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TravInfo Field Operational Test Evaluation: Information Service Providers Customer Study

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ABSTRACT

This paper presents the findings of the customer study of Information Service Providers. The Information Service Provider customer study is part of the traveler response evaluation for the TravInfo Field Operational Test. Presently, three private partners of the TravInfo project deploy traffic Web sites using exclusively the TravInfo database. A survey of Web site users was conducted over seven months from August 1998 – March 1999. A survey instrument was incorporated into the Web site. The study addressed the usage of Web site information and the travel behavior of Web site users. The key finding of the survey is that Web site service may significantly influence travel behavior. The vast majority of those who retrieved incident reports modified their trips. The study showed that drivers who encounter traffic congestion frequently are likely to access information on a regular basis. Most traffic Web site users are repeat customers because they are satisfied with the information they have obtained through the Internet. People who retrieve Web site information have more travel options than those who obtain information from other sources. Web site information is more understandable than the information disseminated through other media. People perceived that the quality of Web site information is better than other sources in terms of its usefulness and reliability. Web site users are more receptive to traffic reports than are those who use other information sources. Keywords: traffic Web site, travel behavior

Keywords: Web site, advanced traveler information, travel behavior

EXECUTIVE SUMMARY

As part of the TravInfo Field Operational Test, a regional Traveler Information Center (TIC) was created. Since September 1996, the center has been disseminating traveler information to the public through the Traveler Advisory Telephone System (TATS) and to Information Service Providers through the Landline Data Server. TravInfo collects, integrates and disseminates information on current traffic conditions and multi-modal travel options, including transit schedules and carpool matching as well as freeway construction schedules. Presently, three information service providers rely exclusively on TravInfo to disseminate traveler information through traffic Web sites. During the field test, the Contra Costa Times, Etak and a division of Maxwell (later bought by SmartRoutes) all deployed traffic Web sites based on TravInfo data.

Three privately offered traffic Web sites were evaluated from the user perspective. These Web sites disseminate traffic information on major freeways and the transit schedules of 27 Bay Area transit services. Although all three providers use exactly the same information, provided by TravInfo, each has its own dissemination methods. One shows freeway speed and incident locations on a map. Others show similar information using the text format.
The results presented here are preliminary; further analysis is warranted to support the preliminary conclusions. Although the sample is fairly representative of Internet users, we do not know as yet to what extent it is representative of traffic Web site users. To correct response biases, it is necessary to assess the number of people who requested the site and the profiles of the users. The preliminary data analysis, however, suggests the following inferences.

Most of the traffic Web site users are commuters with full-time jobs. Because of their employment status (high income professionals or managers), their arrival time at work is flexible and they have a varying degree of travel options, either by taking an alternate route or by changing their departure time. Most Web site customers are solo drivers whose primary commute route is the freeway. This is understandable since the service provides primarily freeway traffic conditions.

The key finding of the survey is that the Web site service may significantly influence travel behavior. Of those who retrieved incident reports, 80% modified their trips. This trend is considerably different from the studies of radio/television listeners or telephone information callers. 25% of those who obtained <u>pre-trip</u> incident information from radio or television modified their trips (1); 50% of those who obtained <u>pre-trip</u> traffic information from TravInfo TATS modified their trips (7). The reasons may be that:

- People who retrieve Web site information have more travel options than those who obtain information from other sources.
- The Web site information is more understandable than the information disseminated through other media.
- People perceived that the quality of Web site information is better than other sources in terms of its usefulness and reliability, although both the TravInfo telephone system and the Web sites disseminate similar information to users.
- Web site users are more receptive to traffic reports than are those who use other information sources.

These reasons are somewhat conjectural and thus they should be tested in the subsequent phase of the data analysis. However, the important point to stress here is that nearly half of the Internet users believe that their decision to change on the basis of Web site information has resulted in substantial savings in travel time.

INTRODUCTION

The purpose of the TravInfo Field Operational Test was to broadly disseminate accurate, comprehensive, timely, and reliable traveler information to the public in the San Francisco Bay Area through various means. A fundamental premise of the TravInfo Field Operational Test was that stimulatin the private sector to invest in and develop advanced traveler information systems would lead to ther wider use by the traveling public through a variety of devices, including personal computers, collular phones, personal digital assistance units, digital watches and in-vehicle navigation devices. It was hoped that as more travelers used the data to select appropriate modes, routes, and departure time, the overall Bay Area transportation system would become more efficient.

As part of the TravInfo Field Operational Test, a regional Traveler Information Center (TIC) was created. Since September 1996, the center has been disseminating traveler information to the public through the Traveler Advisory Telephone System (TATS) and to Information Service Providers through the Landline Data Server. TravInfo collects, integrates and disseminates information on current traffic conditions and multi-modal travel options, including transit schedules and carpool matching as well as freeway construction schedules. Presently, three information vendors rely exclusively on TravInfo to disseminate traveler information through traffic Web sites. During the field test, the Contra Costa Times, Etak and a division of Maxwell (later bought by SmartRoutes) all deployed traffic Web sites based on TravInfo data.

Three privately offered traffic Web sites were examined from the user perspective. These Web sites disseminate traffic information on major freeways and the transit schedules of 27 Bay Area transit services. Although all three providers use exactly the same information, provided by TravInfo, each has its own dissemination methods. One shows freeway speed and incident locations on a map. Others show similar information using the text format.

The purpose of the study is to understand the extent to which traffic Web sites influence individual travel decisions. Until recently, the primary source of traffic information has been commercial radio. Over 60 Bay Area radio stations report traffic conditions during morning peak hours and almost 90% of the Bay Area adult population is aware of the radio traffic reporting service. Hence, most of the travel behavior studies to date have been focused on assessing the effects of radio traffic reports on behavioral changes. With the upsurge of Internet usage and its rapidly expanding consumer market, many urban and rural regions in the US have deployed traffic Web sites.

To assess the effects of Internet service on travel behavior, a survey of Web site users was conducted over seven months from August 1998 – March 1999. The paper presents the results of the traffic Web site user survey in the Bay Area. The survey objectives were to: 1) identify the population segment of traffic Web sites users, 2) determine the types of information that users most frequently retrieved, 3) assess the satisfaction level of Web site information, and 4) understand travel choices made based on traffic information retrieved from Web sites.

The goal of the study is to shed light on the behavioral characteristics of Web site users and the extent to which Web site information is able to influence travel choices. Previous studies on travel behavior of Bay Area households that listened to radio or television traffic reports suggest that only one quarter of the listeners modified their travel behavior even if they were aware of a major traffic problem on their planned route (1). The most frequently cited reasons were that listeners believe traffic will clear by the time they reach the incident site and that taking an alternate route would not necessarily save travel time. A question is whether people who retrieve information from Web sites show similar behavioral characteristics.

The paper begins with previous studies followed by methodology. Then the results of the survey are reported and conclusions are presented at the end of the paper.

PREVIOUS STUDIES

Traffic Web sites are new services in the marketplace. Although traffic Web sites have been deployed in many cities and rural counties in the US, only a handful of user studies are available to date. Among them are the Yosemite Area Traveler Information System (YATI) Web site, the Ventura County transit Web site in California and the traffic Web site provided by the Washington Department of Transportation.

The Yosemite Area Traveler Information System is a federally funded Field Operational Test (FOT) to integrate traveler information in five rural counties around Yosemite National Park in central-eastern California (2). One of the project objectives was to evaluate the effectiveness of the YATI Web site by surveying visitors to the park. Yosemite Park is a tourist destination for local, regional, national, and international visitors. The primary way of getting to the park is by personal vehicle. The YATI Web site service is intended to help vehicle traffic into, within, and around the park during the peak tourist season and during emergency situations such as bad weather or forest fires. The Web site service is targeted to those who are interested in planning their trip before leaving home. A sample of 42 participants was recruited from park visitors; this amounts to less than one percent of total site visits in 1998. The survey was conducted over several months. It showed that 52% of the Web site users did not make any change and made their originally planned trip. Of those, 82% thought the Web site information useful. In general, the YATI Web site was favorably received.

The Ventura County transit Web site is to help users preplan their trips by choosing a preferred transit mode, considering the walking distance between transit stops and travel time (3).
The survey instrument was placed on the Internet transportation chat room within the county. As expected, the majority of the Web site users (64%) retrieved information at home while 23% retrieved information before leaving for home. People tend to choose their method of travel before leaving home. They will not leave their car at their work place and take transit home unless there is a major event which makes it difficult to drive home or for some other personal

reason. The study found that the transit Web site was able to influence people to take transit especially from the upper income group (between $50,000 – 70,000 annual income). 70% of the respondents indicated that they took transit because of the information available through the Internet, otherwise they would have driven. Interestingly, the Web site service was most commonly used by commuters (over 40% of the respondents). The Web site users were predominantly male (69%) although women generally make up a higher proportion of transit ridership than men. Nearly half of the respondents (43%) were in the age group between 25 and 44 years. The study also found that there was no significant relationship among income groups for the use of the transit Web site.

The Washington State Department of Transportation (WSDOT) disseminates traffic information through its own Web site for the greater Puget Sound Metropolitan area; this includes the cities of Seattle and Tacoma. The preliminary results of the user survey of the WSDOT traffic Web site also showed that the users of the site are predominantly male (over 70%). The majority of them (65%) have been using the service for more than a year (4). Almost all survey participants found the Web site information useful, especially on the level of traffic congestion. 43.1% of the participants thought that the traffic information actually saved them time and 20.7% thought it helped them reduce stress. 27.4% would like to have more detailed information on traffic incidents. Over 90% of the participants said that they used the Web site information for their commute and 78.3% said their primary route is the freeway. In response to the information about traffic problems, nearly half of the participants (43% before leaving home, 48% before leaving for home) changed their departure time. More people chose to leave later than originally planned. About one fifth chose to take an alternate route and only 2-3% changed the mode. Many people felt that traffic Web sites are very useful.

The previous studies of Web site users indicate that people are fairly receptive to traffic or transit Web site services and their effects on travel behavior seem significant, although most of the results were still preliminary. In this paper, we will examine the travel behavior of Web site users in the San Francisco Bay Area.

METHODOLOGY

As part of the TravInfo Field Operational Test, users of three traffic Web sites serving nine counties of the Bay Area were surveyed. The survey instrument was incorporated into the individual Web sites and respondents filled out the questionnaire. The survey was administered from August 6, 1998 – March 6, 1999.

The survey questions were directed to obtaining user information on:
- How people learned about the Web sites
- Where the site was accessed
- What type of information users accessed the Web site and how frequently the users were retrieving from the Web sites
- How long have they been using the site
- When do they usually retrieve information
- What are the benefits of Web site information to users
- How useful was the information to users for planning their trips
- How did they change their travel behavior based on the information obtained
- Demographic characteristics of the users.

The survey results presented here are preliminary, based on the analysis using the descriptive statistical method. Advanced statistical tools will be used later to calibrate choice models.

Over the seven month survey period, 334 participants responded to the survey. To verify the representativeness of the sample, since the participants were self-selected, the demographic characteristics (age and household income) of the sample were cross-checked with the demographic characteristics of the Internet user population in the Bay Area. The preliminary results suggest that the sample is fairly representative of the Bay Area user population. The majority of Internet users are between 25 – 50 years of age, predominantly male with college or graduate school education.

SURVEY RESULTS

At the time of the survey, Information Service Providers in the Bay Area estimated that approximately 15,000 - 20,000 users retrieve information from their Web sites per month. This figure is based on the count of Web page retrieval and, based on the probability, accounted for the frequency of use per user. The survey results were presented in the order of 1) the demographic characteristics of the sample, 2) the travel characteristics of Web site users, 3) information requests from Web sites, 4) changes in travel behavior as a result of obtaining Web site information, and 5) the benefits of Web site information and the level of service satisfaction.

As part of the TravInfo Field Operational Test, TravInfo provides a traveler advisory telephone information system. By calling a single designated 817-1717 telephone number, callers can get traffic and transit information similar to information disseminated through the Internet. The Bay Area Web sites exclusively tapped into the TravInfo database. Through the survey, we assessed the awareness of the telephone information service and its usage. The findings of the TravInfo telephone system survey part is presented at the end of this section.

Demographic Characteristics of the Sample

The survey participants were mostly white, in the age group between 25-54 years old and were employed full time. They were, on the whole, well educated and financially well-off; half of them claimed household incomes of at least $80,000 (44.9%; 25.1% claimed at least $100,000). The demographic characteristic of the sample is similar to the population that travels on US 101, the major corridor between the Silicon Valley and the San Francisco Central Business District (1). As shown in the WSDOT Web site users, the majority of Bay Area traffic Web site users are male (79%). Most of them are engaged in professional or managerial work. Most of the participants were employed full time (full-time 82.8%, self employed 8.3%, student 3.6%).

Figure 1. Age Distribution of Traffic Web Site Users

Percent of participants
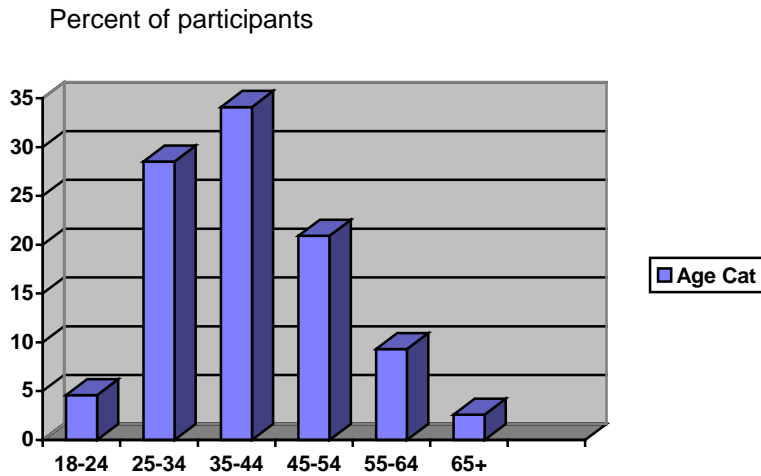
Travel Characteristics of the Sample

Most of the participants were commuters (90%) with flexible arrival times (64.8%); two thirds of them commute to work by personal vehicle via the freeway (mostly freeway 68.1%, mostly surface street 12.1%, both equally 17.4%). The average commute distance is 25 miles (similar to the Bay Area average commute distance) and the average commute time is 45 minutes because most of them encounter traffic delays due to an incident or recurring congestion on their route. In some cases, commuters make intermediate stops (11.3%) to drop off children in the morning and pick them up in the evening or to shop for groceries on their way home.

Figure 2. Education of Traffic Web Site Users
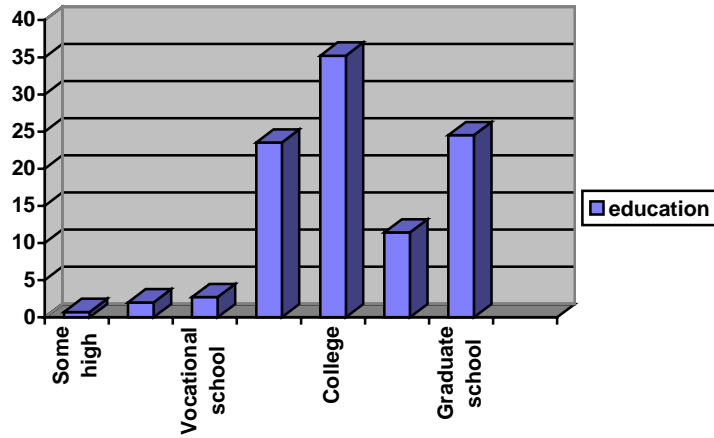
Percent of participants

Figure 3. Ethnicity of Traffic Web Site Users
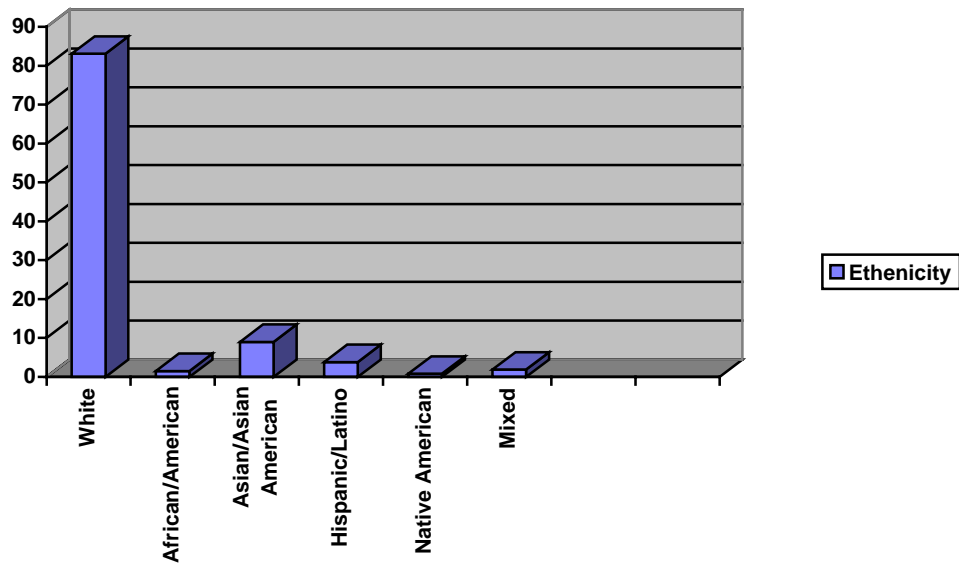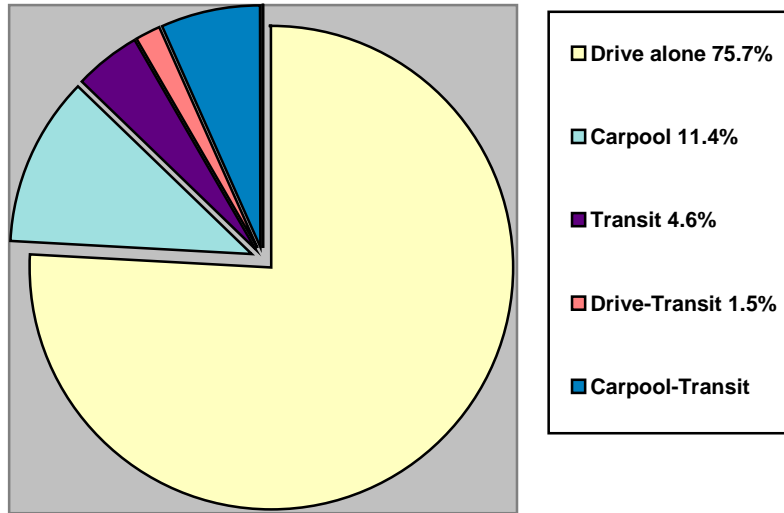
Percent of participants

Figure 4. Modal Split of the Sample

Drive alone 75.7%

Carpool 11.4%

Transit 4.6%

Drive-Transit 1.5%

Carpool-Transit

During the past month, 88.7% of the participants had experienced traffic congestion at least once a week; half of them had encountered traffic congestion every day or more than five times a week. The participants frequently learned about traffic problems from the Web site: two thirds were able to retrieve incident data at least once a week (five or more times a week 15.7%, three to four times a week 14.1%, one to two times a week 25%, less than once a week 31.1%, never 14.1%). The majority of them have had the option of changing their route or their departure time or both. Very few people had the option of taking mass transit.

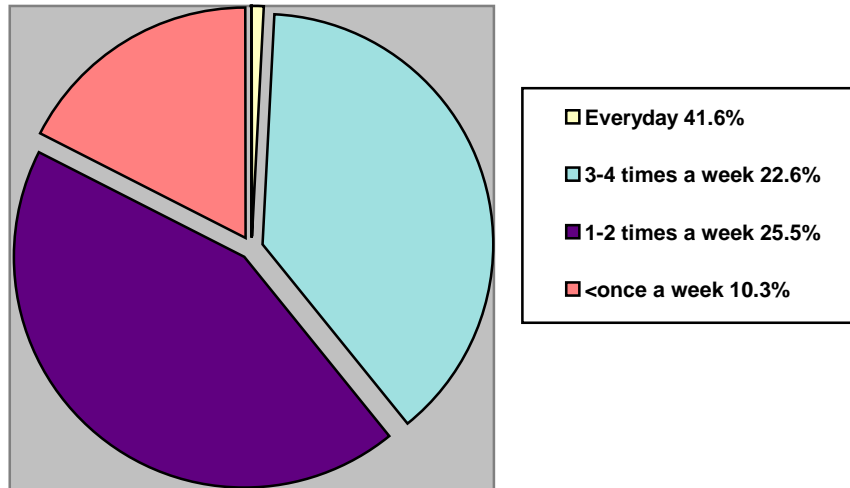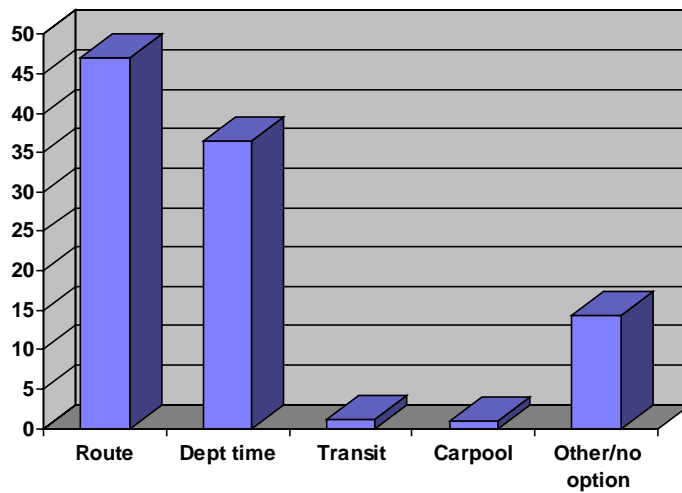Figure 5. Experience in Delays due to traffic congestion

- Everyday 41.6%
- 3-4 times a week 22.6%
- 1-2 times a week 25.5%
- <once a week 10.3%

Figure 6. Travel options available to the sample

Percent of participants

Information Requests from Web Sites

The participants indicated that they learned about the Web sites from various sources including a link from another site (30%), Internet search engine (27.3%), word-of-mouth (17.4%), from the media (9.6%), and other sources (15.6%). The vast majority of users (80.5%) requested information regarding traffic or freeway conditions. Less than 10% requested transit information. This is because the transit Web site service is limited to schedule information. Real-time bus arrival and delay of schedule information are not yet disseminated.

Half of the participants had used the service more than six months (49.7%, three months 13.9%, one to two months 13%, less than one month 15.5%); 18% were first time users. Nearly 40% of the participants used Web site information regularly (more than three days a week 38.2%, one to two days a week 26.1%, less than one day a week 35.3%). Of those who use it on a regular basis, the vast majority retrieve information at least once a day (once a day 55.9%, twice a day 33.6%, three times a day 6.6%). This suggests that many Web site users are repeat customers. The statistical tests showed that the people who encountered traffic congestion frequently, that is, more than three times a week, are likely to access information regularly, that is, more than three days a week ($p<.05$).

The survey indicated that people are more inclined to retrieve information through the Internet before leaving for home than before leaving home. Almost twice as many people regularly access information before leaving for home (Table 1). The primary reason for this behavior is largely due to the convenience of checking information before turning the computer off. Retrieving information at home before leaving home in the morning is cumbersome to many people. As suggested at the focus group meetings and Bay Area travel surveys, people are not receptive to the extra steps required to retrieve information by making a telephone call or turning the computer on when they prepare themselves to take a journey to work (5, 6). These data confirm the participants' response from where information was generally retrieved and the type of trips planned when obtaining information.

Table 1. Web Site Information Access and Use Purpose

When information is retrieved	Before leaving work 53.5%	Before leaving home 18.6%	Both 13.2%	
Where information is retrieved	At work 65.5%	At home 26.7%	School 1.2%	Other 6.6%
Type of trip planned	Going home 52%	Going to work 12.9%	Going to business 9.6%	

Changes in Travel Behavior as a Result of Obtaining Web Site Information

Over 80% of those who learned about congestion from the Web site changed their travel behavior, but about 16% did nothing. The study showed that the effect of Web site information on travel behavior is significant ($p < .05$). Half of those who obtained traffic information from Web sites took an alternate route and nearly 40 % changed their departure time.   The cross-tabulation suggests that people who have travel options are likely to change their travel behavior to take the options available ($p < .05$). In other words, when people learned about traffic problems on their planned route and if they have only an option to take an alternate route, they in fact took an alternate route. If they have the option to take either an alternate route or change their departure time, they tend to change their departure time, to leave later than originally planned.

About 60% of those who modified their trips perceived themselves to have saved travel time (58.8%), on the average about 20 minutes. One third of those who modified their trips were not sure (39.5%). About two percent of them thought their decision to change may have caused an additional delay (1.7%).

Figure 7. Changes in Travel Behavior based on Web Site Information

- ☐ Took transit 1.2%
- ☐ Dept time change 36.5%
- ■ Made stops 4.8%
- ☐ Cancelled 2.4%
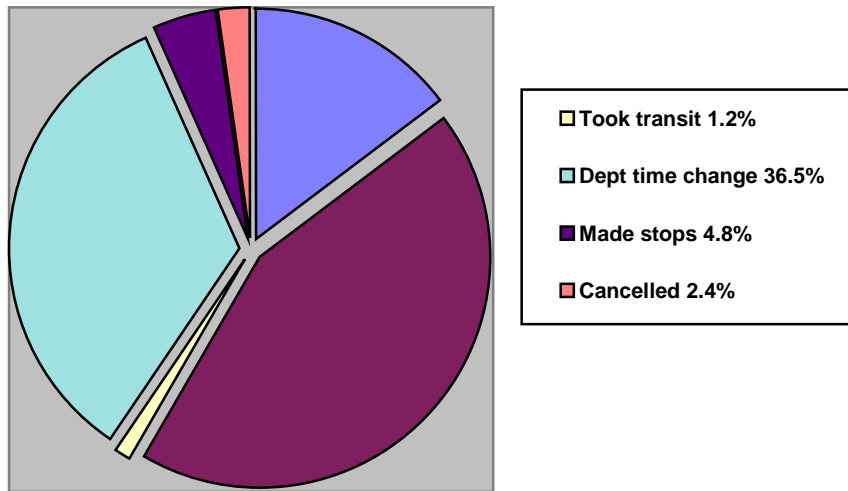
Benefits of Web site information to users

The benefits of Web site information are perceived to have more psychological attributes than measurable consequences. One third of the participants said that the benefit of Web site information is the fact that they are able to be aware of traffic conditions before departing. One quarter of them said that the benefit is that they are able to make informed travel decisions. Very few people said they were able to save travel time as a result of obtaining travel information. Similarly few people thought of traffic information as helping them reduce stress or anxiety. This finding is similar to the study of Bay Area households that pre-trip information is helpful in knowing the traffic conditions and being able to make informed travel decisions and has little to do with reducing stress. However, a greater number of people who obtained traffic information en route perceived that the information helped them reduce stress.

Web sites have the ability to convey information visually. Most participants thought that a Web site map and text presentation were useful for them in comprehending information. Of those, 93.6% said a map presentation was very or somewhat useful (very useful 46.5%, somewhat useful 47.1%). Similarly, 93.1% of the participants said that a text presentation was very useful or somewhat useful (very useful 41%, somewhat useful 52.1%).

Table 2. Benefits of Web Site Information to Users

	Percent
Get information about traffic conditions	33.8
Make informed travel decisions (including changing departure time, route, mode and canceling planned trip)	24.5
Save travel time	9.6
Reduce stress/anxiety	5.1
Other	27.0

Compared with radio/television reports, two thirds perceived Web site information to be better than radio or television reports. 62.1% indicated that Web sites are much better or somewhat better (much better 27.9%, somewhat better 34.2%). The primary reasons were that users can retrieve information on demand and the information that they retrieve is perceived to be more relevant to their trip and reliable than radio or television reports.

TravInfo 817-1717 Telephone Service Awareness and Usage

The Web site service is oriented toward pre-trip information in the current time. When in-vehicle navigation or Personalized Digital Assistants (PDA) systems are widely deployed, the Web site service can readily be utilized en route. Less than 3% of the Bay Area automobiles are equipped with in-vehicle devices and about 9% of the Bay Area population has units. On the other hand 51.1% of the population subscribes to a cellular telephone service. The Web site user survey showed that a similar number of Web site users have cellular phones (53.1%). A compelling question is why Web site users are twice as many as the users of the TravInfo telephone information service although both the Web sites and the telephone system disseminates the same information. Furthermore, a number of studies have indicated that more people listen to radio traffic reports en route than pre-trip. Our initial hypothesis was that the low usage of the telephone system was due, to a large extent, to the fact that people were not aware of the service. Therefore, we asked the question, how many people were aware of the TravInfo traveler information service.

Interestingly, one third of the participants (35.2%) were aware of the TravInfo telephone service while only 9% of the Bay Area population in general had heard about the telephone system. Of Web site users who were aware of the TravInfo telephone information service, 78% called TravInfo to obtain traffic or transit information. Less than 25% of those who knew about the service ever used it before making a trip and less than 15% ever used it en route. Note that these figures are not mutually exclusive. Nearly half of them learned about the telephone service through the Internet TravInfo Web site. One plausible reason that not many Web site users obtain information from the telephone service is that people are generally accustomed to the type of services with which they are most comfortable and they do not know that TravInfo telephone information comes from the same database.

CONCLUSIONS

The results presented here are preliminary; further analysis is warranted to support the preliminary conclusions. Although the sample is fairly representative of Internet users, we do not know as yet to what extent it is representative of traffic Web site users. To correct response biases, it is necessary to assess the number of people who requested the site and the profiles of the users. The preliminary data analysis, however, suggests the following inferences.

Most of the traffic Web site users are commuters with full-time jobs. Because of their employment status (high income professionals or managers), their arrival time at work is flexible and they have a varying degree of travel options, either by taking an alternate route or by changing their departure time. Most Web site customers are solo drivers whose primary commute route is the freeway. This is understandable since the service provides primarily freeway traffic conditions.

The key finding of the survey is that the Web site service may significantly influence travel behavior. Of those who retrieved incident reports, 80% modified their trips. This trend is considerably different from the studies of radio/television listeners or telephone information callers. 25% of those who obtained <u>pre-trip</u> incident information from radio or television

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- Web site users are more receptive to traffic reports than are those who use other information sources.

These reasons are somewhat conjectural and thus they should be tested in the subsequent phase of the data analysis. However, the important point to stress here is that nearly half of the Internet users believe that their decision to change on the basis of Web site information has resulted in substantial savings in travel time.

What seems apparent from this survey as well as from the TravInfo 817-1717 survey is that changes in travel behavior are closely associated with the quality of information perceived by users. This suggests that an improved traveler information service will undoubtedly influence travelers to modify their travel behavior.

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