ENTERPRISE Transportation Pooled Fund Study TPF-5 (231)

ENTERPRISE

Use and Impacts of Camera Images and Other Displays of Traveler Information

EXECUTIVE SUMMARY

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September 2013

Acknowledgements

This document was prepared for the ENTERPRISE Transportation Pooled Fund TPF-5(231) program. With agencies from North America and Europe, the main purpose of ENTERPRISE is to use the pooled resources of its members, private sector partners and the United States federal government to develop, evaluate and deploy Intelligent Transportation Systems (ITS).

Project Champions and Project Team

Bill Legg, Washington State Department of Transportation, was the ENTERPRISE Project Champion for this effort. Joop Van Bergen, Dutch Ministry of Transport (Rijkswaterstaat), initiated the project's problem statement and was the ENTERPRISE Project Co-Champion.

Members of the project team who provided input during the project, including feedback on the survey design, web usage statistics, and information about new camera deployments:

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Executive Summary

This Executive Summary contains an overview of the background, objective, approach, results and conclusions of the ENTERPRISE Project "Use and Impacts of Camera Images and other Sources of Traveler Information." The full project report can be found at the ENTERPRISE Program website.

Background

At the highest level, traveler information provided by transportation agencies can be categorized in to two distinct types of dissemination:

1) **Verified Reports**: Information formulated and/or verified by transportation agencies that describes travel conditions on roadways, providing quantitative or qualitative descriptions about what travelers can expect on their route. Verified reports may include:

    - ***Traffic Maps*** **-** Maps that visually display measured traffic speeds
    - ***Congestion Reports / Travel Times*** – Descriptions that report time delays or travel times between two points
    - ***Incident Reports*** – Reports that describe locations of incidents (e.g. stalled vehicles, crashes, debris on the roadway) that could impact congestion or safety
    - ***Road Condition Maps and/or Reports*** – Maps and reports that describe weather-related driving conditions (good, fair, poor) or pavement conditions (dry, wet, icy, etc.)
    - ***Construction*** **Locations** ***and Road/Lane Closures*** **–** Maps and descriptions that indicate work zone locations and limits of lane or road closures

    For example, an incident report provided by an agency may indicate the location of an incident and the impact to the roadway (e.g. left lane closed). An incident report is typically verified by the agency by viewing the incident site via a live camera feed and/or verbal descriptions provided by dispatch or law enforcement on the scene.

2) **Unverified Displays**: Displays that provides information that is open to interpretation by travelers and may influence travel decisions. Unverified displays may include:

    - ***Camera Images*** – Real-time "snapshot" views that travelers may use to interpret travel conditions (e.g. traffic speeds or weather-related road conditions.)
    - ***Live Video*** **–** Real-time motion views that travelers may use to interpret travel conditions
    - ***Weather Monitoring Station Data*** – Current weather data (e.g. air temperature, wind speeds, etc.) that travelers may use to interpret how atmospheric conditions are impacting roadway conditions

For example, one traveler may view a camera image on a transportation agency website and interpret the traffic condition as congested, whereas another traveler may view the same camera image and interpret the traffic condition as free flowing.

Objective

The overall objective of this project was to understand the use and impacts of camera images and other "unverified" displays of information that can be interpreted by travelers, especially when compared to verified reports. It is anticipated that the results from this project could be used by agencies who are questioning whether to display unverified displays to travelers or whether to increase/decrease their current displays (e.g. add or decrease cameras for display to the public.)

Project findings could also help agencies better understand potential issues and impacts associated with travelers' interpretation of various information types. For example, travelers who misunderstand unverified displays (e.g. weather information or camera images) may perceive conditions to be better or worse than actual conditions. In contrast, travelers who rely heavily on verified reports, which may not always be up-to-date and accurate, might be better served to see unverified displays of "real-time" conditions. For example, a section of road designated as "Dry" on a traveler information website may actually be snow-covered or icy, due to changing weather conditions, in which case travelers could receive more accurate information by viewing a camera image showing actual conditions.

Approach

The focus of the project was on traveler information websites hosted by transportation agencies, as opposed to information accessed via agency 511 phone lines, changeable message signs on roadways, or other sources of traveler information. The project consisted of four investigation approaches:

1) **Literature Search** - Relevant literature was reviewed and summarized in order to avoid duplication of efforts and learn from previous related efforts.

2) **Online Survey of Travelers** - A survey (posted on transportation agency traveler information websites) was conducted to gather feedback from motorists.

   - Five (5) state DOTs hosted the online survey.
   - The survey design included the following areas of inquiry:

     - Survey contributors were asked to rate the usefulness of various types of traveler information, including examples of verified reports and unverified displays.
     - Survey contributors were asked about the added value of viewing camera image in addition to color-coded traffic maps. They were also asked about the importance of viewing traffic maps in addition to camera images.
     - Survey contributors were asked to choose the information type (weather reports, road condition maps, camera images) that is the most useful when seeking weather-related road information.

3) **Web Usage Comparisons** - Web statistics from DOT traveler information websites were gathered and assessed to determine usage patterns for various traveler information types.

   - Five (5) comparisons were completed, utilizing web usage statistics provided by four (4) state DOTs.
   - Comparisons included both traveler information websites that cover mainly metropolitan areas and traveler information websites that provide statewide traveler information.

4) **Assessment of Impacts due to Deployment of New Cameras** - Interviews were conducted with staff from transportation agencies that have recently deployed new cameras, to determine if/how the deployments impacted travelers.

   - Three (3) state DOTs participated in interviews for this assessment.
   - Assessment sites with new camera deployments included six (6) cameras in rural Idaho, approximately six (6) cameras in the Tacoma, Washington metropolitan area, and approximately 46 camera images in rural Iowa that were made available to the public for the first time on Iowa DOT's Traveler Information Website.

Results

Overall findings indicate that unverified displays, specifically camera images and weather station data, are not as highly accessed as verified reports such as traffic maps and road condition maps/reports. However, many users of traveler information websites indicated that they highly value camera images, especially in combination with traffic maps and road condition maps/reports. Observations from agency staff indicated that the public expresses a strong desire to have as much information as possible about traffic and road conditions and will commonly express dissatisfaction when camera images are not available in specific areas of low coverage or are not functioning properly.

725 responses to the online survey of travelers were received. Results revealed a number of preferences reported by users of traveler information websites:

- Camera images are highly valued by many traveler information website users, especially to complement information provided by traffic maps and road condition reports. Camera images are often valued because they are considered to be more "real-time" than traffic maps.
- Most users of traveler information websites would not be satisfied with camera images alone, especially when obtaining information about traffic/congestion conditions.
- Camera images appear to be more useful to traveler information website users during inclement weather, especially in rural areas and by younger drivers.
- Camera images were rated nearly as highly as road condition reports, in terms of the most useful type of information when seeking weather-related road condition information. A number of users of traveler information websites expressed value in viewing a combination of camera images and road condition reports when seeking this information.

- Weather reports (air temperature, wind speeds, etc.) are not considered to be very useful.

The web usage comparisons provided observations about actual usage patterns for various types of information on traveler information websites*:*

- Unverified displays (camera images and weather station data) were not accessed as frequently as verified reports (traffic maps and/or road condition maps/reports). The lower use of camera images may indicate that visitors to traveler information websites are often satisfied with the information they receive from landing pages (typically verified reports such as traffic maps or road condition maps) and do not always need to see camera images to view actual conditions.
- The rate of access to camera images increased with inclement weather (e.g. significant winter storms, flooding events) and during construction seasons. In many cases, though access to other pages also increased with winter weather, the rate of increase was not as dramatic as the increase in access to camera images.
- In the Twin Cities metro area, cameras images were highly accessed near work zones that created significant congestion.
- Camera images appear to be highly accessed near work zones that create significant congestion.

Interviews with agency staff from the Idaho Transportation Department (ITD), Iowa DOT, and Washington State Department of Transportation (WSDOT) provided insights about the impacts of making new camera images available via traveler information websites:

- Decisions to deploy new cameras are not typically driven by public demand. Rather, these investments are typically made to improve traffic management and operations. In the Iowa DOT case, however, the decision to make cameras available throughout the state in rural areas was driven by the agency's desire to provide as much information as possible to motorists, especially in rural areas during winter weather events.
- Inclement weather (e.g. snow events) creates high demand for traveler information, as observed by WSDOT while monitoring web usage over time and noted by Iowa DOT as a motivating factor for making camera images in rural areas available via their traveler information website.
- The public generally expects to have as much information as possible about travel conditions. ITD received requests from the public for additional cameras and weather station data in areas where there were gaps in coverage. In each deployment case, agencies received expressions of appreciation after cameras were deployed.
- As new cameras and RWIS stations are deployed by ITD in areas with sparse coverage, district maintenance stations experience fewer calls from the public requesting road conditions.
- In the WSDOT case, news media played an important role in disseminating information about traffic conditions along the I-5 corridor where new cameras were deployed. WSDOT staff observed that when incidents are highly publicized, motorists tend to change their travel

patterns accordingly. In this instance, the availability of camera images is influencing travel behavior, due to increased publicity.