agencies' coverage areas are by holding the cursor over the map, which turns the area green and labels it. For example, Figure 38 demonstrates this by showing the Alameda–Contra Costa Transit District's (AC Transit's) service area in dark gray and the service areas of other agencies included in the itinerary planner in a lighter gray. Further, the customer can click on the map to bring up detailed information about the agency. This feature includes both service areas for AC Transit, County Connection, Emery Go-Round, MUNI, Union City Transit, Tri-Delta Transit, and Westcat, as well as lines representing Caltrains, Bay Area Rapid Transit (BART), Bay Area Ferries, and Altamont Commuter Express services.

MTC's landmark error trapping feature, shown in Figure 39, allows a customer to respecify a landmark location if the AIP system does not recognize the initial input. MTC works closely with each of its member transit agencies to identify important landmarks—a list that is regularly updated. MTC assumes that customers use a combination of origin and destination types when creating an itinerary. The landmark list is in a typical database and is not geocoded. Figure 40 shows the output that the customer is given. Of particular note are the following features of the itinerary page:

- The walking maps and detail of the associated system map provided even for transfers,
- Fare by trip leg and total fare, and
- The Revise Your Trip feature.

The fare by trip leg is particularly important for regional multimodal itinerary-planning systems for which a leg on intercity rail could raise the fare significantly. Note that although only one itinerary is provided, unlike other AIP systems deployed in the United States, the Revise Your Trip feature makes it simple for the customer to modify the itinerary characteristics without having to start the process over.

5.1.13 Utah Transit Authority

The Utah Transit Authority (UTA) has a highly innovative program to personalize information to its customers based on their individual needs. While the agency does not send out "real-time" information per se, it provides notifications based on the tracking and monitoring of the conditions of the system. In addition, the website includes an automated itinerary trip planner.

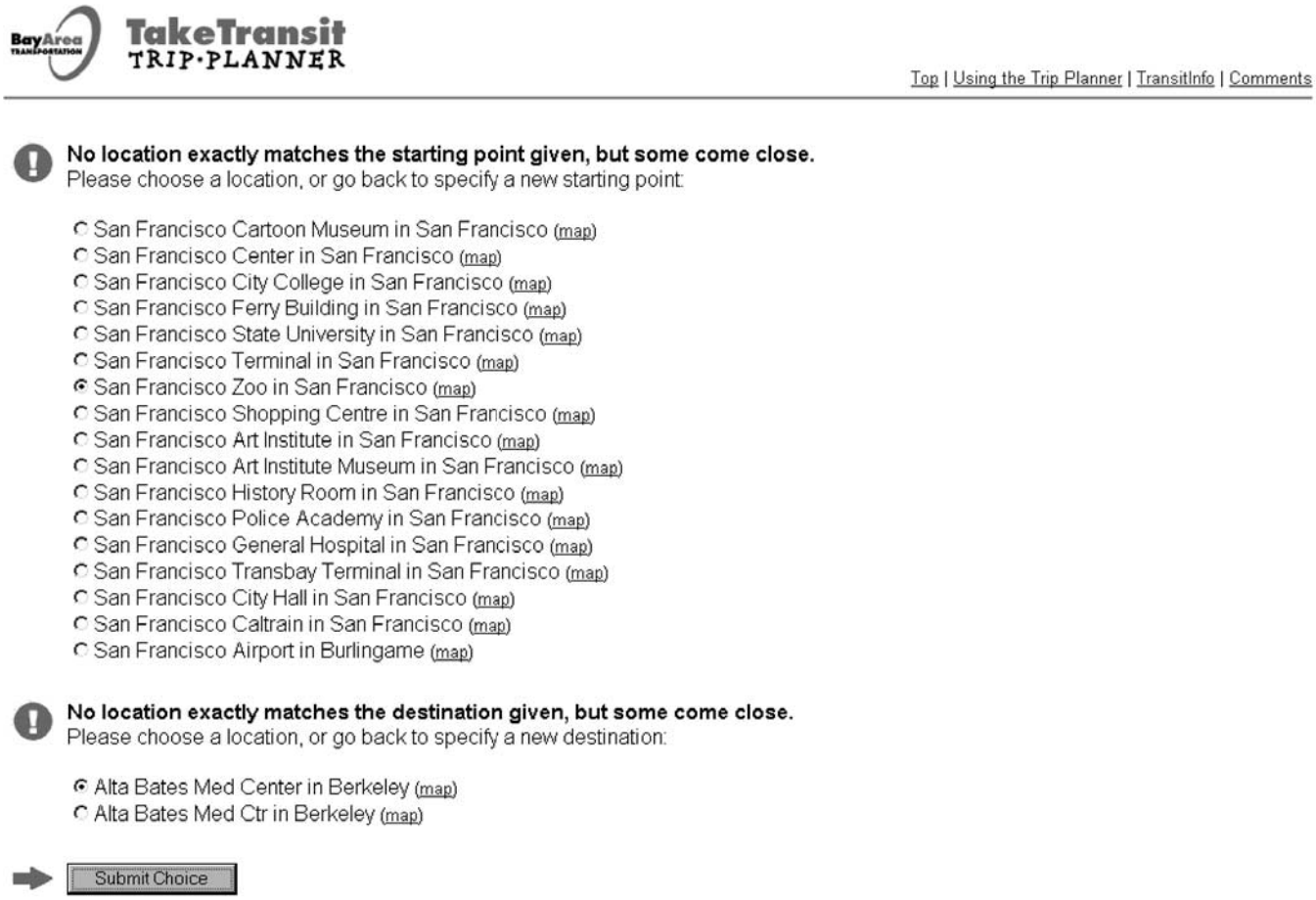

Figure 39. TakeTransit landmark correction page.

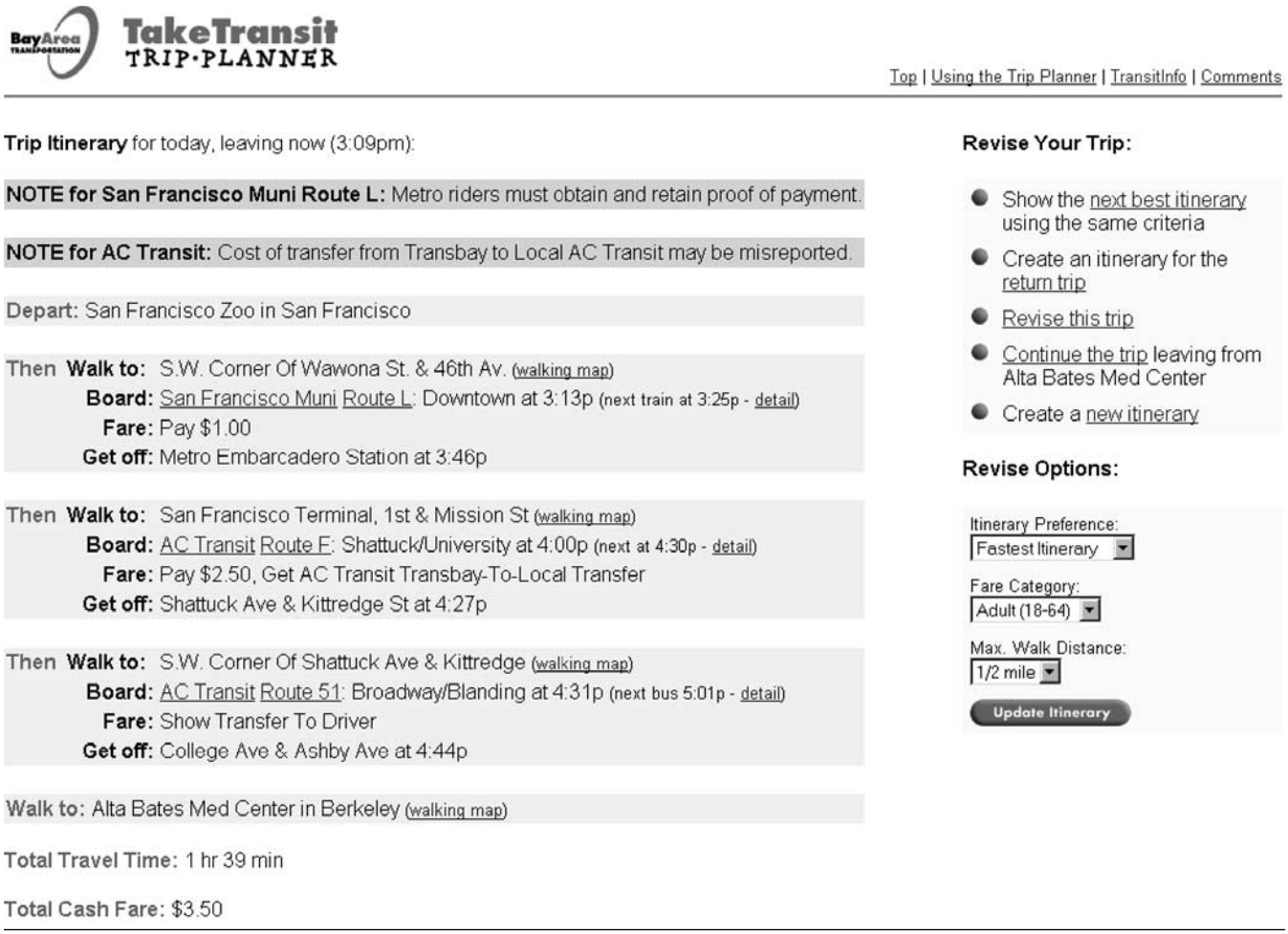

Figure 40. TakeTransit itinerary output.

UTA's primary goal is to reposition itself within the community and to be actively involved in making a better environment for the community. The web-based customer information allows the agency to develop a good relationship with its customers. The agency's goal has been to make public transportation more convenient and to have a friendly interface so that people are not afraid to ride the bus. The UTA Itinerary Planner has a user-friendly customer interface, which allows origins and destinations to be defined in terms of (1) addresses, (2) landmarks, and (3) categories of places. The three forms of input are placed on the same screen as the specification of date and time. The date is entered by use of a calendar for quick entry by clicking. As shown in Figure 41, when selecting categories of places, a pull-down list of those places is displayed. Figure 42 shows using a destination that was already used by the customer in a previous trip plan.

Figure 43 shows the screen that the customer uses to set the date and time of travel. Figure 44 illustrates the resulting itineraries. The trip planning results can be e-mailed, as shown in Figure 45.

In order to get e-mail notifications, customers must be registered with UTA My Way. By registering, customers also have the privilege of participating in surveys and new programs offered by UTA before nonregistered customers can. Once an individual picks his or her routes, information related to those routes (like disruptions) will pop up on the screen when the user logs on. Figure 46 shows the initial UTA My Way screen, and Figure 47 shows the personalization screen.

UTA My Way is geared more toward regular customers, while the trip planner is thought to increase the accessibility of the system for nontransit riders. UTA has found that having to register to use the service discourages people from using the trip planner (or other services), so UTA put the service on the general website. When UTA put the trip planner on the general website, usage increased by 1,000 hits in 1 week.

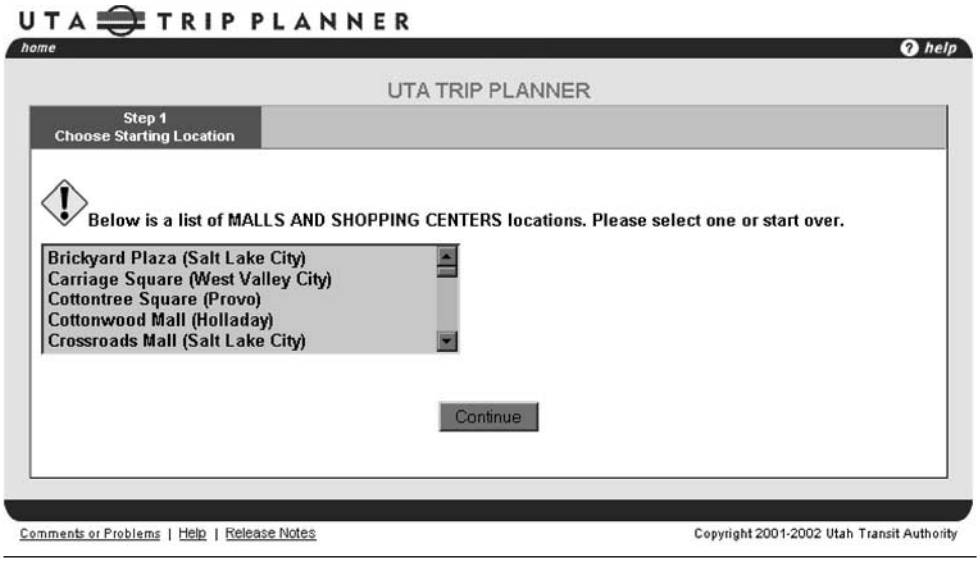

Figure 41. Result of category selection in UTA Trip Planner.

UTA On the GO! is a service UTA offers through AvantGo. The service allows customers to synchronize their PDAs and desktops to download schedule information. Using UTA On the GO! customers can download schedules to any handheld device. Ideally, UTA would like to have a push-pull system in which it would have account information for an individual, and UTA could send customers information on the handheld device as well as allowing them to pull information from the website. However, UTA has not done this yet. On the GO! was added in June 2000.

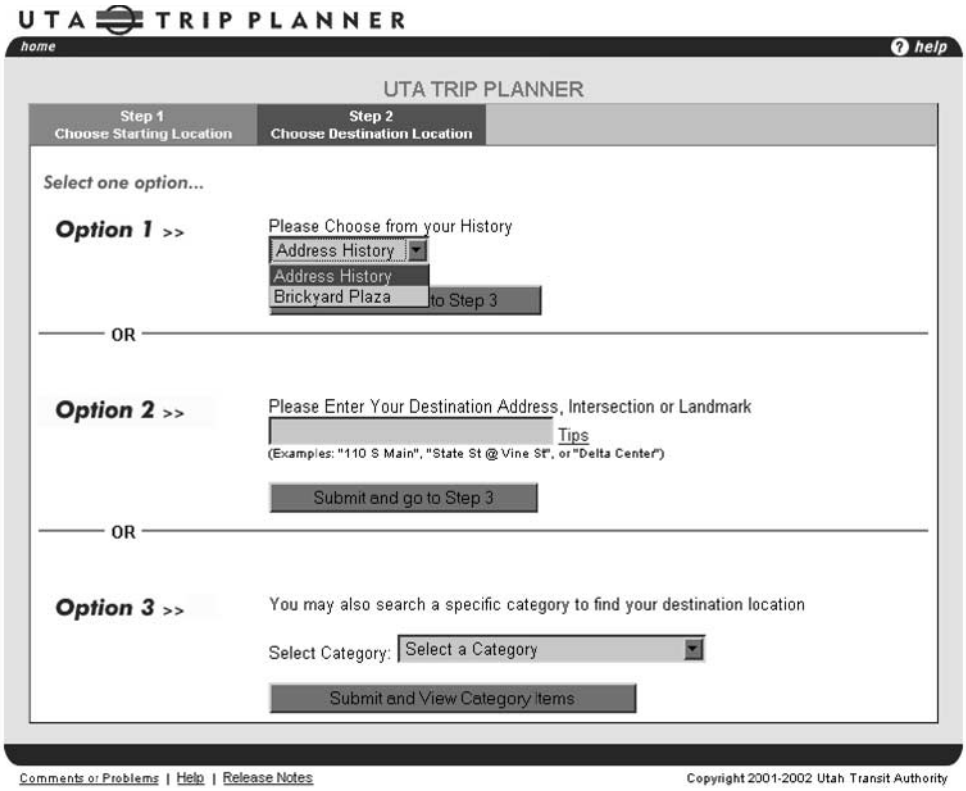

Figure 42. Step 2 of UTA Trip Planner, including address history.

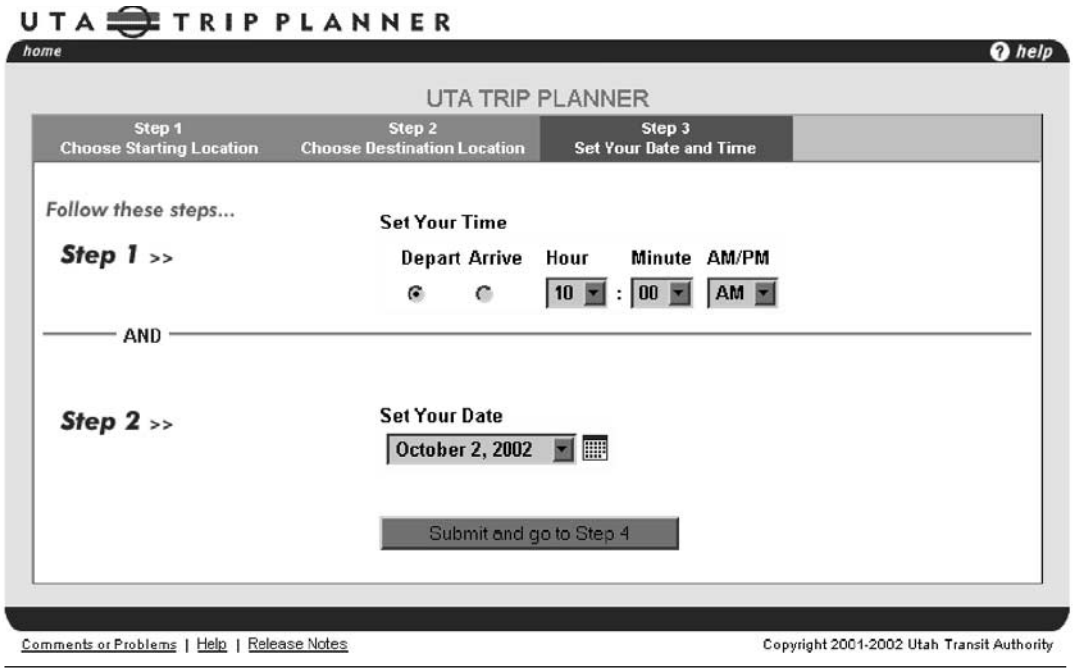

Figure 43. Step 3 of UTA Trip Planner, including address history.

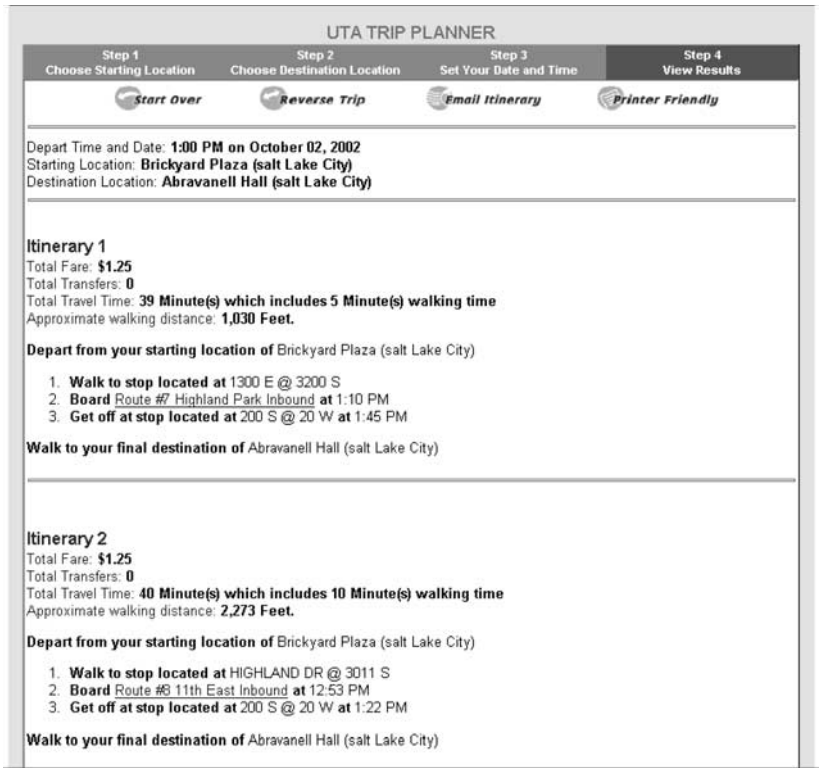

Figure 44. Itineraries produced using UTA Trip Planner.

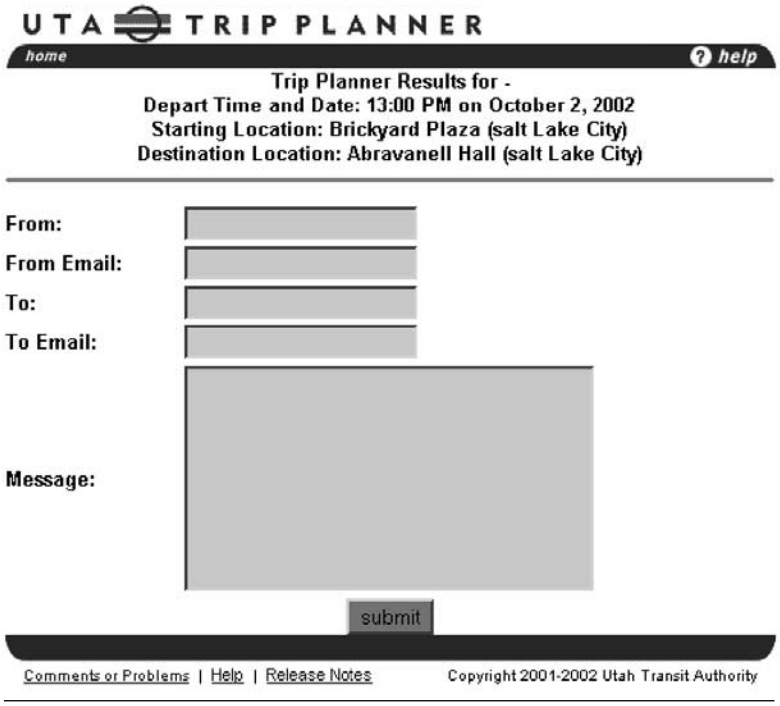

Figure 45. Trip Planner e-mail feature.

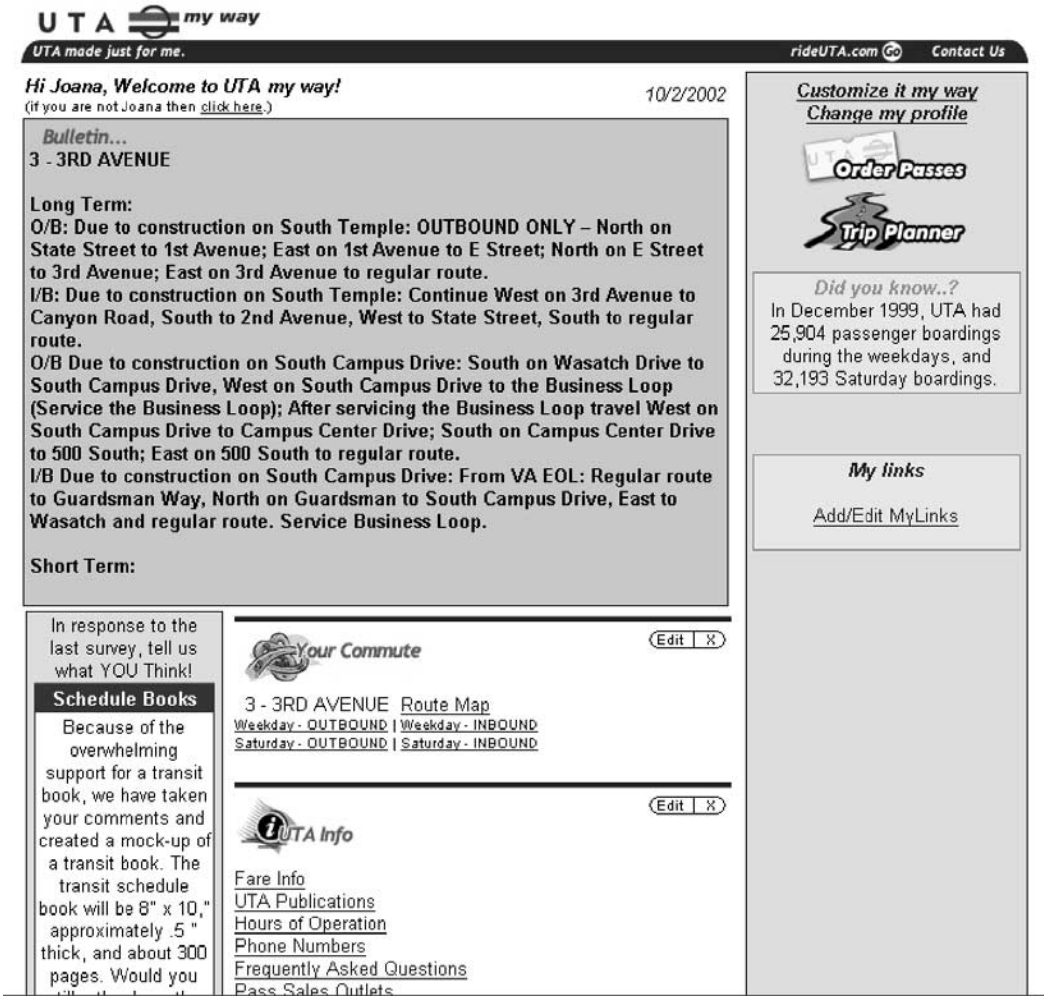

Figure 46. UTA My Way initial screen.

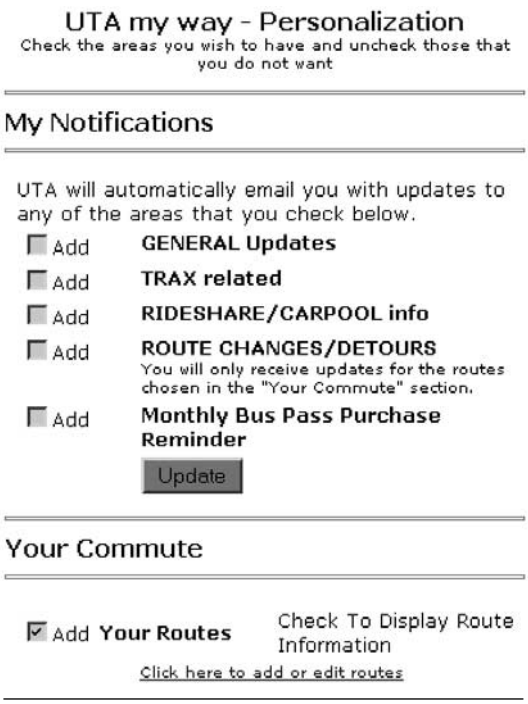

Figure 47. UTA My Way personalization screen.

5.2 EUROPEAN SYSTEMS

The European portion of the project focused on 10 initiatives designed to improve public transit information. Table 9 presents a summary of each project.

5.2.1 London, United Kingdom

Transport for London provides a variety of TTI services, including the Journey Planner (see Figures 48 and 49), real-time bus arrival information at bus stops throughout London (see Figure 50), and several other customer-oriented services such as bus stop-specific schedules and maps (described in Section 8.3). London was one of the first cities in the world to deploy LED signs at bus stops that indicate the arrival times of the next buses at each equipped stop. This system, called Countdown, was piloted in 1992 on bus Route 18. The results of surveys conducted during the pilot indicated that Countdown was highly popular with customers. In 1993 and 1994, Countdown was tested in several bus corridors. In 1996, a London-wide rollout of AVL and Countdown was approved. In 2001, the AVL program was 80% complete and the Countdown program was 25% complete (*13*). As of March 2002, 1,473 Countdown signs were installed and operational. The plan was to have a total of 2,400 signs installed by March 2003 and 4,000 signs by 2005. Four thousand signs cover 25% of all stops and will benefit 60% of all passenger journeys.

The approach for the implementation of Countdown has been to deploy the signs in boroughs where the buses have been equipped with AVL. There are 33 boroughs in London; as of March 2002, 14 have Countdown. Surveys suggest that Countdown has improved attitudes to bus travel, changed perceptions of wait time and level of service, influenced travel behavior, and had a positive effect on perceived security when passengers are traveling at night. According to Transport for London research, Countdown has been extremely well received by passengers and is reliable as well as accurate. Extensive surveys and monitoring have been undertaken throughout Countdown's operation and are continuing.

In terms of component reliability and system availability, the level of failures is low and the availability is over 99%. A survey conducted to assess information accuracy at 1,379 Countdown sites in the late 1990s revealed that

- Accuracy was within ±1 minute 50% of the time,
- Accuracy was within ±2 minutes 75% of the time, and
- Accuracy within ±5 minutes 96% of the time.

Countdown-style displays are now installed at many London Underground stations. While Countdown information is not currently provided via mobile media, other Transport for London services, such as the Journey Planner, are provided via cell phones and wireless PDAs using free SMS and WAP.

5.2.2 Helsinki, Finland

The greater Helsinki area is home to several TTI services, including Personal Mobile Traveler and Traffic Information Service (PROMISE); the Journey Planner; the Espoo and Länsiväylä Passenger Information System (ELMI); and Helsinki City Transport's real-time system (HELMI), which covers both bus and tramlines.

The PROMISE project ran from January 1996 through February 1999. The objective of PROMISE was to provide people with personalized multimodal real-time traveler information throughout their trips. Travelers could access this information at home, in the office, or while traveling. Wireless devices (including mobile phones and PDAs), the Internet, and in-car devices were used primarily to access PROMISE. Based on market research and user-group initiatives, the PROMISE services offered included trip planning, on-trip route guidance, traffic and public transport information, yellow pages, points of interest, and weather information. The following services were available during the project period:

- **Public transport trip planning:** This service allowed trip planning in the Helsinki metropolitan area. World Wide Web and TextWeb services were available. The public transport timetable information included local buses, trams, metros, local trains, and a ferry. The user could perform a web search of local public transport timetables or could type in the origin and destination address and the earliest departure time. The trip-planning service also covered railways, buses, and FinnAir domestic services in the whole of Finland. The Helsinki-Vantaa Airport Flight Information Service gave real-time information on arriving and departing flights at this airport. The user could request an alert, which was sent as an e-mail if the status of flight changed.

TABLE 9 Summary of European cases

Location	System Name/Agency and Description
London, United Kingdom	*Journey Planner*, an Internet-based itinerary planner, and *Countdown*, which provides real-time bus arrival information via at-stop displays, are systems by Transport for London.
Helsinki, Finland	*Personal Mobile Traveler and Traffic Information Service (PROMISE)*: real-time public transport, airline, and weather information available via hand-held wireless terminals and the Internet; a Journey Planner; the Espoo and Länsiväylä Passenger Information System (ELMI): and HELMI, Helsinki City Transport's real-time system covering both bus and tramlines.
Turin, Italy	*Telematics Technologies for Transport and Traffic in Turin (5T)*: public-private partnership to provide public transit information, including itinerary planning, using kiosks, variable message signs, and at-stop displays; also provides traffic and parking-management information.
Magdeburg, Germany	*Personalized Information on Disruptions to Public Transport Exclusive to Users of Public Transport (PIEPSER):* information service that notifies public transport users when there is a delay or a disruption to their selected journey that would prevent them from arriving on time.
Karlsruhe, Germany	*De Orientierte Mensch (DOM):* provides a traveler with an integrated set of travel services that are available throughout the whole trip, from the pre-trip stage through completion of the trip.
Brussels, Belgium	*Phoebus*: real-time information on bus arrival times provided through at-stop displays and real-time bus location on the Internet.
Paris, France	*Aide à l'Intervention Globale sur les Lignes en Exploitation (AIGLE)/ALTAIR, InfoGare/InfoTrain:* variety of initiatives to provide waiting and vehicle departure times and other information via telephone; enquiry offices; and at-stop, in-station, and onboard displays.
Munich, Germany	*BayernInfo*, *INFOTEN*, and *MOBINET*: provide multimodal travel information via personal traveler assistants (PTAs), the Internet, and information terminals.
Bologna, Italy	Various integrated ITS technologies for providing traveler information
Western Europe	Regional ATIS systems that are designed to provide itinerary planning and other transit information via the telephone and Internet. The systems include the OV reisinformatie (OVR) national phone system in the Netherlands; transnational services such as *EFA*, *EU-Spirit*, and *ARISE*; and the United Kingdom's national public transport information system, Traveline.

Figure 48. Transport for London's Journey Planner input page.

Figure 49. Journey Planner results.

Figure 50. London Bus Countdown sign.

Public transport timetables were also available to people with mobile communicators using the TextWeb service—which is the equivalent of the web service. The service was accessed by sending the TextWeb keyword "bussit"; a TextWeb form requesting the line number was then returned. The same service could also have been used by entering the keyword "transit" or "bussit" together with the line number. PROMISE then returned the answer directly. This service could also be used by sending an SMS to PROMISE. For trip planning, the service was activated by sending the keyword "trip. "After sending "trip," one received a form in which the parameters to be entered were start address (losoite), start municipality (lkunta), destination address (mosoite), and destination municipality (mkunta).

- **Bus stop timetables:** This service gave the next buses at the bus stop. After sending the keyword "bus stops" (pysäkit), the server returned a form requesting the bus stop number. This was a seven-digit number identifying the bus stop. The number normally was on the bus stop. The number could also have been found on the Internet.
- **Weather Service Finland:** This service gave the weather forecast for the next day in major Finnish towns. A search could be performed in two ways: (1) by using the Sonera Textus (TextWeb) "täsmäsää" (weather) service and selecting the town from a menu or (2) by directly entering the town name in the search. The latter allowed the search to be performed using a normal SMS message from a global system for mobile communications (GSM) phone.

Travelers could access the PROMISE service via various terminals. They could use their own PCs for pre-trip planning, or portable communicators for both pre-trip and en route information, or both. The PROMISE system was based on the NOKIA 9000i Communicator as a portable terminal. The device included a full-featured GSM phone; all typical PDA applications; fax; and Internet applications, including a web browser and e-mail.

An extensive evaluation of PROMISE assessed technical performance, user acceptance, and financial and economic issues (*14*). The PROMISE trials proved to be very successful. The majority of user feedback was favorable. About 70% of test users were moderately satisfied or satisfied with the demonstrated PROMISE services and the concept. Services such as public transport planning and intermodal trip planning were considered to be better than other kinds of information sources. The main advantage seen by the test users was that all the information needed for traveling was available in one package and that information could be retrieved whenever needed. On average, users said that they were prepared to pay for the information services at a rate of, on average, 6.5 (US$6.48) per month, or 50¢ per request. Technical performance of the system was relatively good. The users were excited to employ portable terminals for the information services, but the usability of devices required some improvement. Also, mobile access was found to be slow.

The Journey Planner now available from the Helsinki Metropolitan Area Council is shown in Figure 51. It is available (as of December 2002) at pathfinder3.meridian.fi/ytv/eng/.

The Journey Planner allows the user to search for the best public transport connections between an origin and destination using all buses, trams, and metro and commuter trains in the Helsinki region and the ferry to Suomenlinna. The Journey Planner also includes walking connections from the origin to the first stop, at transfer points, and from the last stop to the user's destination.

Helsinki City Transport's real-time system, HELMI, covers both bus and tramlines and was deployed in 2001. ELMI, which is similar to HELMI, provides passengers with real-time information at bus stops and major transfer points in Espoo and Länsiväylä. ELMI is based on a DGPS-based AVL system, with 300 buses equipped on 60 bus routes

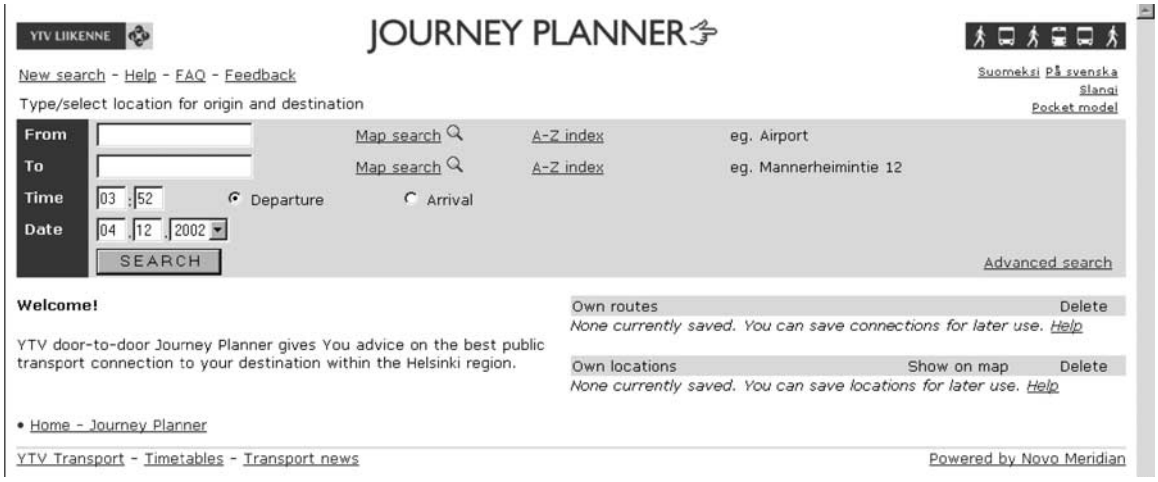

Figure 51. Helsinki Metropolitan Area Council Journey Planner.