

WeatherShare Evaluation: Phase I Proof-of-Concept

Prepared by

Stephen Albert

Director

and

Doug Galarus

Senior Research Associate, Program Manager

Western Transportation Institute

College of Engineering

Montana State University

A report prepared for the

Caltrans District 2

P.O. Box 496073

Redding, CA 96049-6073

and

Caltrans Division of Research & Innovation

P.O. Box 942873

Sacramento, CA 94873-0001

December 14, 2005

DISCLAIMER

The opinions, findings and conclusions expressed in this publication are those of the authors and not necessarily those of the California Department of Transportation or Montana State University.

Alternative accessible formats of this document will be provided upon request. Persons with disabilities who need an alternative accessible format of this information, or who require some other reasonable accommodation to participate, should contact Kate Heidkamp, Communications and Information Systems Manager, Western Transportation Institute, Montana State University-Bozeman, PO Box 173910, Bozeman, MT 59717-3910, telephone number 406-994-7018, e-mail: KateL@coe.montana.edu.

ACKNOWLEDGEMENTS

The Western Transportation Institute would like to thank the following WeatherShare stakeholders for their time and effort during the evaluation phase of this project:

- Mandy Chu, Caltrans Division of Research and Innovation
- Ian Turnbull, Caltrans District 2
- Steve Rogers, Caltrans District 2
- Bill Belcher, Caltrans District 2
- Dino Johnson, Caltrans District 2
- Jeff Kiser, Caltrans District 2
- Bill Stein, Caltrans District 2
- Shawn Watts, California Highway Patrol – Redding
- Rachel Henderson, California Highway Patrol – Redding
- Joy Willis, Shascom
- Dan Spiess, Nor-Cal Emergency Medical Services
- John Lord, Nor-Cal Emergency Medical Services
- Larry Masterman, Nor-Cal Emergency Medical Services
- Scott Holmquist, California Department of Forestry & Fire Protection

TABLE OF CONTENTS

1. Introduction.....	1
1.1. Purpose.....	1
1.2. Background.....	1
1.3. Report Contents	3
2. Methodology.....	4
2.1. Survey	4
2.2. Outreach.....	4
3. Findings.....	6
3.1. Survey	6
3.1.1. Primary focus of responsibility.....	8
3.1.2. Inclusion of user and system requirements.....	8
3.1.3. Frequency of use.....	8
3.1.4. Time of use	8
3.1.5. Experience with internet site use	8
3.1.6. Improvements in website content to meet user needs.....	9
3.1.7. Usefulness of data.....	9
3.1.8. Usefulness of features.....	9
3.2. Outreach.....	10
3.2.1. California Department of Forestry and Fire Protection	10
3.2.2. Caltrans	10
3.2.3. Nor-Cal EMS	11
3.2.4. California Highway Patrol	11
3.2.5. SHASCOM.....	12
4. Future Needs and Applications.....	13

5. Conclusions.....15

6. Appendix.....17

LIST OF TABLES

Table 1: Future Needs and Applications..... 13

LIST OF FIGURES

Figure 1: WeatherShare User Interface..... 2

Figure 2: Survey and Outreach Findings 7

1. INTRODUCTION

1.1. Purpose

The purpose of the WeatherShare Phase I: Proof-of-Concept evaluation is threefold:

- to determine the success of the prototype and proof-of-concept system in meeting the goals and objectives of the project,
- to identify the lessons learned through the project, and
- to identify additional steps that may be needed to increase end user usability.

This evaluation will be first of a series conducted throughout the life of WeatherShare project to determine improvements needed by end users and to assess the benefits to those stakeholder organizations and the region.

1.2. Background

The goal of the WeatherShare project is to streamline and integrate available road and surface weather data in the Northern California area into a single source that is easily accessible by incident responders and potentially the traveling public (Figure 1). WeatherShare is a component of the Redding Incident Management Enhancement (RIME) program, which consists of technology initiatives designed to improve public safety in the Redding area. RIME organizations include: Caltrans Division of Research and Innovation, Caltrans District 2, Caltrans Redding Transportation Management Center, California Department of Forestry & Fire Protection, California Highway Patrol, Shasta Area Safety Communications Agency, and Nor-Cal Emergency Medical Services. To date, WeatherShare covers 7 counties in District 2 and 13 counties in the adjacent Caltrans districts.

Based upon Caltrans' specifications, the Western Transportation Institute (WTI) at Montana State University – Bozeman has utilized technology to provide Caltrans District 2 with a surface transportation weather system (Phase 1) that allows users to view a compilation of available road and surface weather data from various sources in the region.

The WeatherShare system integrates surface weather readings from hundreds of weather stations in Northern California. Data is imported from the California Data Exchange Center (CDEC); MesoWest, a repository of Western U.S. weather information housed at the University of Utah; NOAA's Meteorological Assimilation Data Ingest System (MADIS); and Caltrans RWIS stations.

Currently, data from 11 Caltrans RWIS stations is present in the system. WeatherShare integrates these stations with the stations from CDEC, MesoWest and MADIS, to provide far greater coverage of the region than with RWIS alone. This added data can also be used to verify data from RWIS stations.

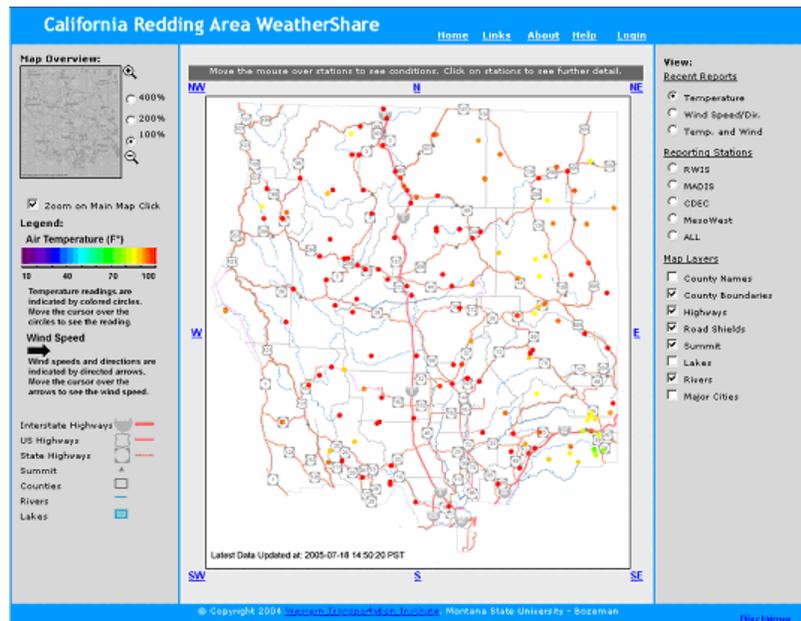


Figure 1: WeatherShare User Interface

The system provides multiple views of data. Public, unauthenticated access allows users to view data by sensor type (temperature or wind, or both), by station type, and by station detail. Map layers can be toggled on and off to show or hide detail such as roadways, water features and county boundaries. Authenticated access allows users who have been granted logins to customize their default view by storing preferences. These users also have access to non-public data such as Caltrans RWIS pavement temperatures, as well as historical data and quality control checks.

Authenticated users have the capability of setting alerts, which are triggered when user-defined thresholds are crossed. For instance, an alert could be set to show wind speeds that exceed 30 miles per hour. Stations with readings for which that threshold has been exceeded would blink on the WeatherShare display to alert the user to this condition. If the user were a TMC operator, they might then activate a changeable message sign to indicate a high-wind warning.

By providing a single source for this information and the ability to customize the display of the information, the system gives users a single, user-friendly access point to surface conditions relevant to operation of roadways.

Phase 1 of the WeatherShare project comprised development of the prototype system, and a test deployment of 6 months for internal use at Caltrans. A systems engineering approach and spiral development model were used to incorporate stakeholder input and feedback throughout the development process, resulting in the prototype/proof-of-concept system

1.3. Report Contents

The Phase I evaluation report provides the methodology for conducting the evaluation, an overall assessment of findings, an analysis by stakeholder group, future needs and applications, and finally a conclusion. It should be noted that only a limited quantitative analysis could be performed due to the small number of user surveys available.

2. METHODOLOGY

2.1. Survey

This evaluation will be the first of a series conducted throughout the life of the WeatherShare project to determine improvements needed by end users and to assess the benefits to stakeholder organizations and the region. The Phase I evaluation survey tool will be used over the life of the project to determine how the system use and functionality changes based on each stakeholders' needs.

Initially, it was envisioned that an evaluation could be conducted once the proof-of-concept was implemented. However, WeatherShare had only been deployed during one season (summer). Researchers quickly realized that organizations have different information needs based on the season. For instance, California Department of Forestry and Fire Protection will have greater need for the WeatherShare information in the summer when fire activity is high; by contrast Caltrans has greater utility for weather information in the winter when roads must be plowed. For this reason, researchers recommended to Caltrans that the evaluation phase of this project will be extended for multiple years.

On August 18, 2005 WTI submitted the survey instrument to WeatherShare stakeholders. As shown in the Appendix, the survey contained eight questions and addressed the following areas:

- Agency's primary focus of responsibility
- inclusion of user and system requirements
- frequency of use
- time of use
- experience with internet site use
- recommended improvements in website content
- usefulness of data
- usefulness of features

Stakeholders had the option to complete a written survey or wait for an interview to be conducted during outreach meetings in Redding.

2.2. Outreach

On September 15 and 16, 2005, WTI staff visited each stakeholder, in order to better meet end user needs, and to collect detailed and qualitative information than cannot be gleaned from a survey. Each meeting varied in length, but generally lasted between thirty minutes and two

hours, depending on the number of participants and the content of discussions. The stakeholder input from these meetings is summarized in the following Findings section.

3. FINDINGS

This section provides findings from the surveys that were distributed to stakeholders and the outreach conducted by WTI. The test deployment of Weathershare occurred in the summer. The system's perceived utility by users will be affected by how much they needed the information during that time period. In the summer WeatherShare would likely be most useful to organizations involved in fire and rescue, such as California Department of Forestry & Fire Protection, SHASCOM and possibly Nor-Cal EMS. During the 2005 summer fire season the events were at an approximate twenty-five (25%) level of normal years. This fact is being specifically noted because intuitively we believe with higher demand comes greater realization of utility.

3.1. Survey

Seven representatives from five stakeholder groups completed the survey, which is included in the Appendix. Because of the small sample size, WTI can only assess trends rather than conduct a statistically oriented assessment. The results of the survey are tabulated in Figure 2, and are discussed in the sections that follow.

	CA FORESTRY AND FIRE	NOR-CAL EMS	CALTRANS D2 (REPRESENTATIVE #1)	CALTRANS (REP #2)	CALTRANS (REPRESENTATIVE #3)	SHASCOM 911	CHP	CHP-REDDING DISPATCH	Averages
1. Primary focus of responsibility	Fire & Rescue	Emergency Medical Service	State DOT	State DOT	State DOT	Dispatch	Enforcement	Dispatch	
2. Inclusion of user & system requirements	8	5	10	6-7	10	5	8	(NA)	7.6
3. Frequency of use	A few times	Daily, More than 1x each day	Weekly	Winter-Daily	Access for testing purposes	Not at all	Not at all	Not at all	
4. Time of Use	Various times during incidents in last few days	Daytime, Nighttime, During incident conditions	Daytime hours, Under changing conditions only, During incident conditions (Storm/Fire, etc)	Winter-99%	for review & testing - will utilize more during winter storms	(NA)	no internet access at work	(NA)	
5. Experience with internet site use									
a. The site is well organized and user friendly	4	4	5	5	4	5	(NA)	4	4.43
b. confident about accuracy of information about current conditions	5	(NA)	5	4	5	5	(NA)	4	4.54
c. Information I get from site helps with job responsibilities	5	2	4	(NA)	4	3	(NA)	3	4.08
d. Site helps me be better prepared for road and weather conditions when managing resources.	5	5	4	(NA)	4	3	(NA)	3	3.75
e. Site is confusing and difficult to use	3	2	2	(NA)	2	1	(NA)	1	2.92
f. Site should be considered for general traveler info.	5	5	4	(NA)	4	5	(NA)	3	3.08
g. Goal of project to serve as a single point of contact for road-weather information has been achieved.	5	5	4	(NA)	3	5	(NA)	3	4.25
h. It takes too long to access some info. and features.	5	1	4	(NA)	2	3	(NA)	3	3.58
i. Important info. missing that should be made available	5	4	4	(NA)	3	2	(NA)	3	3.25
6. Improvements in website content to meet your needs	Would have been helpful to have RH available. I did not see a way to pull from remote stations. Website seems easy to maneuver through.	Considering the value of visibility when driving, some indication of visibility such as fog would be useful.	1. Alarm feature needs to be expanded with ability to set different sites. 2. Presentation of Quality control information is extremely poor. This needs to kick out an overall report for the region &/or specific grouping (like D2 RWIS) on where the problems are. 3. Presentation of history is very poor and only marginally useful as is.	(NA)	With appropriate links to external sites, the program achieves, meets or exceeds the needs of many clients & general public. I cannot view any single source or resource as a definitive and all encompassing tool for weather related information. Linking to and utilizing external sources of reference ensure integrity and validity of the information presented within the given format.	Our Dispatch center has very limited internet capabilities & access-as a protocol. We have not identified a practical use for our specific needs. It is an interesting & useful tool and a worthy project. We hope to use it someday, perhaps in a wildland fire or flood situation.	(NA)	(NA)	
7. Usefulness of Data									
a. Weather station locations	5	5	5	5	5	2	(NA)	(NA)	4.50
b. Fuel moisture and fuel temperature	5	1	3	4	2	2	(NA)	(NA)	2.83
c. Water Levels	5	1	1	(NA)	4	2	(NA)	(NA)	2.60
d. Relative Humidity	5	5	4	4	5	2	(NA)	(NA)	4.17
e. Dew Point Temperature	5	1	4	4	4	2	(NA)	(NA)	3.33
f. Visibility	5	1	4	5	5	2	(NA)	(NA)	3.67
g. Air Temperature	5	5	5	5	5	2	(NA)	(NA)	4.50
h. Pavement Temperature	5	1	5	5	5	2	(NA)	(NA)	3.83
i. Pavement conditions	5	1	5	5	5	2	(NA)	(NA)	3.83
j. Precipitation	5	1	5	5	5	2	(NA)	(NA)	3.83
k. Wind direction & Speed	5	5	5	4	5	2	(NA)	(NA)	4.33
l. Solar Radiation	5	1	4	3	4	1	(NA)	(NA)	3.00
m. Atmospheric Pressure	5	1	4	3	5	2	(NA)	(NA)	3.33
n. Water Temperature	5	1	1	3	4	2	(NA)	(NA)	2.67
o. Summit Locations	4	5	3	4	5	2	(NA)	(NA)	3.83
8. Usefulness of feature									
a. Map display & zoom function	5	5	5	5	5	2	(NA)	(NA)	4.50
b. Web hyperlink to other weather resources	5	3	4	4	5	1	(NA)	(NA)	3.67
c. Weather & Related information (wind speed, etc.)	5	5	5	5	5	2	(NA)	(NA)	4.50
d. Ability to customize (turn on/off) layers	5	5	5	5	5	2	(NA)	(NA)	4.50
e. Report of quality control failures for weather stations	5	5	4	4	4	2	(NA)	(NA)	4.00
f. Ability to distinguish authorized users	4	3	4	5	4	2	(NA)	(NA)	3.67
g. Ability to track historical data	5	4	4	4	5	1	(NA)	(NA)	3.83
h. Ability to provide alert system notification	5	2	5	5	5	1	(NA)	(NA)	3.83
i. Ability to color-code weather info. & provide graphics	5	4	5	4	4	2	(NA)	(NA)	4.00

LEGEND
KEY FOR QUESTION 5:
 5 = Strongly Agree, 4 = Somewhat Agree, 3=Neither Agree or Disagree, 2=Somewhat Disagree, 1=Strongly Disagree

KEY FOR QUESTIONS 7 & 8:
 5 = Very Useful, 4 = Somewhat Useful, 3 = Not Very Useful, 2=Aware of It, 1=Not Aware of It

Figure 2: Survey and Outreach Findings

3.1.1. Primary focus of responsibility

Each agency provided their primary focus of responsibility. Responses included state department of transportation, law enforcement, emergency medical service, fire and rescue, and dispatch.

3.1.2. Inclusion of user and system requirements

The purpose of this question was to understand how user needs were incorporated into the system requirements, functionality and design. The responses ranged from 5 to 10 (ten being the highest level of inclusion) with an average of 7.6. It should be noted that user requirements were discussed at individual and larger RIME/WeatherShare meetings. Some respondents that ranked this category low had a limited level of involvement during the project requirements phase.

3.1.3. Frequency of use

The purpose of this question was to gauge how often users are accessing the WeatherShare site for information. The responses ranged from multiple times per day to zero (due to an inability to access the site because of firewall/policy reasons).

3.1.4. Time of use

This question referred to when a user visited the site for information. The responses ranged from only during the demonstration phase to during incident conditions and dynamic conditions. Many responders stated that they anticipated using the site during conditions when they would benefit from the information, such as during severe winter weather.

3.1.5. Experience with internet site use

For this question, a Likert Scale was used. Stakeholders completing the survey were asked a series of statements in which they had to select a response from “strongly agree” to “strongly disagree”. As shown in Figure 2 WTI assigned a numerical value to each, with 5 as “strongly agree” and 1 as “strongly disagree.” For analysis purposes, any value above a 3.5 is considered positive. In general, survey respondents concluded that the site is:

- well organized and user friendly,
- provides accurate and current conditions,
- helps to prepare for road and weather conditions,
- facilitates resource management, and
- meets the project objective of serving as a single point of contact for road-weather conditions.

Stakeholders identified the following areas as needing improvement (e.g. scores less than 3.5):

- site layout,
- use as a traveler information resource,
- access time, and
- missing information that should be added.

3.1.6. Improvements in website content to meet user needs

With regard to missing information, WTI asked respondents to suggest areas of improvement to meet their needs. Additional information for the site that was recommended included the following:

- providing relative humidity (this feature exists currently).
- enhancing the map to show areas of fog on regional highways.
- expanding the alarm feature with the ability to set different sites.
- improving the presentation of quality control information to provide an overall report for the region and/or a specific grouping (like D2 RWIS) on where maintenance needs exist.
- improving and making more useful the presentation of history reports.
- linking to external sources of references that complement the information provided by WeatherShare

3.1.7. Usefulness of data

Similar to the question regarding “experience with site use,” WTI used a Likert Scale to assess the usefulness of the data on the site. It should be noted that different stakeholders naturally find some data sets of more interest than others. Those data sets selected as most useful (above a 3.5 value) included weather station locations, relative humidity, visibility, air temperature, pavement temperature, pavement conditions, precipitation, wind direction and speed, and summit locations. Types of data that were viewed as less useful included fuel moisture and fuel temperature, water levels, dew point temperature, solar radiation, atmospheric pressure, and water temperature.

3.1.8. Usefulness of features

While there are a number of features recommended by stakeholders to enhance the WeatherShare site, in general all stakeholders found the existing features useful.

3.2. Outreach

To enhance the survey instrument and to engage in a more robust evaluation dialogue, WTI researchers visited the various stakeholders involved in WeatherShare. The results of this dialogue are provided as follows.

3.2.1. California Department of Forestry and Fire Protection

WTI met with a representative of the California Department of Forestry and Fire Protection (CDFFP) regarding the survey responses. This user found the site slightly confusing, but did recognize that this may be a result of limited use; primarily only the demonstration CD had been used to show others the capabilities. Comments included that other users in his agency would find the site useful and that the firewall issues would not be a constraint; however, these users would determine the level and type of use. This user suggested improvements that make it easier to move between layers and from one feature to another. Another suggestion was to link the WeatherShare system to internal CDFFP systems to create a more robust tool. Also, it was determined that CDFFP did not need predictive services as they currently have those through legacy systems. A last suggestion was to secure additional grant funding to expand field capabilities of the system through a partnership of National Highway Traffic Safety Administration, Caltrans Office of Traffic Safety, CDFFP and CHP. Other suggestions for future capabilities are highlighted in Section 6 (Future Needs and Applications).

3.2.2. Caltrans

WTI met with Caltrans representatives from maintenance and operations, traffic management and research. Much of the discussion of the group centered on WeatherShare's ability to assist in collecting and notifying maintenance staff of maintenance needs, developing reports that could be used for documentation, improving on the alert/alarm functions, and finally developing a conceptual plan for how WeatherShare alarm settings could drive a level of field equipment automation to improve maintenance and operation, as well as traveler safety.

Some of the concepts and improvements discussed in the meeting included:

- Creating WeatherShare enhancements that would allow the alarm settings to drive placement of future automated warning systems; for example when a prescribed predetermined threshold is satisfied, the system could alert an operator to activate the appropriate CMS message. This process could then be field automated by an Automated Warning System Controller to reduce operator intervention. The system could also automatically notify (by e-mail or pager) staff of a maintenance need and develop the appropriate trouble report for a broken field element.
- In creating thresholds and report structure it is critical to think though the inter-relationships between the various aspects of road-weather conditions and alert functions. These inter-relationships are critical to addressing the scalability between site specific, group or area, and global conditions.

- As WeatherShare is a tool, enhancement should be made to provide for increased predictive features (approximately 12 hours) including pavement temperature forecast models. It was decided that WTI should set up a teleconference with Caltrans to discuss existing efforts by WTI in this area and how they may be incorporated into WeatherShare to meet Caltrans' needs.
- Quality control and historical report/presentation need to be improved and reverse engineered to meet Caltrans' needs. The acceptance report and structure should address the site, group and global needs, too. These reports would document which sensors on a RWIS may be in need of maintenance, for instance.
- Better links to other weather reporting systems should be provided, and data from these systems should be used by WeatherShare.

3.2.3. Nor-Cal EMS

WTI met with three representatives from Nor-Cal EMS. Representatives who used the system found it user friendly and requested a batch of user names to expand access to other EMS units and hospitals. Similar to some users in other agencies, representatives only had limited experience using the system either because of computer technical challenges (Citrix, SVG plugins, etc) or because it was a marginal event year. As such, some of the proposed improvements that are cited here actually already exist. Some of the suggestions included:

- including dew point (not the same as RH).
- including county/ city boundaries on maps.
- proximity alerts for fog and visibility, including prediction functions.
- pavement temperature forecasting for improved fleet management and safety.
- improving linkage to external sites, including other weather forecast sites such as Weatherbug.com (which is used by NorCal EMS).
- integrating WeatherShare with EMSsystems messaging system.

3.2.4. California Highway Patrol

WTI met with a representative of the California Highway Patrol (CHP) to discuss the survey responses received. As a result of the WeatherShare site not being pre-approved by CHP Administration, dispatch staff can not access the site through the CHP firewall. It was also determined that the WeatherShare system may be of more use to officers in the field rather than dispatchers who rely predominately on Caltrans to provide them with road condition information. There is also sensitivity to additional work tasks for dispatchers and potential overloading of those mission critical staff. The representative highlighted that CHP uses CHIN to secure weather information and that WeatherShare data should be integrated into CHIN. Other suggestions for future capabilities are highlighted in Section 6 (Future Needs).

3.2.5. SHASCOM

WTI met with a SHASCOM representative who had only used the demonstration CD as of that date. Nonetheless, this user stated that SHASCOM is very supportive of WeatherShare, recognizes its utility, and plans on participating in the project meetings and maintaining a long-term commitment to the project. Especially beneficial to SHASCOM are the plume modeling applications and use of displays to better understand wind direction impacts for bio-terrorism, HAZMAT and wildfire incident management. This user thinks there is a significant opportunity for WeatherShare to be integrated into the Emergency Notification System and to assist field officers when they need wind direction. Another future application could be developing a field PDA and integrating with the E-ALERT System in Trinity/Shasta County Sheriff Emergency Operations Centers to assist in multi-agency response. Similar to CDFFP, it has been a marginal event year (mostly structure fires rather than wildland fires), which may have contributed to limited use of the system.

4. FUTURE NEEDS AND APPLICATIONS

Table 1 provides a summary of future applications to the WeatherShare system, as suggested by stakeholders. These suggestions will be explored by WTI and Caltrans and be considered for Phase II enhancements within the budget constraints.

Table 1: Future Needs and Applications

Stakeholder	Potential Application	Does it exist within current system?
California Department of Forestry and Fire Protection	<ul style="list-style-type: none"> • Link to current legacy systems • Integrate ASOS and Caltrans fog sensor for better information to support EMS and helicopter operations such as Weed • Provide ability to query system for precipitation RH, wind, temperature, elevation and loading • Link system through radio system and provide in PDA format • Provide for color coded highway map of chain restriction at summit locations 	These features are not implemented at present, and will be investigated in Phase 2.
Caltrans	<ul style="list-style-type: none"> • Create alarm settings that could drive placement of future automated warning systems • Create automation feature that could notify maintenance staff and develop the appropriate trouble report for a broken field element. • Create thresholds and report structure that recognize the inter-relationships and scalability between site specific, group or area and global conditions. • Provide for increased predictive features (approximately 12 hours) including pavement temperature forecast models. • Provide for links to other weather reporting systems that then enhance quality 	These features are not implemented at present, and will be investigated in Phase 2.
Nor-Cal EMS	<ul style="list-style-type: none"> • Inclusion of dew point (not the same as RH) • Including county/ city boundaries on maps 	Dew point may be included in predictive data in Phase 2. If observed dew point is

	<ul style="list-style-type: none"> • Proximity alerts for fog and visibility including prediction functions • Pavement temperature forecasting for improved fleet management and safety • Linking to external sites could be improved including other weather forecast sites such as Weatherbug.com which is used by NorCal EMS • Integrating WeatherShare with EMS systems messaging system 	<p>not included in provider data, we would need to infer it from RH.</p> <p>County boundaries are already included. City boundaries will be considered in Phase 2. Points for cities are already included.</p> <p>Other features are not implemented at present, and will be investigated in Phase 2.</p>
SHASCOM	<ul style="list-style-type: none"> • Integrating WeatherShare into legacy notification/ alert systems, Shasta/ Trinity County Sheriff EOC's • Creating a PDA application for field officers to obtain wind direction information for improved plume modeling and prediction 	<p>These features are not implemented at present, and will be investigated in Phase 2.</p>
California Highway Patrol	<ul style="list-style-type: none"> • Provide for arrows to be color coded and create more filters to enhance usability and flexibility • Create PDA for field officers that integrates weather, incident management and emergency management 	<p>These features are not implemented at present, and will be investigated in Phase 2.</p>

5. CONCLUSIONS

Based on the surveys conducted and outreach performed, WeatherShare is viewed positively by Redding Incident Management Enhancement (RIME) end users as a tool for performing their duties. While the summer season had only twenty-five (25%) of normal fire events, organizations involved in response could see the utility in the proof-of-concept system and expressed interest in having other units (hospitals, fire and rescue response, field officers, other emergency management locations) having access to WeatherShare. Additional functionality was suggested by partners such as, but not limited to, integrating with fog sensors, PDA development, pavement temperature forecasts, integrating with existing hospital and emergency notification systems, and connection to additional external web sites/ links.

While predominately positive feedback was received on the Phase I system, there is still work to be performed to fully satisfy end user needs and to ensure operational success including:

- addressing fire wall issues with CHP and ensuring the WeatherShare is a tool for dispatch supervisors rather than a potential distraction of service
- integrating existing internal legacy systems and external useful internet links with WeatherShare
- improving historical reports structure, quality control and presentation of information of those reports
- expanding alarm capabilities and display features

The next steps for WeatherShare will be to address enhancements recommended by stakeholders and begin Phase 2. The goal of Phase 2 is to prepare for full corporate deployment of the WeatherShare system in California. The objectives are:

1. Develop a business case to help Caltrans to determine whether and how to proceed with full deployment.

The project team, in cooperation with Caltrans, will conduct a business case analysis and produce documentation for use in an FSR. We will develop partnerships and plans for long-term maintenance and management of the system.

2. Conduct further system development to expand the coverage area; improve usability, effectiveness, reliability and scalability; and enhance the system with unique and useful functionality.

The project team will incorporate additional Caltrans' districts and portions of adjacent states into the system. We will re-assess the user interface for usability and effectiveness; re-evaluate the system for reliability and scalability; implement improvements; and update user, system and maintenance documentation accordingly. With guidance from stakeholders, we will identify, prioritize and implement additional unique and useful functionality.

3. Promote system usage and awareness through on-going outreach, training and support.

The project team will promote system usage and awareness by existing stakeholders and, with the assistance of Caltrans, will identify stakeholders in new coverage areas. We will provide outreach, training and support to existing and new stakeholders.

4. Evaluate the system over multiple seasons and with a wider audience of prospective users.

The project team will evaluate system use and functionality over multiple seasons and across a wide audience of prospective users. We will incorporate evaluation results into the business case analysis. In conjunction with evaluation, we will conduct an on-going needs and requirements analysis and, where appropriate, conduct development and outreach to address identified needs and requirements.

6. APPENDIX

Survey Transmittal Letter and Instrument



Western

Transportation Institute

PO Box 174250

MSU • Bozeman

Date July 19, 2005

Name [Stakeholder Name]

Address [Stakeholder Address]

Dear : [Stakeholder Name]

Attached, please find a copy of the evaluation survey for the WeatherShare system. As mentioned in earlier correspondence, we (WTI) will be making a site visit to Redding on September 15th and 16th to discuss the survey with you. Silvia, our administrative assistance has been scheduling times with individuals and groups, so hopefully we will see you then.

In the event that we are unable meet with you at that time, please return your completed survey in the attached postage-paid envelope. Your feedback is very important.

If you have any difficulty accessing WeatherShare (<http://www.weathershare.org/>) or have other questions, please contact Doug Galarus (dgalarus@coe.montana.edu).

Thank you for your interest and participation in the WeatherShare project. We look forward to your feedback.

Sincerely,

Steve Albert

Director

Western Transportation Institute

Attachments:

WeatherShare Evaluation Survey

Postage-Paid Return Envelope

WeatherShare User Survey

This survey is being undertaken by the Western Transportation Institute, Montana State University, and is sponsored by the California Department of Transportation, to obtain information about your use of the WeatherShare System. Please take a few minutes and answer the questions below. WTI will be arranging meetings during a site visit to Redding on September 15th and 16th, we collect the survey from you then. Please complete the survey as best possible prior to these meetings. In the event that we are unable to meet on those dates, please return the survey to WTI using the included postage-paid envelope. You may provide this survey to others in your agency / organization that use the WeatherShare System. The Survey will be kept confidential and used to provide summary level information.

Contact Information:

Name: _____

Organization: _____

Telephone: _____

E-mail: _____

1. What is the primary focus or responsibility of your agency?

- State Department of Transportation
- Fire and Rescue
- Emergency Medical Service
- Enforcement
- Dispatch
- Other (please specify): _____

2. On a scale of 1 to 10 (ten being the highest) to what extent were your agency needs considered during the WeatherShare system requirements and development state?

3. How often do you visit the WeatherShare site for information?

- Website is open all the time

- Hourly
- Daily
- Weekly
- Monthly
- Not at all
- Other (please specify): _____

4. When do you use the information? (check all that are applicable)

- Daytime hours
- Nighttime hours
- Under changing conditions only
- During incident conditions (storm/fire etc)
- When Supervisor on-duty only
- When Supervisor off-duty
- Other (please specify): _____

5. Based on your experience using the site please evaluate the site in terms of the following aspects – indicate your level of agreement with these statements:

	Strongly Agree	Somewhat Agree	Neither Agree or Disagree	Somewhat Disagree	Strongly Disagree
a. The site is well organized and user friendly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. I am confident about the accuracy of the information about <i>current</i> conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. The information I get from this site helps me with my job responsibilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. This site helps me be better prepared for road and	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

weather conditions when managing resources					
e. I find this site confusing and difficult to use	<input type="checkbox"/>				
f. I think this site should be considered for general traveler information	<input type="checkbox"/>				
g. The goal of this project to serve as a single point of contact for road-weather information has been achieved	<input type="checkbox"/>				
h. It takes me too long to access some of the information and features	<input type="checkbox"/>				
i. There is important information missing from this site that should be made available	<input type="checkbox"/>				

6. Please also indicate in your own words how this website could be improved to better meet your needs. Consider information content, ease of use of the site, ability to understand what is presented and anything else that could make this site better. Be as specific as you can.

7. Now we would like you to rate the usefulness of the data on the Website that you have *used* at least once. For each feature that you have *not* used, please indicate whether you were aware of this feature before taking this survey (Please make a single selection for each data element.)

	Use Data			Don't Use Data	
	Very Useful	Somewhat Useful	Not Very Useful	Aware of it	Not Aware of it
a. Weather Station locations	<input type="checkbox"/>				
b. Fuel moisture and fuel temperature	<input type="checkbox"/>				
c. Water Levels	<input type="checkbox"/>				
d. Relative Humidity	<input type="checkbox"/>				
e. Dew Point Temperature	<input type="checkbox"/>				
f. Visibility	<input type="checkbox"/>				
g. Air Temperature	<input type="checkbox"/>				
h. Pavement Temperature	<input type="checkbox"/>				
i. Pavement Conditions	<input type="checkbox"/>				
j. Precipitation	<input type="checkbox"/>				
k. Wind direction & speed	<input type="checkbox"/>				
l. Solar Radiation	<input type="checkbox"/>				
m. Atmospheric Pressure	<input type="checkbox"/>				
n. Water Temperature	<input type="checkbox"/>				

o. Summit Locations	<input type="checkbox"/>				

8. Now we would like you to rate the usefulness of the *features* on the Website that you have *used* at least once. For each feature that you have *not* used, please indicate whether you were aware of this feature before taking this survey (Please make a single selection for each feature.)

	Use Features			Don't Use Features	
	Very Useful	Somewhat Useful	Not Very Useful	Aware of it	Not Aware of it
a. Map display & zoom function	<input type="checkbox"/>				
b. Web hyperlink to other weather resources	<input type="checkbox"/>				
c. Weather and related information (wind speed etc)	<input type="checkbox"/>				
d. Ability to customize (turn on /off) layers	<input type="checkbox"/>				
e. Report of quality control failures for weather stations	<input type="checkbox"/>				
f. Ability to distinguish authorized users	<input type="checkbox"/>				
g. Ability to track historical data	<input type="checkbox"/>				
h. Ability to provide alert system notification	<input type="checkbox"/>				
i. Ability to color-code weather information and provide graphic representation	<input type="checkbox"/>				

Thank you!