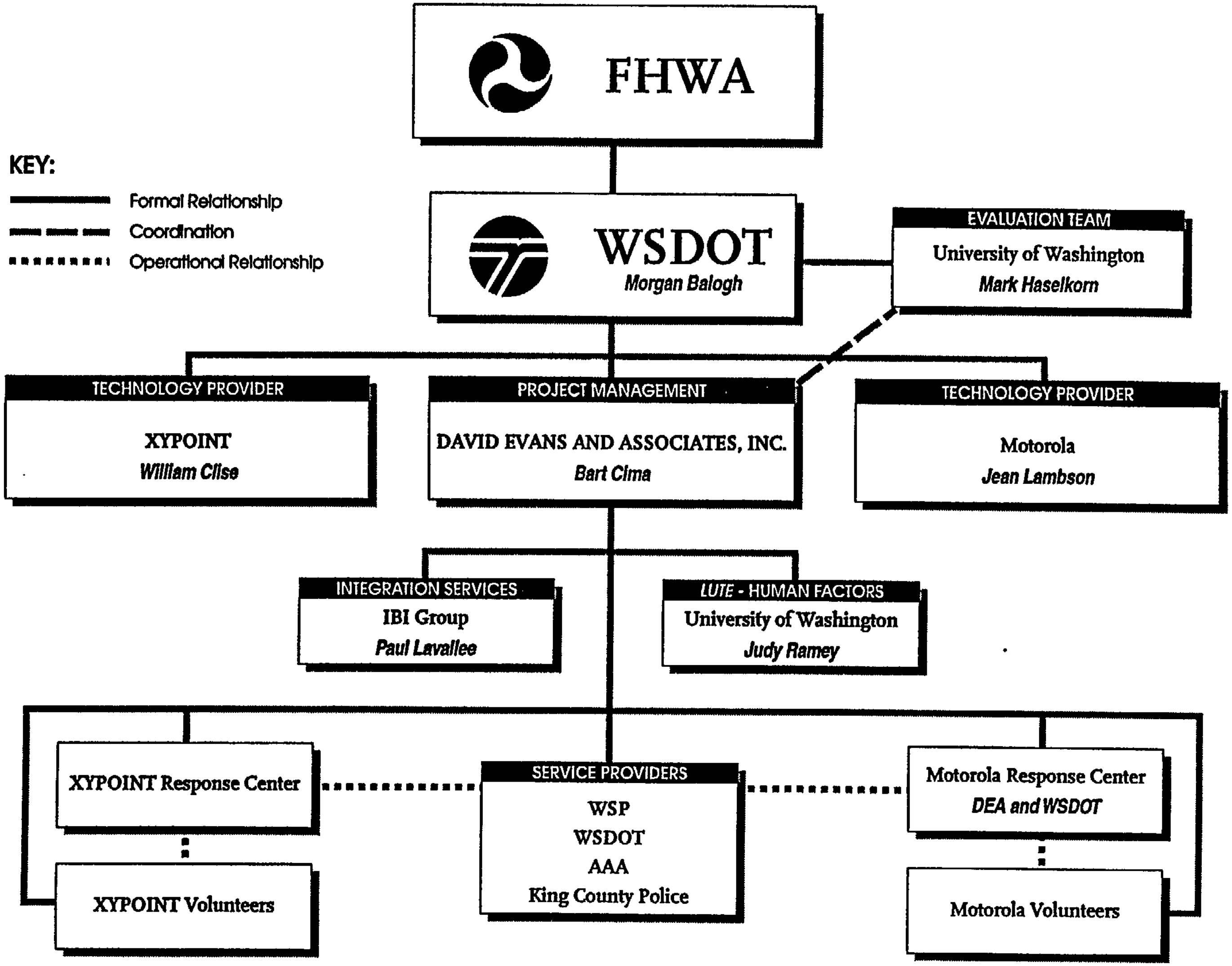
Two groups at the University of Washington participated in the PuSHMe project. The primary role of the Laboratory of Usability Testing and Evaluation (LUTE) which is part of University of Washington's Technical Communications Department, was to determine the requirements of the response center personnel. This effort included determining the requirements necessary for response centers and technology providers to support a mayday service.

The Evaluation Team consisted of staff from the Technical Communication Department at the University of Washington. This independent evaluation team determined with the project team the PuSHMe test objectives, prepared the projects evaluation plan, assisted DEA in the development of the field testing plan, evaluated the data collected as part of the User Group Deployment, and will prepare an evaluation report.

AT&T Wireless Services was not a signatory of the PuSHMe memorandum of understanding. However, they donated cellular air time, installed the Motorola emergency notification devices and provided access to the Puget Sound region's Compressed Digital Packet Data (CDPD) network.

Figure 1.1 shows the organizational chart. This chart also describes the relationships between the members of the project team. During the project, the project team participated in bi-weekly conference calls to discuss relevant issues.

Figure 1.1:
Organizational Chart



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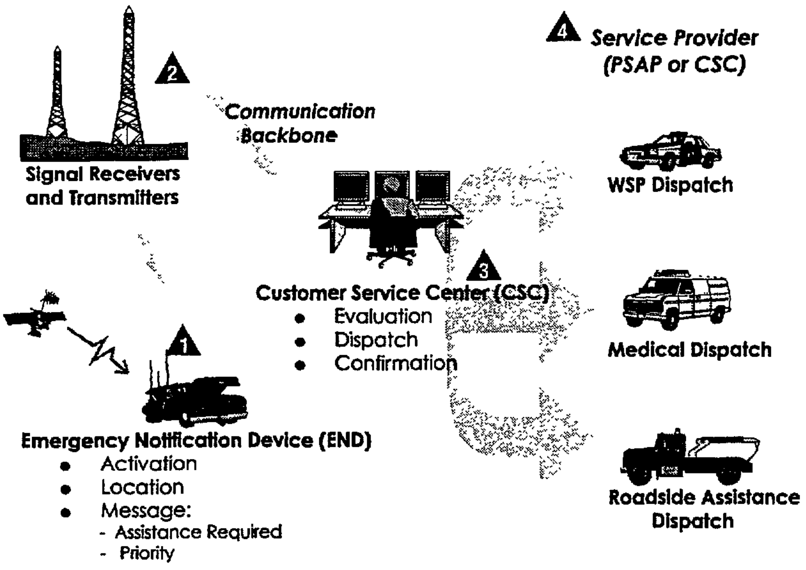
1.3 MAYDAY OPERATIONAL OVERVIEW AND CONCEPT

Figure 1.2:
PuSHMe System Concept



As shown in **Figure 1.2**, a typical mayday call involves a customer needing assistance, pushing a button on their device, their problem and location being transmitted to a service center, the service center calling the appropriate service provider, and service being dispatched to the scene. The mayday call would arrive with Global Positioning System (GPS) data that provides the exact location of the caller. The mayday operator would be located in a Customer Service Center (CSC) that maintains a database of customer information (e.g. medical information, emergency contacts, etc.). The CSC, operated as a subscription service, allows quick access to customer information in an emergency. The service provider is a Public Safety Answering Point (PSAP), commonly known as a E-911 center, or another CSC that dispatches aid or communicates medical advice.

Regional mayday systems can provide a wide range and delivery of services. While these systems have some of the characteristics of alarm, incident response or emergency services, they go beyond these. Unlike home alarm companies, the operators of a mayday system will usually be contacted directly by a customer and not an automated alarm system. Unlike auto clubs or an ambulance service, the mayday operator will not, in most cases, directly dispatch service. However, calls on a mayday system may include automotive, personal injury, criminal, or traveler assistance calls. The types of calls a mayday operator will need to respond to will be more varied than most of these established private subscription services.

A PuSHMe system could offer benefits to both the customer and the PSAP community. The customer benefits from having a PuSHMe system by knowing that, when necessary, they can signal an alert with the push of a button and be assured that the mayday service provider will know their exact location and provide a customized response. A PuSHMe service can offer several benefits to the PSAP community. Better location data, personal medical histories, pertinent personal information, and duplicate call reduction or consolidation are some of these benefits. This type of service, if delivered effectively, will provide better information in emergency situations to PSAPs while reducing customer stress in an emergency.

1.4 PUSHME TECHNOLOGIES OVERVIEW

The Puget Sound Help Me (PuSHMe) project evaluated two GPS-equipped mayday prototype technologies: a Motorola system employing an analog cellular phone and a XYPOINT system utilizing a two-way pager operating on the Cellular Digital Packet Data (CDPD) protocol network. Each device has three main buttons that designate the type of emergency. This allows the CSC to prioritize and tailor their response based upon the users perception of their problem. The Motorola device uses Police, Automobile, Traveler's Assistance, and a hidden panic button. The XYPOINT device uses the following emergency buttons: Emergency, Medical, and Automobile. The XYPOINT device also has Yes and No keys to communicate with the CSC.

The basic functions of the two devices are similar. A user sends an emergency call to a Central Service Center by pressing a button on the device. The CSC receives and processes the call and sends location, incident and subscriber information to the appropriate emergency service. In obtaining and refining information, the Motorola device has a cellular phone link that provides voice contact between the user and the CSC. The XYPOINT device has a display screen that the CSC can use to ask the user questions. The user responds using the device's "Yes" and "No" keys.

Both the Motorola and the XYPOINT systems use GPS technology to locate callers and map based Geographic Information Systems (GIS) to display the location of callers. The GPS information for both systems was also differentially corrected. Differential correction is necessary to improve positioning signal accuracy provided by the GPS satellites deployed by the United States Government. With uncorrected GPS, data is accurate within 100 meters. Differential correction can provide accurate location information within three meters. GPS data is provided in latitudinal and longitudinal coordinates. GIS system takes the coordinates and ascribes them to points on a map. GIS is also capable of providing landmarks and routing information. Together, these allow the CSC operators to give real-world locations to service providers when reporting mayday calls.

Both mayday systems also provide customer databases that link data generated when a call is received to pre-entered customer information. This information can include automobile, medical, and other relevant personal information. In the event the user cannot communicate, these databases can provide important emergency information.

1.5 PUSHME FIELD OPERATIONAL TEST OVERVIEW

The PuSHMe project included usability, marketability, technological and institutional evaluation. The PuSHMe partners were responsible for designing tests and facilitating the data collection, conducting the tests of the devices, and providing the data to the Evaluation Team. The Evaluation Team was responsible for setting sample sizes, defining the evaluation tests, and processing and evaluating the data. Tasks were carried out as set forth in the *Detailed Evaluation Plan* (November 17, 1995).

The usability evaluation determined how the participating users interacted with the devices. This portion addressed whether people understood the buttons, if they could use the system under duress and their general reactions on how the devices and system operated. This information was gathered through direct experience with the devices and interviews with users and questionnaires.

The marketability evaluations identified the demand, the market, and what public / private partnerships could best meet such a demand for an in-vehicle mayday system. The evaluation created a series of hypothetical mayday systems and used them to determine what choices and options users would most value in a mayday system. The best possible public / private service provision scheme was then determined.

The technological evaluation included three types of tests: the Partial Field Test, the Full Field Test, and the Specific Tests. These tests were conducted over a seven month period between November, 1995 and May, 1996. The specific tests were:

- The Partial Field Operational Test which included roughly 200 volunteers using the devices daily to provide a measure of how quickly and reliably the system could accept, recognize and prioritize a call.
- The Specific Tests which analyzed the specific functions of the devices. The Specific Tests included the dropped carrier, moving, topographic interference, location specific, and nation-wide tests.
- The Full Field Operational Test which simulated and evaluated mayday calls from start to finish, including the dispatch of emergency services.

1.6 REPORT STRUCTURE

This report describes the Controlled Field Testing phase of the PuSHMe Operational Test. The work involved a series of controlled field tests of the two PuSHMe mayday systems. The controlled field tests yielded operational data on the emergency notification devices (END) that were used to frame the testing activity during the evaluation effort. Work during this element included:

- development of operational procedures for conducting the evaluation including instructions for users of the devices and central service center (CSC) staff;
- recruitment of 75 volunteers to participate in the Controlled Field Test phase and in the following phase, User Group Deployment, during which project evaluation data was collected;
- installation and testing of the PuSHMe mayday system hardware and software including the CSC systems at the WSDOT Traffic System Management Center (TSMC) and XYPOINT's corporate offices, installation of a Differential Global Positioning System (dGPS) reference station at the WSDOT TSMC, and installation of Motorola ENDs in the vehicles of project volunteers;
- design and development of the required interfaces between the two CSC systems and the PuSHMe system monitoring workstation at the WSDOT TSMC;
- installation and testing of a system monitoring workstation (SMW). The SMW collected time-stamped data characterizing the system performance of both PuSHMe mayday systems as required by the evaluation team;
- integration and testing of the two PuSHMe mayday systems in order to ensure proper operation, information transfer and display of the two CSCs, the dGPS receiver, and the SMW; and
- field testing of the entire system to assess the accuracy and range of the ENDS and the reliability of the system.

This report is divided into the following sections:

Section 2.0 - discusses evaluation requirements of the project;

Section 3.0 - explains the development of operational procedures for using the ENDs;

Section 4.0 - discusses how users were recruited, trained, and how the ENDs were installed in vehicles;

Section 5.0 - explains the data collection process and the interface between the response centers and the system monitoring workstation;

Section 6.0 - presents findings from the field exercises and the testing process.

2.0 EVALUATION REQUIREMENTS

2.1 DETAILED EVALUATION PLAN

Before the PuSHMe evaluation could be executed, it was necessary to determine the data collection requirements including data elements and frequency. Through interaction between the Evaluation Team and the PuSHMe team members, four project goals were identified and prioritized. The four major goals and related objectives are as follows:

Goal A: Evaluate System Performance

1. Does the system perform as designed?
2. Does the system perform to meet service requirements?

Goal B: Evaluate System Usability

1. Do users accept the system (e.g. how it works)?
2. Do users like the system (e.g. what it does)?

Goal C: Evaluate System Marketability

1. What are the conditions that characterize demand?
2. What public/private combinations of services can be economically delivered to satisfy the demand?

Goal D: Evaluate Institutional Issues

1. Can the system be implemented within the current institutional and social framework?
2. What was learned from the institutional interactions of the PuSHMe partners?

Table 2.1 provides an overview of these goals and their related objectives, hypotheses, measures of effectiveness (MOEs), and data sources.

The University of Washington, as the independent evaluator of the PuSHMe project, prepared the *Final Detailed* Evaluation *Plan* (University of Washington et al., November 17, 1995) with input from the team members. This *Plan* was developed to address each of the above goals and describes four evaluation studies to meet those goals. Two of the evaluation studies – Studies 1 and 2 – used data generated by the PuSHMe mayday systems while Studies 3 and 4 used a conjoint analysis and focus groups, respectively, to gather data necessary to address each study's objectives.

The Performance Analysis (Study 1) evaluated the performance of the PuSHMe mayday systems using data generated by the users, computers and operators at the CSCs, and the service providers. The data requirements identified in this report were used to develop the procedures for conducting the various tests summarized in **Table 2.2.** The Performance Analysis identified three types of performance tests: the full field, the partial field and the specific operational tests. The full field operational test tracked a mayday scenario from call initiation through the arrival of emergency service. The partial field operational test measured the drivers' general operations in a variety of settings, taking a call from its initiation through the receipt of that call at the CSC. The specific tests provided data on specific performance issues of the systems. There were

Table 2.1 - Objectives, Hypotheses, MOEs, and Data Sources for All Four Evaluation Studies

GOALS	OBJECTIVES	HYPOTHESES	MEASURE OF EFFECTIVENESS	DATA SOURCES
1. Evaluate System Performance	Determine whether the system performs as designed.	The system performs as designed within acceptable limits.	See Table 2.2	· User Response Forms · Response Center Computers · CSC Operators · Simulated Service Provider Forms
	Determine whether the system performs to meet service requirements.	The system performance is sufficient to meet service requirements. The system is more effective than comparable alternatives.	Time and location requirements for emergency response. Comparison to performance of regular cellular phones.	· Literature Review · Partner-provided Cellular Phone Comparison Data · User Response Forms · Response Center Computers • CSC Operators · Simulated Service Provider Forms
2. Evaluate System Usability	Evaluate whether users accept the system (e.g., how it works).	The system is easy to use.	User performance and assessment · Frequency of the correct button being pushed · Ease of using devices	• Literature Review • Questionnaires, · User Response Forms, · Interviews (if needed).
	Evaluate whether users like the system (e.g., what it does).	The system is desirable.	User perceptions of: · Response, · Reliability, · Safety, and · Security	
3. Evaluate System Marketability	Determine the conditions that characterize demand.	The demand conditions can be identified.	User preferences for alternative configurations of the service.	Conjoint analysis • Interviews · Questionnaires
	Determine which combinations of services can be economically delivered to satisfy the demand.	A specification of the system can be supplied to satisfy the demand.	User preferences for alternative configurations of the service.	
4 Determine Institutional Feasibility of Implementing the System	· Describe institutional issues that impacted the operational test. . Describe the desirability of this type of system. · Evaluate the operational protocols developed. · Identify the issues associated with the Framework for Future Design	N/A	· Functionality of operational protocols used during full field operational test. · Desirability of implementation by those currently involved in emergency response. · Feasibility of future implementation based on model developed by partners.	· Structured interviews with partners and "spokespersons" from public agencies. • Literature review. • Observations at CSCs. · Observations of the Response of a Focus Group to the Framework for Future Design developed by Partners.

Table 2.2 - Study 1 Tests, Variables, MOEs, Data Sources, and Sample Sizes

TESTS	INDEPENDENT VARIABLES		MOEs	DATA SOURCES THAT ADDRESS MOEs	# Trials Motorola	# Trials XYPOINT
I. Full Field Operational Test	Motorola (1 Cond.) 1. Time of Day - Peak Cellular 2. Environment - Suburban 3. Circumstance - Emergency	XYPOINT (1 Cond.) 1. Time of Day - Peak Cellular 2. Environment - Suburban 3. Circumstance - Medical 4. Response - Yes	1. Time Delays 2. Quality of Information Concerning Location of Incident 3. Call Connected with One Button Push a. Yes b. No 4. Call Disconnected During Test a. Yes b. No	1. User Response Form; CSC System Generated Data Packet; CSC Operator entered Information; Emergency Service Provider Response Form 2. Emergency Service Provider Response Form 3. User Response Form 4. User Response Form	100	100
II. Partial Field Operational Test	Motorola (18 Cond.) 1. Time of Day a. Pk. Cell. Hrs. b. Off-Pk. Cell. Hrs 2. Environment a. CBD b. Rural c. Suburban 3. Circumstance a. Emergency b. Rdside Assist. c. Traveler Assist.	XYPOINT (36 Cond.) 1. Time of Day a. Pk. Cell. Hrs. b. Off-Pk. Cell. Hrs 2. Environment a. CBD b. Rural c. Suburban 3. Circumstance a. Police b. Medical c. Auto 4. Response a. Yes b. No	1. Time Delays 2. Call Connected with One Button Push a. Yes b. No 3. Call Disconnected During Test a. Yes b. No	1. User Response Form; CSC System Generated Data Packet; CSC Operator entered Information 2. User Response Form 3. User Response Form	3,600	7,200
III. Specific Tests						
Specific Test 1 - Dropped Carrier Specific Test	Motorola (1 Cond.) 1. Time of Day - Peak Cellular 2. Environment - Suburban 3. Circumstance - Emergency	XYPOINT (1 Cond.) 1. Time of Day - Peak Cellular 2. Environment - Suburban 3. Circumstance - Medical 4. Response - Yes	1. Operator Recognizes Call Drop a. Yes - FD Entered by CSC b. No - FD Not Entered by CSC 2. Call Re-established at its Previous Rank a. Yes - AR Entered at CSC b. No - AN Entered at CSC	1. CSC Operator-entered Information 2. CSC Operator-entered Information	100	100
Specific Test 2 - Moving Test	Motorola (1 Cond.) 1. Time of Day - Peak Cellular 2. Environment - Suburban 3. Circumstance - Emergency		1. Vehicle Location Tracked Correctly for 15 Minutes	1. CSC "Breadcrumbs Trail" Map Compared to Pre-determined User Route Maps	100	N/A
Specific Test 3 - Topographic Interference Test	Motorola and XYPOINT (4 Cond. Each) 1. Barrier a. In Between Buildings (Urban Canyon) b. In Parking Garages c. In Forest d No Barriers 2. Time of Day - Peak Cellular 3. Circumstance - Emergency/Medical		1. Time Required for the GPS Location to be Received in the Vehicle 2. Time Required for User Location and Service Request to be Received at the CSC 3. The Call Connecting With One Button Push	1. CSC System Generated Data Packet 2. CSC System Generated Data Packet 3. User Response Form	200	200
Specific Test 4 - Location Specific Test	Motorola and XYPOINT (3 Cond. Each) 1. Time of Day - Peak Cellular 2. Environment a. CBD b. Rural c. Suburban		1. Location Accuracy (Lat./ Long.)	1. CSC System Generated Data Packet, User Response Form	100	100
Specific Test 5 - Nation-wide Test	Motorola (2 Cond.) 1. Time of Day - Peak Cellular 2. Type Environment - Constant 3. Location of Initiation (Seattle/Phoenix) 4. Circumstance - Emergency		1. The Call Connecting With One Button Push 2. Location Accuracy (Lat./ Long.) 3. Quality of Voice Communication	1. User Response Form 2. CSC System Generated Data Packet, 3. User Response Form	50	N/A

five specific tests: Dropped Carrier, Moving Vehicle, Topographic Interference, Location Specific, and Nation-wide. The evaluation plan described in the *Final Detailed* Evaluation Plan was used to develop the testing procedures and protocols for each of the operational and specific tests. Each of these tests is described in further detail below.

Study 2 - Usability Analysis evaluated the usability of the PuSHMe mayday systems from the user's point of view. This evaluation study analyzed the user's acceptance and perception of each system and included both qualitative and quantitative analyses of data gathered from users participating in the partial field operational test. The analysis relied on data collected from:

- a literature review;
- User Report Forms;
- questionnaires administered to project participants; and
- in-person interviews of selected users.

2.2 FULL FIELD OPERATIONAL TEST

This test was designed to evaluate the PuSHMe mayday systems from call initiation to service arrival and call closure. Both DEA and WSDOT employees acted as users, following a script that defined the location and button to be pressed. The CSC received, interpreted, prioritized, and acknowledged the call. The CSC then called the appropriate service provider that dispatched an on-duty policeman or roadside assistance to locate the user. The information that was passed from the CSC to the service provider included the user's location, vehicle and user description, and the type of incident. Upon arrival, the user alerted the CSC and the call was closed out. This operational test evaluated the performance of the device, the workstation, and the quality of the PuSHMe information. Data collection included time-stamps and location information, as well as qualitative data about the usefulness of the information from the emergency service.

Two sets of data were generated by the full field operational test from the User Response Forms and the CSC logs. The completed User Response Forms were manually entered into a database. The CSC logs were electronic fries containing:

- data provided by the END and in-vehicle GPS receiver;
- data entered by the CSC operator; and
- data provided by the (Differential Global Positioning System) dGPS receiver located at the CSC.

The User Response Forms included the following information:

- time initial button pushed;
- time user received request verification from CSC;
- time user received notice that service is on the way;
- time service actually arrived;
- location;

- weather;
- number of attempts to connect to the CSC; and
- whether the user lost connection.

The CSC logs captured the following data:

- **Unique ID** - a unique identification number generated for each call;
- **GPS Time** -the time that the vehicle acquired GPS location;
- **System Time** -the current time according to the CSC computer;
- **Vehicle ID** -the identification number associated with the in-vehicle END;
- **Location-** the longitudinal and latitudinal coordinates as determined by the in-vehicle GPS receiver and corrected by the dGPS at the CSC;
- **Event Type** -which button the user pushed; and
- **Comments** - information manually entered by the Operator.

2.3 PARTIAL FIELD OPERATIONAL TEST

The partial field operational test provided data regarding the drivers' (users') general operations in a variety of settings. The test took a call from initiation to confirmation of receipt at the CSC. The variety of settings included location, circumstance, weather and time of day. Given a specific time and circumstance (e.g. heart attack, carjacking, etc.), users were asked to push a button on the END which described their given circumstance. These tests provided data regarding:

- the usability of the system within the context of a simulated situation (circumstance);
- the performance of the systems in various locations;
- the performance of the systems during peak vs. off-peak cellular times;
- the performance of the systems based on button pushed;
- call acknowledgment time;
- the performance of the systems in different weather conditions; and
- system reliability (frequency of calls connecting with one button push when not unexpectedly disconnecting or encountering other technical difficulties).

The User Response Forms provided a scenario description and **a** user response section. The scenario description included the following information:

- device identification number (and phone number for the Motorola devices);
- volunteer name and number;
- date of the test;
- circumstance; and
- time of test.

Circumstances designed to simulate a situation which the END could assist the user in resolving. The circumstances included:

"You are out of gas."

"You have broken your leg."

"Your passenger suffered a heart attack."

"Your engine has overheated."

"A car ran into your vehicle. Your right arm is broken."

"You are lost."

The user response section included up to 11 items which provided data on the independent variables and measures of effectiveness described in Table 2.2. The 11 items were:

- time button pushed;
- location;
- type of location (Urban, Suburban, or Rural);
- weather (Clear, Cloudy, Raining, Snowing);
- which button the user pushed (For XYPOINT: Police, Medical, Auto; for Motorola: Emer, RA, TA);
- if the user received confirmation from the CSC;
- time user received confirmation from the CSC;
- if the user lost connection with the CSC (Y/N);
- if, upon losing the connection, the user was automatically reconnected (Y/N);
- for Motorola END only, quality of voice communication with the CSC (very good, good, somewhat poor, poor); and
- if the test failed (no acknowledgment from the CSC within 10 minutes).

Examples of these User Response Forms are included in **Appendices D** and **F.**

Although the User Report Forms were primarily used as part of Performance Analysis (Study I), some information from the User Report Forms was used as part of the Usability Analysis (Study 2). Specifically, for each trial, the users indicated which button they pushed. This information was analyzed to get a sense of how users tended to translate an emergency or roadside assistance circumstance into the appropriateness of pushing one of a fixed number of buttons. The appropriateness of the buttons users tended to push was then correlated to the protocols currently used in the PuSHMe CSCs. This helped to evaluate the effectiveness of the current designs and offered insight into future design improvements. In conjunction with the usability questionnaire, the User Response Forms were reviewed to determine how users decided which button to push given the different scenarios.

2.4 SPECIFIC OPERATIONAL TESTS

These tests evaluated the systems capabilities to:

- reconnect after the signal has been dropped (Dropped Carrier);
- accurately revise positions during a moving test (Moving Vehicle);
- communicate despite topographical obstacles (Topographic Interference);
- precisely locate vehicles (Location Specific); and
- assist vehicles located in different regions of the country (Nationwide).

Initially, seven specific tests were proposed but discussion between the Evaluation Team and DEA resulted in the Time Gap and Traveler's Assistance tests being withdrawn. Data that would have been collected from these tests was found to have been collected as part of other tests.

Two sets of data were generated by the specific operational tests: hardcopy forms completed by the user and the electronic data generated at the CSC.

2.5 FIELD EXERCISES

Field exercises were conducted for the two operational and five specific tests. These exercises ensured that the PuSHMe systems would function as planned during the User Group Deployment. The field exercises were critical for the specific tests due to their short duration. For these tests, the exercises were typically performed over a half-day while the actual test occurred over a three to four day period. The exercises allowed users and CSC operators to familiarize themselves with the test procedures and to identify any flaws in the test which needed to be addressed before the actual test was carried out.

One day of field exercises were conducted for the Full Field Operational Test. Test procedures were modified and protocols were refined to meet the requirements of the Service Providers. The field exercises showed that the simulated incidents did not require all of the information available during an actual emergency. (See Chapter 7 of the *PuSHMe Institutional Issues Report* for a full explanation.)

For the Partial Field Operational Tests, the exercises ensured that each of the different combinations of variables (18 conditions in the Motorola system and 36 conditions in the XYPOINT system) were evaluated using a scenario database created in Microsoft Access. Users were requested to activate their END once per day Monday through Friday, except statutory holidays, during a random 15-minute window based on the time users indicated that they would be available and the CSC's hours of operation. The Motorola system was in operation between 1:00 p.m. and 6:00 p.m. while the XYPOINT system operated between 7:00 a.m. and 6:00 p.m. The Motorola system's hours of operation were limited due the small number of users equipped with the device. (The number of users was determined by the budget for equipment.) Conversely, the XYPOINT system had more users and operated over a longer time period. Data collected as part of the partial field operational test were included with data collected for the User Group Deployment. No data was discarded by the Evaluation Team and only the testing procedures were revised.

3.0 DEVELOPMENT OF OPERATIONAL PROCEDURES

The team members developed operational procedures for conducting the User Group Deployment PuSHMe Field Operational Test. Operational procedures included the processes for recruiting users and instructions for installing devices in vehicles, and the step-by-step instructions needed by users and CSC operators to conduct the various tests. The operational procedures were developed to meet the requirements of the *Final Detailed Evaluation Plan.*

3.1 USERS

A sample group of users who were unfamiliar with the project were trained using the draft operational procedures. This group then conducted sample partial field operational tests on the Motorola system. After the training session, the sample group was debriefed. Their responses were used to finalize the operational procedures for training users and conducting the partial field operational test. The operational procedures continued to evolve as new issues were identified. Although the XYPOINT system was not ready at the time of this initial testing, the lessons learned as part of this pretest were incorporated into the controlled field testing conducted on the XYPOINT system.

Safety was paramount during the testing. Therefore, the operational procedures required users to pull over to the side of the road and conduct the test while safely stopped by the side of the road.

3.2 RESPONSE CENTER OPERATORS

Two mayday systems were evaluated as part of PuSHMe: Motorola and XYPOINT. Motorola provided the Motorola CSC system located at the WSDOT Northwest Region headquarters building in Seattle. The other CSC system was located at the offices of XYPOINT. The staff at both CSCs were trained on the duties and responsibilities of a CSC operator.

3.2.1 Motorola CSC System

Operators at this CSC were trained using the *Central Service Center Operator's Manual* (Response Systems Partners Inc., 1995). This manual familiarized the CSC operators with the Mobile Assurance, Security, Tracking and Emergency Response System (MASTERS) software, which was the initial Motorola system. The manual outlines response procedures to be followed by CSC operators when using the MASTERS software and enables a CSC operator to respond effectively to provide services in any situation. Motorola upgraded the software prior to the evaluation phase, and changed it to Motorola's trademark name, MOTOTRAC (Motor Vehicle Tracking) System.

The typical sequence of events used by the CSC operator for a Motorola call during the full field operational test included the following eight steps:

1. Click mouse on icon indicating the call.

(The system displayed the appropriate location map, queried the customer database to obtain vehicle data and began tracking the vehicle. A typical location map is shown in Figure 3.1.)

2. Initiate voice communication with the vehicle and inform the user that the END has been activated and that the vehicle is being tracked.
3. Attempt to obtain specific information regarding the incident.
4. Notify the appropriate response service.
5. Continue tracking the vehicle until notified that tracking is no longer necessary.
6. Make notes and explain the disposition for each of the calls accepted.
7. Thank the user for pushing the button and that the test is now terminated.
8. Terminate the connection.

For the partial field operational test, the CSC operator conducted the following six steps.

1. Click mouse on icon indicating the call.

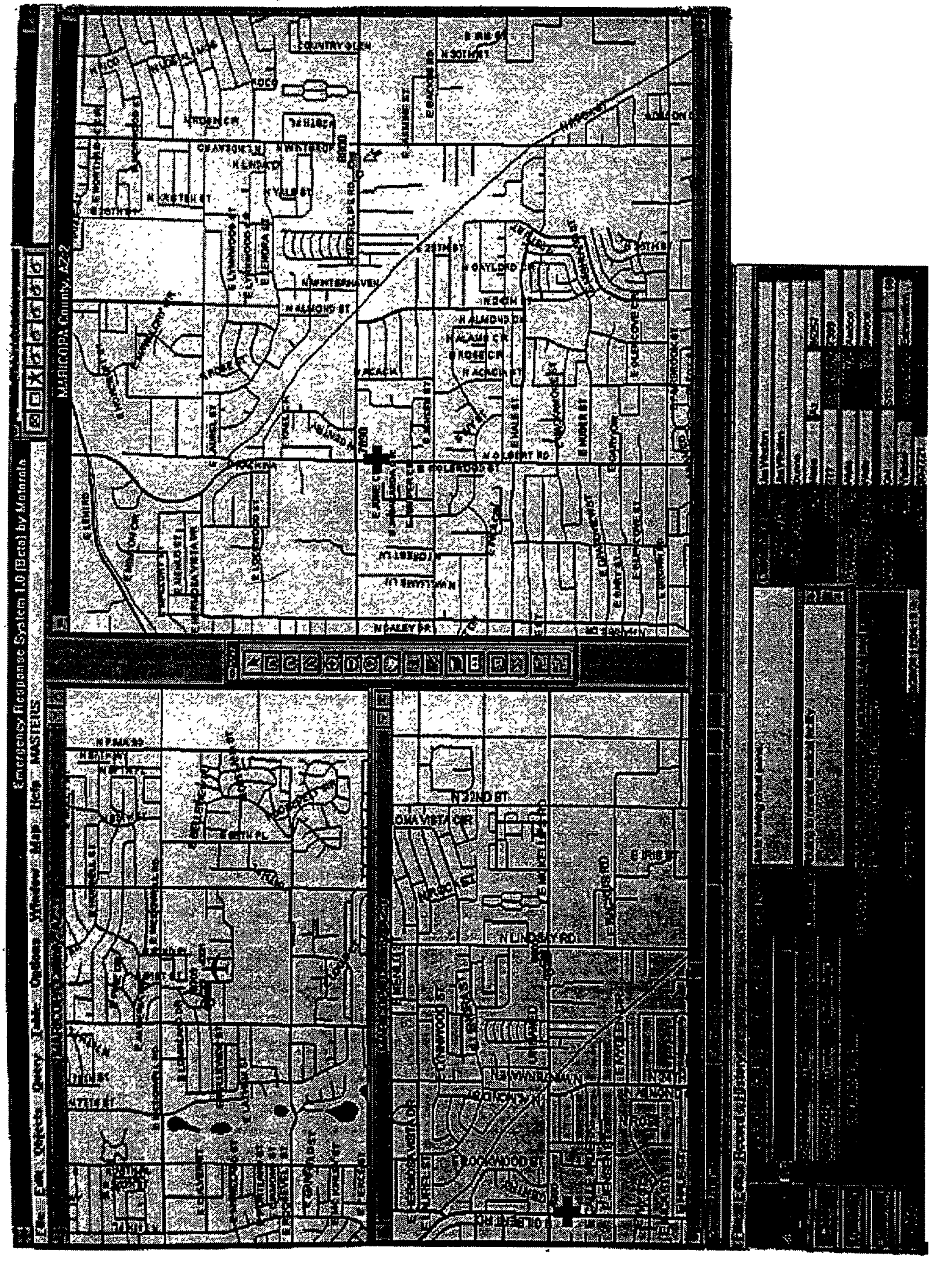
   (The system displayed the appropriate location map, queried the customer database to obtain vehicle data and began tracking the vehicle.)
2. Initiate voice communication with the vehicle and inform the user that the END has been activated and that the vehicle is being tracked.
3. Attempt to obtain specific information regarding the incident.
4. Make notes and explain the disposition for each of the calls accepted.
5. Thank the user for pushing the button and that the test is now terminated.
6. Terminate the connection.

Specific codes were developed to describe the call disposition to expedite analysis. The manual also included instructions prepared by IBI Group that described how to start up, shut down, and troubleshoot both the Motorola CSC system and the IBI Group System Monitoring Workstation. When CSC operators discovered a problem with the Motorola system, a problem log was completed. The problem logs were reviewed at the end of full field testing.

3.2.2 XYPOINT CSC System

The operators at the XYPOINT CSC were also trained in response procedures to conduct the operational tests. These procedures were developed by XYPOINT, DEA, and LUTE with comments from the independent evaluation team and were based upon existing protocols used at local PSAPs. These protocols are documented in *The Current Mayday System in Puget Sound* (LUTE University of Washington, February 9, 1996). Operators did not have a reference manual that documented the XYPOINT procedures for the operational tests. As with the users' operational procedures, the CSC response procedures continued to evolve as new issues were identified. Some of these issues are discussed in Section 6.0.

Figure 3.1:
Typical CSC Workstation Display



4.0 RECRUITMENT, INSTALLATION, AND TRAINING

4.1 RECRUITMENT OF USERS

The full field operational test and specific tests were conducted by DEA and WSDOT staff. The partial field operational test required recruitment of over 200 volunteers. During Controlled Field Testing, 75 users were recruited to ensure the smooth functioning of all aspects of operations including the mayday systems, data collection, operator training and user training. The search for users was a three phase process that also served to find the additional volunteers required for the User Group Deployment: identifying eligible people, presentation training, and enrollment.

The first phase identified organizations who could be interested in in-vehicle mayday system technology and could support the test. These organizations included private corporations and local public agencies. Typically, the organization's fleet manager or transportation coordinator (responsible for the organization's transportation demand management program) were approached for assistance with finding and supporting employees in volunteering for the project. The volunteer profile asked for volunteers who:

- have a dedicated vehicle;
- are located in King and/or Snohomish counties within AT&T's cellular network boundaries;
- are frequent travelers, e.g. people commuting or work crews; and
- have schedules that provide availability during study hours.

Typical information sent to employers is included in **Appendix A.** The next phase involved training the users. A DEA employee visited each worksite and gave a 40 minute presentation to the employer and potential users. The presentation explained the purpose of the PuSHMe Project and the users' role in the project. Slides used in these presentations are shown in **Appendix B.** The third phase occurred for those users still interested in volunteering for the project. They were asked to complete a Consent Form, a Liability Form, and a Demographic Information sheet. All forms were developed by DEA and then modified with input from the University of Washington and the other team members. Two different versions of the Liability Form were prepared to meet the individual requirements of the two technology providers. The information collected in the Demographic Information sheet was maintained completely confidentially and was considered only for data purposes for this project. Information collected on the Demographic Information sheet included users' availability. For example, this data was used to identify the times that each volunteer could participate in the test. Copies of these forms are in **Appendix C.**

4.2 INSTALLATION AND TRAINING

Installation of the devices and training of users were consolidated for both mayday systems. The two systems varied greatly in the amount of effort required for installation. Each PuSHMe mayday system had different procedures for installation and training.

4.2.1 Motorola

The Motorola Emergency Notification Device (END) was professionally installed at the AT&T Wireless Services Installation Center most convenient to the user. If the user was unable to have the device installed at one of the installation centers, an AT&T Wireless Services Mobile Installer visited the user.

DEA staff delivered the devices and components to the installation centers prior to the installation of the device in the users' vehicles. The *"ARROW' PuSHMe Vehicle Module Installation Manual* (Motorola, 1995) was provided to each installation center and mobile installer. This manual describes the Motorola END installation procedures, the required tools, and a complete wiring diagram for the END.

At the time of installation, the user met with DEA staff at the installation location with the test vehicle. A visual inspection of the vehicle, conducted by an AT&T service technician in the presence of the user, determined where the device would be installed in their vehicle. Any other installation concerns were discussed at this time. Since installation of the END typically took four hours to complete, DEA staff provided transportation for the user to and from their place of employment. After the END was installed, DEA staff inspected the system to confirm that the proper telephone line was activated and that the CSC phone number was programmed into the END's memory. Once the system passed inspection, the user was individually trained and provided with the PuSHMe Training Package that included operating instructions, a sample User Response Form, and three weeks worth of User Response Forms **(see Appendix D).** The information contained in the User Response Forms is described in Section 2.3. A self-addressed, stamped envelope was enclosed for the return of the previous series of forms.

4.2.2 XYPOINT

The XYPOINT END consisted of a small, hand-sized black box, a GPS antenna with a magnetic base, and a power cord equipped to plug into the cigarette lighter receptacle. This device was portable and did not require securing the END onto the vehicle. Acceptance testing on all ENDs was conducted by DEA staff who assured that each device was operating properly when they were distributed to the users. A copy of the acceptance test is attached in **Appendix E.** Due to the simple nature of this system, training typically occurred in groups and each user was provided with an END and a PuSHMe Training Package at that time. This package included operating instructions, a sample User Response Form, and three weeks worth of User Response Forms (see **Appendix F).** The next series of forms was mailed to the user in the last week of the prior series. A self-addressed, stamped envelope was enclosed for the return of the previous series of forms.

5.0 DATA COLLECTION

As indicated earlier, the PuSHMe Field Operational Test demonstrated and evaluated the two PuSHMe technologies; the Motorola cellular phone and the XYPOINT two-way pager. Each system's Central Service Center provided a link between the user and the response agency. The data captured by each system and the daily operations of both systems were completely separate.

The quantitative analysis, as defined by the *Final Detailed Operational Plan,* required the collection of real-time data characterizing the system performance for both PuSHMe mayday systems. Both systems collected and stored their own data in separate databases and in different formats. The PuSHMe Field Operational Test required a method to interface with the two PuSHMe mayday systems and store relevant project data in a single evaluation database.

The System Monitoring Workstation (SMW) was developed by IBI Group to consolidate the data required by the evaluation team. The SMW also provided a means to display the location of service calls from both PuSHMe mayday systems. This feature would demonstrate the ability of a Traffic Management Service Center (TMSC) to receive incident data from future mayday service providers.

5.1 SYSTEM MONITORING WORKSTATION

The SMW issues defined above identify its three required functions: communication, processing and storage. First, the SMW must communicate with the PuSHMe mayday systems to receive the relevant data. Next, the data must be filtered and sequenced to match the requirements of the evaluation team. Finally, the data must be stored and made available to the University of Washington Evaluation Team. The development of the SMW can be described by exploring the development of each function.

5.2 DATA INPUT

The Motorola system collected a wide range of data used both for display purposes and post-event evaluation. The Motorola data was stored in the form of two tables: the call table and the position table shown in **Tables 5.1** and 5.2, respectively. Motorola developed special software for the PuSHMe Field Operational Test to transfer the required data directly to the SMW.

Table 5.1: Motorola Call Table

field Name	Field Type	Length
alarm_code	char	10
call_close_time	hh:mm:ss	8
call_date	mm/dd/yy	8
call_disposition	char	256
call_id	char	20
call_notes	char	256
call_time	hh:mm:ss	8
call_timestamp	hh:mm:ss mm/dd/yy	17
call_vehicle_id	char	12
closed	integer	4
cumulative_hold	inteaer	4
oper_id	char	10
position_hh:mm:ss	hh:mm:ss	8
selected_call	integer	2
telco line	integer	4
hh:mm:ss_placed_on_hold	hh:mm:ss	8

Table 5.2: Motorola Position Table

Field Name	Field Type	Length
call_id	char	20
corr_applied	integer	2
corr_height	floating point	4
corr_lat	double precision floating point	8
corr_lon	double precision floating point	8
DOP	floatina ooint	4
heading	integer	2
position-time	hh:mm:ss	8
rec stamp	hh:mm:ss	8
used	inteaer	2
veh_id	char	12
velocity	integer	2

The SMW was located alongside the Motorola system at the TSMC and was configured to receive data transmitted through a serial connection. During an active call, Motorola data was transmitted to the SMW every five seconds.

The XYPOINT system logged all data records generated for each event in the system including: communications from the field, communications to the field, and operator entry. The weekly log of XYPOINT data records was transmitted to the SMW via modem to be incorporated into the evaluation database. **Table 5.3** defines the format of the data log.

Table 5.3: XYPOINT Record Log Definitions

Field Name	Field Type	Length
Operator Identification	char	3
Shift Number	char	1
Date	yymmdd	6
Call Tracking Number	char	4
Time	hh:mm:ss	8
Push-Button Id	char	1
IP Address (Vehicle ID)	xxx.xxx.xxx.xxx	15
One Field Containing	(format defined below)	100
GPS Info Header	char	4 (">RLN")
GPS Time of Day	char	8
Latitude	char	10
Longitude	char	11
additional GPS information	char	67
or		
Evaluation Code	char	100
or		
Text entered by the operator	char	100

5.3 DATA PROCESSING

The main function of SMW data processing was to provide the evaluation database with data extracted from the records provided by the participating PuSHMe mayday systems. The data processing was developed in four steps:

- identification of the desired database elements;
- reconciliation of desired data sets with PuSHMe data sources;
- definition of the evaluation database; and
- development of software to filter the data and populate the database.

For the first step, the evaluation team identified data collection requirements based on the quantitative analysis description. These requirements described the desired set of data elements to be collected directly corresponding to specific events encountered in a generic mayday system response. **Table 5.4** displays the data elements and the associated events for which the data is collected.

Table 5.4: Data Requirements Defined by Evaluation Team

Generio Event Description	Data Source	Time Stamp	Call ID	Vehicle ID	Pos	Weather	Env	Comments
User Activates Device	User Response Form	•	•	•	•	•	•	•
Control Center Computer Receives and Logs Request	PuSHMe Mayday System							
(Operator Entered)	•	•	•	•				
Control Center Operator Identifies and Logs Incident	PuSHMe Mayday System							
(Operator Entered)	•	•	•				•	
Control Center Operator Contacts User to Verify Request	PuSHMe Mayday System	•	•					•
User Verifies Operator-Echoed Information	User Response Form	•						•
Control Center Logs Service Dispatch Request	PuSHMe Mayday System (Operator-Entered)	•	•	•	•			•
Emergency Service Dispatcher Receives Request	Service Dispatch Response Form	•	•	•	•			
Service Arrives at User's Position	User Response Form	•						•
Control Center Operator Verifies Arrival of Service	PuSHMe Mayday System							
(Operator-Entered)	•	•					•	
User Acknowledges Service Arrival and Logs Out	User Response Form	•						•
CSC Operator Logs Out	PuSHMe Mayday Svstem							
(Operator-Entered)	•	•					•	

Next, the desired data collection schedule and set of data elements were reconciled with the data available from each system to establish data elements that could be supplied automatically by each PuSHMe mayday system. Automated data collection was incorporated as much as possible, but some events and some data elements were not recorded by one or both PuSHMe mayday systems. For events where the data could not be collected automatically, other data sources were used including User Response Forms and unique operator-entered codes. **Table 5.4** also identifies the data sources for each event.

The third step involved the definition of an evaluation database for data required from the evaluation plan. The data record for the Motorola system contained most of the data elements described in **Table 5.4.** The XYPOINT data records represented a subset of the data elements available from the Motorola system. Therefore, the Motorola record format was adapted to become the evaluation database format. **Table 5.5** summarizes this database format describing the availability of data from the PuSHMe mayday systems.

Finally, specific communications software were prepared for each PuSHMe mayday system. This software was designed to run continuously on the SMW and to process the data transmitted via serial connection and modem. Processing involved reading the data records form both PuSHMe mayday systems, parsing the data fields contained within these records, and populating the evaluation database with the appropriate values.

5.4 DATA STORAGE

The evaluation database has the format described in **Table** 5.5 and contains data from both PuSHMe mayday systems. The active version of this database resides on the SMW and is archived on tape and other PCs. When data is archived, the active database file is purged in order to keep the database file to a manageable size. Periodically, data was exported from the database to create separate files representing weeks of data. The data was further subdivided based on the source PuSHMe mayday system. These files were then provided to the evaluation team.

Table 5.5: Description and Format of Evaluation Database on the System Monitoring Workstation

Field Name	Type	Field Size	Description
call-id	char	20	A unique identification code associated with the call. All records with the same call-id are generated as part of the same call. For Motorola, this code is generated by concatenating the Motorola's vehicle identification with the initial time of the call. For XYPOINT, this code is generated by concatenating the 3 character operator identification, a blank, the 8 character session number, another blank and the 4 character tracking number.
vehicle-id	char	12	The unique identification assigned to the vehicle for the duration of the operational test.
call alarm	char	10	This is the call type dependent on the button pushed on the field units. For XYPOINT, only the first record of a call will contain data in this field.
call-date	char	8	The date (mm/dd/yy) the call was initiated.
call_time	char	8	The time (hh:mm:ss) the call was initiated.
call-stamp	char	17	This is a date and time stamp (mm/dd/yy hh:mm:ss) associated with each individual record. The order and timing of records associated with a call are determined by this time stamp.
closed	num	4	An integer indicating the status of the call. For Motorola, this value can either be 0, 1 or 2. A 0 indicates that the call is open. The other values indicate stages of the closing procedure. For XYPOINT, the value is always 0.
call-close	char	8	The time stamp associated with the closing time for the call.
corrapp	num	2	This field indicates a value related to the differential correction applied to the GPS data.
corrlat	num	10	The differentially corrected latitude.
corrlong	num	11	The differentially corrected longitude.
corrheight	num	11	The differentially corrected height. For XYPOINT, this field contains the seconds past 00:00 GMT that the reading was made.

6.0 FINDINGS

Two original mayday systems were tested as part of the PuSHMe project. The Motorola system was cellular based and allowed the caller to contact a CSC with the push of a button. The XYPOINT system was a two-way pager system using the Compressed Digital Packet Data (CDPD) protocol. The field tests were designed to evaluate the full functioning of the PuSHMe mayday systems from call initiation to call closure.

The controlled field tests of the two regional mayday systems included:

- the development of operational procedures for using the ENDs;
- the recruitment of users;
- the installation of ENDs in vehicles;
- the interfaces between the response centers and the system monitoring workstation;
- the integration and testing of the PuSHMe mayday system; and
- and field exercises.

6.1 OBSERVATIONS AND LESSONS LEARNED

During the course of the Controlled Field Testing, potential problems in the system and procedures were identified and corrected as applicable. The intent of the controlled field testing was to concurrently evaluate the procedures for training and conducting the two operational and five specific tests for both systems. Motorola testing began in October, 1995. Due to a variety of technical problems with the END, the CDPD network and the XYPOINT CSC computers, the XYPOINT system was deployed three months later in January 1996. By this time, lessons learned from the Motorola system were used to refine the operational procedures used in XYPOINT system test.

6.1.1 Prescribed Testing Times and Locations

Initially, it was proposed that the users in the Partial Field Operational Test call in from a specific location at a specific time each day. This was accomplished by randomly selecting a 15-minute window during the time when the user would be in their vehicle along the routes that they typically travel. During the training session, users were informed that if they could not conduct the test during the prescribed time window, they should conduct the test at a time convenient for them. As the Controlled Field Test progressed, it was noted that the users were not following this instruction. Instead, they indicated that they were not available to push the buttons that day. This problem was resolved by modifying the User Response Form by indicating what the hours the CSC would be operating thereby providing more time to conduct the test.

In addition, it was impractical to ask a volunteer to conduct a test at a relative location such as urban, rural, or suburban. As a result, the User Response Form was revised to allow the user to record the location where they conducted the day's test.

6.1.2 Priming the Data Pump

During start-up of the Motorola CSC server, it became apparent that it was necessary to verify that the data pump program was sending data to the SMW. After investigating this issue, it was decided to add an additional step to the server start-up procedure. This protocol consisted of the CSC operator contacting a DEA employee to make a call from a DEA vehicle equipped with the Motorola END. This call provided data necessary to verify proper operation of the software. The operator would label this call "xt" for the benefit of the evaluation team. This code indicated that the call was not a test. Again, it should be emphasized that this data pump was specifically developed for the PuSHMe test special data collection requirements. The data pump is not a normal or necessary part of the Motorola system, which does not maintain internal data records more extensive than those required by the PuSHMe project.

6.1.3 CSC Staffing

Another lesson learned was that dedicated, trained staff were necessary to operate the CSC. The CSC should be staffed by people whose primary responsibility is operating the CSC and who would not have time conflicts such as those who are also going to school or had another job. As the test progressed, the CSC operators became more confident and adept at using the CSC system and required less supervision.

6.1.4 Reliability of Emergency Notification Devices

Although all of the devices were test models, the ENDs are all prototype models that will be refined for commercial sale. A relatively high failure rate was experienced by the Motorola and XYPOINT ENDs. Approximately one replacement XYPOINT END was issued to a user each day over the duration of the partial field operational test. Similarly, the Motorola Vehicle Modules (MVM) were frequently exchanged (about 50 percent of units in stock). The MVM contained the GPS modem and associated hardware and software that allowed data to be sent over the cellular voice line to the CSC.

6.1.5 Recruitment of Users

Recruiting of volunteers was a challenge and very time consuming. Volunteer recruitment must be given more emphasis for future ITS projects. Volunteers might be offered an incentive for participating, i.e. gift certificates, baseball caps, T-shirts. For any future recruiting drives, we recommend identifying potential employers by obtaining a listing of all businesses with more than 100 employees, conducting a blanket mailing, and following up with phone calls. In addition, local Vanpools - a good source of volunteers for PuSHMe - should be approached earlier in the process to perhaps include them as team members in the test.

6.1.6 Panic Buttons

The initial set of Motorola ENDs had personal security buttons (panic buttons) installed on the seat belt clasp. Due to the location, this feature was activated unknowingly by the users. This feature provided a one-way voice link with the CSC in which the CSC operator could listen to the vehicle. However, no signal of activation is provided to the user other than a very small icon on the handset's screen. Unintentional activation of this feature led to the draining of batteries in several vehicles. Since the studies did not plan to evaluate this feature, these panic buttons were not critical to the project. As a result, installation of this feature was discontinued in any other vehicles equipped with the Motorola END. The PuSHMe project was a temporary installation with a desire to keep it simple with minimal modification to the volunteers' vehicles. The system does accommodate permanent user selection of optimal locations for placement of the panic button and is intended to be used in cases like carjacking when it would be desirable to notify the CSC of the panic situation and allow them to hear what was happening in the vehicle without alerting the perpetrator, similar to a silent alarm in a bank. No signal of activation is purposefully designed into the panic feature to prevent further provoking the criminal or alerting him/her that they are being tracked and authorities notified.

6.1.7 Installation of Motorola ENDs

Installation of the Motorola system was a challenge for the AT&T Wireless Service installers. Although familiar with installation of cellular phones, they needed extra advice for the correct placement of the GPS antennas. Initially, staff from Motorola trained an installer from AT&T. However, this installer left AT&T and that support was no longer available within AT&T. Furthermore, five different installation centers were used with many different installers. Few, if any, had much experience installing the Motorola ENDs. Even though written instructions were provided, the Motorola END must be inspected to ensure that all components are in the correct location and that the phones were properly programmed by a member of the test team who is familiar with the equipment.

When these mayday systems become available commercially, it is expected that local dealers would have installation staff on hand who are very familiar with the END. An example of this are the car alarm and auto stereo dealers. Therefore, this problem should be considered to be project-specific.

6.1.8 Reliability of CDPD Network

When users were trained on the XYPOINT END, the XYPOINT CSC was not always operational due to CDPD network problems. The network must be up and operating for the user to get useful training which also makes them confident that the system will work during the test. Although the delay in starting the XYPOINT system testing phase of the testing allowed the application of lessons learned from the Motorola system, the delay did result in a need to extend the testing period beyond what was originally planned. In addition, three versions of the END were produced. These upgrades were necessary so that the XYPOINT ENDs were compatible with the AT&T software upgrades. This resulted in older versions being recalled from the users to be replaced by the newest version.

6.1.9 Coding Unfamiliar to XYPOINT Users

During the field testing, messages were sometimes sent to the XYPOINT users which were intended for users conducting specific tests. These messages were often unfamiliar and resulted in confusion of the user. Sometimes, this confusion resulted in the user becoming suspect of the END's ability to work properly. Consequently, they would mark a successful test as a failure. Therefore, users should be familiar with all messages and, as a result, a list of likely messages was created and distributed to the users.

6.2 USER GROUP DEPLOYMENT TESTS -WORK ELEMENT 3

The next phase of the PuSHMe Operational Test was the User Group Deployment Test that built upon the procedures developed and lessons learned during the Controlled Field Testing. The User Group Deployment Test collected the data necessary to conduct the Performance Analysis and Usability Analysis studies.

During this work element, the number of users was expanded to a goal of 50 Motorola users and 200 XYPOINT users. These people took part in the Full Field Operational Test, the Specific Operational Test, and in the completion of the Partial Field Operational Test. The User Group Deployment Test is discussed in Technical Memorandum 3.

Appendix A
Field Test Information Sent to Employers of Volunteers

PuSHME (Puget Sound Help Me) Mayday Project

Background

PuSHMe is an operational test of a mayday technology and system sponsored by the Federal Highway Administration (FHWA) and the Washington State Department of Transportation (WSDOT).

PuSHME is a regional emergency notification and response technology. The system would allow a driver in need of assistance to transmit his or her location (using GPS technology) to a response center. The response center would then immediately dispatch the appropriate type of assistance, whether a tow truck, police or other emergency services. This project will test this mayday system and analyze various aspects including operational, user, institutional, and technological requirements.
The tests permit an evaluation of how well newly developed Intelligent Transportation System (ITS) technologies work under operating conditions and they assess the benefits of, and public support for, the product or system. Operational tests are conducted in a “real world” operational highway environment under actual conditions.

David Evans & Associates is currently seeking volunteers to participate in operational tests of the new technology. We have been targeting local governments, transit agencies, and large employers as an outlet to send information about the project. Enclosed is an attachment of PuSHME overview sheet which gives a brief description of the project. We are asking if it could be posted, put ln a news letter, or mentioned in an appropriate meeting to attract volunteers. We will come out and give a brief presentation of the project or answer any questions if desired.

Our initial volunteer profile calls for participants to:

- have a dedicated vehicle;
- be located in King and/or Snohomish counties within the cellular network;
- be frequent travelers, people commuting or work crews; and
- have schedules which provide availability during study hours (7:00 a.m. - 6:00 p.m.).

Volunteer Involvement

Volunteers would have devices delivered/picked up at their convenience, and be given instructions on their part in the operational test (participation in test is no more than 5 minutes per day). All volunteer information will be kept confidential and will be destroyed at the end of the operational test or the volunteer’s involvement in the test.

I have enclosed a set of sample participation forms for more insight on volunteer involvement. If you have any questions, you can contact PuSHME volunteer coordinators:

Aaron Shupien or Scott Soiseth
David Evans and Associates, Inc.
Telephone: (206) 455-3571

Thanks for your interest and assistance!

U.S. Department of Transportation
Federal Highway Administration

Washington State
Department of

PuSHMe

Puget Sound Help Me Mayday System

Have you ever run out of gas on a busy freeway or been lost at night in an unfamiliar area? Help us test this new technology that will provide mayday service to you at the touch of a button from your car.

PuSHMe is:

- an operational test of leading edge emergency notification and response technology which provides automobile drivers with safety, security and convenience at their fingertips.

PuSHMe features:

- Personal Emergency (heart attack, collision)
- Roadside Assistance (flat tire, stall)
- Travel Assistance (I'm Lost!)

PuSHMe technologies include:

- Global Positioning Satellite Systems (GPS)
- Compressed Digital Packet Data (CDPD communications
- Analog Cellular Communications
- Map-based geographical user interfaces.

How YOU Can Help!

- We will be accepting a limited number of volunteers to take part in PuSHMe testing between February, 1996, and June 1996. Volunteers will be asked to participate for no more that 5 minutes per day between 7:00 a.m. and 6:00 p.m., Monday through Friday– without interfering with their daily routine.
- For further information, contact Aaron Shupien or Scott Soiseth @ 455-3571

DAVID EVANS AND ASSOCIATES,INC.

DECEMBER 8, 1995

DAILY JOURNAL OF COMMERCE

LOCAL HIGHWAYS BECOMING MORE INTELLIGENT

Field tests on a state-of-the art traffic information system are being done in Seattle as part of the Federal Highway Administration's Intelligent Transportation System Initiative.

It is called Puget Sound Help Me (PuSHMe) Regional Mayday system and it is designed to allow drivers who need help to signal their precise location to a response center, allowing highway blockages to be cleared more quickly.

Using new technology, emergencies can be identified, classified and responded to more quickly, accordingg to David Peach, state traffic engineer "Timing is critical to providing help for stranded motorists and also to clear accidents that causethe backups all too familiarto commuters."

Full-scale field tests began last month on two competing systems. Participants in the tests include the state Dept. of Transportation, the state patrol, the University of Washington, a consortium of technology companies, and emergency response organizations and volunteers. It is being coordinated by David Evans and Associates, Inc., a Bellevue-based consulting firm.

One of the systems being tested was developed by Motorola and combines cellular telephones and Global Positioning Systems to find vehicle locations. Mapping and database technologies will display vehicle locations at a customer service center.

The Motorola system gives drivers a number of basic services including personal security, emergency assistance, roadside asistance and traveler assistance such as congestion information. It will eventually offer stolen vehicle recovery and vehicle security.

Motorists use the system by pressing a button on their cellular phone handset. The system will contact the customer service center where operators will respond to the request. Operators will track vehicle location, speed and direction while the driver talks to them.

A second system being evaluated is one developed by Sentinel Communications. It also uses Global Positioning Systems to track location but it does not require a cellular phone. Emergency response requests are transmitted to a response service center over a data network. The system handles data only, so the driver will have a text display device through which the response center operator can ask questions which require only a yes or no answer.

The Sentinel system will handle three types of emergencies: police, medical and auto. Response center operators contact the appropriate authorities to provide assistance.

Both systems have been installed and will be tested for six months. The tests will include simulated emergencies. The university will do a formal evaluation to assess performance, usability, marketability and other

Appendix B
PuSHMe Project Slide Presentation

(Puget Sound Help Me)

A Puget Sound Regional Mayday Test

A FHWA ITS Field Operational Test

David Evans and Associates, Inc.

PuSHMe

(Puget Sound Help Me)

A Puget Sound Regional Mayday Test

A FHWA ITS Field Operational Test

DEA David Evans and Associates, Inc.

- **Location**
- **Message**
  - Assistance Required
  - Priority

,

Roadside Assistance

Need for MAYDAY Services

- **Cellular Emergency Calls Generally Routed to State Patrol**
- **Over 20% of Cellular Emergency Calls Must Be Rerouted**
- **Over 25% Do Not Know Their Exact Location**
- **Many Calls Are For Non-Emergencies**
- **Very Limited Ability to Track Vehicles During Carjacking or Theft**
- **Opportunity for Service Provided by Private Sector**

- Message
  - Assistance Required
  - Priority

DAVID EVANS AND ASSOCIATES, INC.

Need for MAYDAY Services

- Cellular Emergency Calls Generally Routed to State Patrol
- Over 20% of Cellular Emergency Calls Must Be Rerouted
- Over 25% Do Not Know Their Exact Location
- Many Calls Are For Non-Emergencies
- Very Limited Ability to Track Vehicles During Carjacking or Theft
- Opportunity for Service Provided by Private Sector

Project Evaluation Goals

Evaluate System Performance

1. **Does the system perform as designed?**
2. **Does the system perform to meet service requirements?**

Evaluate System Usability

1. **Do users accept the system?**
2. **Do users like the system?**

Evaluate System Marketability

1. **What are the conditions that characterize demand?**
2. **What public/private combinations of services can be economically delivered to satisfy demand?**

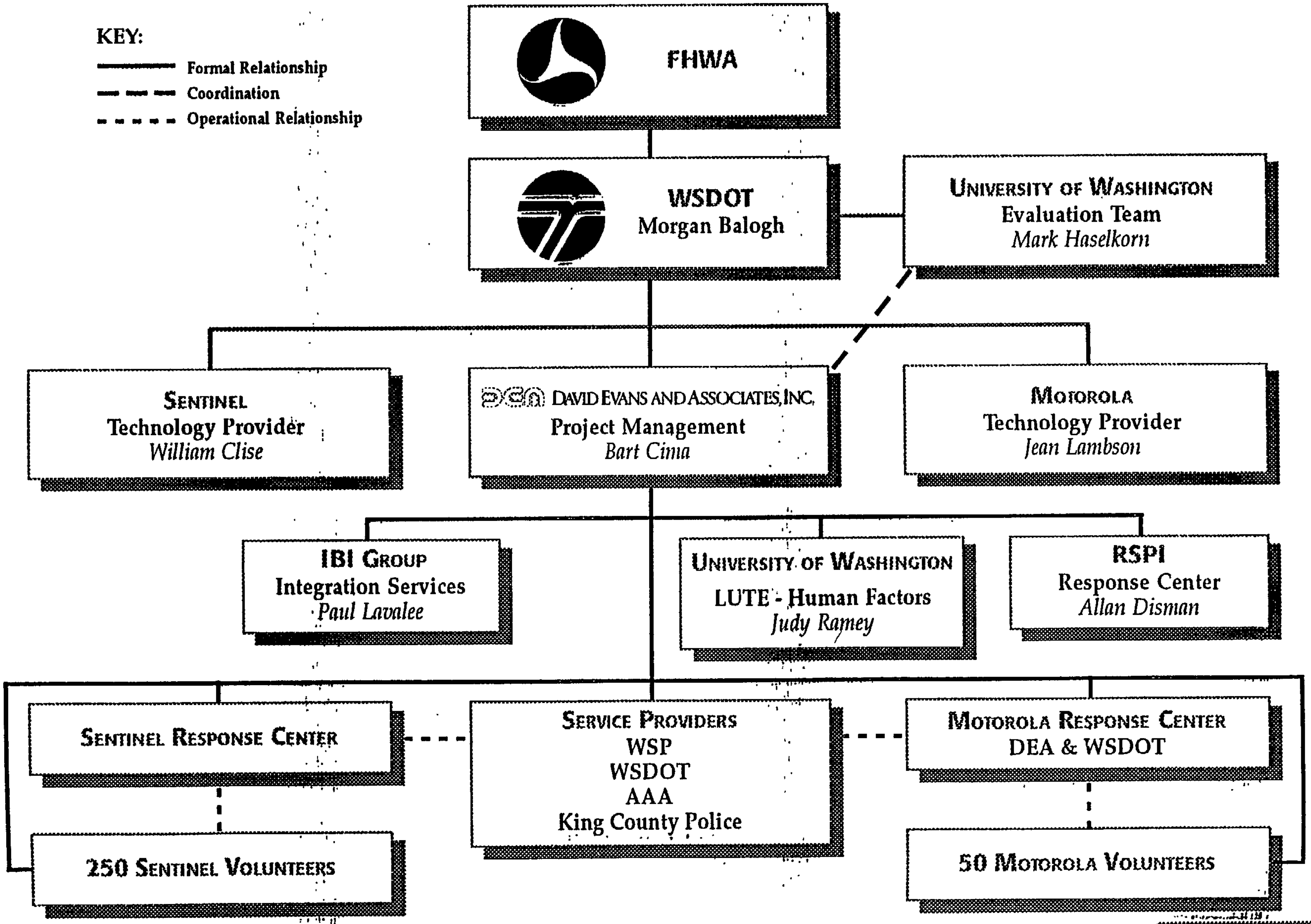
Evaluate Institutional Issues

1. **Can the system be implemented within the current institutional and social framework?**
2. **What was learned from the institutional interactions of the PuSHMe partners?**

Project Partners

- **Washington State Department of Transportation**
- **David Evans and Associates, Inc.**
- **Washington State Patrol**
- **Motorola**
- **Response System Partners, Inc.**
- **Sentinel Communications Corporation**
- **AT&T Wireless Services**
- **IBI Group**
- **University of Washington (Laboratory for Usability, Testing and Evaluation)**

PuSHMe Project Organizational Chart



DAVID EVANS AND ASSOCIATES, INC.

Volunteer Characteristics

- **Frequent Daytime Traveler**
- **Dedicated Vehicle — County or Private**
- **Located in Snohomish or King Counties**
- **Willing to Have Device in Vehicle**

Volunteer Responsibilities

- **PUSH Button when Asked**
- **Receive Acknowledgment**
- **Complete Log Sheet**
- **May Be Interviewed for Reactions**
- **Sign Liability Waiver**
- **Provide Demographic Information**

Schedule

- **Installation — Late September 1995**
- **Begin Testing — October 1995**
- **End Testing — April 1996**
- **Remove Devices — May 1996**

Appendix C
PuSHMe Volunteer Package

Welcome to PuSHMe!

Puget Sound Help Me Regional Mayday System Operational Test

The Washington State Department of Transportation and the Federal Highway Administration thank you for participating in PuSHMe - the Puget Sound Help Me Operational Test.

The PuSHMe Operational Test will evaluate two Mayday systems designed to provide emergency service to motorists equipped with the Mayday technology. Using wireless communication and Global Positioning System (GPS) technology, motorists can broadcast the nature of their emergency and location to the Customer Service Center (CSC). In response, the CSC will dispatch the appropriate emergency personnel to the motorists location thereby saving time and potentially lives.

The PuSHMe Operational Test is an exciting opportunity to increase safety, provide security, and combat congestion in the Puget Sound region. Currently, motorists in need of assistance cannot always give accurate information to response agencies and valuable, potentially life-saving, time is wasted searching for the vehicle. Over the next six months, you will play an important role in **bringing** this Mayday service to the public by providing the PuSHMe team with valuable information that will be used to evaluate the needs and requirements for the future implementation of a Mayday system.

The PuSHMe Operational Test is a partnership between the Washington State Department of Transportation, the Federal Highway Administration, Motorola, Sentinel Communications, AT&T Wireless Services, Response Systems Partners Incorporated, and David Evans and Associates, Inc.

After completing the enclosed volunteer consent form, liability form, and demogaphic survey, please mail it to us in the attached pre-stamped envelope. Once we receive this information, we will contact you regarding the installation of your device. After installation, we will present a 40-minute training session on operating the PuSHMe Emergency Notification Device.

If you have any questions, please contact your PuSHMe Volunteer Coordinator:

Scott Soiseth
David Evans and Associates, Inc.
Telephone: (206) 455-3571

Thank you again helping make PuSHMe a success!

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PuSHMe CONSENT FORM

Puget Sound Help Me Regional Mayday System Operational Test

We appreciate that you are offering your time to assist US in assessing a regional mayday system. There are some important details that you should be aware of

Volunteer Coordinator: Floris van Weelderen, P.E.
Transportation Engineer
David Evans and Associates, Inc.
Telephone: (206) 455-3571

Procedures

As volunteers in this study, you will be asked to push buttons on the Emergency Notification Device (END) when asked, record your actions in a log, complete a questionaire, and be available for a possible interview of your reactions to PuSHMe. You may also be asked to participate in an interview before and after you have had experience using the PuSHMe system.

Risk, Stress, or Discomfort

This study will not expose the participants to risk, stress, or discomfort beyond that normally associated with safely operating a motor vehicle. No emergency response personae1 will arrive after initiating a call on the END.

Confidentiality

At the end of the operational test, the volunteer data base will be purged in order to ensure your anonymity and confidentiality. Data will be retained by the Volunteer Coordinator for no more than one year following the date on which the study is completed. You are free to refuse to participate in the study and may withdraw at any time without penalty.

Thank you for your assistance and interest **in *PuSHMe!***

11.1.95

Floris van Weelderen, P.E. — Date

The study described above has been explained to me, and I voluntarily consent to participate in it. I have had the opportunity to ask questions and understand that future questions that I may have about the project will be answered by the Volunteer Coordinator.

Signature of Volunteer — Date

Please print name above, last name first.

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PuSHMe LIMITATION OF LIABILITY AND ANTI-TAMPERING AGREEMENT

Puget Sound Help Me Regional Mayday System Operational Test

Anti-Tampering Agreement:

I,________________________________,agree not to attempt to open the Sentinel Communications, Inc. (Sentinel) device or allow anyone else to attempt to open the device. I understand that this would constitute tampering and could damage this device and/or reveal Sentinel proprietary technology, and I would be liable for such damages.

Limitation of Liability:

I, the user of the PuSHMe system, understand that this device was developed for testing purposes only and agrees not to use it in a real emergency. Not withstanding any other representations, verbal or written, I agree to accept $50.00 as total liquidated damages for any claim or claims against the Federal Highway Administration, Washington State Department of Transportation, David Evans and Associates, Inc., Sentinel and the other PuSHMe partners, its agents, employees, and successors, related to the use of the PuSHMe system. In executing this release, I represent that I am of legal age and competent to enter into this agreement.

____

Signature Date

____

Please print name above, last name first.

For additional information contact Floris van Weelderen or Bart Cima at (206) 455-3571.

PuSHMe

The following **information will be used to optimize your participation in PuSHMe and to provide demographic information regarding the participants. All volunteer information will be kept confidential.**

Vol Information

Name (last name first)

Home Address

City and Zipcode

Telephone - Daytime | Telephone - Evenings

Employer

Emergency Contact | Telephone

Vehicle Information

Make	Model	Year	Color	License

Demographic Information

Sex (circle one) Male Female

Age ______ Years

Education (circle level obtained)
- **High** School
- **Technical College**
- Community College
- University
- Other ______

Occupation ______

Annual Income (circle one)
- < $20,000
- $20,000 to $29,999
- $30,000 to $39,999
- $40,000 to $49,999
- $50,000 to $74,999
- > $75,000

Usual Route to Work (circle up to 3 routes used)
- **I-5**
- **I-405**
- SR 9
- SR 99
- SR 167
- **I-90**
- SR 18
- SR 520
- SR 522
- SR 525
- Other (fill in) ______ ______ ______

Vehicle miles traveled per year ______

Availability

When **are you typically** travelling in your vehicle in the afternoon?

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
From					
To					

PuSHMe LIABILITY CLAUSE

Puget Sound Help Me Regional Mayday System Operational Test

RELEASE OF CLAIMS AND LIABILITY

I, ___________________________, understand that the PuSHME system is in a developmental test phase and should not under any circumstances be used during this developmental test phase as a security or safety device. I, therefore, agree that I am using PuSHMe only as a volunteer participant in a test or demonstration and that I will not rely upon the PuSHMe system to protect me or others from harm of any kind or to guard me or others as a safety or security device.

I UNDERSTAND AND AGREE THAT THE FEDERAL HIGHWAY ADMINISTRATION, WASHINGTON STATE DEPARTMENT OF TRANSPORTATION, DAVID EVANS AND ASSOCIATES, INC., MOTOROLA, INC., RSPI AND THE OTHER PuSHMe PARTNERS DISCLAIM ALL LIABILITY TO THE FULL EXTENT PERMITTED BY LAW FOR ANY INJURY OR LOSS RESULTING DIRECTLY OR INDIRECTLY FROM USE OR RELIANCE ON THE PuSHMe SYSTEM AS A SECURITY OR SAFETY DEVICE.

I hereby release the Federal Highway Administration, Washington State Department of Transportation, David Evans and Associates, Inc., Motorola, Inc., RSPI and the other PuSHMe partners, its agents, employees, successors and assigns from any and all claims, liabilities and losses whatsoever arising under, in connection with or related to my use of the PuSHMe system. In executing this release, I represent that I am of legal age and competent to enter into this agreement.

____

Signature Date

____

Please print name above, last name first.

For additional information contact Floris van Weelderen or Bart Cima at (206) 455-3571.

Appendix D
Motorola Training Package

PuSHMe User Familiarization

Puget Sound Help Me Regional Mayday System Operational Test

The Washington State Department of Transportation and the Federal Highway Administration thank you for participating in PuSHMe - the Puget Sound Help Me Operational Test.

PuSHMe is an exciting opportunity to increase safety, provide security, and combat congestion in the Puget Sound region. Over the next six months, you will play an important role in bringing this service to the public.

This user familiarization package contains all the material you will need including instructions for operating your PuSHMe Emergency Notification Device (END) and completing your volunteer log. Please fmd enclosed:

- PuSHMe volunteer instructions. Step-by-step instructions lead you through your daily test of the PuSHMe system;

- A sample log sheet. This sheet has been completed so as to provide you with a reference of how to complete the log sheet.

- First set of log sheets. Log sheets are provided in a set for use over a three-week period. At the beginning of the third week, you will receive a new set of log sheets for the next three-week period. This will be mailed directly to you or passed out by your Organization Coordinator. Please note that PuSHMe testing will not be conducted on statutory holidays.

If you do not receive your set of log sheets by the middle of the third week, please contact the Volunteer Coordinator (see below). After your call, we will immediately send a duplicate set of log sheets to you.

After completing each three week set of log sheets, place them in the attached pre-stamped envelope and drop in the nearest mail box.

Please keep this package in your car with your PuSHMe END for future reference. If you have any questions or concerns during the test please contact:

Scott Soiseth
David Evans and Associates, Inc.
Telephone: (206) 455-3571
e-mail: fvw@wln.com

Thank you for making PuSHMe a success!

PuSHMe Volunteer Instructions

1. Read log to determine time you are scheduled to conduct your test.

2. At time of test, pull over to the side of the road in a safe manner.

3. Leave engine running.

4. Verify telephone is set to the Project Telephone Number. Press “RCL - #".

5. If necessary, change telephone number by pressing “RCL - # - STO”.

6. Read instructions in the log.

7. On log, note TIME, LOCATION, and WEATHER.
   Sample descriptions of LOCATION

Street address:	415 118th Avenue SE, Bellevue
Intersection:	Northeast comer at SE 8th Street and 112th Avenue SE, Bellevue
State route and milepost:	SR 520 Westbound at Milepost 6.0

8. Based on the instructions provided in the log, PuSH appropriate button on handset. (EMER, RA, or TA).

9. If a connection is made with Customer Service Center (CSC), the Operator will answer
   a. Operator confirms which button was PuSHed and your location.
   b. Operator will indicate that “The test is complete.”
   c. PuSH “END” on handset
   d. Complete log
   e. Go to Step 11

10. If no connection with the CSC is made within 10 minutes, the test is terminated:
   a. PuSH “END” on handset
   b. check “FAILED TEST’ in log

11. If necessary, change telephone number back to personal line by pressing “RCL - # - STO".

12. Safely reenter traffic and continue on your way.

In case of questions, call the following:

CSC Direct Line:

(206) 440-4787

Volunteer Coordinator
Scott Soiseth
David Evans and Associates, Inc.
(206) 455-3571

PuSHMe Volunteer Log Test#: MOT00608

Date: 12/6/95

Time: 5: 15 to 5:29 PM

Name: Wmcheil, Steve

Unit ID: M40

Unit Phone #:

Circumstance: You have broken your leg.

Please complete the following. For most questions, you can simply circle a response. For some, you may need to fill in a blank.

1. Time button PuSHed: 5. 18 [ ] Check here if unable to PuSH button
2; Location: 251 First Ave Seattle
3. Location type: Urban Suburban Rural
4. Weather: Overcast Rain Snow Clear
5. Which button did you PuSH? EMER RA TA
6. Did the Service Center acknowledge your call within 10 minutes? Yes NO
7. If yes, time of call acknowledgement: 5 . 19
8. When speaking with the Service Center, were you disconnected? Yes No
9. If you were disconnected (#8 above), did the call reconnect? Yes No
10.. What was the quality of the voice communication with the Service Center? Clear 'Distorted

FAILED TEST! Check box if the Service Center did not acknowledge the call within 10 minutes. [ ]

Comments: Place any comments in this space.

If you have any questions contact Scott Soiseth at (206) 455-3571.

Appendix E
XYPOINT Emergency Notification Device Acceptance Test

Sentinel Emergency Notification Device

Acceptance Test Checklist

Name: ___________ Device No.: _____________ Date: ___________

Weather: ____________ Location: ______________

Start-up Test

		YES	NO
1.	Red light is flashing.	☐	☐
2.	LCD displays “PuSHMe / Sentinel Com . . ...“.	☐	☐
3.	Sentinel device should beep 3 times.	☐	☐
4.	Red light is steady.	☐	☐
5.	LCD displays “PuSHMe”.	☐	☐

911 Function Test

		YES	NO
6.	PuSH “911”		
7.	LCD displays “Sending 911” .	☐	
8.	SEND beeps once.	☐	☐
9.	The LCD displays “Confirm 911? . . ...”	☐	☐
10.	SEND beeps once.	☐	☐
11.	PuSH “Yes”.		
12.	LCD displays “Yes received:‘.	☐	☐

Medical Function Test

		YES	NO
13.	PuSH “Medical”.		
14.	LCD displays “Sending Medical” .	☐	☐
15.	SEND beeps once.	☐	☐
16.	The LCD displays "Confirm Medical? . . ...”	☐	☐
17.	SEND beeps once.	☐	☐
18.	PuSH "No".		
19.	LCD displays “No received”.	☐	☐

Auto Function Test

		YES	NO
20.	PuSH “Auto”.		
21.	LCD displays “Sending Auto”.	☐	☐
22.	SEND beeps once.	☐	☐
23.	The LCD displays “Confirm Auto? . . ...”	☐	☐
24.	SEND beeps once.	☐	☐
25.	PuSH “Yes”.		
26.	LCD displays “Yes received.”	☐	☐

Location Test

		YES	NO
27.	LCD displays” Confirm your location?”	☐	☐
25.	LCD displays “Location confirmed”.	☐	☐
29.	LCD displays “Disconnecting”.	☐	☐
30.	Send beeps 3 times and LCD displays “PuSHMe”	☐	☐

Appendix F
XYPOINT Training Package

Puget Sound Help Me Regional Mayday System Operational Test

The Washington State Department of Transportation and the Federal Highway Administration thank you for participating in PuSHMe - the Puget Sound Help Me Operational Test.

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This user familiarization package contains all the material you will need including instructions for operating your PuSHMe Emergency Notification Device (END) and completing your volunteer log. Please find enclosed:

- **PuSHMe volunteer instructions.** Step-by-step instructions lead you through your daily test of the PuSHMe system;

- **A sample log sheet.** This sheet has been completed so as to provide you with a reference of how to complete the log sheet.

- **First set of log sheets.** Log sheets are provided in a set for use over a three-week period. At the beginning of the third week, you will receive a new set of log sheets for the next three-week period. This will be mailed directly to you or passed out by your Organization Coordinator. Please note that **PuSHMe testing will not be conducted on statutory holidays.**

If you do not receive your set of log sheets by the middle of the third week, please contact the Volunteer Coordinator (see below). After your call, we will immediately send a duplicate set of log sheets to you.

After completing each three week set of log sheets, place them in the attached pre-stamped envelope and drop in the nearest mail box.

Please keep this package in your car with your PuSHMe END for future reference. If you have any questions or concerns during the test please contact:

Aaron Shupien
David Evans and Associates, Inc.
Telephone: (206) 455-3571
e-mail: fvw@wln. com

Thank you for making PuSHMe a success!

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PuSHMe Volunteer Instructions

1. Read the log to determine the time you are scheduled to conduct your test.

2. Run the GPS antenna out the door and place it on the car roof for optimum performance. (The GPS antenna wire should be placed at a point where the rubber gasket on the door cushions the closure.)

3. Plug the Sentinel unit into the cigarette adapter and place on the passenger seat The device will take approximately two minutes to register: first the LCD will display the words "PuSHMe / Sentinel Communications" followed by "PuSHMe / Sentenel, Registering with Network". When registered with the network, the unit will beep three times and the LCD will display "PuSHMe". Now a button can be PuSHed.

4. At the time of test, pull over to the side of the road in a safe manner. Place the Sentinel device on the dash board.

5. Leave the engine running.

6. The LCD should display "PuSHMe" and the red light on the front of the box should be steady. If not, unplug the Sentinel unit and repeat step 3 until the device is registered.

7. Read the circumstance in the log.

8. On the log, note TIME, LOCATION, LOCATION TYPE, and WEATHER.
   Sample descriptions of LOCATION

Street address:	415 118th Avenue SE, Bellevue
Intersection:	Northeast corner at SE 8th Street and 112th Avenue SE, Bellevue
State route and milepost:	SR 520 Westbound at Milepost 6.0

9. Based on the instructions in the log, PuSH the appropriate button. (911 Medical, or Auto).

IO. After the appropriate button has been PuSHed,
   a. The LCD will display "SENDING 911", "SENDING MEDICAL", or "SENDING AUTO".
   b. The device will beep once.
   c. The LCD will display "CONFIRM 911, PRESS YES OR NO" , " CONFIRM MEDICAL, PRESS YES OR NO" , or "CONFIRM AUTO, PRESS YES OR NO".
   d. The device will beep once.
   e. Reply to confirmation by pressing 'Yes" or "No" as instructed.
   f. The LCD will display "SENDING YES' or "SENDING NO".
   g. The LCD will display 'YES RECEIVED" or "NO RECEIVED'
   h. The LCD will then display "DISCONNECTING".
   i. The device will beep 3 times and the LCD will display "PuSHMe"
   j. Complete the log.
   k. Unplug and stow the device in a safe manner. Remove the antenna from the roof of the car.
   l. Go to Step 12.

11. If the unit does not register within 5 minutes, or if the LCD display is frozen at "Sending xxxx (or any other message) for 5 minutes, the test is terminated:
   a. Unplug and stow the device. Remove the antenna from the roof of the car.
   b. check "FAILED TEST" in log.

12. Safely reenter traffic and continue on your way.

In case of questions, call:

tSo

Volunteer Coordinator
Aaron Shupien
David Evans and Associates, Inc.
(206) 455-3571

OTHER LCD MESSAGES THAT MAY APPEAR

If disconnect takes longer than expected:

"Disconnecting, network delay"

If connection with network is lost unexpectedly:

"Connection lost, Power On and Off'

If connection with network is taking a long time after pressing the first button:

" Sending XXXXX, Please wait"

If connection with network is taking a long time because the Sentinel Response analyst is busy and has passed incident on to a second workstation:

"Sending XXXXX, Busy, rediaiing"

PuSHMe Volunteer Log

Test #: MOT01284

Date:	1/22/96	**Name:**	Storey, Robert A.
Time:	5:30 to 5:44 PM	**Unit ID:**	M01

Circumstance: Individual demands your money at gunpoint.
Confirmation: Yes (line 8)

Please complete the following. For most questions, you can simply circle a response. For some, you may need to fill in a blank.

1. **Time button PuSHed:** 5:35 ☐ Check here if unable to PuSH button
2. **Location:** 415 118TH AVE SE Bellevue
3. **Location type:** Urban Suburban Rural
4. **Weather:** Overcast Rain Snow Clear
5. **Which button did you PuSH?** 911 Medical Auto
6. **Did the LCD display:** Sending 911 Sending Medical Sending Auto
7. **Did the LCD display:** Confirm 911 Confirm Medical Confirm Auto
8. **Which button did you PuSH?** Yes No
9. **Did the LCD display:** Sending Yes Sending No
10. **Did the LCD display:** Yes Received No Received
11. **Did the LCD display "Disconnecting"?** Yes No
12. **Did the LCD display "PuSHMe"?** Yes No
13. **What time was "PuSHMe" displayed?** 5:37

FAILED TEST! Check box if the unit did not register within 5 minutes or if the LCD display is frozen for 5 minutes. ☐

Comments: Any Comments on Test

If you have any questions contact Scott Soiseth at (206) 455-3571