9. Notable Project Innovations and Opportunities for Further Research

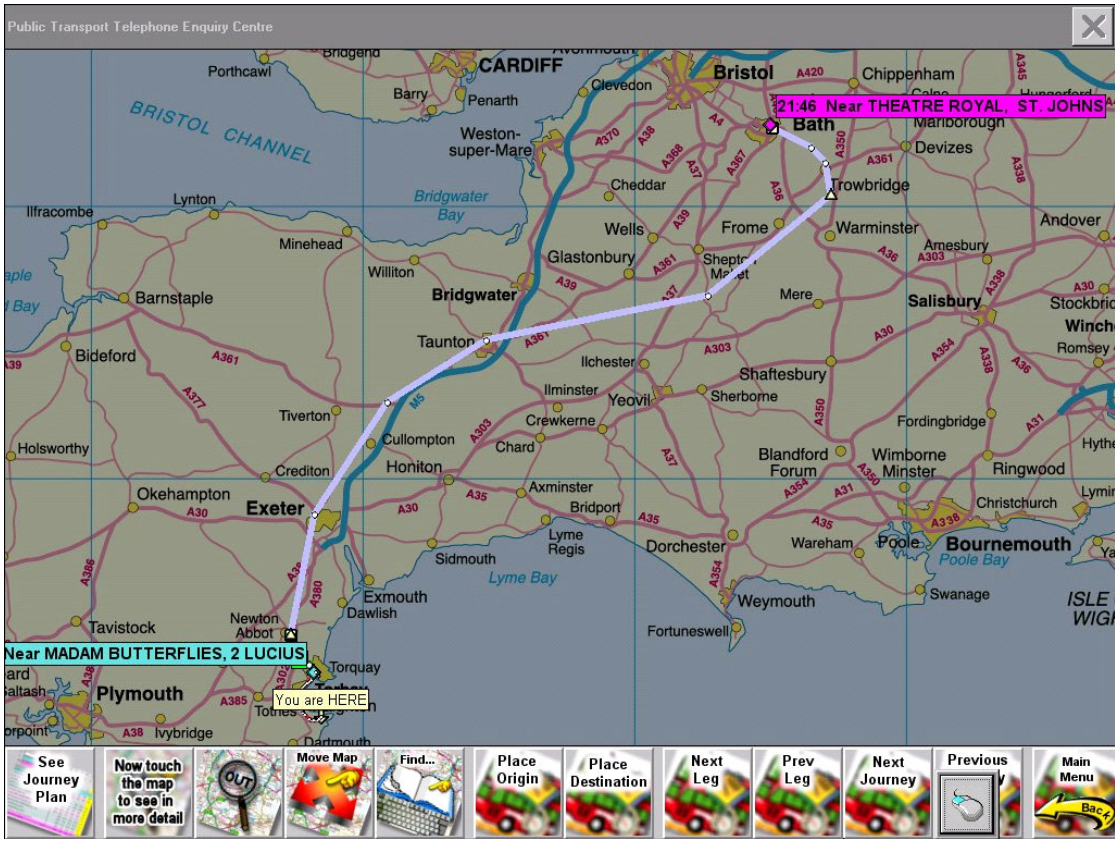
This section of the J-09 Task Order 4 Report identifies many of the most noteworthy project innovations implemented in the surveyed American agencies, points out recent international experience that addresses concepts not yet tested in the United States, and identifies potential opportunities for additional research here in the area of advanced interactive features for electronic information services in the transit industry.

9.1 Notable Project Innovations from the J-09 Survey

The survey conducted during J-09 revealed a broad range of innovative initiatives undertaken by the American transit industry (as well as the AIP implementation in Manchester, England). While the research does not support ranking the importance of individual features with respect to their ability to meet the needs of their local community, it is possible to identify some of the most noteworthy project innovations from among those surveyed. Such a list might include the following:

- The broad range of multimodal traveler information systems offered by a variety of providers in the Puget Sound area, made possible by the involvement of many diverse organizations.
- The institutional commitment demonstrated by the San Francisco MTC, which adopted a new strategy to overcome the failed effects of earlier efforts to develop a meaningful set of traveler information programs.
- The use of a relatively short drop-down list of landmarks to streamline data entry and a an innovative data input format for intersections are characteristics of the San Diego MTS and Twin Cities Metro trip planners, respectively.
- The variable graphic display offered by the San Francisco MTC's system (which ranges from no-graphics, to stick figure maps and the detailed map provided by the local bus operator) is one of the best examples of graphics support uncovered by the survey.
- SEPTA's Web site has an interesting feature that allows the user to specify a station and thus retrieve a list of all buses scheduled to serve that station in a given time period. This feature could be seen as an initial step towards CRM.
- Although not an American site, the itinerary planner now being implemented in the Manchester England Web site will have the most advanced integration with GIS mapping capabilities of any of the systems reviewed in the J-09 survey sample. A beta version of the new format for entering trip origin and destination is shown in Figure 9.1.
- The "one-two-three" format at WMATA's RideGuide presents information on the screen in a large, readable format with an absolute minimum of visual clutter, allowing the customer's attention to be focused precisely where needed.

Figure 9.1 New GMPTE Trip Planner Format



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- The managers of public information at the Washington State Ferry Service have provided a wide range of innovations, including the earliest use of real time GPS to show the location and operating status of the ferry vessels on the Internet and the use of real time cameras to allow customers to observe traffic congestion at key roads approaching the ferry terminals. When the public budget for live cameras was depleted, these managers turned to the private sector, whose services are seamlessly hyperlinked to the public Web site.
- Salt Lake City provides a simple mechanism that allows customers to create personalized transit schedules, and took advantage of the skill of a private company specializing in preparing information for use in a PDA. Future plans for this ambitious program at UTA (called "UTA On the GO!") include other wireless application formats, including WAP-based access to the Web page.
- Both NJ Transit's *My Transit* and Utah Transit's *UTA My Way* represent pioneering first steps in the process of delivering personalized information to individual transit riders, and to communicate with the customer to better understand that customer's needs.
- UTA shares data from trip itinerary planning requests with the service planning department to supplement other information in the service planning process.
- The Ventura County Transportation Commission has one of the few itinerary planners that can be converted to Spanish. This is an especially important example

for agencies whose service areas encompass large non-English speaking populations.

- The Virginia Railway Express uses an unusually strong email feedback function, including a rather thorough Newsletter from the agency, to communicate with riders.
- All of the features available at the Cape Cod RTA are simple, direct, and cost effective for a small transit operator. The approach for locating the desired trip origin and destination on the detailed system route map may be the simplest possible itinerary building program for a system with few realistic points of transfer.
- Similarly, Anchorage Public Transportation developed an extremely cost-effective itinerary planning tool. Although the tool is simpler than applications at larger authorities (e.g. it does not use GIS), it provides an excellent example of what agencies with limited resources might be able to reasonably accomplish.
- On the real-time customer information side, Tri-Rail has developed a very simple way of providing up-to-date vehicle status information for customers. Their tool simply takes a screen shot of the screen seen by operations personnel and feeds this graphic to the customer's computer. The agency has shown how thinking creatively can result in workable, low-cost technological solutions to providing customer information.

9.2 Highlights of the European Experience

A brief review of developing patterns in the European experience provides some insight into areas of "Further Research" that could prove beneficial in the U.S. Major new directions in passenger trip planning systems in Europe include:

- Targeting information to specialized audiences;
- Integrating information about metropolitan and long distance systems; and
- Improving graphical displays and data entry.

Examples of each of these are described below.

Development of information for specialized market segments

One policy direction being explored more in Europe than in the United States is the development of systems targeted at market segments with specialized needs and requirements. One example is a new Swedish system, called "Tågplus Guiden Serviceinfo," that will target elderly and disabled travelers. It will have the following objectives:

- "Better accessibility for disabled people;
- Ease and more comfort in getting information about different travel alternatives;
- Ease, safety, security and comfort when traveling by public transport;
- More passengers and more revenues for Swedish rail and the PTAs; and
- Fewer passengers traveling by special transportation services for disabled persons with reduced costs for municipalities responsible for these services."

The present prototype program, which is targeted at passengers with specialized needs, is called "Genvagen," and is included on a nationwide trip planning program CD-ROM widely distributed in Sweden. It provides highly detailed descriptions and pictures of all the major intermodal transfer facilities in the system. Figure 9.2 is an example that shows a screen containing the layout of the train station at Helsingborg, where riders transfer to the ferry to Denmark. All the screens show the station design, and the location of key facilities on each floor of the station. With this program, travelers with special needs can explore each intermodal transfer station to learn the location of accessible bathroom facilities and the hours during which they are open. This screen provides the user access to information specifically designed for families traveling with children and also information specifically for travelers with physical disabilities.

The CD-ROM-based program goes far beyond the level of detail associated with airport layout maps and other macro-scale facility descriptions. It makes heavy use of simple photographs of key geographic figures to help orient the customer, using a tool elegantly applied in the Cape Cod RTA Web site.

The program is being developed by researchers at Lund and Chalmers Universities in Gothenburg and Karlstad. The "Genvagen" program can be seen as an early example of specialized information targeted at market segments with special needs and requirements. As such, it represents an interesting prototype for further US research into the challenge of making public transportation systems easier to use by groups with special needs, as well as providing detailed information for those who would appreciate learning more about possible points of transfer.

Integration with longer distance trip planning services

The Zurich Hafas System is a good example of the integration of metropolitan trip planning systems with longer distance trip planning systems. In the United States, statewide itinerary trip planning systems are being planned in Oregon and are under consideration in California and a 13-state region on the Eastern Seaboard. However, none have yet been implemented in the U.S.

In the Zurich system, the entire local transit network for the metropolitan area (including tramways, local bus, ferries, mountain funiculars, and commuter rail) is included in the itinerary trip planning system, while the *national* intercity network is included at a scale of detail appropriate for longer distance trips. Consequently, a trip could be planned from a specific address in a Zurich suburb to a train station near Geneva, but not to a street address in Geneva. The system has merged the local network of Zurich with the national inter-city network, but has not attempted true door-to-door trip planning capability for the entire country. Figure 9.3 shows the screen used for requesting itinerary information.

Improvement of the data entry function- integration with GIS mapping

A major area of concern revealed in the J-09 interviews was the increased use of mapping throughout the trip planning process. From the perspective of software designers, maps can be used to indicate a geographic location even more easily than text-based descriptions of address, etc. However, for the agency managing the server, there may be additional costs associated with presenting and interacting with the maps.

Figure 9.2: "Genvagen" Trip Planner Distributed via CD-ROM in Sweden

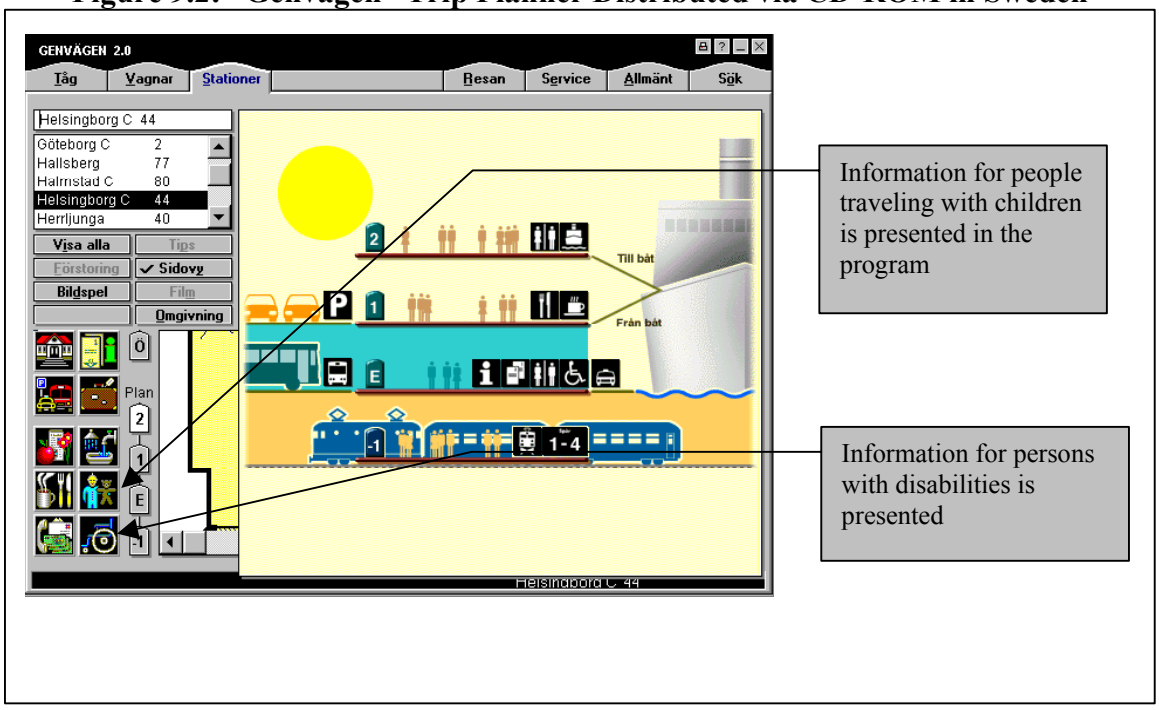

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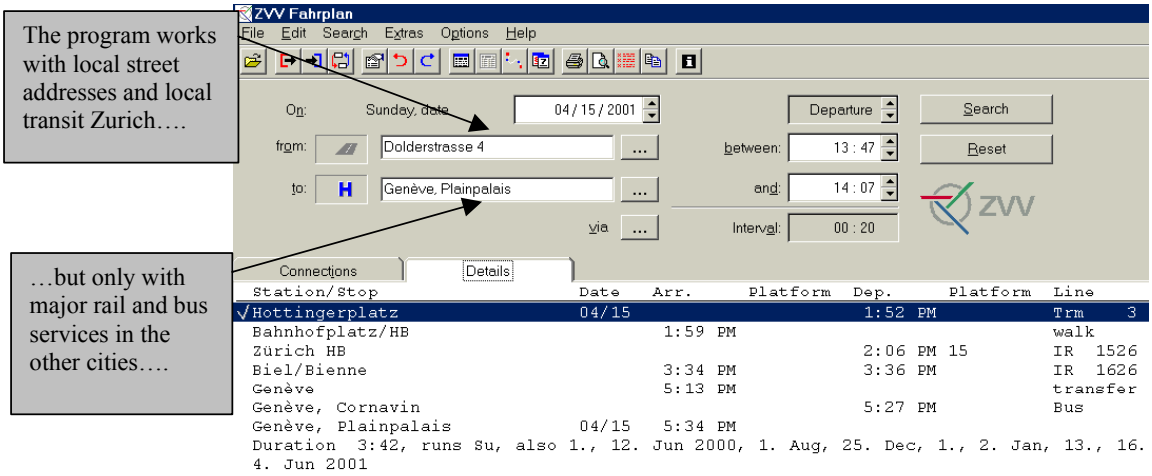
Figure 9.3: Zurich Passenger Information System



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The concept of extensive map-based data entry can be demonstrated both in Web-based trip planning products (such as the one shown in Figure 9.1) and in automated itinerary planning programs released on CD-ROMs.

The Dutch *Planner Plus* incorporates a highly scalable GIS map-based description of the entire country, detailed to a block-by-block basis. This address-to-address capability is then applied to those modal services defined as national in nature. The program allows the trip origin and/or destination to be entered into the system by clicking on the desired points on the map, or by use of the text-based entry format as an optional alternative, as

shown in Figure 9.4. The system also provides a wide variety of categories of landmarks for those using the text-based forms.

One very unusual feature of this program is that it allows the user to specify the access mode to the primary rail terminal of origin (or from the rail terminal of destination) with choices of bicycle, bus, auto, or on foot. The trip planning algorithm makes recommendations for the total trip based on the specified choice of local access mode. Thus, a trip by rail might be routed via the nearest station if the user specified walking as the access mode, but via another nearby station with better connections if the user specified bicycle as the access mode. A distant station with the fastest connections might be selected if the user specified automobile as the access mode. The program also recognizes those geographic areas covered by subsidized train-taxi services, and those where such services are not available. Figure 9.5 shows a recommended walking path from the traveler's point of origin (address specific) to the rail terminal of origin. At present this itinerary planning system is offered to the public on a CD-ROM.

9.3 Further Research

Based on a review of best practices in the sample of American transit Web sites and the examples of new practices identified in Europe, further research is recommended in eight specific areas:

- Updating key developments with additional case studies;
- Improving the data entry/error trapping process;
- Expanding the geographic coverage of information services;
- Expanding the intermodal content of information services;
- Creating information for targeted market segments;
- Applying passenger information data to improve services;
- Monitoring development of Customer Relationship Management; and
- Coordinating with on-going studies of real time passenger information.

Updating key developments with additional case studies

While the J-09 survey process should be noted for what it discovered, it was by no means exhaustive. The J-09 Task 4 survey provided an overview of the services in full operation by highly innovative transit agencies, and presented a portrait of those systems from the viewpoint of those actually in charge. However, as of the writing of this report, neither the new system of "Trips 1-2-3" in the New York metropolitan area, the planned mapping function for San Francisco, nor the new map-based technology for Manchester, UK were yet in operation. All of these involve issues revealed in the J-09 Survey, and merit further monitoring as they become operational.

The research team made a conscious decision to interview only managers of programs that are presently in full operation, to minimize the problem of comparing actual experiences with the promises and intentions of planned new systems. Once fully deployed, Trips 1-2-3 will provide an unprecedented opportunity to study the institutional challenges of coordinating dozens of independent transportation providers into a single program providing a seamless interface to the user.

Figure 9.4: Map-based Data Entry Offered on the Dutch Railways Planner Plus Program

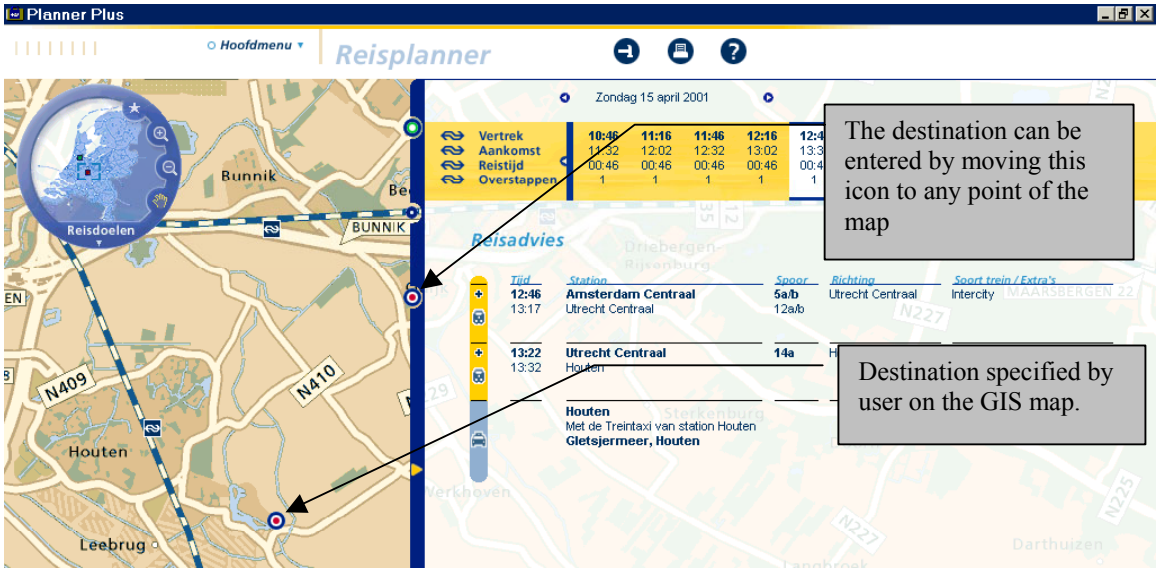

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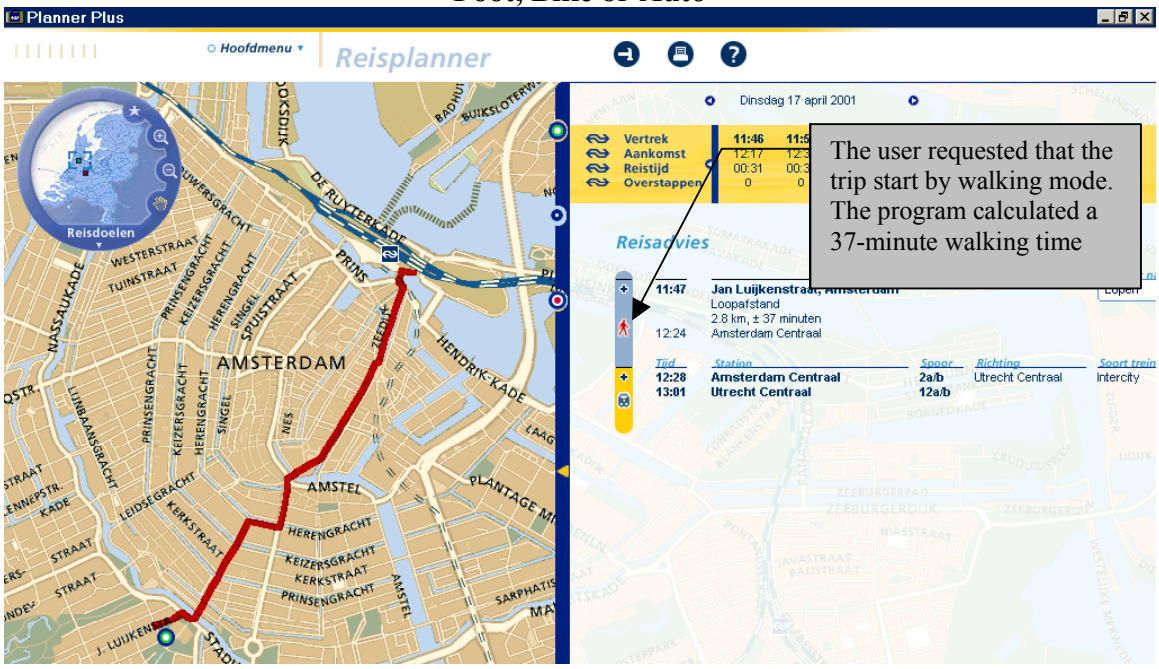
Figure 9.5: The Dutch Planner Plus Program Showing Access to the Rail Station by Foot, Bike or Auto



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It should also provide an early case study of the applications of the TCIP protocols, which were applied in the system design.

Improving the data entry and error trapping process

A major conclusion of the J-09 survey effort is a common concern for the overall quality of the user's data input process. As discussed in Sections 5 and 6, many of the managers interviewed expressed a desire to see the data entry process improved, although there was

great disparity concerning their belief in its potential. These proposed improvements cover both text-based and map-based data entry techniques. The use of an "error trapping" procedure as the principal mechanism to aid in the search process can be improved, as shown in several programs, including that of Utah Transit. Developing improvements in map-based input have the potential to integrate transit service information with more broadly-based Geographic Information Systems in operation in those areas. The long-term implications of such integration should be documented in the TCRP research process.

Expanding the geographic coverage of public mode information services

The J-09 survey revealed that several major systems are considering improving coordination and integration with similar systems in adjacent areas. Coordination (and/or integration) of systems in Washington and Baltimore is already underway, and in San Francisco discussions have begun concerning a statewide approach to itinerary trip planning. In addition, meetings have been held in Seattle to discuss integration of public information systems from Portland, Seattle, and Vancouver BC. The Oregon DOT is also working on the creation of a statewide itinerary planning system which will integrate traditional local transit services with longer distance services provided by Greyhound and Amtrak. Along the eastern seaboard, 13 states and the District of Columbia are working together through the I-95 Corridor Coalition to provide integrated public mode itinerary planning for the full region.

At present there is no research activity to monitor and support the efforts of public mode agencies around the United States to expand the geographic area of itinerary trip planning efforts that are commonly accepted as essential for a metropolitan area. This represents a very logical next step for the TCRP J-09 program.

Expanding the intermodal content of public mode information services

The J-09 survey revealed a great deal of commonality in the approach to the design and operation of advanced interactive passenger information systems dealing solely with traditional metropolitan public transportation services. However, there exists almost no coordination between the content of the metropolitan transit information systems and those providing information about airports and, more specifically, access to airports. While some airport Web sites, such as the San Francisco International Airport, have made improvements in the quality of the public mode information for airport ground access, most provide no reference whatsoever to locally available itinerary planning systems. Likewise, there are no examples applying door-to-door trip planning logic to the actual public mode services provided for airport access services.

The TCRP Project Panel for Projects B-18 and B-18A, "Improving Public Transportation Access to Large Airports" concluded that more research should be undertaken to develop specific automated itinerary planning systems to support greater use of public modes at American airports, in addition to the application of real time information systems for public airport access modes.

In a similar vein, there is currently only a small research effort to coordinate the provision of information about local transit access to/from modes such as Amtrak and Greyhound. The American Travel Survey shows, for example, that in the Northeast Corridor about 40% of long distance bus trips end in a public transportation service, as do 25% of

Amtrak trips. Working cooperatively with the I-95 Corridor Coalition, Greyhound is now undertaking a series of market research tests to gauge the scale of the market for integrated multimodal transportation information. However, in general, automated transit itinerary planning has not been applied in any intermodal context.

Creating transit information for targeted groups

Research should be undertaken in the area of providing transit trip information to those with specialized needs. The SamTrafiken organization in Stockholm is now developing specialized programs for persons with varying kinds of disabilities. Figure 9-2 showed an early example of the kind of information being included in trip information packages in Sweden. The same program shows the location of accessible bathrooms, and shows the hours of their operation. The program also shows the location of services for families traveling with children.

The early efforts of the Cape Cod RTA to include area photographs within the body of its real time information system can be seen as the first steps in using electronic media to help prepare travelers for the decisions they will need to make their transfers within the full trip. At American airports today, passengers arriving on their first flight segment are commonly met by passenger service representatives who show the way to the connecting gate. By contrast, a traveler making a multisegment trip by public modes may be expected to leave one terminal and walk several blocks just to locate the connecting terminal. The Cape Cod prototype shows how easy it may be to provide information making such connections more clear and understandable.

Applying "passenger information" in related areas of management

In London, England today information originally generated for real time passenger information is being used for a massive restructuring of the management approach to controlling service quality provided by private carrier operators. While the information from the Countdown project was originally organized for the use of the passenger, it will now be archived and applied in a systematic way to determine the level of performance of each carrier, and as a basis for financial incentives and disincentives. The J-09 Survey revealed very little common use of the data initially organized for customer information purposes, with the exception of Salt Lake City where it was shared the service-planning department. The importance of programs to "archive" operational data, and make that data available for service planning, mobility analysis and capital planning is currently being explored in some detail for roadway-based operational data; the additional uses of this information for transit management purposes should be documented.

Monitoring the development of Customer Relationship Management

Activities to customize the presentation of information to better serve the individual traveler that were revealed in the J-09 Survey at New Jersey Transit, Utah Transit, Seattle and San Francisco may represent a major new direction for the American Transit industry. The TCRP J-08 project, "New Paradigms in the Management of Public Transportation Organizations" identified the application of information technology as a key factor in the restructuring of the transit industry towards an individual customer focus. From our research, it seems that the actual use of the improved communication system is somewhat in flux, and will need to develop over time. In Salt Lake City, managers hope to make a direct linkage between the automated trip planning process, and

the ability of live operators to help with its difficult aspects; the live operator would immediately see the details of the inquiry process undertaken so far. Establishing better links between separate elements of the total system would result in a more 'seamless' experience for the customer. Very little has been written on the application of these CRM concepts to the transit industry.

Coordinating with on-going studies on the use of real time information

The J-09 survey revealed a wide variety of professional concerns on the issue of "real time" and dynamically updated information, ranging from high optimism surrounding early systems to fear of liability stemming from the misapplication of information. Many participants in the survey believed that more research was needed in this important, developing area. Currently, there are several FTA-sponsored studies underway concerning the application of real time information in the transit field. Further activities in this area under the J-09 program should coordinate closely with these on-going research efforts.