# Integrating the Surface Transportation Weather Information: An ITS System for Northern California

www.weathershare.org

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# Agenda

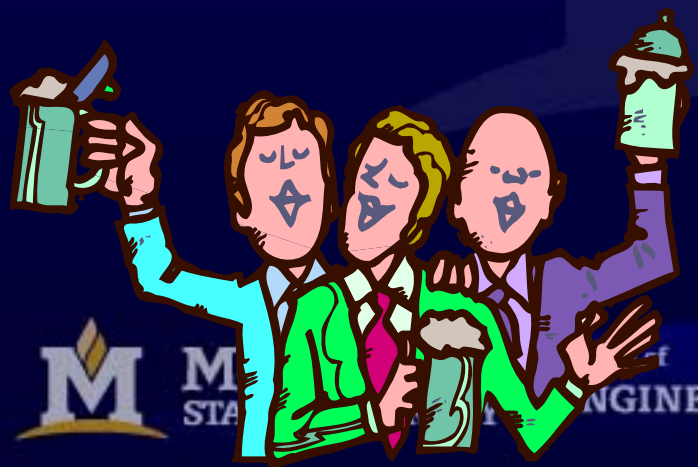
- Background
- Scope
- Problem Statement & Vision
- System Briefing
- Conclusions
- Acknowledgements

# WeatherShare Project

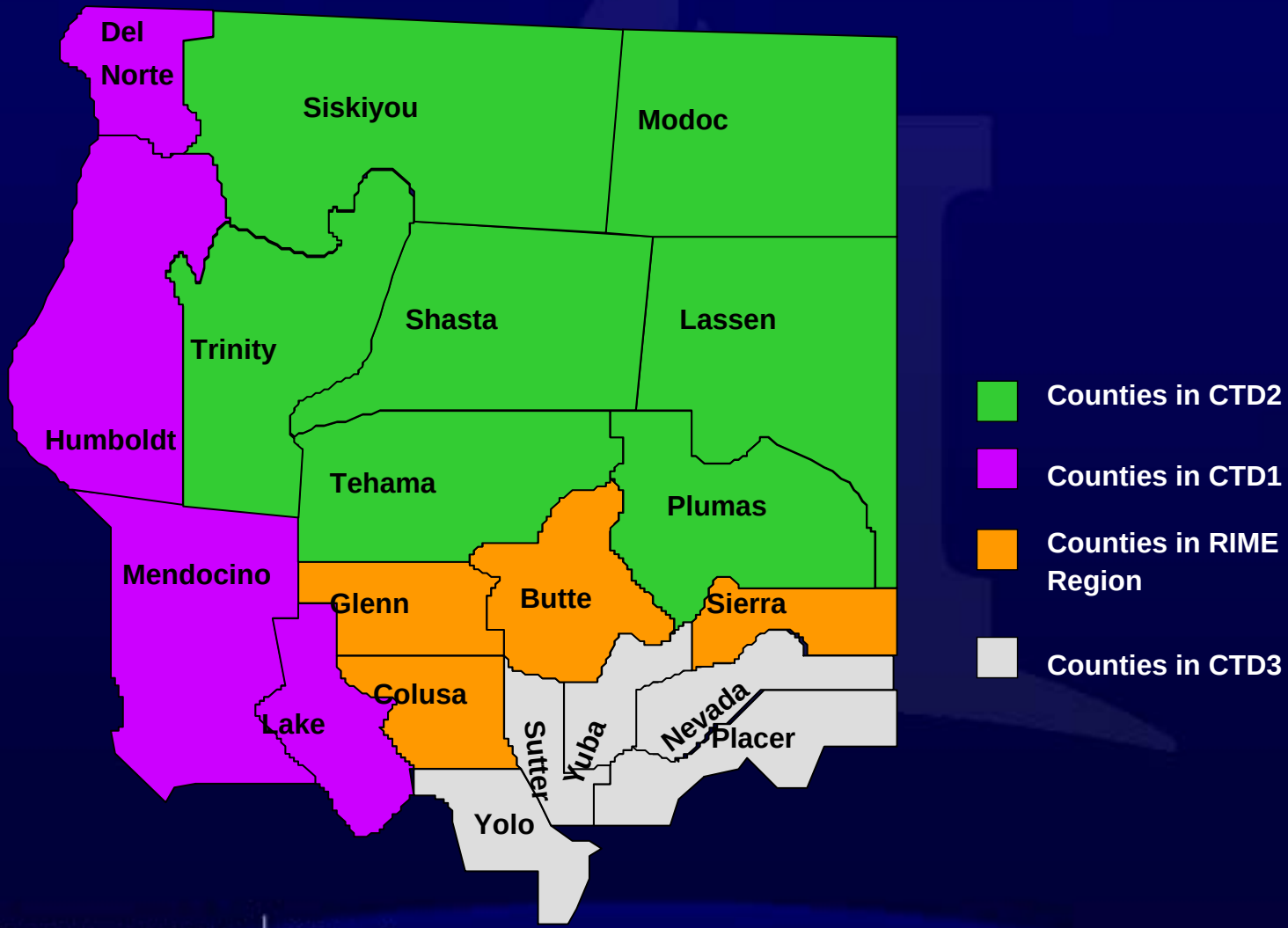
- Redding Incident Management Enhancement (RIME) program, 2003
- Multiple stakeholders
  - Caltrans District 2
  - Caltrans Redding TMC
  - California Department of Forestry (CDF)
  - California Highway Patrol (CHP)
  - Shasta Area Safety Communications Agency (SHASCOM)
  - NorCal Emergency Medical Services (EMS)

# Goal of the Project

- To streamline and integrate currently available road weather data in the region into one single source easily accessible by incident responders and potentially the traveling public

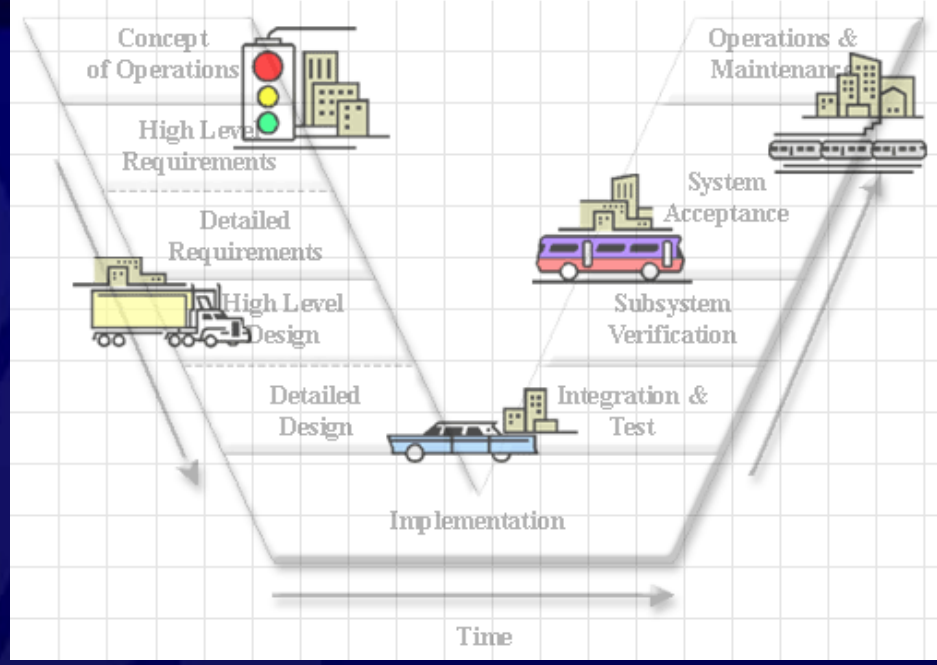


# Region of Interest



# Methodology

- Phased approach
  - goes through the V-model in an iterative manner
  - to minimize potential risks
- System engineering tools
  - Project Plan
  - Concept of Operations
  - User Requirements Analysis
  - Configuration Management Plan

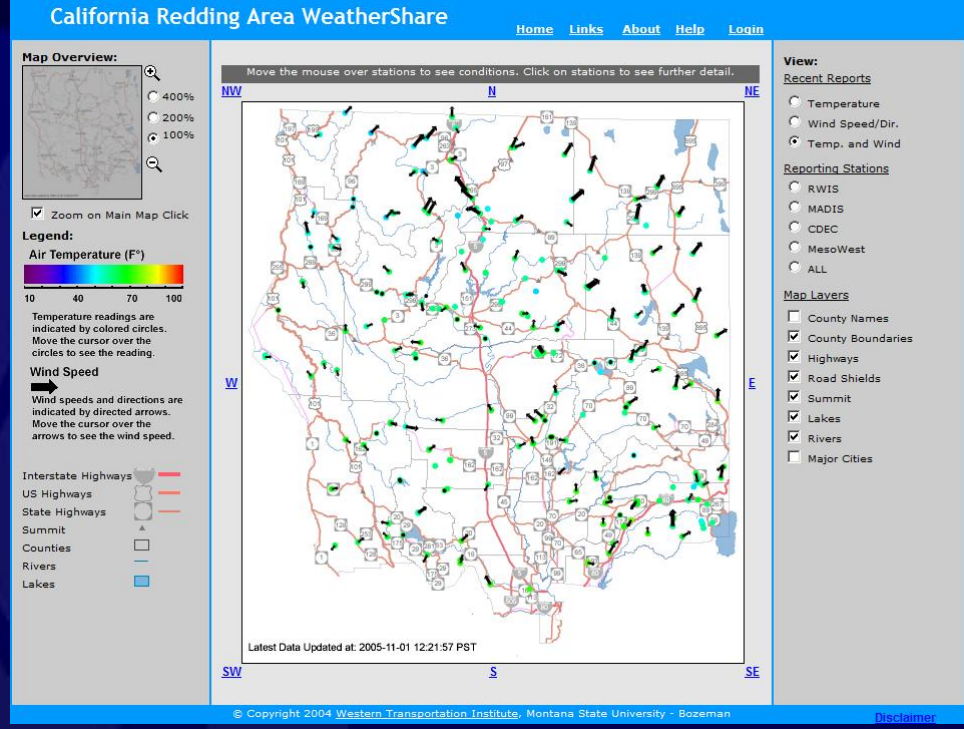


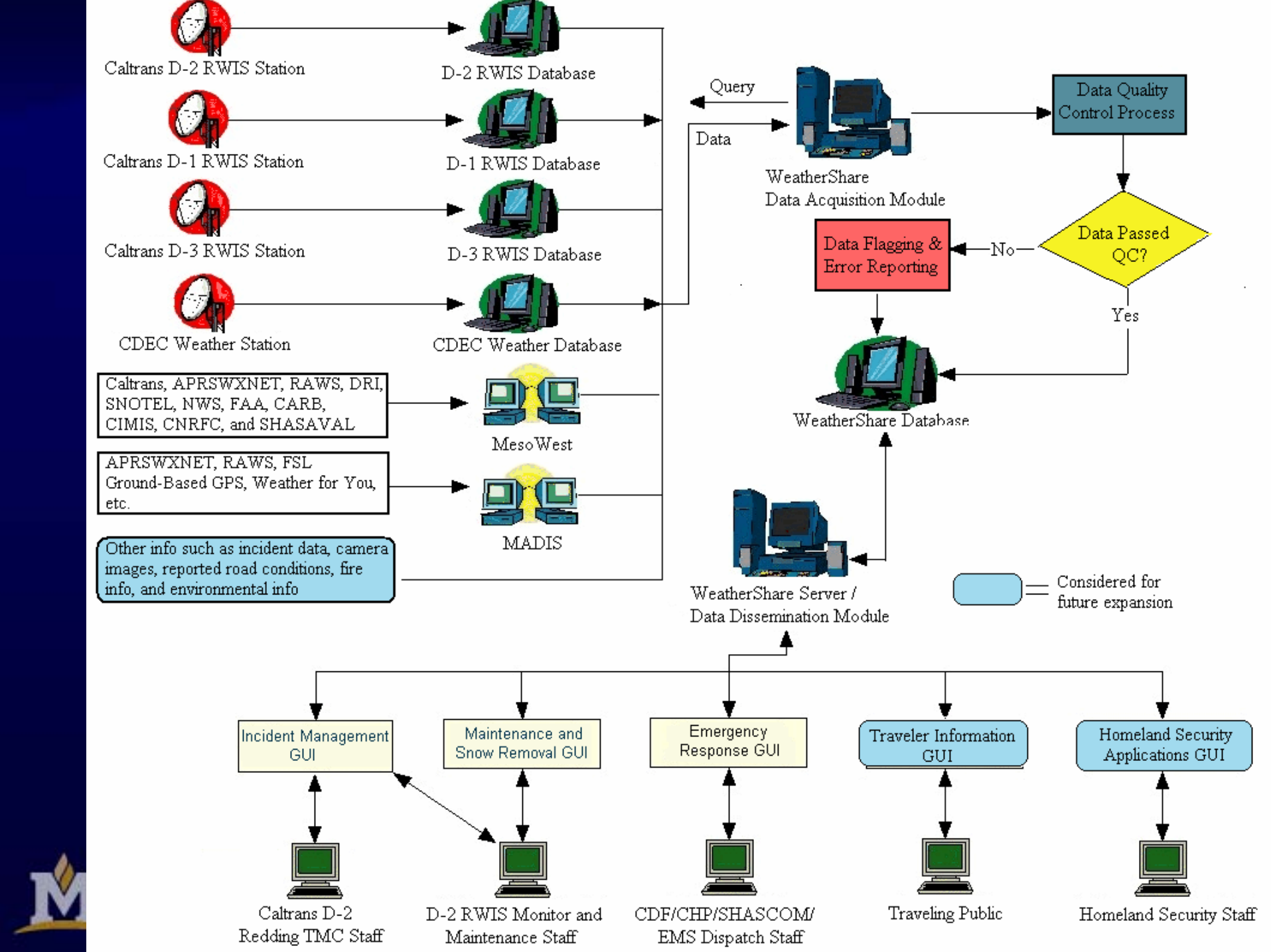
# Problem Statement

- Abundant road weather information, separate sources, various interfaces
  - Inefficient and time-consuming
- Use of the data has not yet reached its full potential
  - Potential applications in new program
- Desire for easy access and integration & quality control of road weather data

# Vision

- A surface transportation weather application
- Allow users to view a compilation of all available road weather data from various sources in Northern California
- Greatly increasing the efficiency of situation assessments for various purposes

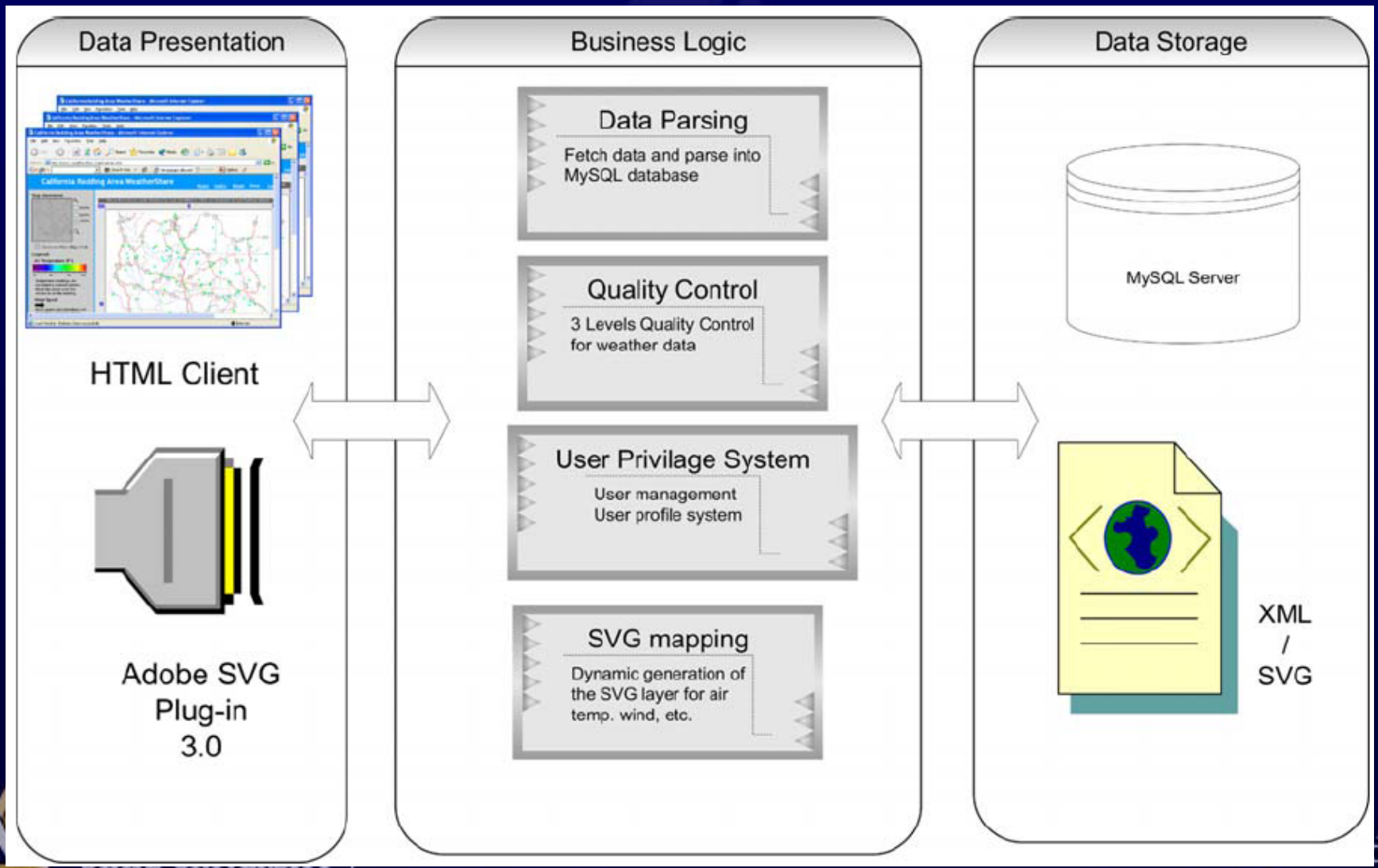



Caltrans D-2 RWIS Station
D-2 RWIS Database
Caltrans D-1 RWIS Station
D-1 RWIS Database
Caltrans D-3 RWIS Station
D-3 RWIS Database
CDEC Weather Station
CDEC Weather Database
Caltrans, APRSWXNET, RAWS, DRI, SNOTEL, NWS, FAA, CARB, CIMIS, CNRFC, and SHASAVAL
MesoWest
APRSWXNET, RAWS, FSL Ground-Based GPS, Weather for You, etc.
MADIS
Other info such as incident data, camera images, reported road conditions, fire info, and environmental info
Query
Data
WeatherShare Data Acquisition Module
Data Quality Control Process
Data Passed QC?
No
Yes
Data Flagging & Error Reporting
WeatherShare Database
WeatherShare Server / Data Dissemination Module
Considered for future expansion
Incident Management GUI
Maintenance and Snow Removal GUI
Emergency Response GUI
Traveler Information GUI
Homeland Security Applications GUI
Caltrans D-2 Redding TMC Staff
D-2 RWIS Monitor and Maintenance Staff
CDF/CHP/SHASCOM/ EMS Dispatch Staff
Traveling Public
Homeland Security Staff

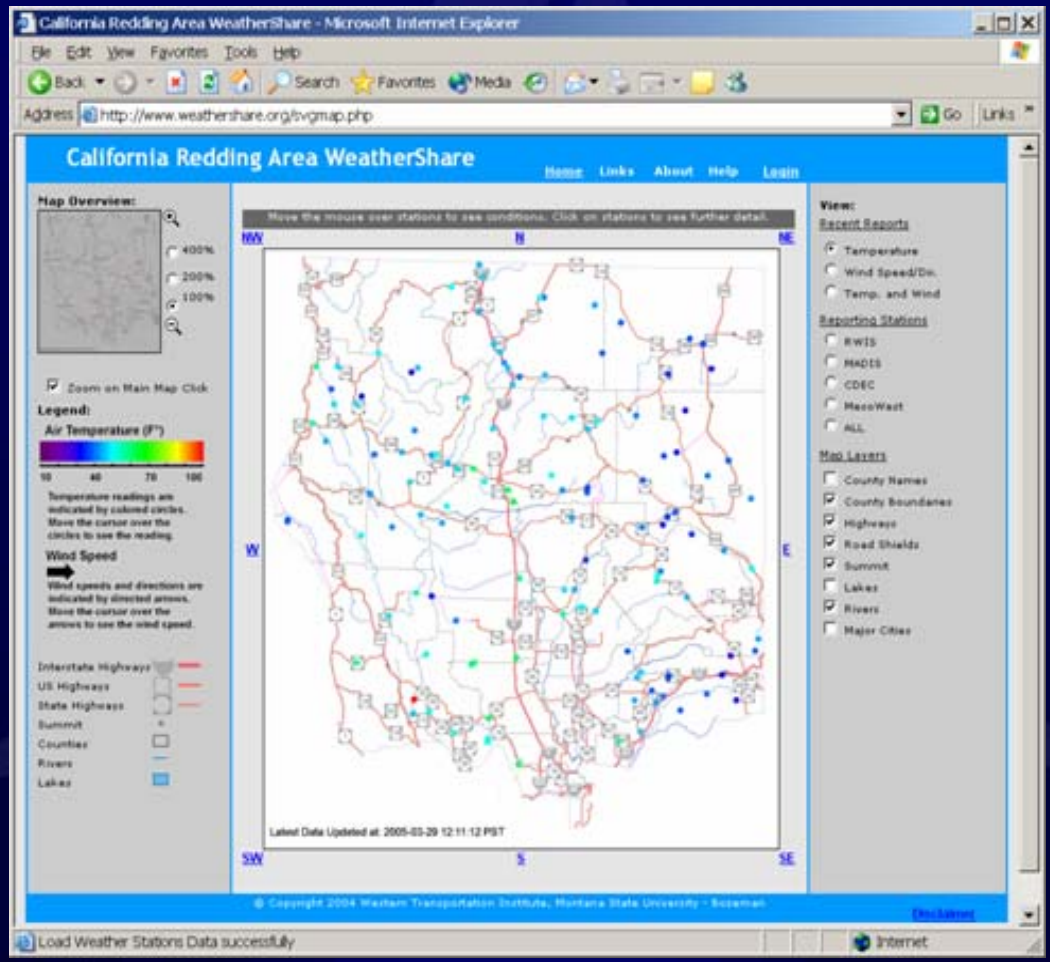
# WeatherShare Characteristics

- Leveraging resources
- Road weather data sharing and integration
- Weather data standardization and quality control
- An easy-to-maintain, cost-effective product powered by an open-source web platform (Linux/Apache + Perl + MySQL + PHP)
- Scalable, interactive map displays powered by the SVG technology
- Customizable, individualized user interfaces powered by the PHP Smarty template system
- Database-driven web pages powered by the MySQL technology

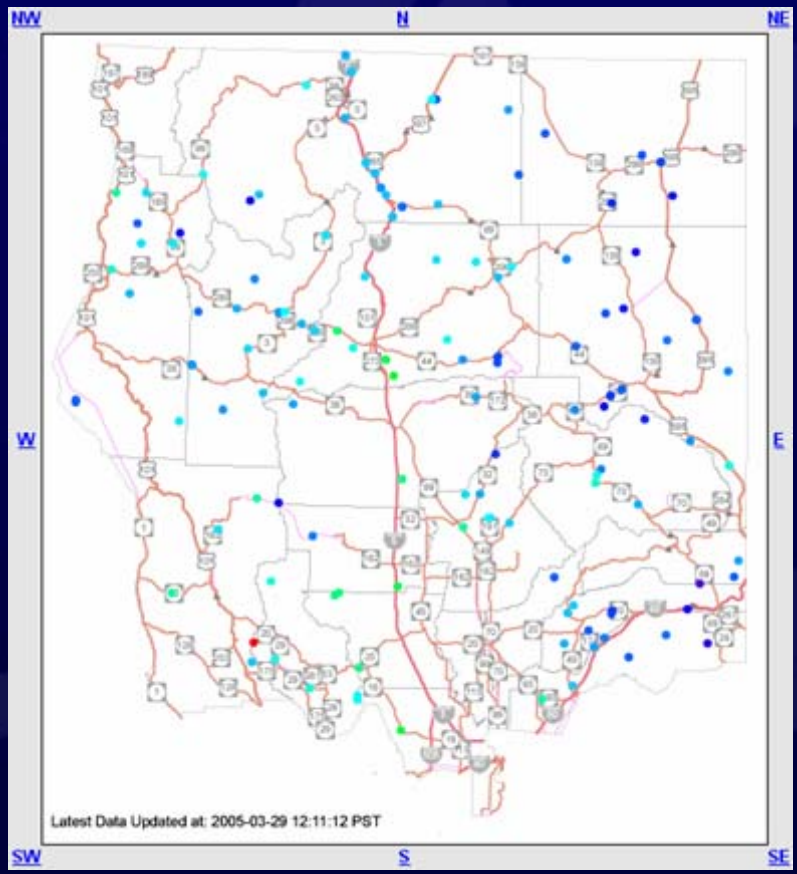
# Multi-tier System Architecture



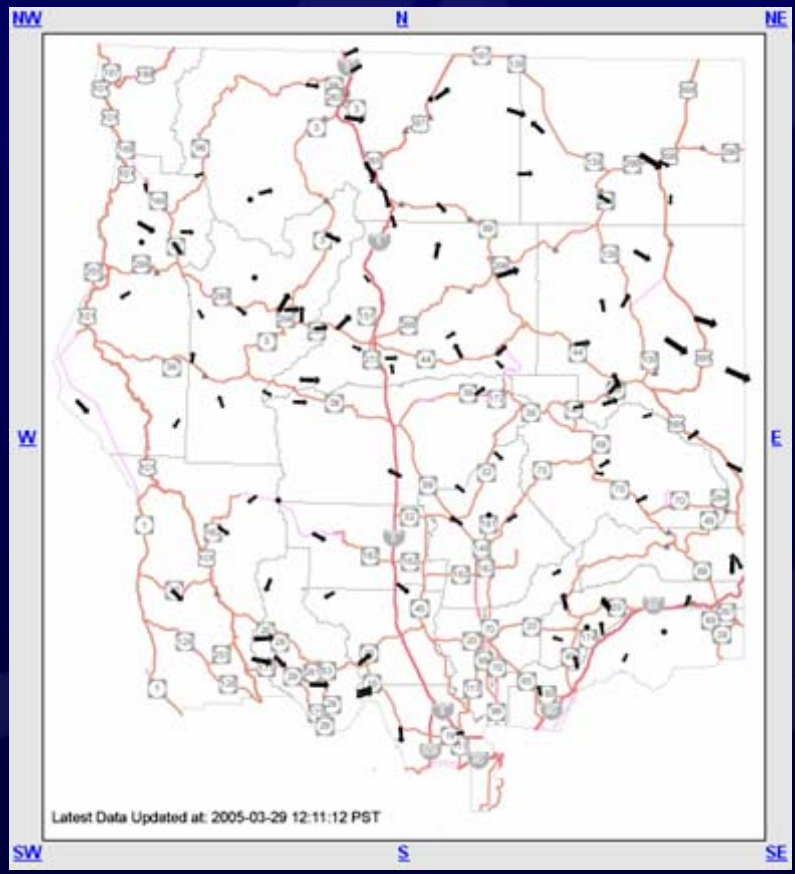
# The WeatherShare Interface



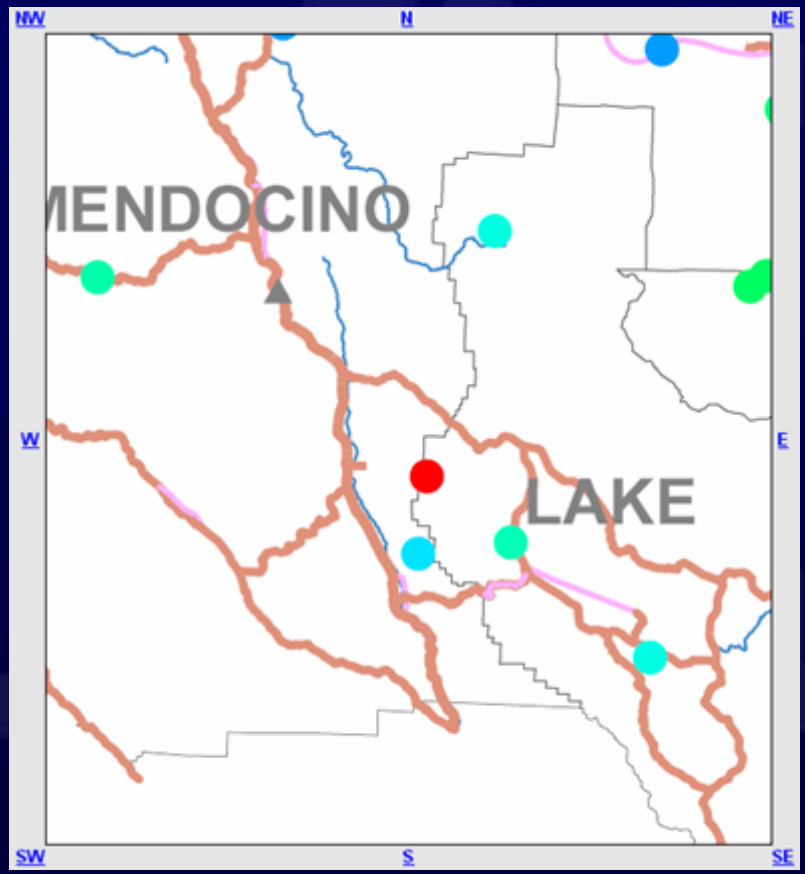
# Temperatures from Stations Reporting within the Past Hour



# Wind Readings from Stations Reporting within the Past Hour



# Data Can be Viewed in Context



# California Redding Area WeatherShare



**Map Overview:**

400%
200%
100%

Zoom on Main Map Click

**Legend:**

Air Temperature (F°)


Temperature readings are indicated by colored circles. Move the cursor over the circles to see the reading.

**Wind Speed**

Wind speeds and directions are indicated by directed arrows. Move the cursor over the arrows to see the wind speed.

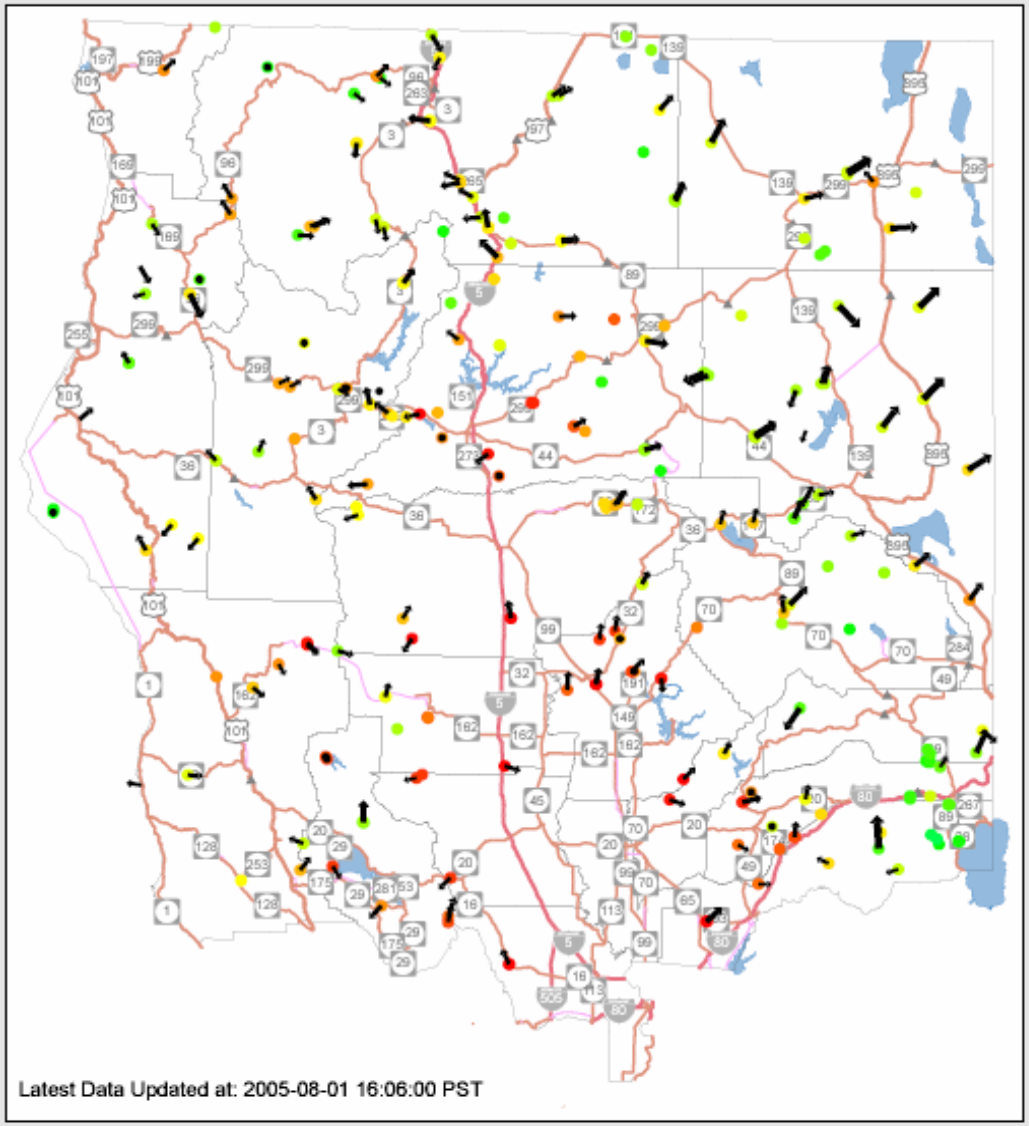
Interstate Highways
US Highways
State Highways
Summit
Counties
Rivers
Lakes

Move the mouse over stations to see conditions. Click on stations to see further detail.

NW N NE

W E

SW S SE




**View:**

Recent Reports

- Temperature
- Wind Speed/Dir.
- Temp. and Wind

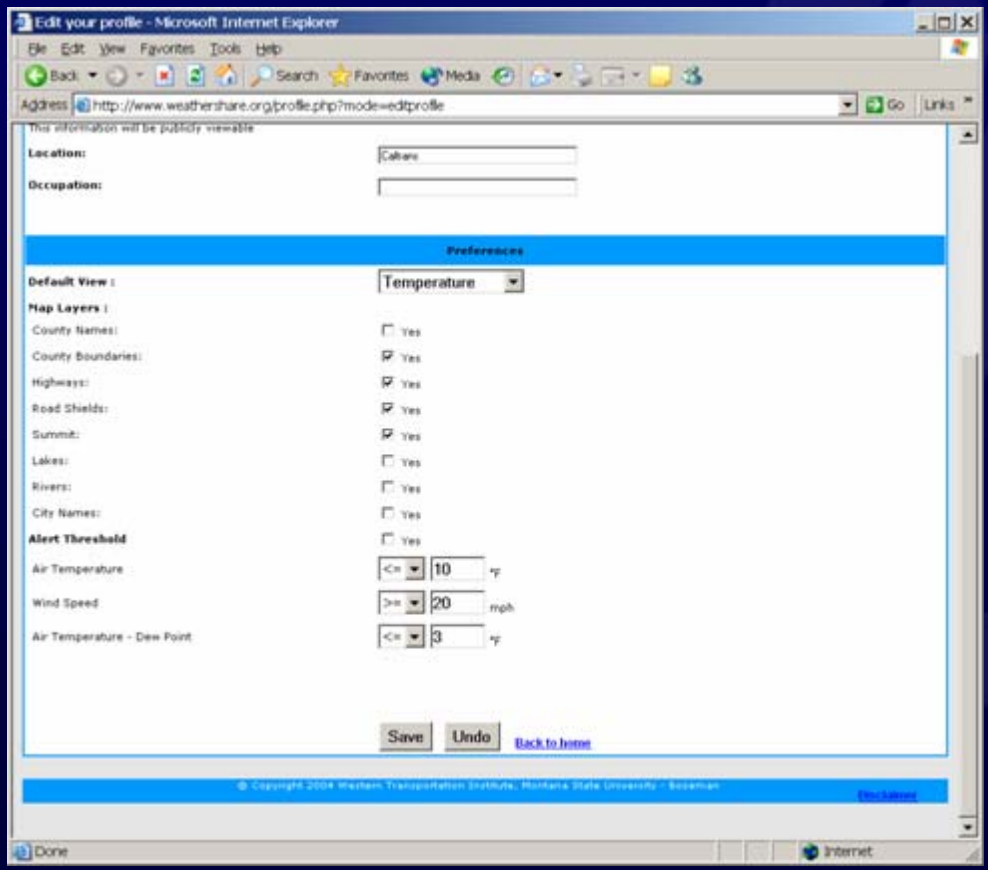
Reporting Stations

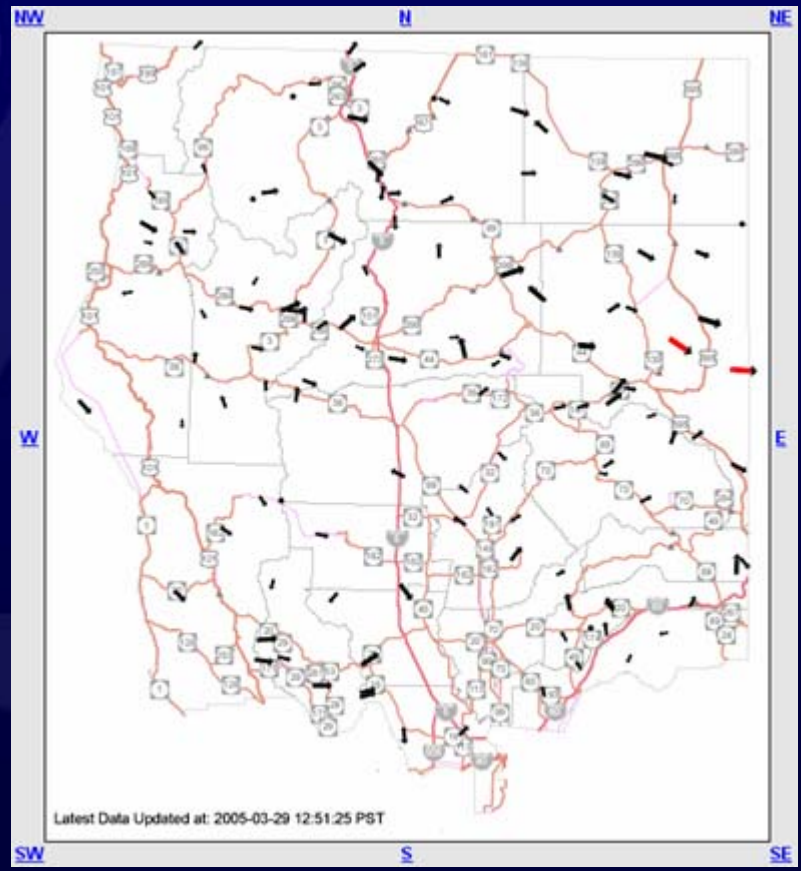
- RWIS
- MADIS
- CDEC
- MesoWest
- ALL

Map Layers

- County Names
- County Boundaries
- Highways
- Road Shields
- Summit
- Lakes
- Rivers
- Major Cities

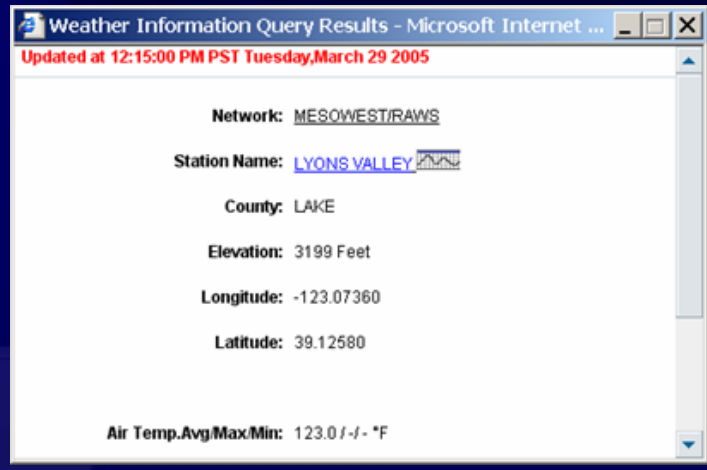
# Alerts/Thresholds Defined by Authorized Users

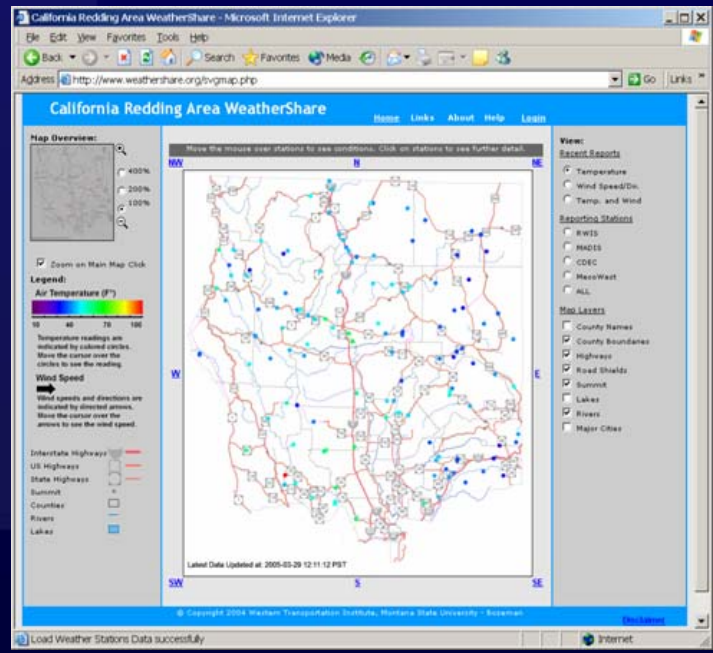


# Other System Features

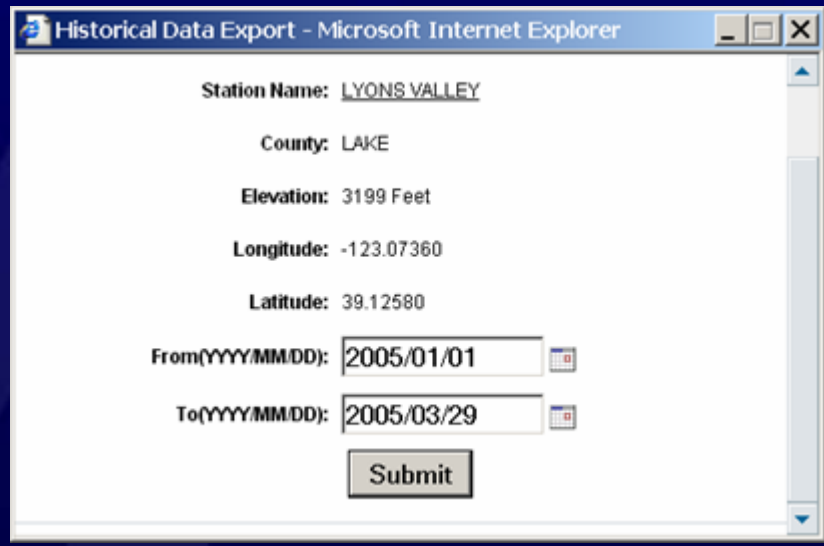
1. Automatically push road weather information to the user every 5 minutes
2. Use a map display that permits the user to zoom into, zoom out of, or pan into the area of interest
3. Allow the user to turn on/off various data layers on the interactive map display

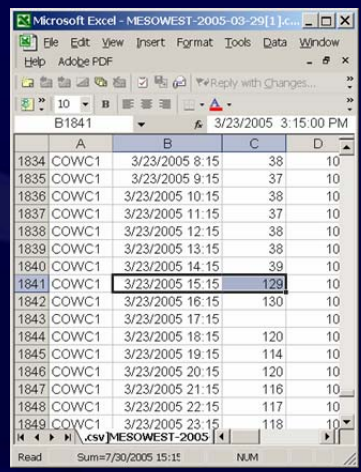


# Other System Features (Cont'd)

4. Apply quality control procedures for all the real-time reporting stations
5. Allow the user to track historical data for a period of up to one year from present
6. Backup the road weather data on a daily basis and implement a backup mechanism for the server as well



# Conclusions

- WeatherShare has served as a regional showcase and proof-of-concept for the national priority: better weather info. for surface transportation.
- Due to the involvement of multiple stakeholders and the complexity of institutional and technical issues, it is important to develop partnerships among organizations in order to promote the successful integration of road and weather data from various sources.
- In building a successful ITS system that can meet the users' needs, it is crucial to involve the users and stakeholders from its very early stages of design and development and throughout its lifecycle.

# Acknowledgements


- Caltrans Division of Research and Innovation (DRI)
- Caltrans District 2
- Upstream weather data providers (CDEC, MADIS, MesoWest and NWS)
- RIME organizations (CHP, CDF, SHASCOM, and NorCal EMS)
- WTI IT team
- Lisa Ballard, P.E.

# Questions

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| *Goals of the Clarus Initiative* | *WeatherShare Features* | *Supporting Documents* |
|---|---|---|
| • Road Wx data standardization, sharing & integration (national)<br>• Road Wx data QC<br>• Systems Engineering<br>• Multiple stakeholder coordination<br>• Prototype for requirements analysis | • Road Wx data sharing & integration (regional)<br>• Wx data QC<br>• Systems Engineering<br>• Multiple stakeholder coordination<br>• Prototype for requirements analysis<br>• Open-source | • Project Plan<br>• Concept of Operations<br>• User Requirements<br>• Configuration Management Plan<br>• Facilities Study Report<br>• Survey for Evaluation |

# Next Steps – Phase II

- Improved functionality of the system
- Extended geographic coverage
- More comprehensive evaluation