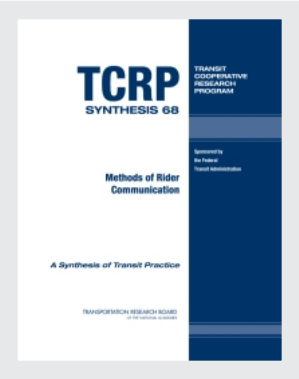

Methods of Rider Communication

DETAILS

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AUTHORS

Carol L Schweiger; Transportation Research Board

TRANSIT COOPERATIVE RESEARCH PROGRAM

TCRP SYNTHESIS 68

Methods of Rider Communication

A Synthesis of Transit Practice

CONSULTANT
CAROL L. SCHWEIGER
TranSystems Corporation
Medford, Massachusetts

SUBJECT AREAS
Public Transit

Research Sponsored by the Federal Transit Administration in Cooperation with
the Transit Development Corporation

TRANSPORTATION RESEARCH BOARD

WASHINGTON, D.C.
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TRANSIT COOPERATIVE RESEARCH PROGRAM

The nation's growth and the need to meet mobility, environmental, and energy objectives place demands on public transit systems. Current systems, some of which are old and in need of upgrading, must expand service area, increase service frequency, and improve efficiency to serve these demands. Research is necessary to solve operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the transit industry. The Transit Cooperative Research Program (TCRP) serves as one of the principal means by which the transit industry can develop innovative near-term solutions to meet demands placed on it.

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TCRP was established under FTA sponsorship in July 1992. Proposed by the U.S. Department of Transportation, TCRP was authorized as part of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). On May 13, 1992, a memorandum agreement outlining TCRP operating procedures was executed by the three cooperating organizations: FTA, the National Academy of Sciences, acting through the Transportation Research Board (TRB); and the Transit Development Corporation, Inc. (TDC), a nonprofit educational and research organization established by APTA. TDC is responsible for forming the independent governing board, designated as the TCRP Oversight and Project Selection (TOPS) Committee.

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FOREWORD

By Staff
Transportation
Research Board

Transit administrators, engineers, and researchers often face problems for which information already exists, either in documented form or as undocumented experience and practice. This information may be fragmented, scattered, and unevaluated. As a consequence, full knowledge of what has been learned about a problem may not be brought to bear on its solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

There is information on nearly every subject of concern to the transit industry. Much of it derives from research or from the work of practitioners faced with problems in their day-to-day work. To provide a systematic means for assembling and evaluating such useful information and to make it available to the entire transit community, the Transit Cooperative Research Program Oversight and Project Selection (TOPS) Committee authorized the Transportation Research Board to undertake a continuing study. This study, TCRP Project J-7, "Synthesis of Information Related to Transit Problems," searches out and synthesizes useful knowledge from all available sources and prepares concise, documented reports on specific topics. Reports from this endeavor constitute a TCRP report series, *Synthesis of Transit Practice*.

This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. Each report in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems.

PREFACE

This synthesis will be of interest to transit planners and managers and to those who work with them, who strive to build new ridership and retain existing riders by providing high-quality customer service. It documents effective methods of communicating with transit customers in a variety of situations. The state of the practice in transit agency communications with customers is discussed, using the following five dimensions as a way of determining what constitutes successful communication: (1) who an agency is communicating with and where they are located; (2) content, form, and accessibility of communication; (3) communication timing and frequency; (4) communication dissemination media; and (5) capital and operating costs associated with communication. This synthesis also offers information from transit agencies about how they determine the effectiveness of their communications and lessons learned in developing communications programs and providing communications by electronic means.

This report includes a literature review that revealed a wealth of information on the subject of rider communication. Literature focusing on the use of electronic media to disseminate communication was also plentiful, covering both U.S. and international studies. Survey information from 33 transit agencies is presented, covering such fundamental elements of communicating with riders as communication characteristics, types of riders receiving communication, dissemination media and access methods, and costs associated with communication. Interviews with key personnel at agencies considered to have innovative methods of communicating are included, as well as case studies from five transit agencies offering detailed program information.

Carol L. Schweiger, TranSystems Corporation, Medford, Massachusetts, collected and synthesized the information and wrote the paper, under the guidance of a panel of experts in the subject area. The members of the Topic Panel are acknowledged on the preceding page. This synthesis is an immediately useful document that records the practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As progress in research and practice continues, new knowledge will be added to that now at hand.

CONTENTS

METHODS OF RIDER COMMUNICATION

SUMMARY

Access to transit services is dependent on the effectiveness of communicating information to existing and potential riders. Furthermore, the effectiveness of this communication is one of the most critical factors determining customers' perception of the services provided by transit agencies. In ridership surveys conducted by agencies across the United States, customers are often asked to rate the performance of the system in terms of rider communication. For example, 2005 ridership surveys conducted for several transit agencies included specific questions that addressed each agency's performance in terms of communicating with riders and which methods of communication were most effective.

Communications play a significant role in transportation agencies striving to build new ridership and maintain existing riders. In addition to common communications, such as maps and timetables, there are several types of communications that contribute to what is considered "high-quality service," which can maintain existing riders and attract potential new riders. High-quality service includes not only improved elements of transit services, such as reduced travel times and improved service reliability, but also direct customer service elements, such as real-time arrival and departure information, on-board information and amenities (e.g., wireless Internet), and automated fare payment.

Given this background, the primary purpose of this synthesis is to document effective methods of communicating with riders. This synthesis reviews the state of the practice in agency communications with customers using the following elements as a way to determine what constitutes successful communication:

- Who the agency is communicating with and where they are located;
- Content, format, and accessibility of communication;
- Communication timing and frequency;
- Communication dissemination media and access; and
- Capital, and operations and maintenance costs associated with communication.

There is a wealth of literature on the subject of rider communication, and three major conclusions were derived from the literature review. First, customer needs for communication and their access to information is fairly well understood. Second, the literature confirms that it is a challenge to measure the effectiveness of communication. Finally, there is a distinct difference between the United States, and European and Asian experience in using electronic media to disseminate communication. Just as public transit is embraced more in Europe and Asia than it is in the United States, the use of technology, such wireless application protocol devices and short message services (text messaging) is more prevalent in Europe and Asia than it is in the United States.

The survey conducted as part of this synthesis covered the most fundamental elements of communicating with riders: characteristics of the communication (content, format, accessibility, frequency, and timing); types of riders receiving the communication; dissemination media and access methods; and costs associated with communication. Surveys were received from 33 transit agencies, including two from international agencies. Annual ridership ranged

from 276,000 (paratransit-only respondent) to 425,000 (rail-only respondent) to 95.8 million (multi-modal respondent) and 685.3 million (for an international respondent).

Many agency communications programs include technology, including automated transit information. The term automated transit information covers both static (e.g., schedules and fares) and dynamic information (e.g., real-time bus arrival time) provided through an automated means at various stages of a trip (pre-trip, en-route, on-board). This information can be disseminated using a variety of media, including 511 systems (the Federal Communications Commission-designated phone number for regional and statewide traveler information in the United States), land and mobile telephones, interactive voice response (IVR), Internet, cable television, pagers, personal digital assistants, kiosks, e-mail, electronic dynamic message signs (DMSs) at stops or stations, and on-board DMSs. As of 2004, a total of 488 U.S. transit agencies had implemented an automated transit information system. The majority of these systems have been deployed for the pre-trip stage of a journey (90%).

Nearly all of the survey respondents provide the following types of communication to their riders:

- Operational information (e.g., route detours),
- Route and schedule information,
- Proposed service changes,
- Public meeting information,
- Security,
- Safety (e.g., mind the gap),
- General information (e.g., how to ride and fare information), and
- Transit in the community (e.g., transit agency teamed with local business).

There is considerable variation in the content and frequency of communication as reported by the survey respondents. In terms of operational information, the most prevalent provided in real-time is next vehicle arrival and departure time. The most prevalent information provided periodically and on a one-time basis concerns detours and delays. The next most prevalent type of operational information provided on a one-time basis is trip and/or connection time.

As expected, general information is the most prevalent of all rider communications. Under safety and security, reminders about suspicious activities and packages were the most common under the periodic category.

The most prevalent dissemination media used by the survey respondents included hard-copy, Internet, telephone, and static signs at stops and stations. The methods used to determine the content of rider communication is summarized as follows. For operational and general information, complaint information provides the majority of input to determining content. Consulting with riders is the next most common method of determining the content of operational and general information.

In terms of costs, data were collected on the capital and operations and maintenance costs of several communications methods. The data reported by agencies were limited, indicating that either agencies are not fully aware of the costs and/or the costs of specific systems could not be separated from larger capital purchases.

This synthesis revealed that agencies have used various types of campaigns to communicate specific information to existing and potential riders, and brief descriptions of sample programs being used by responding agencies are reported. In addition, responding agencies reported many innovative programs to maintain and attract riders, and nearly two-thirds of the agencies

reported programs and/or goals that use technology, such as DMSs at stops and stations and information provided by means of various media.

The survey included five specific questions on how an agency determines the effectiveness of its rider communications. First, a majority of responding agencies reported that they conduct surveys of riders to determine if the communication reached the market for which it was intended. Second, most responding agencies noted that they consult with an advisory committee to determine if the communications are accessible. Third, the use of surveys and rider feedback accounted for the majority of responses as to how agencies determine if the communications were understandable. Fourth, rider feedback through focus groups, citizen advocacy groups, and surveys was used to determine timeliness; however, employee monitoring and feedback were also noted as useful methods. The final factor in communications effectiveness is determining whether the changes that were expected as a result of the communication (e.g., increased ridership) actually occurred. The survey instrument is shown in Appendix A.

Several quantifiable measures were used by responding agencies, including ridership statistics, volume of calls to customer information, number of complaints, and hits on the website. Several other agencies use surveys and overall service monitoring to ensure that routes are productive and that ridership levels are remaining stable or increasing.

Key lessons learned from agencies regarding the use of electronic media to disseminate communication and the effectiveness of communications covered a wide variety of issues, including organizational, technical, and operational factors. The following technical factors are summarized here:

- Maintenance of current and accurate information can be more resource-intensive and expensive than providing the information.
- There should be a simple method for riders to update their e-mail addresses and other electronic information.
- Server hosting needs should be outsourced. It is much more reliable to host the communication technologies in an off-site, secure environment.
- On-street equipment must be damage-proof from deliberate acts of vandalism, and weatherproofed from extreme weather conditions.
- Procure only transit-specific products, equipment, and services that can be modified with minimal effort.
- Anticipate growth and the need for adequate systems capacity.
- Consider alternatives to an IVR system, because it can take much time and money to implement, and because there is a limit to the amount of information that can be effectively communicated by means of an IVR.

The organizational factors can be summarized as follows:

- The communications department must be in charge of the content of electronic communications, because it is a communications function, not a technology infrastructure function.
- Partnering with business is a strategy that not only saves money, but increases the effectiveness of communications.
- The maintenance of any system requires multidisciplinary approaches. An information technology person who does not understand transit cannot create or maintain an effective information system. Creating a strong team approach is the best method to make communications products functional and effective.
- An agency should consider the post-project maintenance of hardware and software. An agency should know the cost of repair, maintenance, and replacement before any system is procured.
- Proper training of all staff in good customer relations is a necessity when electronic communications fail.

The operational lessons learned can be summarized as follows:

- Ensure that internal processes and resources for delivering a consistent quality of information are in place.
- Conduct pre-project research.
- Perform quality control of vendors.
- Provide consistent, simple messages.

The six key conclusions resulting from the synthesis are summarized here:

- Agencies need to take into account a variety of factors when determining the most effective method of communicating with riders. These include the stage of the travel chain in which the communication is needed and the demographic characteristics of the communications recipients, and their ownership of and ability to use technology.
- If technology is used to communicate with riders, agencies must establish a process for testing and monitoring the accuracy and timeliness of the communications.
- The selection of appropriate dissemination media is based on not only the content of the communication but also the demographics of the riders.
- An agency should have an "information strategy" to ensure effective communication.
- Agencies should ensure that internal processes and resources are in place for delivering a consistent quality of information.
- Maintaining or increasing ridership should not be the only metric that determines the effectiveness of communications.

CHAPTER ONE

INTRODUCTION

PROJECT BACKGROUND AND OBJECTIVES

Transportation agencies strive to build new ridership and retain existing riders by providing high-quality customer service. There are several components of high-quality service that include not only improved elements of transit services, such as reduced travel times and improved service reliability, but also direct customer service elements, such as real-time arrival and departure information, on-board information and amenities (e.g., wireless Internet), and automated fare payment. This synthesis focuses on the effective communication with transit customers in a variety of situations.

The synthesis report documents the state of the practice in agency communications with customers, using the following elements as a way to determine what constitutes successful communication:

- Who the agency is communicating with (e.g., regular commuters, persons with disabilities, tourists, and potential riders) and their location;
- Content (e.g., timetables, route maps, trip planning, and next vehicle arrival and departure time), format, and accessibility of communication;
- Communication timing and frequency (e.g., real-time, periodic, and one-time);
- Communication dissemination media (e.g., hardcopy, electronic signage, mobile phones, and Internet) and access [push (send text message for information request) or pull (use Internet to obtain information)]; and
- Capital, and operations and maintenance costs associated with communication (including all resources, such as staff time).

For the purposes of this synthesis, effectiveness is defined as providing accurate, clear, accessible, understandable, and timely information, and reaching the intended audience. The report includes an examination of how effectiveness is measured, including its impact on transit ridership.

A review of the relevant literature in the field is combined with surveys of selected transit agencies and other appropriate stakeholders to report on the current state of the practice. The survey's purpose was to obtain information on communication characteristics, effectiveness, costs, and best practices. Based on survey results, several case studies and profiles were developed to describe innovative and successful practices, as well as lessons learned and gaps in information. An important element of this report is the documented interviews with key personnel at agencies regarding their communication methods.

TECHNICAL APPROACH TO PROJECT

This synthesis project was conducted in five major steps. First, a literature review was undertaken to identify the methods currently used by agencies to communicate with riders and to identify the issues associated with deploying methods of communication.

Second, a survey was conducted to collect information on factors such as types of communication; content, accessibility, and frequency; the types of media and technology used to disseminate the communication; and the effectiveness of communication. In addition, data on the techniques used to develop communication, relationships with dissemination providers (e.g., mobile telephone companies), communication costs, and best practices in communications were collected.

Third, the survey results were analyzed. Fourth, follow-up telephone interviews were conducted with key personnel at agencies that have exemplary methods of communication. Finally, the results and conclusions were prepared and documented.

REPORT ORGANIZATION

Following this introductory chapter, this report is organized as follows:

- Chapter two summarizes the literature review.
- Chapter three describes the types of travelers that agencies are communicating with (e.g., regular commuters, persons with disabilities, tourists, and potential riders), the content and format of the communication (e.g., timetables, route maps, trip planning, next vehicle arrival and departure time), the timing and frequency of the communications, and the dissemination media and type of access (e.g., push or pull).
- Chapter four presents information about capital, and operating and maintenance costs.

- Chapter five provides examples and discusses the effectiveness of rider communication techniques.
- Chapter six presents case studies from selected agencies that have exemplary methods of communicating with riders.
- Chapter seven summarizes the results of the synthesis, and presents conclusions.
- A Bibliography is presented that contains citations for literature that is not specifically referred to in the text.
- Appendix A contains the survey instrument, Appendix B is a list of responding agencies, and Appendix C contains "Good Practice Cards" that were developed by The Ministry of Transport and Communications in Finland.

CHAPTER TWO

LITERATURE REVIEW

The literature review revealed that a considerable number of reports, papers, articles, and press releases have been written about methods of communicating with riders. The literature can be divided into two major categories: (1) research describing the information needs of riders and (2) approaches to customer communication being used by transit agencies, and market research conducted by transit agencies that reflect customer perceptions of communications. All documentation reviewed for the synthesis is cited in the References and Bibliography.

RIDERS' COMMUNICATION NEEDS

There was a wealth of information from the literature describing riders' needs for communication. The following seven key pieces of literature covered this topic extensively and are detailed in this chapter:

- The Ministry of Transport and Communications (Finland), *Guide for Improving the User-Friendliness of Information Services of Public Transport* (*1*).
- *TCRP Report 45: Passenger Information Services: A Guidebook for Transit Systems* (*2*).
- *TCRP Research Results Digest 5: Electronic On-Vehicle Passenger Information Displays* (*Visual and Audible*) (*3*).
- *Customer Preferences for Transit ATIS*, prepared for FTA (*4*).
- *Traveller Information Systems Research: A Review and Recommendations for Transport Direct* (*5*).
- "Public Transport Information Web Sites: How To Get It Right" (*6*).
- Metro (in Leeds, United Kingdom), "Information Strategy 2006" (*7*).

All of this literature describes the customers' needs for communication, including types of information, format and media for dissemination, and frequency. Understanding these needs is critical to identifying the most effective methods of communication.

Finland's Ministry of Transport and Communications documented information that is directly relevant to this synthesis. In its *Guide for Improving the User-Friendliness of Information Services of Public Transport* (*1*), the Ministry recognizes the relationship between providing quality information and the riders' perception of public transportation services. "The use of public transport information increases alongside of the general growth of mobility. Thus, the usability of information will be more and more significant in enhancing the attractiveness of public transport" (*1*, p. 11). The *Guide* covers the nature and distribution of information, effectiveness of communication (called "criteria for information" in this report), and the travel and information chains in a trip (see Figure 1). The criteria for information were identified as clarity, conciseness, reliability, timeliness, repeatability, consistency, and prioritization.

As part of the *Guide*, "Good Practice Cards" were developed that provide the best practices for specific rider communications. Sixteen cards were developed (see Appendix C), corresponding to information that should be provided throughout an entire trip (see the trip chain in Figure 1). For example, there is a card for Electronic Displays on Bus Stops that provides guidance with regard to the technology, location, design, placement, contents of the information, and recommendations regarding the text field.

The other cards were developed for:

- Advance Information—travel information available by telephone, short message service (SMS), or on the Internet.
- Personal Service—service needed to complement other forms of public transport information.
- Info Kiosks—interactive computer terminals for providing information.
- On-Board Displays in Public Transport Vehicles—informing passengers along the various stages of their journey.
- Fixed Information in Public Transport Vehicles—facilitates finding the right vehicles and services during a trip.
- Information Signs—assisting passengers in finding their way in terminals and other areas.
- Hearing Disabilities and Public Transport Information + Acoustics—visual information for those who are hearing impaired.
- Mobility Disabilities and Public Transport Information—information on the accessibility of public transport.
- Park & Ride—information for those who cannot walk to a station or stop.
- Visual Disabilities and Public Transport Information + Tactile Information—audible information for visually impaired individuals.

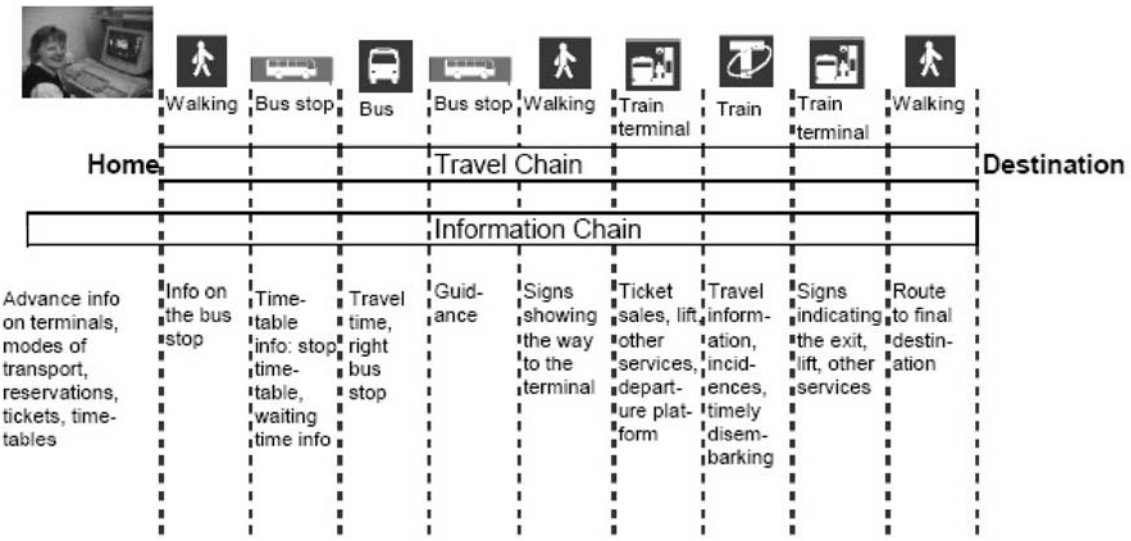


FIGURE 1 Example of information needs during a journey.

- Phone Services + Mobile Phone and Wireless Application Protocol (WAP)—a variety of travel information accessible by telephone.
- Fixed Information on Stops—information on routes and schedules, and other fixed information.
- Fixed Information in Terminals—essential travel information, such as way-finding and information on auxiliary services.
- Real-Time Information in Terminals—real-time arrival and departure information to customers.
- Websites—up-to-date information by means of the Internet on a variety of public transport and related services.

In *TCRP Report 45: Passenger Information Services: A Guidebook for Transit Services* (*2*), pre-trip information needs were identified as consisting of the following elements:

- Location of the nearest bus stop,
- Routes that travel to the desired destination and transfer locations,
- Fare, and
- Time of departure and approximate duration of the trip.

Information needs of customers who are en route were identified as consisting of at least the following:

- At the departure point—identification of the correct bus to board.
- On board the vehicle—identification of bus stops for transfers or disembarking.
- At transfer points—how to transfer to another route; cost, time limits, and restrictions; and identification of the correct bus to board.
- At the destination—area geography (i.e., location of the final destination in relation to the bus stop) and return trip information (e.g., departure times and changes in route numbers).

This guidance describes the need for more information at each stage of travel and reports that a combination of information (e.g., maps and use of signage) is needed because each type of communication and media has its own set of strengths and weaknesses.

This report identifies the most critical factors or elements that will increase the effectiveness of the communication. These are, in no particular order:

- Rehearsal—customers' viewing maps and other material to become familiar with the transit system.
- Simplicity—requiring the use of common names and terms, and references to known locations or directions to aid in orientation.
- Consistency—names, codes, and formats being consistent from sign to sign and from one type of information aid to another.
- Continuity—the rider building on initial information with data that confirm decisions and reiterate next steps in the trip. This can be provided by bus stop signs, on-board route maps, and other information aids that help the rider progress from one step of the journey to the next.
- Repetition—redundancy (e.g., repeated formats, coding by shape and/or color, and consistent number and name), which will help to reinforce trip and transit information in the mind of the rider.

In terms of on-board communication with riders, passengers participating in two focus groups "indicated that attention to both transportation messages and entertainment may enhance customer experiences on vehicles (*3*). Focus group participants were especially interested in next-stop, route number and

name, and other transportation information, as well as entertainment, time of day, and traffic updates" (*3*, p. 2). Although this study is more than 10 years old, it reflects the current needs of passengers, as described in *TCRP Report 45* and other key documents summarized in this section.

As described in the FTA report (*4*), workshops were held in four metropolitan areas across the United States (Providence, Rhode Island; Columbus, Ohio; Salt Lake City, Utah; and Seattle, Washington) with transit customers to answer the following questions:

- What kinds of transit information do customers want and expect transit agencies to provide?
- Where should information be made available to transit travelers?
- Which delivery system do users prefer?
- When should the information be made available to be most useful to transit travelers?
- What are the critical human factors issues in presenting and displaying transit information?

Many types of communication were considered essential by the workshop participants, given the demographics of the focus groups, specifically (*4*, p. 3):

- For pre-trip planning purposes, the highest preferences were for timetables.
- Traditional (printed) or static forms of information were preferred over real-time (electronic) information for pre-trip planning, again, given the demographics of the focus groups.
- The two predominant ways transit customers preferred to obtain pre-trip information is in printed form (such as a portable schedule) and by means of a computer (such as Internet or e-mail).
- Trip time forecasts were the most preferred type of real-time pre-trip information.
- Pre-trip information needs were much greater when planning an unfamiliar trip than for a familiar trip.
- The overall level of preference for information while at the wayside was substantially less than for pre-trip planning. Once a transit trip is initiated, the options narrow and the traveler has most of the information he or she wants. The preferences for information at the wayside focus mostly on real-time information to be accessed through electronic message signs or video monitors.
- At the wayside, in addition to real-time information types, static information printed on paper or on signs at the transit stop was also considered essential by many riders, and primarily includes schedules, route maps, and fares.

Extensive research into customer needs for communication was conducted for the development of Transport Direct (*5*), a program that provides the United Kingdom with multimodal traveler information, including the ability to compare travel options across public and private transport modes (see http://www.transportdirect.info/TransportDirect/en/Home.htm?cacheparam=1). Of the 13 factors critical to the design of Transport Direct, at least 6 were devoted to customer communications and, specifically, the aforementioned dimensions of communication. The recommendations regarding these factors were:

- *Consumer demand for information*. "Transport Direct will need to capture the public's attention with unique features that distinguish it from other services and which are valued by consumers" (*5*, p. 4). Furthermore, "poor information accessibility can pose a barrier to public transport use that is as serious as the potential barriers of physical access to public transport services" (*5*, p. 4).
- *Information requirements of the end user*. "Customer understanding of the term *reliability* associated with travel options needs to be defined and understood. Possible representations of reliability as information should be conceived and assessed in terms of their usefulness to customers" (*5*, p. iii).
- *The importance of awareness and marketing*. "There appears a need for the public transport industry in particular to do more to promote to the public the availability of information concerning its transport services" (*5*, p. 13).
- *Effects of information on behavior*. "Potential users of an information service should have the opportunity to physically be exposed to the service or a prototype of the service in order to determine their attitudes towards the service and the behavioural consequences, if any, of using this service" (*5*, p. iv).
- *Media and presentation formats*. "Alternative interface designs and information structures should be identified for [an information] service. Prospective end users of the service should be engaged in the design of the service through an iterative process of consultation and usability testing" (*5*, p. iv).
- *Integration of real-time systems into travel information systems*. "Research to accelerate the understanding and delivery of real-time information to mobile devices is needed concerning user take-up, technical aspects (including development of information sources such as [automated vehicle location (AVL)], costs, and presentation of information" (*5*, p. v).

In 2001, the United Kingdom organization, Institute of Logistics and Transport (ILT), developed guidance for creating effective public transport information websites. In their guide (*6*), ILT states that "for Internet-based public transport information to be useful, it must fulfill the user's needs and it must be easy to use. If this new medium for public transport information provision is used to best effect, public confidence in the quality of Internet-based public transport information can be fostered and greater use of public transport, by existing users and non-users, can be encouraged" (*6*, p. v). Although this appears obvious, after examining a variety of websites during the research phase of this synthesis, it was clear that not all public transport information websites are

easy to use. Furthermore, ILT stated that "fundamental to the success of public transport information web sites is a focus on the user. Unless the user's information needs have been understood, the information content is unlikely to be relevant to the user's needs" (*6*, p. v).

In addition, the ILT study emphasized that public transport information websites should focus the users of the website and the information content should be made easily accessible. The website user should be able to navigate to the desired information within "three clicks." The information provided on websites should not be overly technical and should be easily comprehended. Website content should be rich in information and concise. The internal and external links should be designed properly to prevent users from being confused. For example, the users should be alerted when being automatically navigated to an external website. To attract users, the websites should also organize the content by effective use of text and visuals (e.g., graphics and maps).

A review of more than 600 transit websites was done to analyze public transport information website content. It was concluded that site content should be revised to make it more appropriate by defining the audience and purposes of the site, including information that is necessary for the purposes, and excluding information that is not necessary. It was also suggested that user interfaces should be revised to improve sites to make them easier to use and more accessible.

Another important aspect of this guidance is the implication of providing web-based public transport information by means of recent technologies and services, such as WAP-enabled portable devices, the ability to locate the wireless device user, and new communications technologies, such as Bluetooth and general packet radio service. Although at the time this guidance was written (in 2001) several of these technologies were brand new, they are fairly commonplace now. The key implication of these new technologies on public transport information website design is to keep the interfaces and information simple.

Metro in Leeds, United Kingdom, developed a detailed information strategy based on customer needs. This information strategy is updated annually and identifies priorities for improvements based on these customer needs. Table 1 shows Metro's information requirements for 2006.

In September 2005, Metro launched a campaign called "yournextbus" in West Yorkshire, which was expanded to South Yorkshire in 2006. In preparation for the launches, the Metro hired a marketing and media firm and proceeded to develop the system using the four P's of marketing: product, price, place, and promotion. The yournextbus product consists of information accessible by means of SMS, WAP, and the Internet. A price was determined for the text messaging, and the promotion was developed. The promotion identified who was being targeted by the new system, defined the communication, and identified where and what promotional material would be provided to those being targeted. A detailed Communications Plan was developed that covered all of the necessary activities within and external to Metro as the new system was being launched.

As mentioned in Metro's Information Strategy, the success of the yournextbus was measured by examining the use of the system and customer feedback. In the West Yorkshire system, detailed statistics regarding the number of SMS messages and WAP/Internet visits were compiled and analyzed over a five-month period starting just before the launch of yournextbus. Furthermore, the number of text messages sent and received on an hourly basis was examined for a one-week period to determine usage profiles. Finally, Metro studied what affected usage of the new system, in addition to customer feedback.

Other documentation that reflected riders' communication needs focused on specific aspects of transit travel, such as transferring. For example, in a recent study conducted for the Metropolitan Transportation Commission (MTC) in the San Francisco Bay Area (*8*), the communication issues associated with "transit connectivity" were identified. Transit connectivity refers to a customer's ease of transferring from one transit system to another. In the Bay Area, this is a significant part of the transit travel experience, with more than 20 public transportation agencies providing services. Given that several of the key aspects of connectivity are customer information, sources of that information, and dissemination media, this study examined the current barriers to connectivity related to these elements.

Taking into account these barriers, the following recommendations were made (*8*, pp. 3–8):

- Provide transit information by means of a variety of dissemination mechanisms to support pre-trip and en-route planning.
- Continue to support, enhance, and promote the 511 phone service as the number for transit information, and encourage transition from individual operator phone services to 511.
- Continue to support, enhance, and promote 511.org as a one-stop location for transit information.
- Improve printed information in transit stations.

Recommendations for real-time information and technology were also made (*8*, pp. 3-13–3-14):

- Provide real-time information for segments of "routes that improve regional or intra-agency connectivity, or routes that serve main arterials, express, or limited-stop routes" (*8*, p. 3-14).
- Develop real-time performance accuracy standards.
- Provide required real-time information to a regional database for dissemination on 511 phone, 511.org, and to other transit operators, if applicable, in a standard format.
- Make real-time information displays consistent among hubs.

TABLE 1
METRO (WEST YORKSHIRE) INFORMATION REQUIREMENTS

Stage of Journey and Information Requirements	Current Provision (January 2006)	Priorities for Improvement
Pre-journey, where requirements are principally journey planning and fares information	• Timetable leaflets • Maps • Metroline/Traveline • Journey planner and website (wymetro.com) • Public Internet access points • Travel center service • Printed information, including timetable booklets, bus stop displays, bus and train station displays, area maps and local guides • Range of information outlets stocking timetables, maps, and leaflets • Bus stop and station information	• Increase self-service through promotion of Metro's website (wymetro.com) for journey planning information and timetable downloads • Provide fare information through Metroline and journey planner • Achieve consistent standard across all travel centers • Tailored, personalized information delivery • Info kiosk/Internet access points at more locations
Beginning the journey	• Location of bus stop/shelter and how to find which is your stop • Real-time information by text, WAP, and Internet • Bus stop information, confirming time, and departure location	• Real-time displays at shelters, voice real-time service accessed via Metroline number • Bus stop information to be expanded to all stops
Bus stop/shelter/ station	• Real-time information • Travel centers at bus stations • Electronic information displays at bus stations • Printed information • Location information	• Real-time information at all bus stations
Bus journey	• Service change dates information • Promotional information	• Next stop information • Route information • Destination information

Note: WAP = wireless application protocol.

Transit agencies are providing more communication regarding security awareness and procedures than ever before. One key document regarding this type of communication was prepared by the Permanent Advisory Committee to the New York Metropolitan Transportation Authority (MTA) (*9*). This organization conducted a study regarding communications policies at several MTA agencies.

> It is especially important that communication with customers involve not only the agencies transmitting information to customers, but also the agencies listening to customers, who constitute a vital first source of information about potential threats in the public transportation system. This is a new paradigm . . . (*9*, p. i).

Customers have found the quality of response during emergencies to be inconsistent, particularly related to communication. In our research we found that MTA operating agencies' emergency response plans differ significantly in how they incorporate communication as an integral component.

Recommendations resulting from this study included those for communicating with riders covering all of MTA and individual operating agencies. In summary, these covered improving and expanding customer information regarding emergencies; supplying personnel with appropriate information to provide customers with during emergencies [e.g., alternative service, providing information in common formats, and preparing a detailed communication section to be included in the emergency response plan (*9*, pp. 28–32)].

After this report was published, one specific aspect of communication with riders, the audibility of announcements in New York City subways, was the subject of a newspaper article that described the current status of public address systems in the system's 468 stations (*10*). In a subsequent article (*11*), statistics were cited indicating that an upgrade to the public address system would be necessary for announcements to be understandable by customers. The MTA does have a plan to upgrade the public address systems by installing "public address/customer information screens with audible speakers and digital text display panels" in 201 stations by 2009 and the other 267 stations by 2015.

It has been reported that different types of media can be used to communicate with riders, particularly to disseminate pre-trip and real-time information. However, the selection of the media is dependent on several factors, including the location of the riders. For example, pre-trip information can be accessed through the Internet, wireless personal digital assistants (PDAs), and mobile phones. For customers at bus stops, information can be provided in the form of light-emitting diode (LED) dynamic message signs (DMSs), liquid crystal display (LCD) panels, video monitors, kiosks, and/or mobile phones. Mobile information media such as mobile phones and PDAs can be used at any stage of the trip. On-board information can be provided visually through DMSs and audibly through voice announcements. Recently, agencies have also started deploying wireless Internet [wireless fidelity (Wi-Fi)] on board, providing customers with access to static or real-time information over the Internet while they are on board.

In terms of disseminating real-time information, *TCRP Synthesis 48: Real-Time Bus Arrival Information Systems* (*12*) identified several media that are being used to disseminate real-time information (see Figure 2). Although these information dissemination media have proven to be effective, transit agencies are improving the content of the communication as well as the media based on customer feedback and their own experiences in deploying the media. For example, the MyBus system, which provides pre-trip and real-time information for King County Metro in Seattle, was updated over time based on user feedback (*13*). In addition, a study on MyBus revealed that the key elements in providing effective communication to transit riders included developing partnerships among all transportation agencies in a region, recognizing the utility of dissemination media and systems to end users, and keeping up with advanced technologies. The feedback that caused the system developers to update the system over time included the notion that users wanted to be aware of the real-time progress of their bus on the Internet and to be alerted just before the arrival of the next bus at their bus stop(s).

In terms of providing rider communication by electronic media, Europe and Asia have embraced supplying public transport information on mobile devices perhaps more than anywhere else in the world. For example, information is available from both small and large agencies by means of

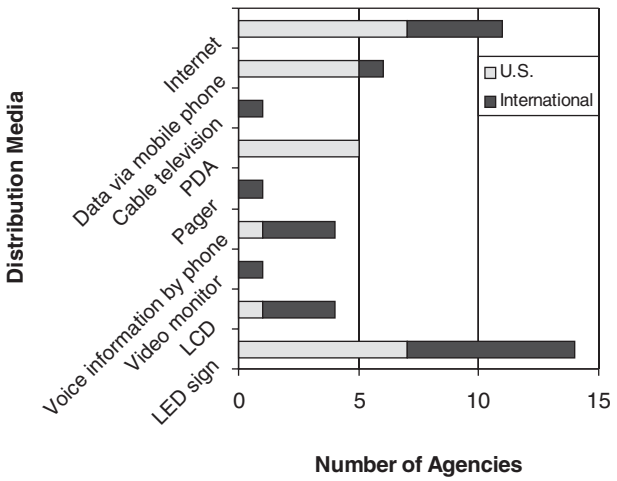


FIGURE 2 Distribution media for real-time bus arrival information (*12*, p. 13).

mobile telephones (from several mobile phone service providers) throughout the United Kingdom and Western Europe. For example, in the United Kingdom, WAP and SMS services are available in Nottingham County as well as in London (see chapter six for a more in-depth discussion of Transport for London). The technologies that drive these mobile services are shown in Figure 3.

One unique application of mobile device use for public transport communication was developed in Magdeburg, Germany. Personalized public transport information, focusing on disruptions, is presented by means of a variety of media as part of a demonstration project (*15*). Magdeburg has a population of 230,000, with 157 trams and 61 buses that operate on 20 lines. The PIEPSER project (personalized information for commuters of public transport) provided notifications of disruptions, as well as information on alternate routes through multiple modes (not just public transit) by means of SMS to subscribers of the information service affected by the disruption.

Hoyer et al. noted that "the acceptance of a personalized information service strongly depends on its quality" (*15*, p. 5). Furthermore, providing accurate disruption notifications was a challenge, given that several manual processes were required and, once the incident occurred, information regarding the disruption has to be continually updated. This project resulted in a strong case for using this type of rider communication to at least maintain public transit ridership.

Another European example of rider communication using the latest technology is provided through Portsmouth's Real-time Integrated Traveler Information System (PORTAL) (*16*). "PORTAL combines the provision of a Real-Time [Bus] Passenger Information system (RTPI) delivered by wireless broadband (Wi-Fi), with touch screen information and Internet services integrated within bus shelters, providing a range of great travel services for the 41,000 or so daily

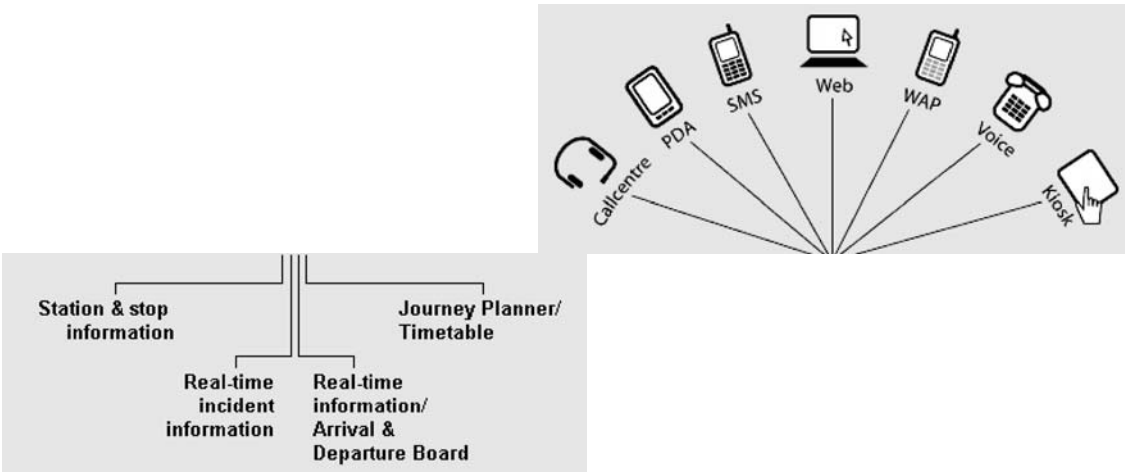


FIGURE 3 Dissemination media for public transport information (*14*).

passengers across the city" (*17*). (See Figures 4 and 5 for photos of PORTAL shelters and real-time information.)

From a rider perspective, essential transit information, including information on real-time arrivals and disruptions, and itinerary planning, is provided in the bus shelters through display screens and fully integrated touch screens. In addition, maps and other service information can be printed out.

FIGURE 4 PORTAL at bus shelter.

As mentioned earlier, rider communications by means of mobile devices is common in Europe and Asia. Specifically, the use of SMS or text messaging is much more common than it is in the United States, as shown in the literature and on agency websites. For example, Auckland, New Zealand's, public transit system has embraced WAP and SMS as a way to increase ridership and provide better customer service (*18*). Text messaging is the hallmark of the "Virtually Thr" system that was introduced in Auckland in 2002. This system was developed to "present bus information in the way customers wanted it. It was also about tapping into people's

FIGURE 5 PORTAL display in shelter.

preferred media." Text messaging is the preferred way for young people in the Auckland area to communicate, and the chief information officer (in 2002) at the Auckland Regional Council recognized this as a significant market for public transit.

In addition to WAP and SMS services, the website was improved and web discussion groups were added. These discussion groups are rare in public transit settings, as noted by the chief information officer at the Council in 2002. "We are one organization that is not hiding behind a website. Our discussion area is a place where people can have a go about the transport services, even the drivers" (*18*).

Another notable aspect of the Virtually Thr system is the cost to both taxpayers and customers. "Our Rideline call centre costs us $1.80 per interaction with the public. Compare that with our new services, the web, WAP, and SMS, which cost us 9 cents per interaction. (The SMS messages cost 30 cents each for users.)" (*18*). Furthermore, "the call centre costs just under $2 million a year to operate and handles 1.4 million calls a year; the ongoing cost of the website, the WAP, and SMS services combined is $60,000 a year and between them they already handle 600,000 calls annually—and the number keeps on rising, about 30% every six months" (*18*).

One final observation of this system is that it uses only one integrated database to store and provide all customer information. Before Virtually Thr, customer information resided in numerous locations in the agency.

Yet another approach to communicating with riders is being demonstrated in Zurich, Switzerland, based on the location of a mobile device owner (*19*). Because several countries have mandated or will be mandating that mobile telephone locations be provided by telecommunication companies, commercial firms are exploring the opportunity to provide public transport information based on the location of the phone user. The potential for providing location-targeted customer information includes the following (*19*, p. 35):

- Personal "last km" navigation—the final stage at the end of a journey that is necessary to reach the entrance of the destination building by walking.
- Tracking people in transit who need to find each other (or who may be vulnerable).
- Managing or redirecting traveling field workers.
- Supporting visitors arriving in unfamiliar cities in finding points of interest (restaurants, hotels, and the like) with electronic tour guides.
- Providing navigation aids for people with disabilities (e.g., in the form of aural locational information for those with visual impairments).

One of the key issues associated with providing location-based rider communication is that riders may be in locations where global positioning system (GPS) signals are very weak or nonexistent. In a demonstration that is being conducted in Zurich, weak GPS signals are being boosted within Zurich's main rail station. This station not only serves local, regional, national, and international rail customers, it is also a major hub for other public transportation services. "The test, covering typical passenger movements across the station concourse between entrances, generated GPS-derived position fixes that clearly depicted the routes walked" (*19*, p. 36).

TRANSIT AGENCY COMMUNICATION APPROACHES AND MARKET RESEARCH

The literature review covered customer preferences for agency-provided traveler information. The FTA report (*4*), mentioned earlier in this chapter, describes several features of traveler information. The report shows that customer preferences vary based on several factors, including gender, age, and education level. For example, in this study female riders preferred real-time information to static information more so than male riders. Travelers in the 25–64 year age group were found to have a stronger preference for video displays or kiosks that show real-time information at the wayside as compared with younger or older riders. Individuals with higher levels of education were more comfortable with advanced technology media such as the Internet and wireless devices.

This 2003 report also shows that, in general, customers have a greater inclination toward pre-trip planning resources, which are preferred primarily in traditional (paper-based) forms. This study also shows that pre-trip information is needed more for an unfamiliar trip. While at the wayside, customers prefer real-time information through video monitors or kiosks. This information mainly includes estimated trip time or real-time bus arrival information. It was also emphasized that transit agencies should ensure that all communication, particularly real-time information, is accurate and timely.

The Tri-County Metropolitan Transportation District of Oregon's (TriMet's) Transit Tracker displays show real-time information at selected bus and light-rail stops in countdown format (*12*) as shown in Figure 6. This information is also available using TriMet's website and through portable wireless devices, such as PDAs and mobile telephones.

An on-line survey (*20,21*) of Transit Tracker Online users revealed the significance of an accurate and timely real-time information system on customer satisfaction. The survey results showed that the system was easy to use and that the information was useful and accurate. It was also reported that the DMS displays helped save time. Furthermore, the survey reported that more than 50% of the users (of a total of 368 survey respondents) were satisfied with the bus service in the presence of such information (see Figure 7). The riders also perceived increased safety and comfort in the presence of the real-time arrival information, because they were aware of the wait at the stop.

FIGURE 6 TriMet Transit Tracker dynamic message sign (*Courtesy:* Orbital Sciences Corporation).

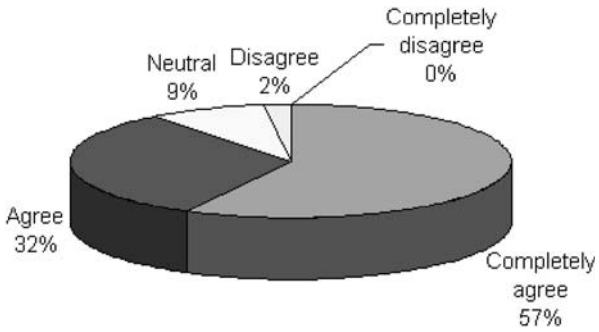


FIGURE 7 Customer satisfaction with bus service owing to Transit Tracker (percentage) (number of respondents, 368).

Another example of effective communication was discussed in the Island Explorer Field Operational Test (Acadia National Park, Maine) evaluation. This evaluation (*22*) was conducted, in part, to determine the customer satisfaction with the Island Explorer system, including the information communication to riders. (The evaluation activities began in the spring of 2000 and were completed in the winter of 2002–2003.) A survey with 928 respondents concluded that visitors believed that the availability of real-time departure information (on DMSs) and on-board next-stop announcements (provided by means of an automated annunciation system) made it easier to get around the area (90% and 89%, respectively) and saved them time (80% and 69%, respectively). In the final analysis, the technologies appear to have been an important factor in the decision of many visitors to use the Island Explorer. Fifty-four percent of the survey respondents strongly agreed that the real-time departure signs helped them decide to use transit, and 43% strongly agreed that the on-board automated annunciation system helped as well. The perceived benefits of using real-time information by means of the Island Explorer DMSs are shown in Table 2.

TABLE 2
VISITOR PERCEPTIONS OF BENEFITS FROM USING ISLAND EXPLORER REAL-TIME BUS DEPARTURE SIGNS

Benefit of Using Real-Time Bus Departure Signs	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)	*N* =
Helped to relieve uncertainty when the bus would arrive	51	34	11	3	1	435
Made it easier to get around the area	58	32	8	2	1	430
Saved time	48	32	16	4	1	434
Helped decide to use Island Explorer	54	26	13	5	2	434

Note: Percentages do not always add up to 100 owing to rounding.

As mentioned earlier in the Riders' Communications Needs section, in addition to communicating regular traveler information to customers, agencies are beginning to integrate passenger information systems with nontransportation-related information, such as news, sports, weather, and video-based entertainment (e.g., short subjects) (*23*). This report on the future of traveler information discusses the need to enrich passenger information services using the latest technology. The purpose of enhancing website and other information contents with advanced multimedia features is to get riders' attention. Consumer research was done as part of this study to obtain transit passengers' perceptions regarding the use of advanced features for passenger information. The results of the consumer research in three international cities yielded the following (*23*):

- High customer acceptance levels,
- High advertising awareness achieved, and
- High general satisfaction levels with passengers.

"More than 77% and in some cases more than 88% of the passengers perceived an improvement in the quality of the journey due to passenger information displays" (*23*, p. 4).

The literature review also revealed that agencies are communicating with riders to provide multimodal information. This trend is being adopted by transit agencies to attract the riders that use multiple modes for the completion of their trips. The 511 program provides multimodal information by offering traffic information (e.g., driving conditions, incidents, and construction) as well as transit information (e.g., fares, schedules, and trip planning) in one place. Figure 8 shows several San Francisco Bay Area 511 website pages that display multimodal traveler information. Extensive market research was done in the Bay Area to find out the most effective ways to disseminate information to transit riders and other travelers.

Market research conducted in the Bay Area (*25*) resulted in several improvements in the 511 system using interactive voice response (IVR) technology. For example, the phone service was improved by including a voice recognition feature that follows a menu item called "short cuts." This feature assists experienced callers by allowing them to bypass the full menu. The research also found a strong need for transit information that would allow users to plan a variety of trips beyond their day-to-day commutes. The updated

FIGURE 8 San Francisco Bay Area's 511 system (*24*).

FIGURE 9 Bay Area Transit information main 511 web page (*26*).

TakeTransit Trip Planner component of the Bay Area 511 system (see Figure 9) fulfills such needs.

A series of three satisfaction surveys were conducted by the San Francisco Bay Area MTC to evaluate the web and phone services of the 511 system. More than 1,000 users participated in two telephone service satisfaction surveys. Later, 415 web users participated in a survey of the web-based 511 services. The results of these two surveys showed that approximately 90% of all respondents were satisfied with the 511 phone and web services. The major reasons for the small amount of dissatisfaction (10%) among the respondents for both phone and web services were associated with the "accuracy/usefulness of information" and "problems with navigation" (*25*, p. 10).

The MTC also collects user feedback throughout the year through the website and by phone. Based on this feedback and results of the aforementioned satisfaction surveys, the MTC has made specific changes to the 511 website and phone service. The 511 website was redesigned to improve the "ease of navigation." Also, MTC plans to improve 511 by making the trip planner more robust and easier to use, improving the size of the map display, adding a search feature for landmarks on maps, and adding specific train station locations as permanent map features.

The 511 website provides real-time information on San Francisco Muni's J, K, L, M, and N lines, and on the historic F-line streetcars (see Figure 10). Eventually, as the full deployment of real-time transit information for all Muni services is completed, real-time information on all Muni bus and rail lines will be available through the 511 system using both the Internet and telephone.

Several agency customer satisfaction surveys were reviewed as part of the literature search, and each of these included survey questions that directly related to the effectiveness of communication. The results of the 2005 survey conducted for San Francisco Muni are discussed in detail in chapter six.

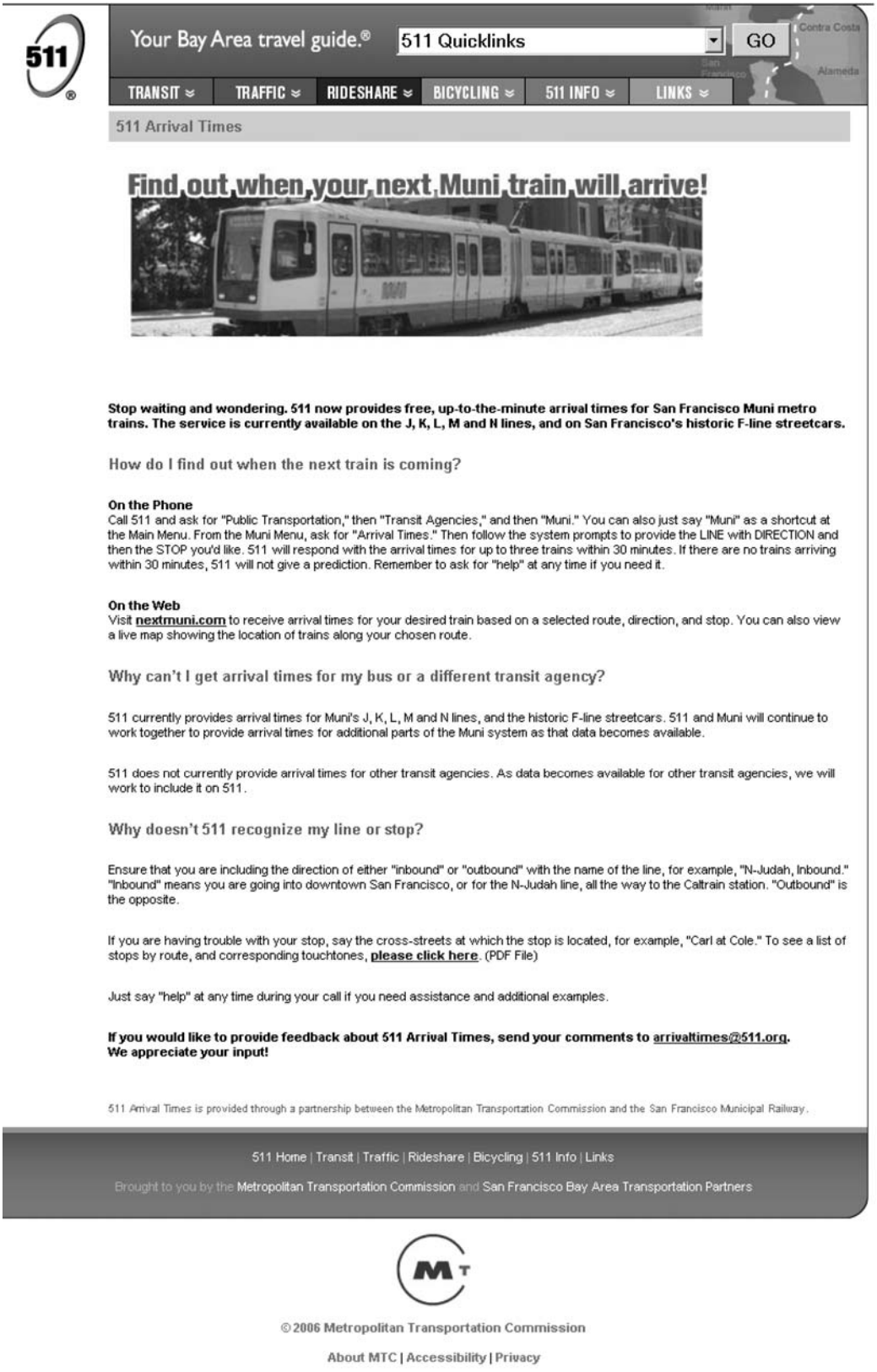


FIGURE 10 Real-time information available on Bay Area 511 (*27*).

Although transit agencies across the world are focusing on providing transit-specific pre-trip and en-route traveler information, many agencies have started to attract riders by providing multimodal information, as discussed previously. The literature review identified several other deployed multimodal traveler information services, including:

- Transport Direct in the United Kingdom (discussed in a 2003 presentation "Transport Direct: Where Have We Got to, Where Are We Going?") (*28*).
- HEILI in Finland (discussed in a 2003 paper "Finnish Multimodal Passenger Transport Information R&D Programme—HEILI") (*29*).
- Northern Europe Mobility Information Service (NEMIS) in Northern Europe (discussed in a 2003 paper "Development of Multi-National and Multi-Modal Traveller Information Services in Northern Europe") (*30*).
- PEdestrian and Public TRAnsport Navigation (PEPTRAN) in Winchester, United Kingdom (discussed in a 2003 paper "Peptran—Mobile Pedestrian and Public Transport Navigation in Your Pocket, Is This the Future?") (*31*).
- Portsmouth's Real-Time Integrated Traveler Information System (PORTAL) in Portsmouth, United Kingdom (*32*) [mentioned earlier in this section and discussed in a 2003 paper "Portsmouth's Real-Time Integrated Traveller Information System (PORTAL)"].

A review of these systems, which serve multimodal riders, has revealed important factors about rider communication. For example, there is a greater need for information during an unfamiliar trip and an inclination toward the use of mobile information media, such as mobile telephones. The market research conducted by the Transport Direct project team shows the following significant items related to customer preferences (*28*). The results of their study, which was conducted in 2003, showed user preferences for multimodal information, especially in the case of unfamiliar trips.

- People (generally) give little consideration to end legs of journeys when planning their travel.
- Mobile phones and SMS are considered by the public as prime candidates for the provision of in-trip and real-time information.
- Seventy-two percent of information users seek information for leisure travel compared with 21% and 29% for commuting and business travel, respectively.
- Users of telephone and Internet information services who determine the mode after consulting information source(s):
  – Short, unfamiliar journey—13%; and
  – Long, unfamiliar journey—27%.
- Sixty-nine percent of information users would prefer to consult a multimodal rather than uni-modal information service when preparing for an unfamiliar journey.

CHAPTER THREE

CHARACTERISTICS OF COMMUNICATING WITH RIDERS

The synthesis survey covered several key characteristics of rider communications. Before examining these characteristics, the overall and modal annual ridership and types of riders served by each respondent were noted. Most agencies provide fixed-route bus service and cover many types of riders, including commuters, the elderly and disabled, K-12 and college students, and tourists. Total annual ridership for each agency is shown in Table 3. Ridership among the respondents varied from 276,000 (paratransit-only agency) to 685,300,000.

COMMUNICATION TYPES AND FREQUENCY OF DISSEMINATION

Nearly all of the survey respondents provided the following types of communication to their riders:

- Operational information (e.g., route detours),
- Route and schedule information,
- Proposed service changes,

TABLE 3
AGENCIES THAT RESPONDED TO SURVEY QUESTIONNAIRE

Agency Name	Abbreviation	City/State	Annual Riders
Ann Arbor Transportation Authority	AATA	Ann Arbor, MI	4,900,000
Berks Area Reading Transportation Authority	BARTA	Reading, PA	2,600,000
Capital Area Transportation Authority	CATA	State College, PA	6,044,141
Capital Metropolitan Transportation Authority	CMTA	Austin, TX	33,873,000
Charlotte Area Transit System, City of Charlotte Public Transportation Department	CATS	Charlotte, NC	18,000,000
City of Colorado Springs Transit Services Division	CSTSD	Colorado Springs, CO	2,800,000
CityLink (Greater Peoria Mass Transit District)	CityLink	Peoria, IL	2,330,000
Fort Worth Transportation Authority	The T	Fort Worth, TX	7,126,567
Fresno County Rural Transit Agency	FCRTA	Fresno, CA	425,946
GO Transit	Go Transit	Toronto, Ontario	46,000,000
Greater Bridgeport Transit Authority	GBTA	Bridgeport, CT	4,675,000
Greater Hartford Transit District	GHTD	Hartford, CT	276,000
Interurban Transit Partnership	ITP	Grand Rapids, MI	6,400,000
Kitsap Transit	KT	Bremerton, WA	5,100,000
Metro Transit	Metro	Minneapolis, MN	69,500,000
Milwaukee County Transit System	MCTS	Milwaukee, WI	47,000,000
Montgomery Area Transit System	MATS	Montgomery, AL	749,554
Norwalk Transit District	Wheels	Norwalk, CT	1,783,595
Orange County Transportation Authority	OCTA	Orange, CA	66,590,000
Pace Suburban Bus	Pace	Arlington Heights, IL	36,877,892
Pierce County Public Transportation Benefit Area Authority Corporation	Pierce Transit	Lakewood, WA	14,476,000
Port Authority of Allegheny County	PAT	Pittsburgh, PA	70,000,000
River Valley Transit (Williamsport Bureau of Transportation)	RVT	Williamsport, PA	1,200,000
Santa Clara Valley Transportation Authority	VTA	San Jose, CA	39,380,000
Shore Line East, Connecticut Department of Transportation	SLE	New Haven to New London, CT	425,000
Singapore Mass Rapid Transit Ltd.	SMRT	Singapore	685,300,000
South Bend Public Transportation Corporation	TRANSPO	South Bend, IN	3,112,602
South Coast Area Transit	SCAT	Oxnard, CA	3,234,465
Southern California Regional Rail Authority	SCRRA	Los Angeles, CA	9,946,566
Transfort/Dial-A-Ride	Transfort	Fort Collins, CO	1,570,000
Transit Link Pte Ltd	Transit Link	Singapore	Not applicable
Tri-County Metropolitan Transportation District of Oregon	TriMet	Portland, OR	39,380,000
York County Transportation Authority	YCTA	York, PA	1,699,735

- Public meeting information,
- Security,
- Safety (e.g., "mind the gap"),
- General information (e.g., how to ride and fare information), and
- Transit in the community (e.g., transit agency teamed with local business).

In larger agencies, the responsibility for communicating with riders is often assigned to multiple parts of the organization. For example, at Pace Suburban Bus, TriMet, Port Authority of Alleghany County (PAT), and Santa Clara Valley Transportation Authority (VTA), the responsibilities are divided as shown in Table 4.

For smaller agencies, most of the communication is done by one or two groups within the agency (e.g., operations and business development). The division of responsibilities is one of the key factors in the effectiveness of communication, as discussed in chapter seven.

As shown in Table 5, there is a wide variation in the content and frequency of communication reported by the survey respondents. In terms of operational information, the most prevalent information provided in real time is next vehicle arrival and departure time. This reflects the trend that shows more agencies deploying real-time information by means of DMSs and on the Internet. The most common type of information provided periodically and on a one-time basis concerns detours and delays. The next most prevalent type of operational information provided on a one-time basis is trip and/or connection time.

As expected, communication of all types of general information is the most prevalent of all of the communications. Under safety and security, reminders about suspicious activities and packages were most prevalent in the periodic category. The responses to this question were not unexpected. However, the dissemination of safety and security information is not being done by as many agencies as those that are disseminating general or real-time information. Given the focus on safety and

TABLE 4
EXAMPLE OF COMMUNICATION RESPONSIBILITIES

Communication Type	Pace	TriMet	PAT	VTA
Operational information	Planning services	Marketing	Media relations and operations	Service operations
Route and schedule information	Planning services/graphics	Marketing	Operations and customer service	Marketing and service operations
Proposed service changes	Planning services and government affairs	Marketing and communications	Media relations, operations, and marketing	Marketing and service operations
Public meeting information	Government affairs	Marketing and communications	Engineering, planning, media relations, and marketing	Marketing
Security	Bus operations	Marketing and operations	Safety, marketing, and media relations	Marketing and protective services
Safety	Safety	Marketing and operations	Safety, marketing, and media relations	Marketing and protective services
General information	Marketing and communications	Marketing	Marketing, customer service, and media relations	Customer service and marketing
Transit in the community	Business development, and marketing and communications	Marketing and capital projects	Sales, marketing, and operations	Community outreach

Source: Survey responses.
Notes: Pace = Pace Suburban Bus (Illinois); TriMet = Tri-County Metropolitan Transportation District of Oregon; PAT = Port Authority of Alleghany County (Pennsylvania); VTA = Santa Clara Valley Transportation Authority (California).

TABLE 5
FREQUENCY OF COMMUNICATION (No. of agencies reporting)

Type of Information	Frequency			
	Real Time	Periodic	One Time	Other
Operational				
Next bus/train/ferry arrival/departure time	10	2	4	7
Detours/delays	6	15	12	6
Vehicle location	5	1	1	3
Trip and/or connection time	3	5	11	4
Parking availability	1	3	4	4
Other	1	0	1	0
General				
Maps, routes, schedules, and fares	5	23	10	8
Rider's guide	2	18	11	5
Information for disabled riders	4	20	11	7
Trip planning (including Point A to Point B planning, find closest stop, find service at a location)	12	12	9	8
Other	0	2	0	0
Safety/Security				
Reminders about notifying officials about suspicious packages or activity	3	17	9	4
Evacuation of transit facilities/vehicles	4	8	6	2
Escalator/elevator outages	3	3	2	2
Amber alerts	1	0	0	3
Other	1	1	0	2

Source: Survey responses.

security at the time this report was prepared (June 2006), the overall results in this information category are somewhat unexpected. Overall, Table 5 shows the trend toward providing certain operational information in real-time, while continuing to provide general information on a periodic basis.

COMMUNICATION DISSEMINATION MEDIA

The dissemination media used by the survey respondents are shown in Table 6. The contents of the table directly correspond to the results of the aforementioned FTA study (*4*), which indicates that riders prefer to obtain information in printed form, through the Internet, and by telephone (see Figure 11). This strong correlation between the FTA research report and what is actually being provided by the survey respondents indicates that the top three types of media are the most effective methods of communicating with riders.

In terms of information accessibility, Table 7 shows the number of survey respondents that provide different types of information in various accessible formats. Some types of information easily lend themselves to specific accessible formats, such as large print for maps, routes, schedules, and fares; information for disabled riders; and rider's guides. Overall, the information in this table indicates that the majority of responding agencies provide general information in multiple accessible formats. The most widely used format for general information is large print, followed by a Section 508-compliant website. Safety and security information in accessible formats is somewhat limited in reporting agencies.

The survey asked respondents to note the methods that are used to determine the content of rider communication. For operational and general information, complaint information provides the majority of input to determining content [reported by 30 and 26 agencies, respectively (of the 33 responding agencies)]. Consulting with riders is the next most common method of determining the content of operational and general information (reported by 25 and 20 agencies, respectively). Surprisingly, many agencies reported that they determined the content of operational, general, and safety and security information in-house with no external input (21, 17, and 10 agencies, respectively). Nineteen agencies reported that they consulted with an external source in determining the content of general information and safety and security information. In addition, several agencies reported that they base the content of their operational, general, and safety and security communication on another agency's communication (13, 16, and 15 agencies, respectively).

TABLE 6
CURRENT DISSEMINATION MEDIA (No. of agencies reporting)

Type of Information	Dissemination Media												
	Paper (23%)	Static sign at transit stop/station (13%)	Electronic sign at transit stop/station (3%)	Public address system (3%)	On-board electronic sign (1%)	Internet (website) (22%)	Telephone (19%)	Mobile telephone (1%)	Wireless application protocol-enabled device (1%)	Kiosk (5%)	E-mail or page (5%)	Wireless device (e.g., PDA, iPod) (1%)	Other (3%)
Operational													
Next bus/train/ferry arrival/departure time	15	15	10	6	3	15	19	1	2	8	2	1	1
Detours/delays	23	18	7	8	1	20	22	3	1	5	10	3	4
Vehicle location		1	0	1	2	2	6	0	0	0	0	0	0
Trip and/or connection time	14	10		2	1	16	16	1	1	6	3	1	1
Fare payment	26	15	0	0	1	24	21	2	1	6	7	1	5
Parking availability	5	1	2	0	0	6	6	1	1	3	3	1	0
General													
Maps, routes, schedules, and fares	30	22	0	0	0	30	23	0	1	10	5	2	4
Rider's guide	27	6				24	13			4	1	0	4
Information for disabled riders	26	7		1	1	25	21	1	1	2	4	1	2
Trip planning (including Point A to Point B planning, find closest stop, find service at a location)	10	4				17	20	2	1	3	2	1	4
Safety/Security													
Reminders about notifying officials about suspicious packages or activity	19	13	5	7	2	13	3	1	0	3	4	0	0
Evacuation of transit facilities/vehicles	8	5	2	4	0	5				0	1		3
Escalator/elevator outages	1	3	1	0	0	3	3	0	0	0	1	0	0
Amber alerts		1	0	1	0	0	0	0	0	0	0	0	1

Source: Survey responses.
Note: Blank cells indicate that providing information is not applicable using the specific dissemination media.

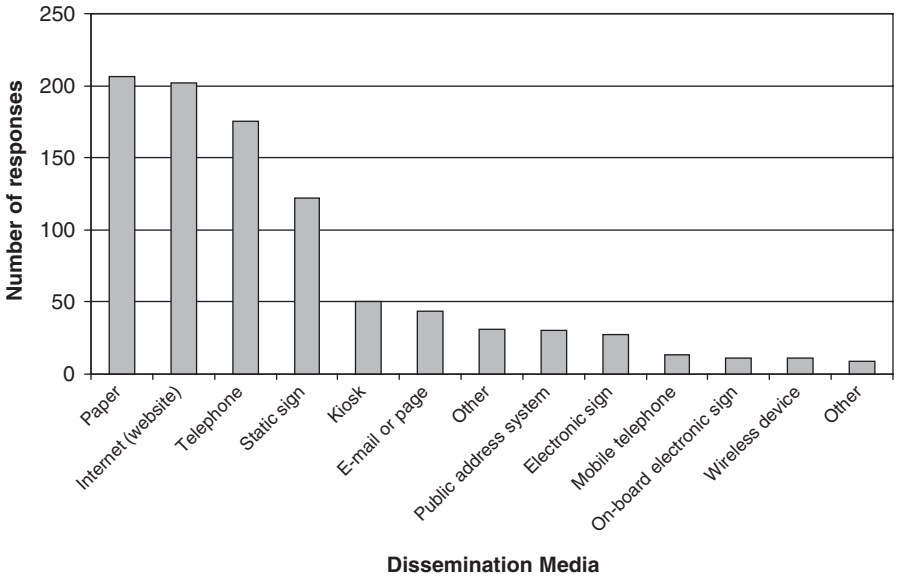


FIGURE 11 Dissemination media (*Source*: survey responses).

TABLE 7
COMMUNICATION ACCESSIBILITY (No. of agencies reporting)

	Accessible Format						
Type of Information	Braille	Large print/large font size	Audio version of visual information	Visual version of audible information	Website is Section 508-compliant	Interactive voice response technology	Other
Operational							
Next bus/train/ferry arrival/ departure time	3	10	8	6	6	5	5
Detours/delays	3	8	6	4	7	4	5
Vehicle location		1	3	2	2	1	4
Trip and/or connection time	4	6	3	4	8	4	4
Parking availability		1		1	5	2	3
General							
Maps, routes, schedules, and fares	9	20	8	6	14	7	5
Rider's guide	7	13	5	3	12	4	3
Information for disabled riders	8	15	7	4	11	5	5
Trip planning (including Point A to Point B planning, find closest stop, find service at a location)	1	5	7	6	10	4	4
Safety/Security							
Reminders about notifying officials about suspicious packages or activity	2	7	7	6	6	3	2
Evacuation of transit facilities/ vehicles	1	1	3	3	2	2	2
Escalator/elevator outages			1	1	2	2	1
Amber alerts			0	0	0	0	1

Source: Survey responses.
Note: Blank cells indicate that providing information is not applicable using the specific format.

CHAPTER FOUR

COMMUNICATION COSTS

Before discussing costs reported by agencies responding to the survey, the components of the costs associated with procuring, operating, and maintaining the communication technologies can be summarized as follows. Capital cost estimates for each technology component represent the one-time expenditures through a vendor deployment contract for hardware, software, and services. Normally, an allowance for design, procurement, and implementation support costs and for contingency is included in the capital cost for each technology. Annual operations costs for each communication technology include recurring expenditures for items such as incremental staff salaries and benefits, data communications charges, power charges, and training costs. Annual maintenance costs include recurring expenditures for field equipment inspections, preventative maintenance, replacement parts, support for software and computer and network hardware, and incremental maintenance staff salaries and benefits.

The major cost components associated with agency communication technologies are as follows:

- Electronic signs at stops and stations
  - Next arrival and departure prediction software (if the signs will display real-time information),
  - Interface to AVL system,
  - Next arrival and departure stop or station sign (hardware), and
  - Power and communication for sign.
- On-board electronic sign and audio system (automated annunciation system)
  - On-board annunciator and in-vehicle display signs,
  - GPS receiver,
  - Fixed-end hardware,
  - Interface to AVL systems (if annunciation system is integrated with AVL system), and
  - Staff labor or consultant labor to compose text and record audio announcements.
- Website
  - Development labor,
  - Hosting cost,
  - Website server, and
  - Next arrival and departure website application if real-time information to be included on the website.
- Internet trip (itinerary) planning system
  - Itinerary planning software,
  - Server, and
  - Staff or consultant labor to maintain data.
- IVR system
  - Software,
  - Server, and
  - Application software to incorporate functionality such as real-time information, trip cancellation (for demand response service), itinerary planning, and automated notification (for demand response customers).

Responses to the questionnaire regarding the costs of communicating with riders yielded a limited amount of information. Most of the information that was reported was related to the costs for websites, trip itinerary planning systems, and IVR systems. The reported capital, and operating and maintenance (O&M) costs are shown in Table 8.

There is a wide variation in all of the costs reported. For DMSs, the capital costs per sign ranged from $2,700 to $140,000, and the total annual O&M costs ranged from $500 to $13,000. For on-board electronic sign and audio systems, the capital costs per equipped vehicle ranged from $800 to $3,126. The annual O&M costs for these systems were reported by only two agencies and were $5,000 and $76,000.

The total capital costs for a website ranged from $4,200 to $550,000. One agency reported that the capital cost of the website was one full-time equivalent. The annual O&M costs for a website ranged from $600 to $250,000. The capital costs of trip itinerary planning systems ranged from $25,000 to $600,000, and the O&M costs from $5,000 to $59,000. The capital costs of IVR systems ranged from $85,000 to $16,000,000, and the O&M costs from $15,000 to $52,700.

Two agencies had an agreement with a wireless carrier. The prices between these two varied widely. Three agencies indicated costs for e-mail services, and these also varied widely.

TABLE 8
CAPITAL AND OPERATING AND MAINTENANCE COSTS OF COMMUNICATION MEDIA

Agency--> ? Electronic Communication Media	AATA	BARTA	CATA	CATS	CMTA	CSTSD	GHTD	MCTS	Metro	OCTA	Pierce Transit	RVT	The T	TriMet	VTA
Electronic sign at transit stop/station															
Total units	1	1				2						2	10	121	137
Total capital cost	$2,700	$100,000				$10,000						$40,000	$1,400,000	$1,500,000	$1,507,000
Total O & M cost		$10,000				$500						$2,000		$2,000	$13,000
On-board electronic sign/audio system (annunciation system)															
Total units	69				380	76						27			4,084
Total capital cost	*				$304,000	$76,000						$54,000		$3,000,000	$12,765,000
Total O & M cost					variable							$5,000			$76,000
Website															
Total capital cost				$5,000			$4,200	$36,000		1 FTE**	$10,000			$24,000	$550,000
Total O & M cost			$2,000	$60,000	$60,700		$600				$95,000	$5,000		$34,000	$250,000
Internet trip planning software															
Total capital cost	$42,000			$200,000	$193,000	$40,000			$600,000		$100,000			$25,000	
Total O & M cost	$8,000			$20,000	$59,000	$5,000			$30,000		$20,000			$35,000	$18,000
Interactive voice response system															
Total capital cost				$85,000	$16,000,000				$220,000					$87,000	$127,210
Total O & M cost				$15,000	$52,700				$18,000					$16,000	$18,260
Contract/agreement with wireless carrier															
Total units						25									
Total capital cost						$37,500									
Total O & M cost						$5,000						$20,000			
E-mail software															
Total units															
Total capital cost				$2,000											$309,500
Total O & M cost				$2,000										$12,000	$232,000

* Part of a larger system.
** FTE = full time equivalent.
Blank cells signify that many agencies did not report information in the media categories.
(*Source*: Survey data as reported.)

CHAPTER FIVE

EFFECTIVENESS OF RIDER COMMUNICATION TECHNIQUES

EXAMPLES OF THE USE OF TECHNOLOGY

Responding agencies reported many innovative programs to maintain and attract riders, and nearly two-thirds of the agencies reported programs and/or goals that use technology, such as DMSs at stops and stations, and information provided by means of various media (see Table 6). For example, Bay Area Rapid Transit (BART) provides a "QuickPlanner" for the Apple iPod that includes schedules, station information, and a system map. A majority of the agencies mention their website as an integral part of their rider communication programs.

The following paragraphs describe several of the ridership initiatives that include technology.

- At the Ann Arbor (Michigan) Transportation Authority (AATA) there are three innovative uses of technology:
  - Maps and timetables on the website are in a format to be downloaded to PDAs.
  - Real-time bus arrival information is currently at a limited number of stops—this is proposed for expansion.
  - Real-time schedule adherence information is being considered for deployment on the website within the next 2 years.
- For the Capital Area Transportation Authority (CATA) (State College, Pennsylvania), additional technology, such as electronic signs, will be integrated into its system.
- At the Charlotte Area (North Carolina) Transit System (CATS), there is a plan to add web-based trip planning and downloadable schedules, an IVR system with route and stop information, and web-based real-time information.
- The Southern California Regional Rail Authority (SCRRA) (Los Angeles) will be adding DMSs at stations.
- At Pace Suburban Bus (Arlington Heights, Illinois), e-mail and wireless subscription services are planned for 2006, along with real-time arrival and departure information.
- The Orange County (California) Transportation Authority (OCTA) plans to add IVR capability for paratransit users.
- The Montgomery (Alabama) Area Transit System (MATS) will add a kiosk, and is planning for the deployment of an AVL system in FY 2007 for fixed-route vehicles.
- The Greater Bridgeport (Connecticut) Transit Authority (GBTA) will be implementing an AVL system in 2006–2007.
- The T (Fort Worth Transportation Authority, Texas) is evaluating an e-mail notification system for rider alerts.
- TriMet already has technology in place as part of its rider communication program. One can plan a trip at trimet.org using an online trip planner, and can access Transit Tracker (its real-time information system) on the Internet (see Figure 12), and by land or mobile phone using IVR technology.

For those agencies that currently do not have technology, there are many technologies that are under consideration for deployment for rider communication. Seventeen agencies are considering the deployment of electronic signs at stops and stations, 14 e-mail or pager alerts, 13 the Internet as a means to communication, and 12 kiosks. Eleven agencies are considering the deployment of mobile telephone applications, 9 the deployment of IVR and wireless devices, and 8 public address systems and on-board electronic signs.

Other programs that involve the use of technology include:

- PAT's website.
- TransLink's (Singapore) Tele-Info (24-h per day information line) and Electronic Guide [called eGuide and available online (*34*)]. The eGuide shows the route for any rail or bus service, hours of service, headway-based timetable, fares, and bus stop names and numbers.
- South Bend (Indiana) Public Transportation Corporation (TRANSPO's) website and kiosk.
- SCRRA's (Los Angeles) DMSs at stations.
- Pace is planning e-mail and wireless subscription services and real-time arrival and departure information for 2006.
- OCTA has IVR available for paratransit users.
- Mountain Metro Transit's (Colorado Springs, Colorado) website (*35*).
- Shore Line East (SLE's) (Newington, Connecticut) website and automated (e-mail) notification of schedule changes and highway construction information.

COMMUNICATIONS EFFECTIVENESS

The survey included five specific questions on how an agency determines the effectiveness of its rider communications. (For the purposes of this synthesis, effectiveness is defined as providing accurate, clear, accessible, understandable, and timely

FIGURE 12 TriMet Transit Tracker access from home page (*33*).

information, and reaching the intended audience.) First, agencies reported on how they determined or measured if the communication reached the market for which it was intended. Second, they were asked how the communications was determined to be accessible to all individuals. Third, agencies were asked to report how they determine if the communication could be understood by the individuals receiving it. Fourth, agencies were asked how they determine if communications were received in a timely manner (e.g., real-time information received by means of a mobile phone received in a specified time). Finally, agencies reported on how they determine if the communication resulted in the changes that were expected as a result of the communication (e.g., increased ridership).

A majority of responding agencies reported that they conduct surveys of riders to determine if the communication reached the market for which it was intended. One agency reported that it conducts surveys of riders every 2 years and of the general public every 2 to 4 years. Others indicated that a survey of riders and nonriders is conducted annually. One agency's survey includes a rating of performance on 40 customer service elements, including the readability of schedules, information access, access to information by means of the telephone, rider alerts, etc. Three agencies reported that they determined if there was a change in ridership owing to specific communications. Several agencies indicated that they used focus groups; the content of complaints; feedback from rider advisory groups [e.g., Americans with Disabilities Act (ADA) advisory committee]; the agency website; public meetings; and the number of complaints, phone calls, or website hits to determine if the right market was reached with a communication. Two agencies offered that they do not determine if the communication reached the market for which it was intended. One agency noted that they tested the communication on employees, and another mentioned that they receive feedback from bus operators.

Other ways that were noted in determining if the communication reached the intended audience included the following:

- Farebox data surveys;
- Follow-up phone research;
- For rider alerts and schedule changes, customer responses are examined when changes are communicated and after the change to determine how many complain about *not* knowing about the information communicated;
- Examination of the customer relations database of complaints, commendations, and customer contacts;
- Comment cards on all buses and trains, and feedback from field staff;
- Attendance at meetings; and
- Statistics from driver's daily trip reports.

VTA indicated that it measures access to external communications through calls to VTA Customer Service, examining web metrics (e.g., web page hits), and written and electronic customer communications.

On the second element of effectiveness, the agencies' responses to how they determined the communication's accessibility are summarized here. A majority of responding agencies reported that they consult with their agency's disability and/or senior advisory committees to determine if the communications are accessible. Others mentioned offering personal assistance through their mobility planning office and direct contact with those affected by the communication—either face to face or by means of telephone/telecommunications device for the deaf. General rider and community feedback, as well as using surveys, were mentioned by several agencies to determine if the communications are accessible. Complaint analysis is also used by a few agencies. One agency mentioned that they do not determine if the communications are accessible.

Responses to the third component of communications effectiveness, the understandability of communications, can be summarized as follows. The use of surveys and rider feedback accounted for the majority of responses as to how agencies determine if the communications was understandable. Using the number of complaints, and focus and advisory group input were approaches taken by other agencies. Two other responses were notable:

- When doing rider forums (i.e., Public Transit 101), potential rider feedback is obtained.
- "We generally communicate written information to the public in a manner that is generally understood by persons on a fifth-grade level, using plain (nontechnical) Standard English. The operators, however, are trained and socialized to communicate in ways that are befitting of the situation at hand—especially when dealing with elderly, disabled, or non-English speaking patrons."

Many of the agencies that were surveyed do not have real-time information; however, the responses to the question regarding determining the timeliness of communications yielded the following. Rider feedback through focus groups, citizen advocacy groups, and surveys was used to determine timeliness; however, employee monitoring and feedback were also noted as useful methods. The number and content of complaints, particularly those that could be checked in real time, were also used as approaches to determining timeliness. For a few agencies that do have electronic communication of real-time information, the approaches to determining the timeliness of the information were no different than the approaches used for communication through other media. This is an issue associated with the deployment of real-time information, which was noted in *TCRP Synthesis of Transit Practice 48* (*12*). One agency noted that it does not measure or determine timeliness.

The final factor in communications effectiveness is determining whether the changes that were expected as a result of the communication (e.g., increased ridership) actually occurred. Several quantifiable measures were used by responding agencies, including ridership statistics, volume of calls to customer information, number of complaints, and hits on the website. Several others use surveys and overall service monitoring to ensure that routes are productive and that ridership levels are remaining stable or increasing. However, isolating the reasons for ridership changes owing to changes in communication is a challenge, as noted (*12*).

Agencies were asked to identify their most effective methods of communication. Although there was a wide variety of responses, they can be summarized as follows. The methods that were considered the most effective were both electronic and nonelectronic. For example, newsletters and other print media were considered the most effective (19 agencies), with a website being the next most effective (13 agencies). On-board signage was considered effective by 11 agencies; one-on-one contact with customers through transit fairs, bus operators, or customer service staff at key locations by 8 agencies; and e-mail and direct mail by 7 agencies. Six agencies considered a customer service call center and signs at bus stops and transit centers as being effective. Five reported that television and radio and news media were effective, two mentioned IVR, and one each favored surveys and external bus advertisements.

The responses to this question indicated that the most effective methods of communication depend on several factors, including the following:

- The subject and content of the information being communicated,
- The demographic characteristics of the customer receiving the information,
- The location of the customer, and
- The demographic characteristics of the service area.

COMMUNICATIONS EFFECT ON RIDERS

One of the questions in the survey was "Did the deployment of [an] electronically available information system result in an increase in ridership?" The majority of responses indicated that it was difficult to determine if there were any changes to ridership based on the effectiveness of communications. Only two agencies reported measurable increases in ridership owing to communications: Pierce Transit reported a 2% to 3% increase, and MATS reported a 10% increase.

CHAPTER SIX

EXAMPLES OF COMMUNICATING WITH RIDERS

COMMUNICATION AND MARKETING CAMPAIGNS

This synthesis revealed that agencies have used various types of campaigns to communicate specific information to existing and potential riders. In this subsection, there are brief descriptions of sample programs being used by responding agencies. These examples can be characterized as informational campaigns, and those that provide communication to retain existing riders and attract new riders.

At rabbittransit, York County Transportation Authority (YCTA) in York, Pennsylvania, there was a campaign called "I ride rabbit week." In this campaign, riders wore "I ride rabbittransit" pins, and if rabbittransit staff spotted them, the rider won a prize. Furthermore, direct mail was used to communicate with 15,000 seniors to encourage them to ride the fixed-route bus for free. Finally, an internal communication campaign was launched in January 2006 in an effort to increase ridership. This internal branding initiative, called "People Drive Us," is expected to encourage employees to provide a positive brand experience, and result in an increase in ridership.

PAT in Pittsburgh, Pennsylvania, has an ongoing campaign that offers simple information about how to use the Port Authority's services and where someone can go on the bus, light rail, and incline. This advertising campaign, called Riding the Bus 101, is aimed at individuals who are either unfamiliar with the system or afraid to try it.

At CATS in Charlotte, North Carolina, they have an overall campaign called "It's My . . .": "It's My Independence" is for seniors, "It's My Savings Account" for commuters, "It's My Contribution" addresses the positive affect on air quality by taking public transit, "It's My Security Team" addresses safety, and several others.

Metro Transit in Minneapolis, Minnesota, has the "Ride to Rewards" program, which encourages riders by offering prizes, as well as sending rider alerts if there is a service change or promotion. There is a new rider and Resolve to Ride program (see Figure 13). The new rider program has two features that use technology:

- A custom-designed website that uses flash technology and
- Recognition of a new rider when a customer calls 1-800-NEW-RIDER. In this case, information representatives recognize the caller as a potential new rider and provide more thorough assistance, including mailing a New Rider packet to the caller.

Resolve to Ride has a website with a custom designed trip planner featuring 365 things you can do by bus or train. There is also a tool to calculate driving costs to illustrate the affordability of transit.

Transit Link (Transit Link Pte Ltd) in Singapore has a park-and-ride plan designed to encourage commuters to use public transport. Commuters can park their vehicles at a car park near a mass rapid transit station or bus interchange and use public transport to reach their destination. They also offer the "GIRO-Linked ez-link card" scheme to make public transport travel convenient for commuters. This card provides automatic "top-up" of ez-link farecards (*36*). To GIRO-Link an ez-link card, the customer needs an automatic teller machine card and an ez-link card. Step-by-step instructions are displayed on a general ticket machine screen to guide the activation of this feature. A GIRO-Linked ez-link card will top-up itself with a preselected stored value amount when its value falls to zero or below when it is used on buses, the Mass Rapid Transit, or light-rail transit. This GIRO-Link feature eliminates the need for a customer to visit a ticket office, add value machine, or general ticketing machine to revalue the ez-link card's stored value. Every GIRO-Linked ez-link card has a security feature that invalidates the card within 48 h of a customer reporting it lost, and refunds the remaining value and deposit in the lost card directly back into the customer's bank account within 2 weeks.

The Capital Metropolitan Transportation Authority (CMTA) in Austin, Texas, used the "Dump the Pump, Ride the Bus" essay contest to market its transit services. This contest asked people who started riding in 2005 to write about how it changed their lives. They also have the "All Systems Go" promotion, which has its own website (*37*). This promotion is for continuing community input and support for the Long-Range Transit Plan to 2025.

OCTA's campaigns include "Putting Customers First," "Ride on America's Best," and "Senior and Youth Outreach Programs."

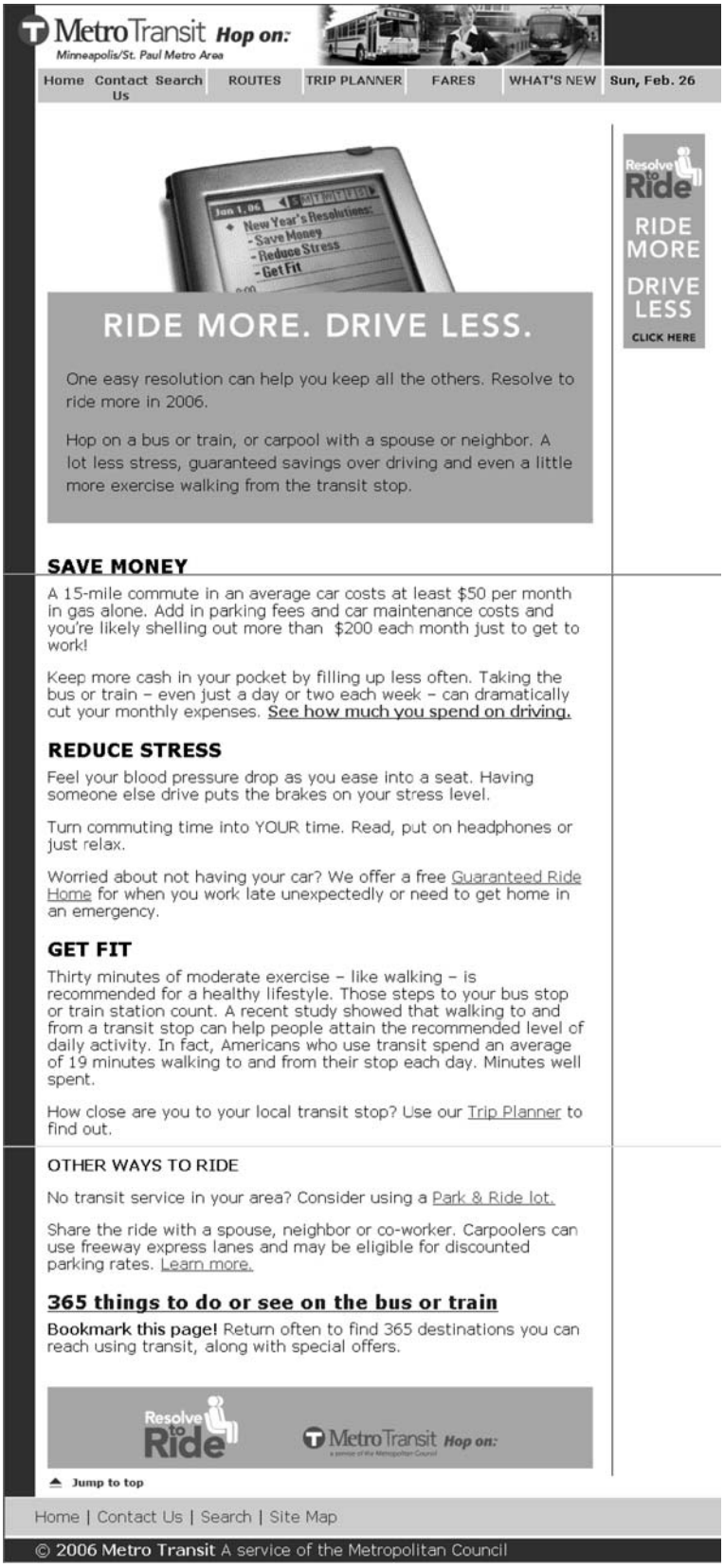


FIGURE 13 Metro Transit Resolve to Ride Program (*35*).

MATS reported three major campaigns:

- "Your Ride is Here" Internet, Television, Print, and Radio advertising promotions.
- The School Outreach Program, providing historical civil rights information to school-aged children, especially on the 1955 Montgomery Bus Boycott (honoring Rosa L. Parks). MATS purchased a fully restored 1956 GMC coach bus for this and other special event purposes.
- MATS also has several collaborative efforts with local nonprofit and social service agencies to provide reduced cost or free bus passes to low-income individuals [e.g., Goodwill Industries, American Red Cross (Katrina victims), and Job Corps].

The T in Fort Worth, Texas, noted two campaigns for customer communication: "We Drive Drivers" and "La T es mi camino" ("The T is my way" Hispanic campaign).

TriMet has a number of campaigns, some of which include technology. TriMet conducts open houses to communicate how the agency makes transit investment decisions in alignment with regional priorities using the Transit Investment Plan annual report. The "Offpeak Marketing Campaign" promotes using transit for recreational trips. In 2006, the theme is "discovery"—FIND inspiration, FIND adventure, FIND what's fresh, etc. (promoting regional venues and attractions with broad public appeal). This is supported by the tagline, "Trimet, See where it takes you," which is completed with the call to action to plan your trip at trimet.org. "Lose the Wait" promotes the convenience of TriMet's Frequent Service (16 bus routes that carry 55% of their riders) with service that is every 15 min or better, 7 days a week. One technology-driven campaign is Transit Tracker, which promotes TriMet's real-time arrival service that gives customers information about the arrival of the bus or train at their stop by phone. It is activated by calling TriMet at 238-RIDE and entering the stop identification number. More than 300,000 calls are placed to this service monthly.

CASE STUDIES

Several of the U.S. transit agencies that responded to the synthesis survey were interviewed by telephone to obtain more detailed information on their rider communications programs. The results of the interviews are presented in this section as case studies.

San Francisco Municipal Railway (California)

San Francisco Municipal Railway (Muni) began demonstrating real-time information in 1999 as a key component of its rider communication program [interview with Byron Morgan and (*38*)]. As of February 2006, the demonstration included the deployment of 25 DMSs and an Internet application (*39*) that displays the real-time arrival information for buses on Route 22–Fillmore and light rail on routes F, J, K, L, M, and N. Currently, one-half of Muni's vehicles, including all diesel coaches and trolleybuses, are equipped with the necessary technology. By August 2007, more than 400 DMSs will be deployed throughout Muni's service area, with another 600 to be deployed later. The signs will be located at bus and rail shelters where power is available, and where the vehicles that stop at those shelters are equipped with the necessary technologies.

Three critical issues related to this type of rider communication were noted by Muni:

- It is critical to develop the procedures and tools necessary to monitor the accuracy of the predictions.
- If a DMS is to be installed in a shelter, the shelter must have access to power. If it does not, providing power to the shelter may be cost-prohibitive.
- During the demonstration that is running for bus route 22, riders at a stop (with a DMS) that services more routes (e.g., route 24) assume that buses on the other route(s) are not running because they are not displayed on the DMS. Because these other services are still operating at the equipped stops, it is confusing to riders waiting for those other services.

Another key element of this rider communication system is the integration with the Bay Area's 511 system. This system provides extensive transportation information for the Bay Area, including transit itinerary planning (see Figure 9) and real-time information on Muni's J, K, L, M, and N lines, and on the historic F-line streetcars (see Figure 10). As mentioned earlier, as the full deployment of Muni's real-time information system is completed, real-time information on all Muni bus and rail lines will be available through the 511 system using both the Internet and telephone.

The funding for this extensive system of real-time information specifically comes from a Real-Time Transit Information Grant Program, which was approved by voters in March 2004, as part of the Bay Area's Regional Measure 2. (Regional Measure 2 is expanding transit service throughout the Bay Area through a $1 bridge toll increase on seven state-owned bridges.) This grant program provided $11.3 million for Muni to implement this system.

Muni also provides a display of train locations outside of the station agent booth on a flat panel display board at the Powell Street station (see Figure 14). Although this display was originally intended to provide information to Muni staff and consultants only (and was not intended for riders), this monitor has become popular with customers. It is also available on the Internet at http://www.sfmunicentral.com/.

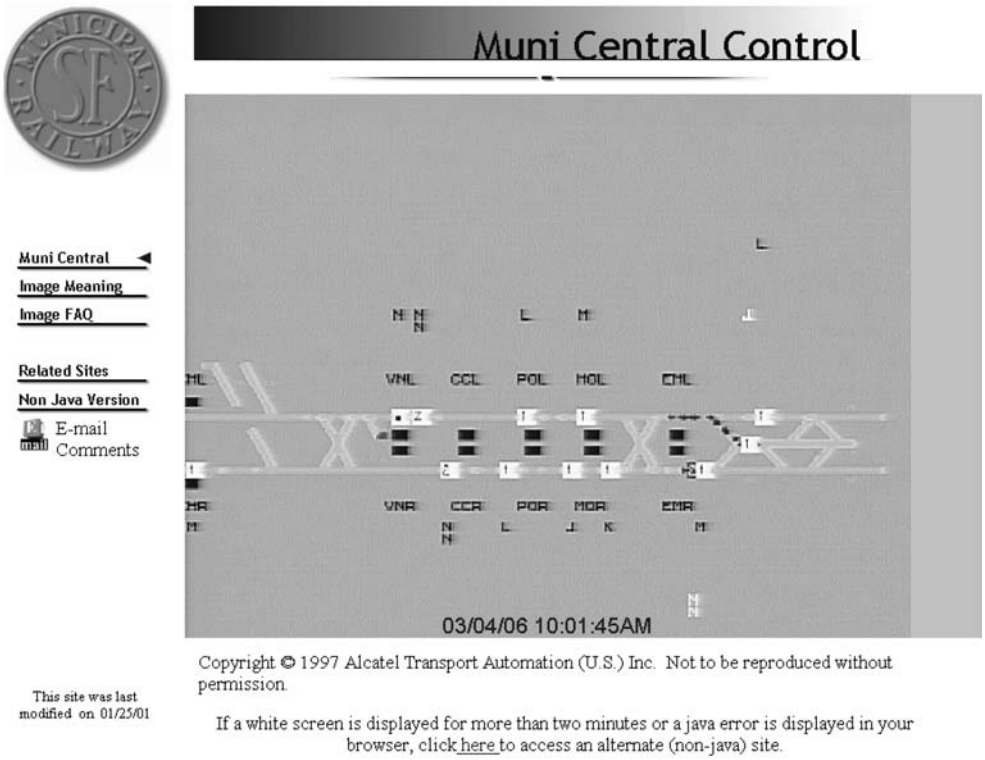


FIGURE 14 Muni real-time information display.

"The image on the Muni Central page shows a line overview of the Muni Metro Railway from Church station to Embarcadero. This image is captured from the screen of the computer in Muni's control center that is used to control trains in the subway via the new Automatic Train Control System (ATCS)" (*40*).

In June 2005, a survey of 400 Muni riders was conducted to determine the level of satisfaction with Muni service, performance, communications, and the website (*41*). This survey indicated the following:

- On-board printed signs and brochures are cited most frequently as the most useful forms of communication to inform riders of changes in Muni's schedule and service. 75% of riders say they are useful forms of communication, including 39% of riders who say they are 'extremely useful.'
- 48% of riders say that television is a useful way of communicating with riders, while 43% cite the newspaper and 42% say radio is a useful method of communication.
- 47% of riders say the MUNI website is a useful form of communication, an increase from 2004 when 41% mentioned MUNI's website (*41*, p. 5).

Survey respondents were asked to identify the most important features of the sfmuni.com website:

- Maps of individual bus routes and bus schedules are the most important to MUNI riders. 65% of riders say bus schedules would be 'extremely' useful to have on the website. 64% say maps of individual bus routes would also be 'extremely' important.

TABLE 9
MOST IMPORTANT FEATURES FOR SFMUNI.COM

Feature	Important (%) 2004	2005
Maps of individual bus routes	77	79
Bus schedules	75	78
Maps of the entire MUNI system	72	77
Service change announcements	70	77
General fare and rider information	73	74
Trip planner	55	74
Vehicle arrival predictions to indicate when a particular vehicle is coming	67	72
On-line feedback	57	60
Site search	52	60
Information about MUNI construction projects	53	59
MUNI press releases	37	43
Information about MUNI administration including reports and awards	29	29

- Maps of the entire MUNI system and service change announcements were viewed to be important features of MUNI's website by 77% of riders.
- Outlined in the table [Table 9] are potential features for MUNI's website that voters cited as the most important (*41*, p. 6).

Finally, the survey explored the use of the sfmuni.com website:

- One-quarter of MUNI riders say they check the website frequently or occasionally. The features these riders check most often include: schedules (38%), maps of individual routes (38%), and the trip planner (27%). Riders are less likely to check maps of the MUNI system or vehicle arrival predictions.
- A majority (59%) of MUNI riders say they have never checked the MUNI website prior to riding (*41*, p. 7).

Ventura County Transportation Commission (California)

The Ventura County Transportation Commission (VCTC) is responsible for the allocation of transportation resources in Ventura County, California. VCTC also operates the Ventura Intercity Service Transit Authority (VISTA). VISTA provides hourly service on seven routes that connect the different communities of Ventura County, as well as the California State University at Channel Islands Campus. The VISTA routes are designed to connect with the local transit services scattered around the county: Camarillo Area Transit, Moorpark City Transit, Simi Valley Area Transit, South Coast Area Transit, Thousand Oaks Transit, and Ojai Trolley Services (*42*).

Most households (70%) in Ventura County had a personal computer 10 years ago. Currently, 90% of households are "wired." VCTC's rider communication program is based on making transit customer-friendly and easy to use, and recognizes that many households are technology savvy.

The key ridership initiatives deployed by VCTC over the past few years include the Bus Tracking and Arrival Prediction System, the Internet/Phone Trip Planner, the "Just Ask Gordon" marketing campaign, and the GoVentura regional smart card program. "These elements were designed to enhance the trip for the transit rider, as well as raise awareness of transit services. Although no formal research has been done on customer satisfaction levels directly related to these efforts, VCTC believes that they have in combination had a significant positive impact on ridership" (*42*).

VCTC provides real-time location and arrival information on all VISTA buses, as well as the buses run by the local operators in each community. This information is available by means of electronic signs at bus stops and from the Internet. There are 31 signs throughout the county at major transfer points and bus stops of a total of 1,505 bus stops in the system. VCTC is considering adding 10 more signs covering more transfer locations.

FIGURE 15 Real-time progress of buses along VISTA routes.

The same information is available through VCTC's website (http://www.goventura.org). Users can view a graphical display showing a map of the area, an outline of the route, and animation of the bus following that route in real time (see Figure 15). Users can zoom in or out while monitoring one or as many as 30 routes. Ventura County residents can view the progress of any VISTA route or any route operated by a local transit agency. Using pull-down menus, a specific bus stop can be selected to see precisely when the next bus will arrive at that location (see Figure 16). This information is available to riders by means of the Internet, as well as WAP-enabled mobile phones and PDAs.

VCTC reports that

> . . . as a result of the Bus Tracking and Arrival Prediction system, calls and complaints to VCTC's Customer Information line have decreased dramatically. Usage statistics for the Internet tracking option have not been recorded, but VCTC says it has undoubtedly been popular. The Executive Director feels that this system 'has probably produced the greatest benefit for riders' (i.e., of the different types of service/information improvements implemented over the years). It cost less than $1 million to equip the fleet of buses for the entire county with this technology. There is also a $20,000–$30,000 annual cost to maintain the system. VCTC hopes to add signs at more transfer points throughout the County.

FIGURE 16 Real-time information for VISTA.

> VCTC found that it did not have to do very much to advertise these new services. An on-board flyer was handed out notifying riders of the technology and a few articles were written in the local newspaper. The technology was also featured prominently on VCTC's website, although the service apparently gained popularity on its own without a specific marketing effort (*42*).

VCTC's Trip Planning includes "dial-a-route" service by means of the telephone that uses two live operators, as well as an automated planner. Information is available in both Spanish and English. "Eighty percent of people taking advantage of VCTC's trip planning services come from outside of Ventura County, meaning that this service is particularly useful to the infrequent rider unfamiliar with the system" (*42*).

In 2002, VCTC initiated a major marketing campaign to promote the intercity services provided by VISTA, as well as the many distinct services provided by the local transit agencies. This campaign also featured the technology that VCTC has deployed.

> VCTC was primarily concerned with increasing transit ridership countywide, and chose to make that the focus of its marketing efforts. When VCTC issued the Request for Proposals for a marketing campaign, it required that the contractor be able to prove it had helped to increase ridership. The RFP emphasized that 'measurable results' would have to be obtained in order for the contract to be fulfilled (*42*).

The "Just Ask Gordon" campaign was developed by the successful proposer. The primary purpose of this advertising campaign, which is broadcast on radio and television (VCTC has found that newspaper advertisements are not effective in their service area), is to demystify riding on a bus. Gordon, a "reluctant transit guru," finds himself in an unusual situation with people desperately needing answers to questions. Gordon always comes up with the right answer, no matter how random the question. Each of the advertisements also contains some piece of information for the public about transit services in Ventura County. Some feature popular destinations and ways to get there, whereas others show how easy and comfortable it is to ride transit. The advertisements are broadcast throughout the county, in both English and Spanish. In addition to the advertisements, the Gordon character (played by a Ventura County resident) has made appearances on buses and at public events. The idea behind the campaign is to make the bus and transit service seem friendly and easy to the nonrider. VCTC's Executive Director described the goal as educating the public "so they know it's easy to get on the bus, and it's easy to know how and when to get on the bus" (*42*). The "Just Ask Gordon" campaign is an example of mixing marketing and customer information to not only communicate with existing riders, but also to attract new riders.

"At the end of the campaign's first year, ridership on VISTA [which provides service to connect the communities of Ventura County] had risen significantly above the baseline. The contract has been renewed in each successive year, as the campaign has continued to raise awareness and ridership has continued to grow" (*42*). Between 2000 and 2005, ridership increased 49.25%. The targeted advertisements described earlier, using predominantly radio and cable television (e.g., MTV), have been extremely effective.

One of Gordon's situations relates to the use of the GoVentura smart card for fare payment. The emphasis of the advertisements is not on the technology, but using the technology as a way of making travel convenient. According to VCTC's Executive Director, it does not matter to riders that the VCTC transit pass has technology (it is a smart card). This approach to using technology as a way of promoting transit without focusing on the technology itself is unique in the transit industry.

Keys to the success of the communications initiatives that include technology include an approach in which VCTC ensures that all vehicle operators become invested in the technology so that they have a sense of ownership. Furthermore, the cities in the county are invested as well, by having to maintain stops and pay for electricity. VCTC also gives all of the transit operators the opportunity to manage their own systems and data. The agency reports that this overall approach has resulted in an increase in ridership for all operators.

VCTC's Executive Director mentioned two specific elements to the success of using technology in communicating with riders. First, technology is still a relatively new approach to disseminating information to riders. This is the result of the reluctance on the part of some agencies to embrace technology and to try new approaches. Many of these agencies are focused on having to build a "business case" for the technology. However, according to the Executive Director, needing transportation is not a business case. Therefore, VCTC's success relies on educating today's public to take advantage of technology that is available. This is possible given the affluence of the county and because so many households are "wired."

The second key to success at VCTC is making the services easy to use, reliable, customer-friendly, and simple. Because many people still have problems reading a traditional bus schedule, providing a schedule or real-time information in a simple format facilitates their travel and willingness to use transit. Having a transit pass that happens to include technology also makes it easier for the rider.

Tri-County Metropolitan Transportation District of Oregon

TriMet believes that technology is practical and a viable tool for their choice riders. Within the service area, 70% of the population is choice riders. Furthermore, Portland considers

itself a very "wired" city. In 2006, it reported that 86% of its residents had Internet access. TriMet's on-line trip planner records 170,000 to 500,000 visits per month.

TriMet has three key elements to its communication program, each corresponding to major phases of a trip: pre-trip, en-route, and on-board. First, they still print "bus books," although fewer than before, and for these there is a charge. Also, the agency still has live customer service operators.

Second, as far as pre-trip and en-route communications, TriMet has an IVR feature that provides real-time information using its AVL system and a database of bus stops. Each bus stop has a four-digit bus and train stop number associated with it, and this stop number can be used to request real-time arrival information. In September 2004, shortly after deployment of this feature, the IVR system registered 330,000 calls per month. The previous IVR system received an average of 30,000 calls per month, when it was simply a schedule retrieval tool.

Third, automated annunciation (using both visual and audio technology) has been deployed on board all light-rail vehicles and on 100 of 600 buses. The remaining buses were scheduled to be so equipped by fall 2006. According to TriMet's Director of Marketing, the annunciation system establishes more consistent and reliable on-board information, because there are 1,500 individual bus operators, who all have a particular style when it comes to announcing stops.

One unique application of technology is the Google pilot of transit information. Google requested data on stops from TriMet for a Transit Trip Planner pilot program [see (*43*) and Figure 17]. Although TriMet views this as an opportunity and a good leverage point, the agency will continue to control the trip planning and other information it provides to the public.

As far as future communications technologies, TriMet is examining SMS/text messaging to provide an even wider range of dissemination media. It is also considering an application that would allow customers to download maps to an iPod.

One of the critical tenets of TriMet's communications program is that it believes in providing the content for riders and asking the riders to provide the delivery system. For example, TriMet provides real-time information; however, the customer is expected to provide the media with which to view such

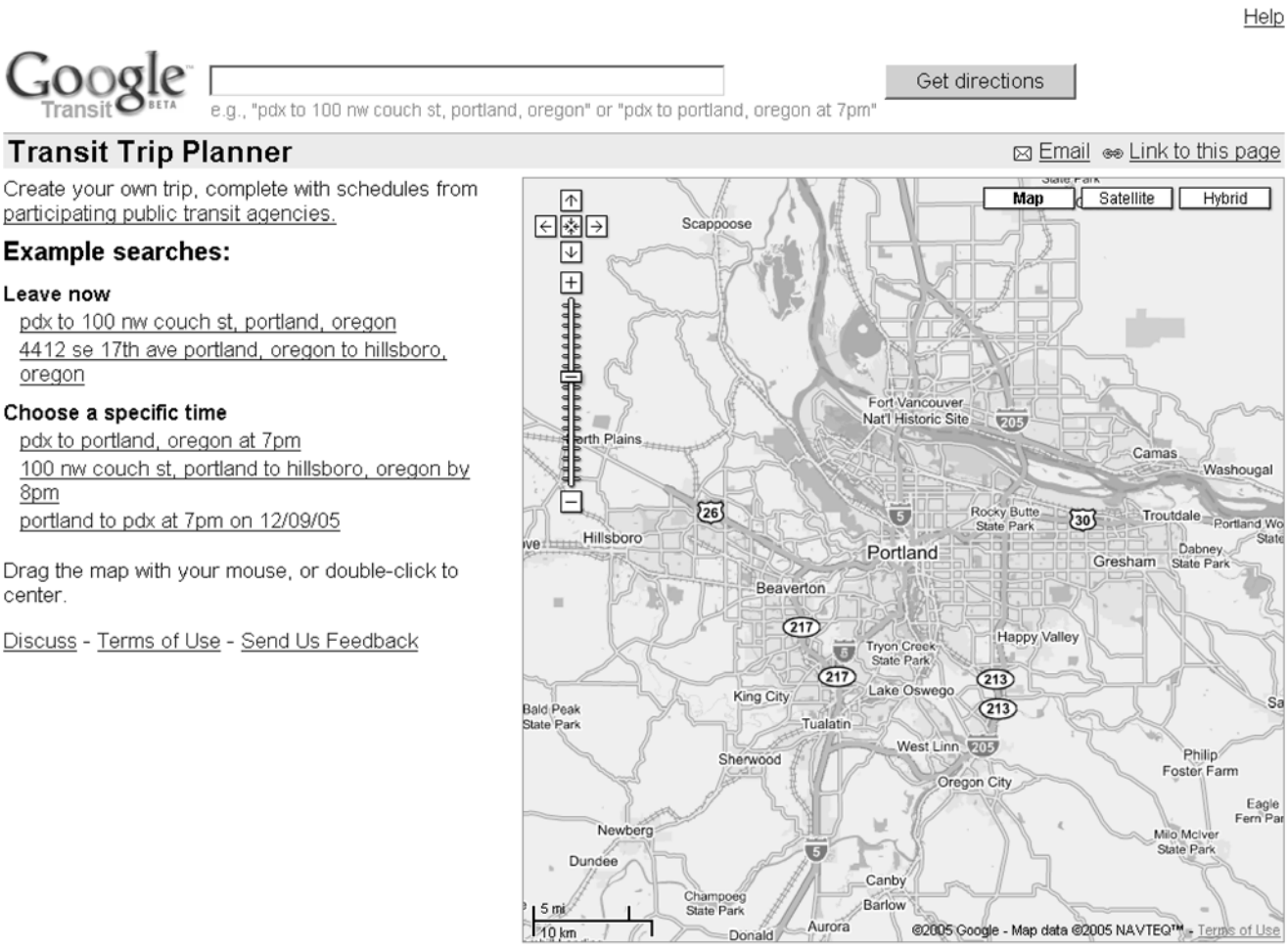


FIGURE 17 Google Transit Trip Planner for Portland, Oregon (TriMet).

information. An important goal of TriMet's communication program is to match the rider's experience with the promise being communicated. In addition, TriMet seeks to combine value with amenities to provide attractive and practical service.

The 18% increase in ridership that TriMet experienced between 2000 and 2005 is derived from a combination of factors, one of which is the provision of real-time information. TriMet believes that real-time information is an amenity that helps to match the experience with the promise. It helps retain riders and contributes to new ridership. TriMet has experienced an increase in calls for real-time information—from 28,000–30,000 per month to 43,000 calls the next month after the inclusion of real-time information. The number of calls has steadily increased every month since the inclusion of the real-time information.

In addition, TriMet is now marketing an application to businesses in which there would be a display of the real-time information for the specific stop(s) that are close to a particular building. This custom display application involves simple scripting and approximately 3 days of programming. For example, a shopping mall might have one or several of these Transit Tracker displays that will be customized and TriMet branded. The customer provides the hardware.

Another factor in the ridership increase is the routes that are branded as "Frequent Service" routes. Of a total of 93 bus lines, 16 are frequent service. The slogan that is attached to these routes is "Lose the wait. Every 15 minutes, every day" (see Figure 18).

Finally, TriMet demonstrated the use of technology for visually impaired individuals to access location and amenity information for every TriMet bus stop and MAX (light rail) station. TriMet teamed up with a private firm to include transit information in its BrailleNote/VoiceNote User Points of Interest database. Downloadable software allows all visually impaired individuals to receive voice or Braille instructions on how to reach any of TriMet's 7,700 bus stops and 64 MAX stations (*44*). One issue associated with this pilot program was that it required the rider to purchase a device that cost between $3,000 and $5,000.

As discussed earlier, TriMet has been very successful in communicating with customers in a variety of ways, particularly through the use of technology. According to the Executive Director of Marketing and Customer Services,

> Reaching riders today takes an effective marketing strategy, one that combines a variety of targeted marketing initiatives with a strong Web component. Web technology can be a wonderfully efficient and effective way to market services, improve customer relations, increase ridership, and most importantly, aid in customer retention. Developing and implementing a successful Web Strategy can be one of the best tools to keep your riders coming back for more. Better communication translates into loyal, repeat riders (*45*).

Transport for London (United Kingdom)

London Buses, which is part of Transport for London (TfL), continues to focus on customer communication with several

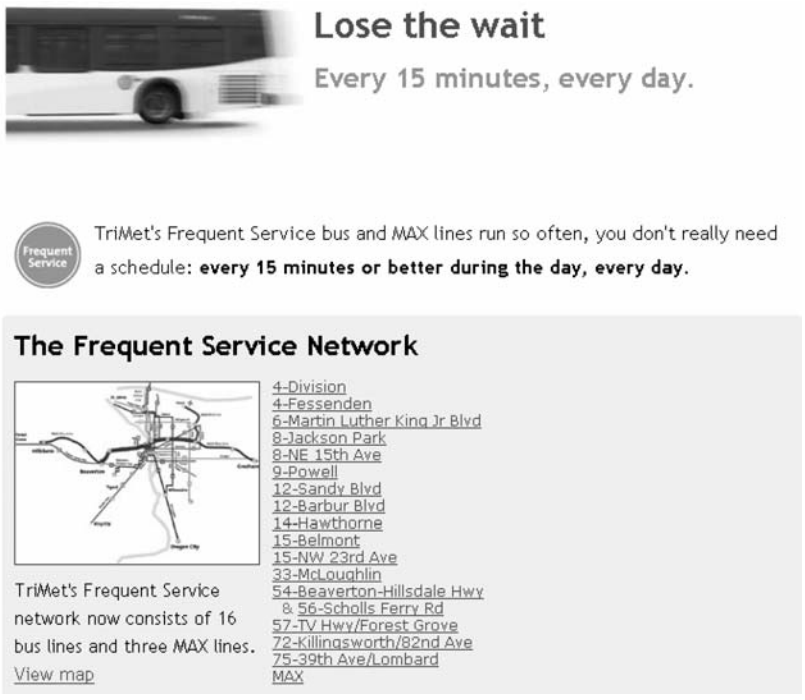
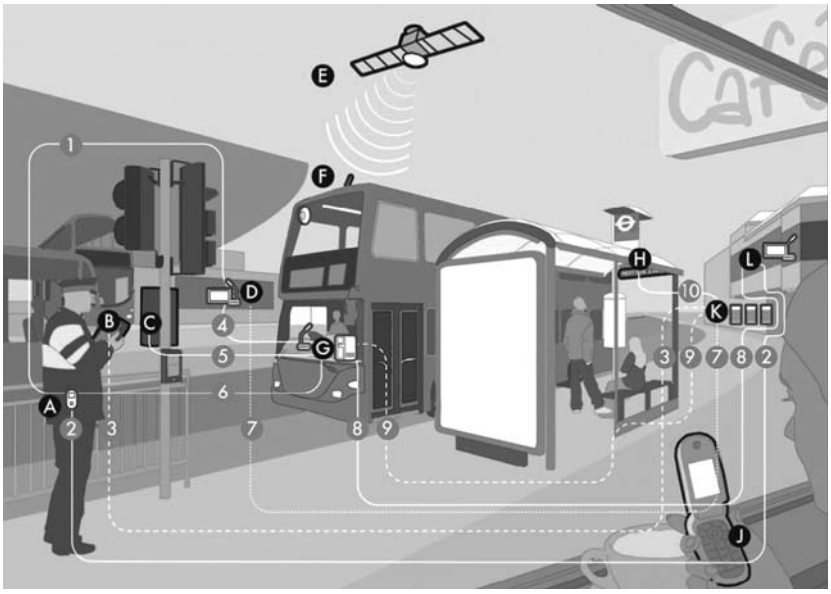


FIGURE 18 TriMet's "Lose the Wait" campaign.

key programs and products that not only promote the use of bus transit, but provide static and dynamic information through multiple communication media. First, London Buses pioneered one of the earliest large-scale uses of DMSs at bus stops. This system, called Countdown, was piloted in 1992 on Bus Route 18. The results of customer surveys conducted during the pilot program indicated that Countdown was highly popular. In 1993 and 1994, Countdown was tested in several bus corridors. By 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. As of March 2002, 1,473 Countdown signs had been installed and were operational; as of 2005, there were more than 2,500 operational signs.

The Countdown system is currently based on a beacon (also known as signpost) AVL system. In April 2005, London Buses began a 10-year program called iBus that will replace the current signpost system with a GPS. Furthermore, "by introducing a £117m state-of-the-art Automatic Vehicle Location (AVL) technology system and comprehensive telecommunications across London, millions of bus passengers are soon to benefit from a more reliable, consistent bus service and will have access to real-time passenger information (RTPI) at bus stops, on board buses, and from SMS text messaging" (*46*). Figure 19 depicts the new "iBus: informing you every stop of the way" system as it is envisioned.

This state-of-the-art system is expected to improve the existing predictions displayed through the existing Countdown system, as well as provide customers with more options for receiving real-time information on board and by means of mobile telephones. The design of on-board electronic visual displays and audio announcements will be based on passenger research and trials. Persons with disabilities will participate in these trials to provide review and comment on the proposed on-board display and audio technologies.



A. Pocket radio
B. On-street controller
C. Traffic light priority control
D. Bus garage
E. Satellite
F. Bus GPS receiver
G. London Bus with on-board computer, voice and data radio, next-stop sign and audio announcement, CCTV, bus priority, camera/traffic enforcement
H. Bus stop Countdown information
J. Mobile phone passenger information (using mobile phone network)
K. Central System
L. CentreComm
1. 2. 6. MPT1327 (standard for analogue trunked radio system)
4. MPT1327 (standard for analogue trunked radio system) and Wireless Local Area Network (WLAN)
3. 9. General Packet Radio Service (GPRS)
5. Two-way wireless radio
7. Virtual Private Network (VPN)
8. MPT1327 (standard for analogue trunked radio system)–Code Red
10. General Packet Radio Service (GPRS)/Integrated Services Digital Network (ISDN)

FIGURE 19 iBus system (*46*, p. 3).

TfL has provided its trip planner on digital cable television. Using a remote control, subscribers can access "TfL London Travel Services" (*47*), which consist of the following:

- Journey Planner—planning a trip from point A to point B in London.
- Live Travel News—the latest updates on Tube, bus, Docklands Light Railway (DLR), and river services.
- Useful information on using the Oyster card (smartcard fare payment device).
- Search capability for licensed taxi and private hire operators in the subscriber's area.
- Phone numbers and advice on fares, Dial-a-ride, Freedom Pass, and other information.

In addition to this interactive service, TfL is providing trip planning and real-time information through other media, including mobile phones, the Internet, and e-mail. "Orange and O^2 [wireless application protocol] WAP users can [use] the mobile Journey Planner—it knows where you are and tells you the quickest way to get to where you want to go" (*47*, p. 1). SMS can be used for the text Journey Planner, in which users send "point A to point B" to 60835. A and B can be postcodes, names of stations, or names of stops in any combination. The Internet Journey Planner is available at http://www.tfl.gov.uk. Free SMS text messages with real-time travel news can be sent to mobile phones and/or by means of e-mail.

Based on extensive customer market research, TfL changed the way that the agency provides basic information to the customer. For example, bus timetables are stop-based, not route-based (see Figure 20). Furthermore, spider maps (see Figure 21) are used to show all of the services radiating from specific transit stops.

TfL demonstrated automated annunciation on five buses on Route 149, and is in the process of conducting focus groups to determine the system's effectiveness (*48*). Non-English speaking riders and persons with disabilities are included in the focus groups.

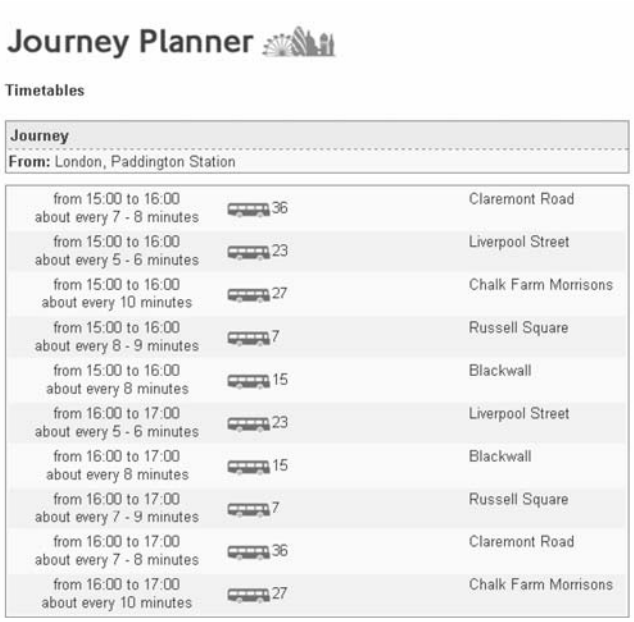


FIGURE 20 Timetable for selected bus services from Paddington Underground Station from 3 p.m. to 5 p.m. on May 31, 2006 (using http://journeyplanner.tfl.gov.uk/user/XSLT_SEL_STT_REQUEST?language=en&mode=line).

Washington Metropolitan Area Transit Authority (District of Columbia)

The Washington Metropolitan Area Transit Authority (WMATA) has several methods to communicate with riders that include technology (*49*). First, basic service information, trip planning, rider alerts, meeting broadcasts, and online chats are available through the Internet. Annually, there are more than 81 million visits to the wmata.com website, and more than 9 million itineraries built from the website (called the Ride Guide). Second, WMATA uses e-mail subscriptions to provide notification of rail service interruption and elevator outages. This method of dissemination is partially manual—the e-mail content is entered by hand. At this time, there were more than 35,000 subscribers to this eAlert system.

Third, WMATA employs IVR technology to provide service information (including scheduled next bus information) and trip planning over the telephone. Approximately 709,000 calls have been handled by the IVR system, with more than two million calls for information handled by customer service agents, in both English and Spanish. Fourth, the passenger information displays used in the subway, or Metrorail, provide real-time train arrival and elevator and escalator information. WMATA will be adding real-time bus arrival information at selected bus stops over the next several years.

WMATA is embarking on a program to fully integrate the systems that provide customer communications. The first phase of this multi-phase program, the Public–Private Technology Partnership Initiative, is a "partnership for a 21st Century Integrated Customer Communication System" (E.L. Thomas, Assistant General Manager, Planning and Information Technology, WMATA, personal communication, Jan. 30, 2006). The vision for this system is to make information available 24 h a day/7 days a week by means of a variety of media throughout the customer's entire travel experience. The hallmark of this system is easy access to information at home or the office when traveling by another mode, at the bus stop, on the bus and train, walking to the station, in the rail station (including mezzanine and platform), and through front line employees.

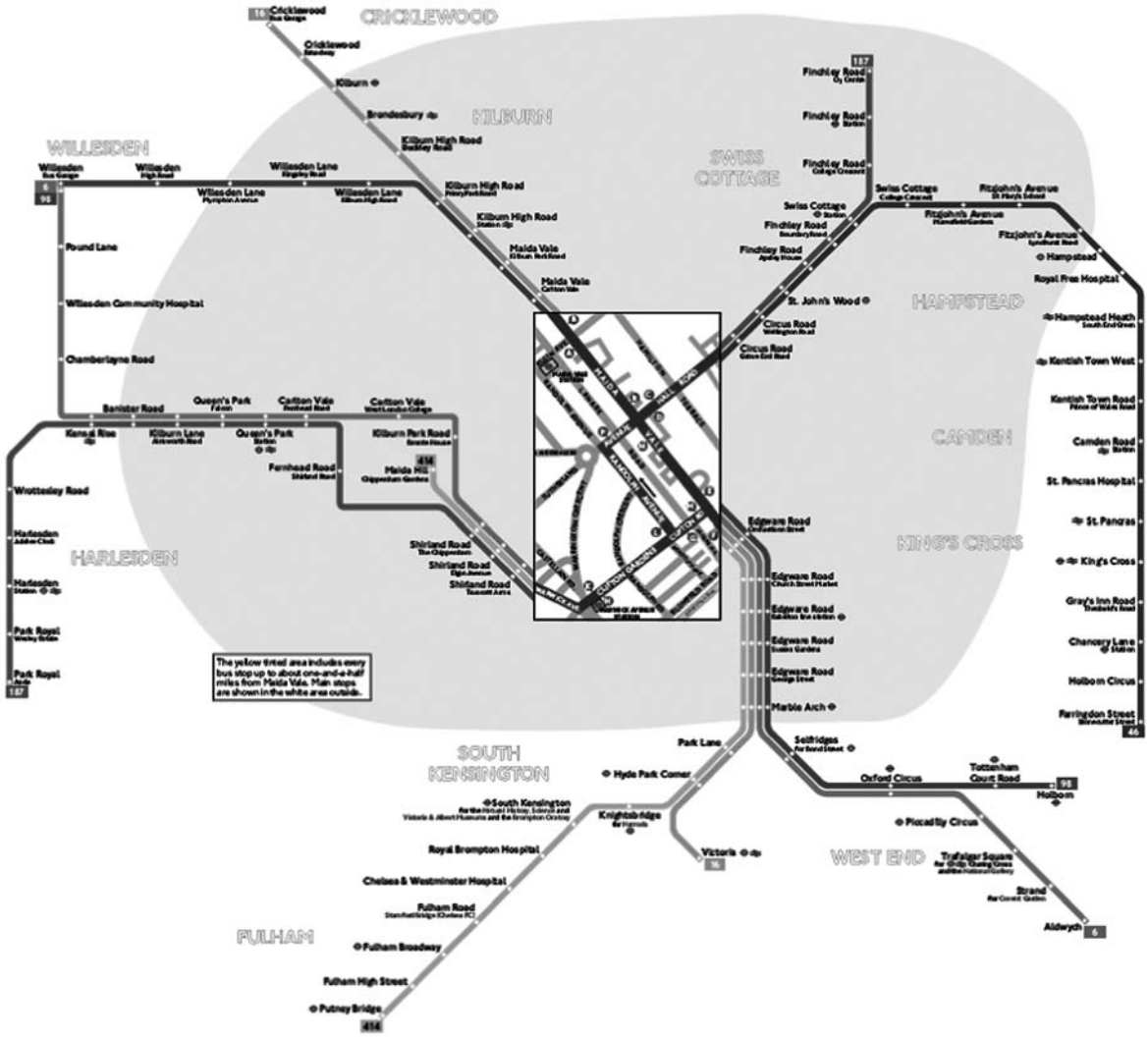


FIGURE 21 Bus services from Maida Vale (spider map).

Upcoming improvements that will be included in the future integrated communications system are:

- Automated switchboard with prerecorded information, including IVR capabilities;
- Real-time bus information;
- On-board information displayed on monitors (as of February 2006, this pilot program was in procurement);
- Future technology projects that were in the concept stage as of February 2006:
  - _ DMSs in stations with real-time service status information,
  - _ Information formatted for PDAs and iPods, and
  - _ Transformation of sales outlets to full-service customer information centers.

Currently, information flows between WMATA and its customers in the following ways. Some of the sources of information rely on technology, as described earlier, and others are partially manual (*50*):

- Main switchboard,
- Town hall meetings,
- Rail line managers,
- Front line employees,
- Board meetings and public hearings,
- Elderly and disabled committee,
- Website,
- On-line chats,
- Riders' Advisory Council,
- Customer Service Center, and
- Customer research.

Figure 22 illustrates WMATA's current [early 2006] customer communications system (the "as is"). The diagram depicts management data originating in many places within the organization under various timeframes, individually dispersed over various dissemination media. However, there is no central location or method of data collection, decision making, or staff dissemination. Nor is there a central or unified method of delivering impact communications to customers.

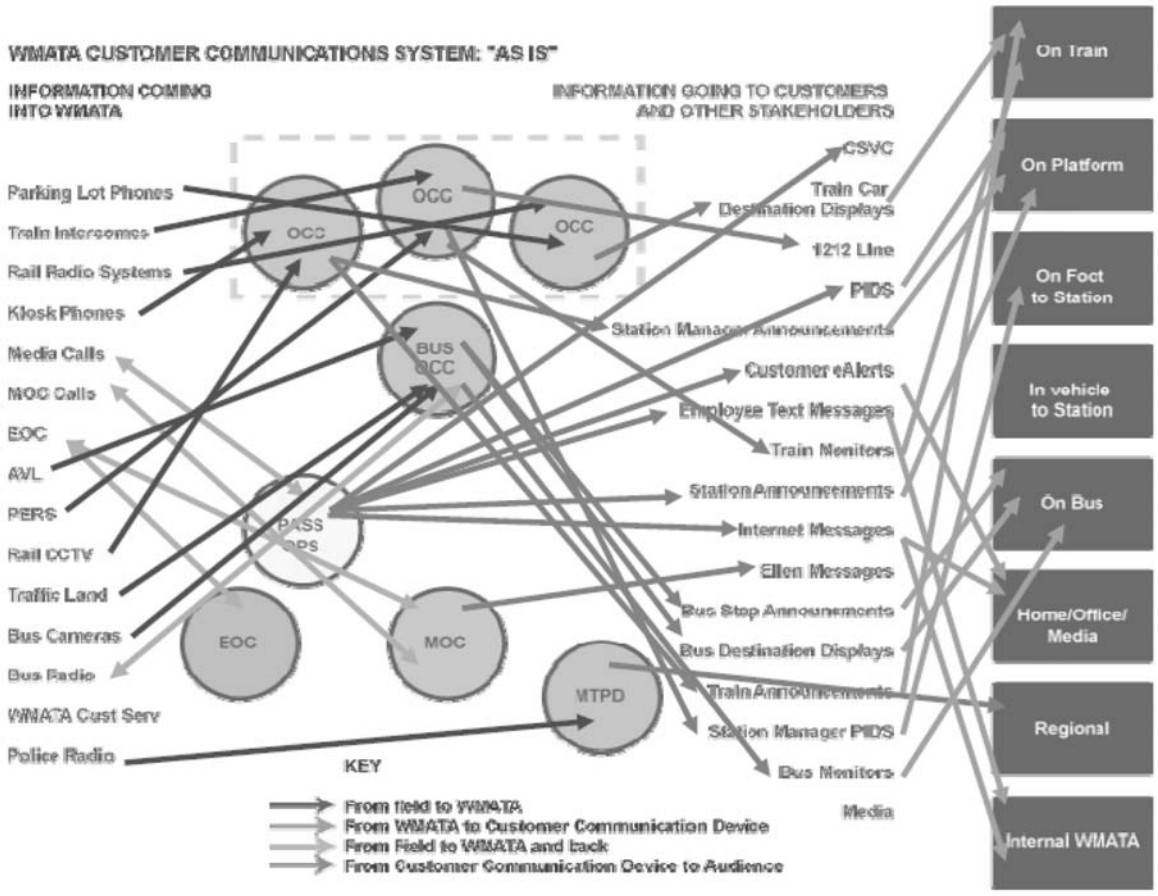


FIGURE 22 Existing (early 2006) WMATA customer communications system (*50*, p. 5).

Lastly, there is no standardized means to disseminate data and information within WMATA staff or to riders in a timely and accurate fashion (*50*, p. 4).

WMATA's future concept, shown in Figure 23, includes the following (*50*, pp. 6–7):

- Creation of an Integrated Customer Communications System, including a management center, capable of both capturing and delivering timely and accurate real-time information to WMATA's customers by means of a variety of outputs, such as the Internet, PDAs, telephones, and DMSs in stations at major bus transfer points.
- Delivery of information to WMATA's customers throughout the Metrorail and Metrobus system and other locations.
- Consolidation of multiple, independent communication systems into an integrated, single solution.
- Expanded use or reselling of WMATA's current unused fiber optic inventory.
- Replacement of WMATA's current aging telephone systems, to include the possible inclusion of Voice over Internet Protocol (VOIP).
- Reselling video and radio broadcasts to underground stations and tunnels.

In terms of rider communication, the future communications system will take into account the following factors:

- The Integrated Customer Communications System should address the complexity of delivering timely and accurate information to riding customers to enhance the means for collecting and determining customer information and to improve system operations.
- In the Washington, D.C. metropolitan area, many WMATA riders have ready access to various wireless devices.
- Reaching mobile customers, including providing delivery to cellular devices and wireless PDAs, will require expanding wireless broadcasting capabilities into the Metrorail tunnel system.
- WMATA's inventory of unused fiber optics is available to provide data communications and bandwidth for these solutions
- Replacement of the telephone system will provide a more efficient means of gathering and disseminating the information to riding customers, while using VOIP.

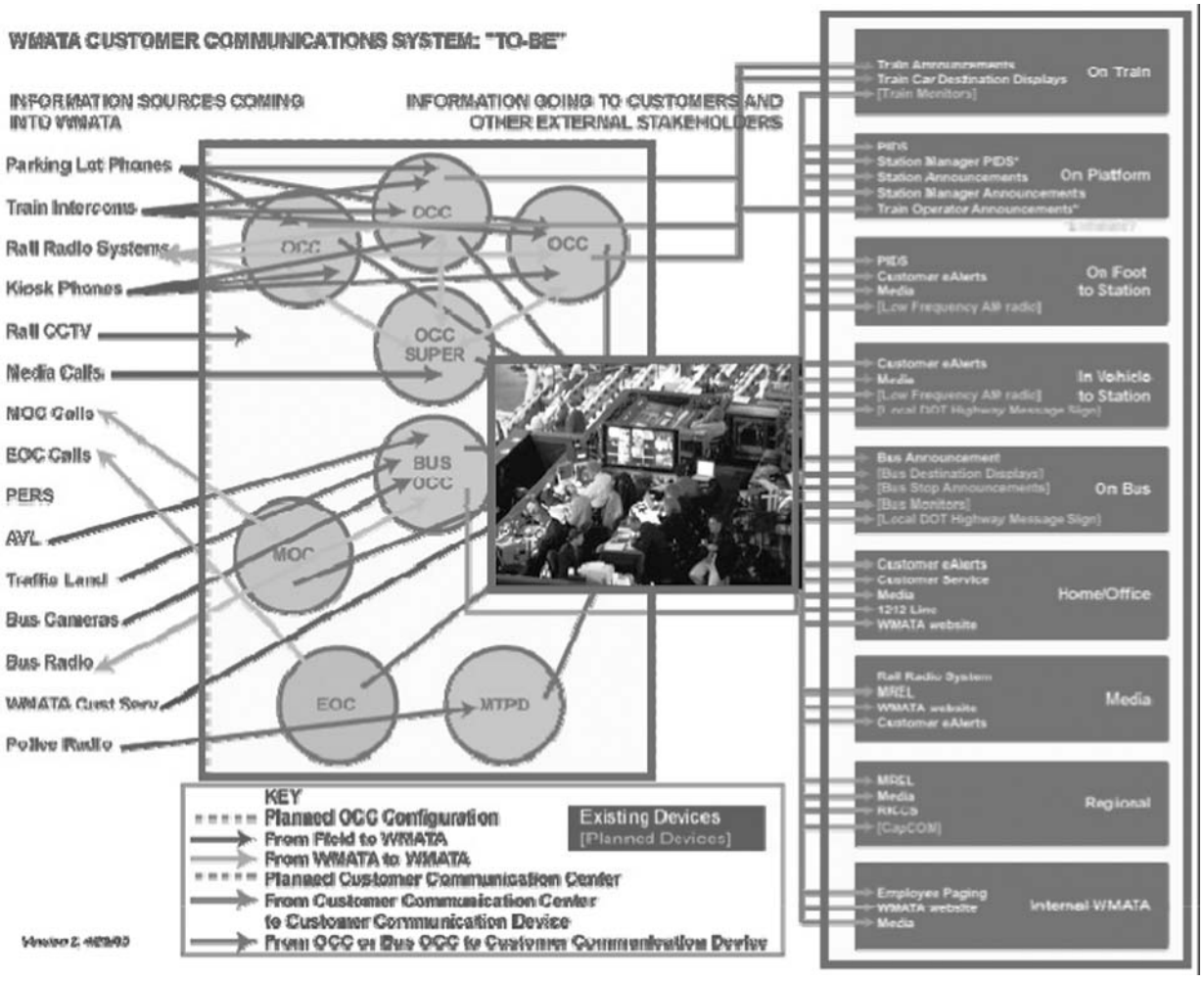


FIGURE 23 Potential future solution for integrated customer communications system.

CHAPTER SEVEN

CONCLUSIONS

Based on the literature review, the responses to the questionnaire, and the case studies, there are four key results of this synthesis.

First, the most effective way to communicate with riders is identified in a limited way in the existing practices. Differentiating among the types of communications and riders, and the point at which the communication occurs in the travel chain is the key to identifying which communication methods are most effective. Each type of communication lends itself to specific dissemination characteristics such as frequency, dissemination media, and accessibility.

For example, general information, such as maps, schedules, and fare information, is normally provided on a periodic basis, particularly when something changes. This type of information does not need to be provided in real time. The most effective media used to disseminate this type of information is hard copy, the Internet, and the telephone. Using dynamic message signs (DMSs) at stops and stations is not an effective means of disseminating this type of information. In addition, this information is normally provided in large print, as well as on a Section 508-compliant website and in Braille. Audible and visual announcements are not an effective way of communicating this information.

The demographics associated with riders (and potential riders) are also critical factors in determining the most effective method of communication. For example, in the FTA study (*Customer Preferences for Transit ATIS*), many individuals desired the most basic information at bus stops—a clock, rather than DMSs. In Ventura County, California, and Portland, Oregon, where the majority of households and residents have access to the Internet and/or own a wireless device, communications methods focus on electronic techniques. These techniques will not be as effective in areas where the population is not as "wired."

Other rider characteristics also factor into determining the most effective method of communicating. For example, "choice" riders (those who have other means of traveling) may require specific dissemination media, such as wireless application protocol (WAP)-enabled mobile devices or DMSs. In recent studies regarding newer transit services, such as bus rapid transit, it is thought that the "high-tech" nature of this service will attract and maintain ridership.

Where the communication occurs in the travel chain is also important. "The full extent of a journey from the passenger's viewpoint is being more and more clearly recognized: a journey is an integrated whole that contains several stages that can be understood as a travel chain." The different stages can make a positive or negative contribution to the ease of travel depending on whether or not the component factors have been integrated into a system. The user of public transportation needs information at all stages of the journey. Traveling from home to one's destination with public transport requires many kinds of information. This is especially true if that particular journey is being undertaken for the first time or if the passenger has functional or mobility disabilities.

Second, one overall term was used by survey respondents and case study interviewees to describe communications effectiveness—consistency. Transportation agencies and the literature confirmed that the consistency of the communication was perhaps the most important factor in providing effective communications. There are two types of consistency: consistency among the sources of information within an agency and consistency of the information provided to the customer. In larger agencies, several departments are often responsible for disseminating different types of information. If this information is not generated by one system, department, or staff member, it may not be consistent throughout the agency. First, if the information is provided electronically and is not always accurate, this inconsistency will lessen the effectiveness of the communication. For example, if a DMS displays, in countdown format, the time of the arrival of the next vehicle, and it is not always correct, this inconsistency will change the perception of transit by those customers using the signs. In addition, they may simply stop referring to the DMSs as a way to know when the next vehicle is coming. Second, if a rider contacts customer service, and customer service does not have the same information that dispatch or other sources has, this rider may be told something that is not timely and is therefore not consistent with the actual situation. Furthermore, with the proliferation of information service providers, a rider can now receive the same information from multiple sources.

Third, simplifying information often makes it more effective. For example, several agencies are moving away from traditional timetables, because they can be difficult to read and interpret. Several agencies, most notably Transport for

London and TransLink in Singapore, use timetables that are either bus stop or route schedules that show approximately how often a bus will arrive at a stop or along a route, rather than providing specific times. These new types of timetables have proven to be quite effective. Another example of simplifying information is accessing information on vehicles arriving and departing at a particular stop. For example, Tri-County Metropolitan Transportation District of Oregon (TriMet) allows customers to enter a "Stop ID" on the website to obtain real-time information.

However, the balance between simplifying information and customizing it for an individual is difficult to achieve. This critical balance is based on the range of customers' needs and of their information requirements, and other rider characteristics such as new versus existing riders, and local riders who are familiar with the area versus visitors.

Fourth, the biggest challenges associated with rider communications can be summarized as follows:

- Reaching the specific individuals for which the communication was intended.
- Getting people to attend to communications, even when provided in multiple formats on various dissemination media.
- Inadequate funding.
- Public perception that transportation agencies should not be expending funds on communications campaigns.
- Need for multiple media and multiple languages for communications dissemination.
- Timeliness of information to all passengers.
- Developing e-communications that are not considered spam.
- For new riders, giving them the confidence, in addition to the information, for their first trip.
- Acquiring and maintaining qualified staff in the call center.
- Information overload, which results in riders not paying attention to communications such as rider alerts.
- Identifying potential riders and the associated communication costs.
- Reaching a wide audience in an affordable and effective way.
- Service changes that require the updating of multiple site-specific static signs.
- Enlisting riders for e-mail alerts so that agencies can discontinue "seat drop" notices.

Several conclusions can be drawn from the synthesis. First, agencies report needing to take the following into account when determining the most effective method of communicating with riders:

- The stage of the travel chain in which the communication is needed,
- The content of the communication,
- The demographic characteristics of the communications recipients and their ownership of and ability to use technology,
- The capabilities of specific technology that could be used to generate the communications,
- The requirements for making the communication accessible, and
- Whether or not the communication will be provided to an information service provider for additional dissemination.

Second, if technology is used to communicate with riders, agencies reported needing to establish a process for testing and monitoring the accuracy and timeliness of the communications. Several agencies indicated in their questionnaire responses that they did not test their communications to determine effectiveness, nor did they monitor the communications once they were disseminated by means of electronic media. Even though additional resources are necessary to do the testing and monitoring, it has been determined that the communication should meet the following criteria for effectiveness:

- Reach the market for which it was intended,
- Be accessible to all individuals,
- Be understood by the individuals receiving it,
- Be received in a timely way, and
- Result in the changes that were expected as a result of the communication.

Third, agencies reported the need to select appropriate dissemination media based on not only the content of the communication, but also the demographics of riders. Furthermore, many agencies have determined that as long as they provide the communication through a variety of media, riders will determine how best to access the communication and what to do with the information. This was mentioned by several respondents, most notably Ann Arbor Transportation Authority and TriMet.

Fourth, agencies reported that having an "information strategy" is critical to ensuring effective communications. An example of this strategy was developed by Metro in Leeds, United Kingdom (see chapter two). This strategy, which is updated on an annual basis, focuses on fulfilling the needs of Metro's customers by developing an approach to address each of the following:

- Customer opinions regarding current communications based partially on market research,
- Data sources,
- Data management,
- Information delivery mechanisms,
- Customer relationship management and outreach,
- Performance standards and monitoring, and
- Identifying necessary resources to carry out the strategy.

Under the information delivery section of the strategy, Metro identifies requirements for each stage of the trip as

mentioned earlier as an element of the HEILI program. In the 2006 Information Strategy, Metro identified what is currently being offered to customers and what should be improved in the following journey stages or locations:

- Pre-journey,
- Beginning of the journey,
- Bus stop/shelter/station, and
- Bus journey.

Although the launch of the "yournextbus" service could be considered typical from a pure marketing perspective, it required significant involvement from several parts of the agency (it was not just a marketing project) and followed their information strategy. This successful communication project highlights the needs for such a strategy and for cooperation among various parts of an agency.

Fifth, agencies reported needing to ensure that internal processes and resources are in place for delivering a consistent quality of information. In terms of processes, these must include maintaining current and accurate information, which is often more challenging than delivering the information. Also, it may be necessary to explore innovative financing to cover some of the resources necessary for effective communications. For example, to promote Santa Clara Valley Transportation Authority (VTA) services to residents of Santa Clara County, VTA worked through local businesses to develop customized web pages for their organizations on VTA's website (http://www.vta.org). The custom web pages include information on VTA bus and light rail serving the employment site.

Finally, agencies reported that maintaining or increasing ridership is not the only metric that determines the effectiveness of communications. Although most communications will either directly or indirectly affect ridership, specific types of communication are not necessarily going to elicit a change in ridership, such as security announcements that remind passengers to be aware of unattended packages, etc. Also, there is a different length of time associated with each type of communication in which effectiveness can be measured. If an agency develops an information or communication strategy, different approaches to measure effectiveness should be identified for each type of communication.

Based on the survey results, there are five areas where further work could be done to better determine the effectiveness of communication, particularly by means of electronic media.

- Methods of effectiveness will vary with the type of communication; therefore, using a list of the types of communication that are provided by electronic means and then determining specific measures of effectiveness could assist agencies in measuring effectiveness. In this synthesis, overall measures were identified (e.g., increase in ridership); however, there was a wide range in the types of communications considered.
- A "model" that could be used by agencies to determine the most effective dissemination media might be helpful. This model should take into account the demographics of the region within which the transit service is being provided, in addition to such factors as the demographics of the riders and whether the agency wants to attract new riders and/or maintain existing ridership.
- Much more information is required about the capital, and operations and maintenance costs associated with communications that will be disseminated by electronic means. Now that more agencies throughout the world are deploying these systems, research into these costs conducted over the next several years should yield more data than what is currently available. Furthermore, a study could be done concerning the requirements of partnering with information service and/or telecommunications providers. Although most of the responding agencies indicated that they did not have a relationship with any of these types of companies, that may change over the next several years as the use of WAP and short message services becomes more prevalent in the United States. Also, a review of the transit systems that have had success in using a third party (i.e., commercial venture) to provide their customer information could contribute to the understanding not only of costs, but also alternatives to providing customer information.
- More information regarding the communication of safety and security information could be provided to agencies. Although it was expected that agencies would describe how best to communicate this type of information as part of this synthesis, it was not mentioned in the open-ended survey responses. Because this is an emphasis area at the federal level, guidance regarding the most effective methods to communicate safety and security information would be helpful.
- More in-depth information regarding a communications project from concept to deployment might be made available to agencies. This could be in the form of a guidance document that provides examples of how specific agencies have made their communications programs successful with technology. Examples could come from both the United States and abroad.

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ABBREVIATIONS AND ACRONYMS

AATA	Ann Arbor Transportation Authority (Michigan)
ADA	Americans with Disabilities Act
ATIS	Advanced Traveler Information System
AVL	Automated vehicle location
BART	Bay Area Rapid Transit (California)
CATA	Capital Area Transportation Authority (Pennsylvania)
CATS	Charlotte Area Transit System, City of Charlotte Public Transportation Department (North Carolina)
CityLink	Greater Peoria Mass Transit District (Illinois)
CMTA	Capital Metropolitan Transportation Authority (Texas)
CSTSD	City of Colorado Springs Transit Services Division (Colorado)
DLR	Docklands Light Railway
DMS	Dynamic message sign
FCRTA	Fresno County Rural Transit Agency (California)
GBTA	Greater Bridgeport Transit Authority (Connecticut)
GHTD	Greater Hartford Transit District (Connecticut)
GPS	Global Positioning System
ILT	Institute of Logistics and Transport
IVR	Interactive voice response
KT	Kitsap Transit (Washington)
LCD	Liquid crystal display
LED	Light-emitting diode
LRT	Light-rail transit
MATS	Montgomery Area Transit System (Alabama)
MCTS	Milwaukee County Transit System (Wisconsin)
Metro	Metro Transit (Minneapolis)
MTA	Metropolitan Transportation Authority (New York City)
MTC	Metropolitan Transportation Commission (California)
Muni	San Francisco Municipal Railway (California)
OCTA	Orange County Transportation Authority (California)
Pace	Pace Suburban Bus (Illinois)
PAT	Port Authority of Allegheny County (Pennsylvania)
PDA	Personal digital assistant
PEPTRAN	PEdestrian and Public TRAnsport Navigation
PORTAL	Portsmouth's Real Time Integrated Traveler Information System
RVT	River Valley Transit (Williamsport Bureau of Transportation) (Pennsylvania)
SCRRA	Southern California Regional Rail Authority
SLE	Shore Line East, Connecticut Department of Transportation (Connecticut)
SMRT	Singapore Mass Rapid Transit Ltd. (Singapore)
SMS	Short message service
TfL	Transport for London (United Kingdom)
The T	Fort Worth Transportation Authority (Texas)
TRANSPO	South Bend Public Transportation Corporation (Indiana)
Transfort	Transfort/Dial-A-Ride (Colorado)
Transit Link	Transit Link Pte Ltd (Singapore)
TriMet	Tri-County Metropolitan Transportation District of Oregon
TRIS	Transportation Research Information Services
VTA	Santa Clara Valley Transportation Authority (California)
VCTC	Ventura County Transportation Commission (California)
VISTA	Ventura Intercity Service Transit Authority
VOIP	Voice over Internet Protocol
WAP	Wireless application protocol
Wheels	Norwalk Transit District (Connecticut)
Wi-Fi	Wireless fidelity
YCTA	York County Transportation Authority (rabbittransit) (Pennsylvania)

APPENDIX A
Survey Questionnaire

Synthesis Questionnaire
Methods of Rider Communication

Date:

Name and Title of Respondent:

Transit Agency Name:

Address:

Phone Number: Fax Number:

Respondent's E-Mail Address:

Purpose of this survey: Transportation agencies strive to build new ridership and maintain existing riders by providing high-quality customer service. There are several components of high-quality service that include not only improved elements of transit services, such as reduced travel times and improved service reliability, but also direct customer service elements, such as real-time arrival/departure information, on-board information and amenities (e.g., wireless Internet), and automated fare payment. This survey focuses on how agencies communicate effectively with new and existing customers in routine and emergency situations. Once the survey results are reviewed, key agencies that have the most effective methods/techniques for communicating with existing and potential riders will be selected for telephone interviews to gather more in-depth information. All survey responses will be confidential. The final results of the survey will be synthesized into a report that will be published by the Transportation Research Board (TRB).

Thank you for taking the time to complete this survey!

Transit System Characteristics:

1. Which modes does your agency either directly operate or subcontract?

☐ Fixed-route bus
☐ Paratransit
☐ Heavy rail/subway
☐ Other (please specify):
☐ Light rail/streetcar
☐ Bus rapid transit
☐ Commuter rail
☐ Ferry

2. How many total riders does your system carry on an annual basis?

3. How many riders do you carry on each mode on an annual basis?

☐ Fixed-route bus:
☐ Paratransit:
☐ Heavy rail/subway:
☐ Other (please specify):
☐ Light rail/streetcar:
☐ Bus rapid transit:
☐ Commuter rail:
☐ Ferry:

4. What percent change in total annual ridership has your agency experienced over the past five years (2000–2005)? %

5. Does your agency have a goal to increase ridership in 2006? ☐ Yes ☐ No

   If Yes, what is that goal? %

Communications Characteristics:

6. How many of each type of customer are riding your system? Please provide the percent of your total ridership for each category of customers. For example, if you carry elderly and disabled customers, you would check off the box, and note that 10% of your riders are elderly or disabled. Note: The percentages will **not** add up to 100%. Also note that if you do not have riders in a particular category or do not know how much of your ridership is in a specific category, do not check off the box for that type of passenger.

☐ Regular travelers/commuters (does not include elderly or disabled riders): %
☐ Elderly/disabled: %
☐ K-12 students: %
☐ College students: %
☐ Male: %
☐ Female: %
☐ Tourists: %
☐ Other (please specify): %

7. Which types of communication does your agency provide to riders or potential riders?

☐ Operational information (e.g., route detour)
☐ Proposed service changes
☐ Security
☐ General information (e.g., how to ride, fare information)
☐ Other (please specify):
☐ Routes and schedule information
☐ Public meeting information
☐ Safety (e.g., mind the gap)
☐ Transit in the community (e.g., transit agency teamed with local business)
☐ Other (please specify):

8. Which departments in your agency have primary responsibility for each type of communication?

☐ Operational information (e.g., route detour)
☐ Routes and schedule information
☐ Proposed service changes
☐ Public meeting information
☐ Security
☐ Safety (e.g., mind the gap)
☐ General information (e.g., how to ride, fare information)
☐ Transit in the community (e.g., transit agency teamed with local business)
☐ Other (please specify):
☐ Other (please specify):

9. Please note which of the following items you provide to customers and how often you provide it. (Check all that apply.)

Communication Content	Frequency			
	Real-time	Periodic	One-time	Other (please specify):
Operational Information:				
Next bus/train/ferry arrival/departure time	☐	☐	☐	
Detours/delays	☐	☐	☐	
Vehicle location	☐	☐	☐	
Trip and/or connection time	☐	☐	☐	
Parking availability	☐	☐	☐	
Other (please specify):	☐	☐	☐	
General Information:				
Maps, routes, schedules, and fares	☐	☐	☐	
Rider's guide	☐	☐	☐	
Information for disabled riders	☐	☐	☐	
Trip planning (including Point A to Point B planning, find closest stop, find service at a location)	☐	☐	☐	
Other (please specify):	☐	☐	☐	
Safety/Security:				
Reminders about notifying officials about suspicious packages or activity	☐	☐	☐	
Evacuation of transit facilities/vehicles	☐	☐	☐	
Escalator/elevator outages	☐	☐	☐	
Amber alerts	☐	☐	☐	
Other alerts (please specify):	☐	☐	☐	

10. How is this information provided to your customers?

Communication Content	Dissemination Media												
	Paper	Static sign at transit stop/station	Electronic sign at transit stop/station	Public address system	On-board electronic sign	Internet (website)	Telephone	Mobile telephone	Wireless application protocol (WAP)-enabled device	Kiosk	E-mail or page	Wireless device (e.g., PDA, iPod)	Other (please specify):
Operational Information:													
Next bus/train/ferry arrival/departure time	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Detours/delays	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Vehicle location	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Trip and/or connection time	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Fare payment	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Parking availability	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other (please specify):	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
General Information:													
Maps, routes, schedules, and fares	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Rider's guide	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Information for disabled riders	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Trip planning (including Point A to Point B planning, find closest stop, find service at a location)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other (please specify):	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Safety/Security:													
Reminders about notifying officials about suspicious packages or activity	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Evacuation of transit facilities/vehicles	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Escalator/elevator outages	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Amber alerts	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other alerts (please specify):	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

11. How do you make communications accessible to all riders? (Please check all that apply.)

Communication Content	Accessible Format						
	Braille	Large print/large font size	Audio version of visual information	Visual version of audible information	Website is Section 508-compliant	Interactive voice response technology	Other (please specify):
Operational Information:							
Next bus/train/ferry arrival/departure time	☐	☐	☐	☐	☐	☐	☐

Detours/delays	☐	☐	☐	☐	☐	☐	☐
Vehicle location	☐	☐	☐	☐	☐	☐	☐
Trip and/or connection time	☐	☐	☐	☐	☐	☐	☐
Parking availability	☐	☐	☐	☐	☐	☐	☐
Other (please specify):	☐	☐	☐	☐	☐	☐	☐
General Information:							
Maps, routes, schedules, and fares	☐	☐	☐	☐	☐	☐	☐
Rider's guide	☐	☐	☐	☐	☐	☐	☐
Information for disabled riders	☐	☐	☐	☐	☐	☐	☐
Trip planning (including Point A to Point B planning, find closest stop, find service at a location)	☐	☐	☐	☐	☐	☐	☐
Other (please specify):	☐	☐	☐	☐	☐	☐	☐
Safety/Security:							
Reminders about notifying officials about suspicious packages or activity	☐	☐	☐	☐	☐	☐	☐
Evacuation of transit facilities/vehicles	☐	☐	☐	☐	☐	☐	☐
Escalator/elevator outages	☐	☐	☐	☐	☐	☐	☐
Amber alerts	☐	☐	☐	☐	☐	☐	☐
Other alerts (please specify):	☐	☐	☐	☐	☐	☐	☐

Communications Effectiveness:

12. Does your agency have a program and/or goals for communicating with riders? For example, New Jersey has an on-going campaign to promote transit as "The Way to Go." Another example is King County Metro's Route 120/125 promotion during the September 2004 service change. ☐ Yes ☐ No

    If Yes, what program(s) do you currently have in place?

13. Do any of these programs and/or goals include the use of technology, such as electronic signs at stops/stations; and information provided via the Internet, mobile phones, pagers, interactive voice response, wireless devices (e.g., personal digital assistants, web-enabled devices, and iPods), and/or kiosks? For example, BART provides a "QuickPlanner" for the Apple iPod that includes schedules, station information, and a system map. ☐ Yes ☐ No

    If Yes, what program(s) include technology?

14. What techniques does your agency use to determine the content, format, and dissemination media for each type of rider communication? (Please check that all apply.)

Communication Content→ Method of Determining Content ↓	Operational Information	General Information	Safety/ Security	Other (please specify):
Content determined in-house with no external input	☐	☐	☐	☐
Consult with external source	☐	☐	☐	☐
Consult with riders (e.g., focus groups, surveys)	☐	☐	☐	☐
Use information from complaints	☐	☐	☐	☐
Base it on another agency's communication	☐	☐	☐	☐
Other (please specify):	☐	☐	☐	☐

15. Once the information is communicated, how do you determine and/or measure whether or not it:

    a. Reached the market for which it was intended?

    b. Was accessible to all individuals?

    c. Could be understood by the individuals receiving it?

    d. Was received in a timely way (e.g., real-time information received via mobile phone was received in a specified time)?

    e. Resulted in the changes that were expected due to the communication (e.g., increased ridership)?

16. Does your agency test the communication prior to releasing it to the public?
    ☐ Yes ☐ No

17. For communication that is provided to customers electronically, does your agency have specific contracts and/or agreements with wireless communications providers (e.g., Verizon Wireless), Internet providers, or information service providers? For example, Transport for London has arrangements with orange™, O_2, T-Mobile, and vodafone™ to provide a variety of wireless application protocol (WAP) (or mobile Internet) services such as travel alerts. ☐ Yes ☐ No

    If Yes, what companies does your agency have contracts/arrangements with?

Communications Costs:

18. What are the capital and annual operations and maintenance costs of providing electronic information to customers on an annual basis?

Electronic Communication Media	Total number of units	Total capital cost	Total annual operating and maintenance cost	Other (please specify):
Electronic sign at transit stop/station				
On-board electronic sign/audio system (annunciation system)				
Website				
Internet trip planning software				
Interactive voice response system				
Contract/agreement with wireless carrier				
Information service provider				
Wireless application software				
Kiosk				
E-mail software				
Other hardware (please specify):				
Other software (please specify):				

19. What is the cost of customers receiving electronic information from your agency? For example, train travelers in Melbourne, Australia, pay no more than $0.55 (Australian dollars) per short message service (SMS) to obtain train timetable information.

Best Practices in Methods of Rider Communication:

20. What methods/techniques of communicating with new and existing riders have been most effective in your agency?

21. If your agency does not currently have electronic communication to riders, has your agency considered it as a way to attract "choice" riders?

☐ Yes ☐ No

If Yes, which electronic technologies are you considering for communications with riders?

☐ Electronic sign at transit stop/station
☐ Public address system
☐ On-board electronic sign
☐ Internet (website)
☐ Interactive voice response
☐ Mobile telephone application
☐ Wireless application protocol (WAP)-enabled device
☐ Kiosk
☐ E-mail or page
☐ Wireless device (e.g., PDA, iPod)
☐ Other (please specify):

22. Did the deployment of an electronically available information system result in an increase in ridership? ☐ Yes ☐ No

    If Yes, how much did ridership increase as a result of disseminating information via electronic means? %

23. If you have conducted surveys and/or focus groups to determine the content or effectiveness of communication, can you provide the results for this Synthesis project? ☐ Yes ☐ No

24. Have you issued any press releases about communicating with riders using electronic techniques? ☐ Yes ☐ No

    If Yes, can we obtain copies of the press releases?

25. What is the one biggest problem associated with communicating with new and existing riders?

26. What was the one biggest problem associated with communicating with riders via electronic means?

27. What is the one biggest problem associated with operating and maintaining the hardware and software that is being used to generate and disseminate information electronically?

28. Please describe any additional "lessons learned" that would benefit transit agencies that are considering communicating with their new and existing riders using electronic means.

29. Are there other agencies that you know of that we should speak to regarding "best practices" in methods/techniques of rider communication? If so, please provide contact information.

Please return the completed questionnaire by January 18, 2006 to:

Ms. Carol L. Schweiger
Assistant Vice President
TranSystems Corporation
One Cabot Road
Medford, MA 02155 U.S.A.
Telephone: 781-396-7775 X30211
Fax: 781-396-7757
E-mail address: clschweiger@transystems.com

We encourage you to return your completed survey to Ms. Schweiger via e-mail at clschweiger@transystems.com. If you have any questions on the survey or the project, please do not hesitate to call Ms. Schweiger.

Thank you very much for your participation in this important project.

APPENDIX B

List of Agencies Responding to the Survey

Ann Arbor Transportation Authority
2700 S. Industrial Hwy.
Ann Arbor, MI 48104
Manager of Service Development

Berks Area Reading Transportation Authority (BARTA)
1700 N. 11th Street
Reading, PA 19604
Assistant Executive Director

Capital Area Transportation Authority (CATA)
2081 West Whitehall Road
State College, PA 16801
Marketing Manager

Capital Metropolitan Transportation Authority
2910 East 5th Street
Austin, TX 78702
Marketing Manager

Charlotte Area Transit System
600 East Fourth Street
Charlotte, NC 28202
Marketing and Communications Manager

Fort Worth Transportation Authority
1600 E. Lancaster
Fort Worth, TX 76102

Fresno County Rural Transit Agency
2035 Tulare Street, Suite 201
Fresno, CA 93721
General Manager

GO Transit
20 Bay Street, Suite 600
Toronto, Ontario M5J 2W3
Canada
Manager, Customer Service Excellence

Greater Bridgeport Transit Authority
One Cross Street
Bridgeport, CT 06610
Director of Planning and Service Development

Greater Hartford Transit District
1 Union Place
Hartford, CT 06103
Executive Director

Greater Peoria Mass Transit District
2105 NE Jefferson
Peoria, IL 61603
Director of Planning

Kitsap Transit
60 Washington Avenue, Suite 200
Bremerton, WA 98377
Marketing and Public Information Coordinator

Metro Transit
560 6th Avenue N.
Minneapolis, MN 55411
Director—Customer Services

Milwaukee County Transit System
1942 N. 17th Street
Milwaukee, WI 53205
Marketing Director

Montgomery Area Transit System
2318 West Fairview Avenue
Montgomery, AL 36108
General Manager

Mountain Metropolitan Transit, City of Colorado Springs
1015 Transit Drive
Colorado Springs, CO 80903
Senior Transit Planner

Norwalk Transit District
275 Wilson Avenue
Norwalk, CT 06854
Deputy Administrator

Orange County Transportation Authority
550 S. Main Street
Orange, CA 92863
Manager of Special Projects

Pace Suburban Bus
550 W. Algonquin Road
Arlington Heights, IL 60005
Section Manager, Marketing, and Communications

Pierce Transit
PO Box 99070
Lakewood, WA 98499
Marketing Manager

Port Authority of Allegheny County
345 Sixth Avenue, Third Floor
Pittsburgh, PA 15222-2527
Assistant General Manager, Marketing, and Communications

The Rapid
300 Ellsworth Avenue SW
Grand Rapids, MI 49503
Public Outreach Coordinator

River Valley Transit
1500 West Third Street
Williamsport, PA 17701
Planning Manager

Santa Clara Valley Transportation Authority
3331 North First Street
San Jose, CA 95134
Manager, Customer Service

SCRRA
700 S. Flower Street, Suite 2600
Los Angeles, CA 90017
Market Research Manager

Shore Line East c/o Connecticut Department of Transportation
2800 Berlin Turnpike
Newington, CT 06131-7546
Transportation Planner 2

SMRT Trains Ltd, SMRT Buses LTD, SMRT Light Rail Pte Ltd
2 Victoria Street
Singapore 187995

South Bend Public Transportation Corporation (TRANSPO)
901 E. Northside Blvd.
South Bend, IN 46617
Marketing Assistant

South Coast Area Transit (SCAT)
301 E. Third Street
P.O. Box 1146
Oxnard, CA 93032-1146
Director of Planning and Marketing

Transfort/Dial-A-Ride
6570 Portner Road
Fort Collins, CO 80525
Planning Specialist

Transit Link Pte Ltd
9 Maxwell Road #03-02
Annexe A MND Complex
Singapore 069112

TriMet (Tri-County Metropolitan Transportation District of Oregon)
4012 SE 17th Avenue
Portland, OR 97202
Director of Marketing

York County Transportation Authority (dba rabbittransit)
1230 Roosevelt Avenue
York, PA 17404
Assistant Executive Director

APPENDIX C

Good Practice Cards from the Ministry of Transport and Communications of Finland

ADVANCE INFORMATION

Purpose

Advance information means travel information that can be ordered to one's home or workplace by phone or SMS or on the Internet. The purpose of advance information is to create the basis for a safe and attractive public transport alternative. It must be possible to anticipate the whole travel chain.

The importance of advance information is highlighted when the objective is that public transport should serve all people. It enables the advance consideration of appropriate travel alternatives, possible critical points of the travel chain, and the seat reservations, tickets and any assisting persons and equipment needed.

Persons with functional disabilities (those with a wheel chair, baby carriage or heavy luggage, short persons or those in poor health) definitely need to get information on any barriers in the changeovers and transfers as well as obstacles to getting the services they need before choosing a transport mode.

Providing information on barriers requires that terminals and other relevant areas are examined from this viewpoint. The information collected is to be presented in a uniform, both nationally and internationally understandable way in the various media used.

Telephone

In many countries, a general phone service has been introduced for obtaining information on public transport (cf. directory enquiries or health care guidance). In Finland, there are several less comprehensive services, the information service on public transport in the Helsinki Metropolitan Area (0100 111, pay service), the national long-distance coach information of Matkahuolto (0200 4000, pay service) and the train information service of VR Ltd (0307 20900 + three other numbers, one providing service in English). Special text phone etc. services are not available.

Mobile phone and WAP, PDA

It is possible to obtain information on train schedules as SMS messages from the VR's 13121 service number, and on the public transport in the Helsinki Metropolitan Area from Sonera Zed. The address of the WAP service is www.wap.zed.fi. See the following SMS message example.

Example of an SMS query

Send an SMS message **BUSSI X Y**
(X = REGION, HKL, ESPOO, VANTAA
Y = bus line number)
to the Zed information number **16400**. E.g.
BUSSI HKL 51.
Cost: 0,59 €/query.

Internet

The Internet is becoming more and more important as a media. At present, nearly all operators provide information on the Internet. However, the information is scattered and forming a long travel chain requires many searches. The establishment of the National Public Transport Information Portal by the Ministry of Transport and Communications will alleviate the problem. Some examples of good services are the following: The door-to-door search at www.ytv.fi/journeyplanner covers the Helsinki Metropolitan Area. Train stations can be searched at the VR Ltd (Finnish Railways) website (www.vr.fi/heo/english/aika/kaukoaikajp.htm) and the Express Buses can be searched at the ExpressBus site www.expressbus.com.

Websites should also provide information on special services like guidance assistance, lifts, rest rooms etc. This means that the site must present the accessible route within a terminal from door to door in an illustrative way. In particular, it is important to tell where assistance can be obtained on the spot. Pictures and other information should be printer-friendly. Websites should also have the option of audio information for at least part of the services. More recommendations for designing websites can be found in the card Websites.

The Swedish Public Transport Co-ordinator Samtrafiken i Sverige AB offers a comprehensive journey planner at http://www.tagplus.se/. The Tågplus-guide gives detailed information on e.g. services at different stations. The website also includes information on accessibility of the travel chain for disabled passengers. In addition, the text on the website can be made larger and the maps zoomed in.

Good Practice Card for Advance Information

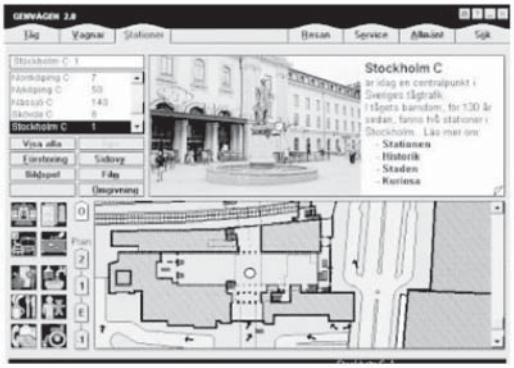
ADVANCE INFORMATION

Publications

The traditional Finnish compilation of public transport timetables, "Suomen kulkuneuvot", contains all domestic train, coach, flight and ship timetables. Publications can also deal with accessible routes. Such a guide has e.g. been made of the London public transport system. It contains a comprehensive review of which services and terminals are accessible, and which ones e.g. persons with mobility disabilities should try to avoid.

CDs and DVDs

Public transport services and alternatives can also be described on CDs or DVDs that can be ordered to one's home or workplace. This necessitates a computer with a CD or DVD player. The information content can be very similar to that on a website, but these media serve well those with a slow Internet connection or none at all. It is advisable to include also audio material. For instance, Genvägen in Sweden provides information about railway stations on CDs and DVDs. However, at present, these information media have not become very common.



Teletext, Digital TV, Radio and TV

Through the traditional media, information is obtained at homes without a computer. However, these media have fairly limited features; they are appropriate for some purposes (on-line information on flight arrivals and departures) but inappropriate for others (terminal information etc.). Radio and local TV, now almost unused, should be utilised in providing information on incidents. Digital TV, with its interactivity and language options, will bring new possibilities, but the development will clearly be slow.

Reservations and Payments

It should be possible to make reservations and pay in many different ways, even to do it in advance at home. Possible ways are by phone, with an SMS message or on the Internet. The present ticket machines may be difficult to operate for many people, which is why different kinds of safe ways to purchase tickets should be offered. The form of the tickets should also vary; it may not always be necessary to have a paper ticket but an electronic one in a mobile phone or a chip, or an entry in the operator's listing containing also the requests for special services (cf. a ticketless flight with a special meal and guidance assistance), are also possible.

Advance information is needed on:

Distances
Places to buy tickets
Toilets
Steps
Lifts
Nursing rooms
Luggage storage
Information service
Guidance assitance
Aids (wheelchair lifts etc.)
Rest rooms, places to sit in
Where/what will be announced audibly
Guidepaths for the blind, signs
Accessible public transport routes and alternatives (e.g. low-floor buses)
Nighttime services
Opening hours

...and of course on:
Transport mode alternatives
Public transport routes
Bus stops
Timetables

And once one is on the move, an online help must be available to provide information on public transport throughout the operating hours: "In this terminal/train, call this number and make an inquiry or request help."

See also Phone services, Websites, Personal Service and Fixed Information in Terminals.

Good Practice Card for Advance Information (*continued*)

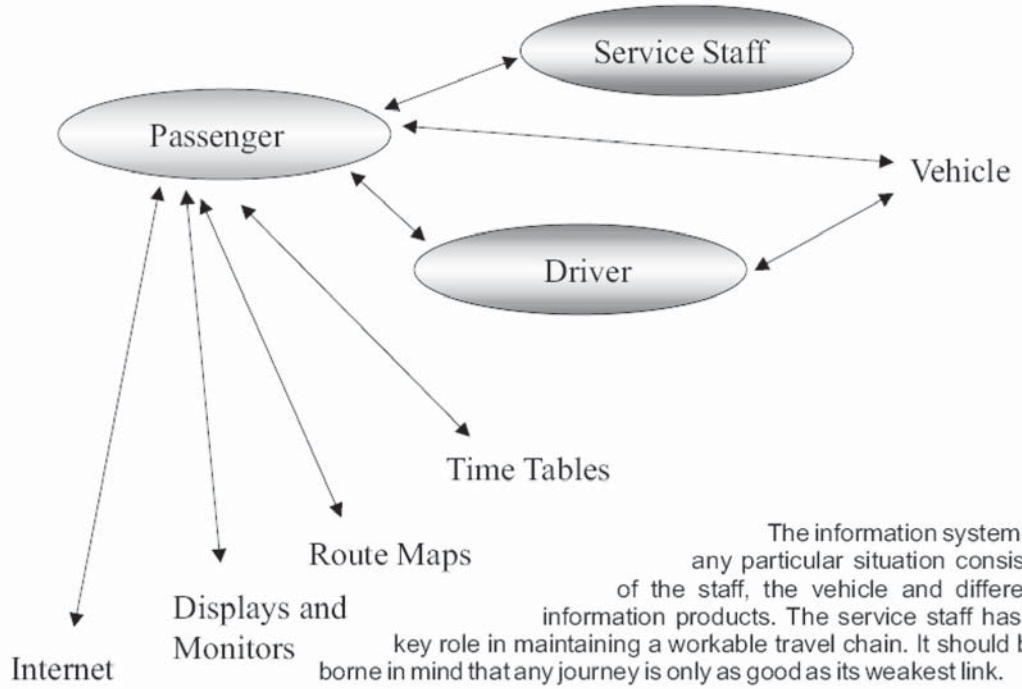
PERSONAL SERVICE

Passengers have a right to get personal service and advice if they want or need it. Even the best technological systems supporting accessibility may sometimes go unnoticed, and personal service is needed to complement other forms of public transport information.

Customer Service

A good location for the information desk in terminals and stations is near the ticket office or the entrance. Information desk has to be accessible also to wheelchair users and short persons. Aids are needed to facilitate the communication of e.g. persons with speech defect. "Yes" and "No" cards and different kinds of brochures and publications about travel-related matters are examples of such aids. Simple things like pen and paper should not be forgotten.

Customer service is of importance especially to disabled people. However, good customer service is the right of all passengers. Good service is competent, kind and polite. Opening doors and advising on rest rooms, easy ways to various places and special services, without asking, are part of good service. However, help should not be imposed on anyone who does not want it.



The information system in any particular situation consists of the staff, the vehicle and different information products. The service staff has a key role in maintaining a workable travel chain. It should be borne in mind that any journey is only as good as its weakest link.

See also Advance Information, Phone Service and Mobility Disabilities and Public Transport Information.

Good Practice Card for Personal Service

PERSONAL SERVICE

Training

The staff needs to be trained to identify, approach and guide passengers who need help. The staff also have to know what kind of problems passengers face. In addition, uniformity of services is an important contributor to the quality of public transport: the passengers must be able to be confident about getting the service they need.

Representatives from disabled and elderly people's associations may participate in staff training, for they are familiar with the issues that are particularly important for their respective groups.

Staff language skills, including sign language, are important.

People with mobility disabilities often need personal service. They may need staff assistance in both embarking and disembarking. They may also need help in finding a barrier-free route e.g. in terminals and stations. Persons with visual or hearing disabilities do not necessarily need physical assistance in getting on board but may need help in way-finding and orientation.

The importance of personal service in information provision is highlighted especially with elderly passengers and in cases where ordinary means of communication do not reach all passengers. According to research findings, both elderly and disabled passengers must almost always resort to checking the correctness of the information they have received (through other media) from staff members. This is caused e.g. by the unreliability or inadequacy of the information (it may not contain any mention of accessibility etc.).

A feeling of being in control of the situation is important for all passengers. The use of public transport must feel safe so that lack of confidence is not a hindrance for travelling. A competent staff plays a key role in inspiring the confidence of passengers.

References

Accessible Travel Centre. Ministry of Transport and Communications, Finland, publication 9/2000. (in Finnish with an English Abstract)

Forward without Barriers. Proposals of the Working Group on Accessible Public Transport. Ministry of Transport and Communications, Finland, publication 23/2001. (in Finnish with an English Abstract)

Good Practice Card for Personal Service (*continued*)

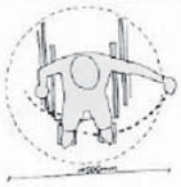
INFO KIOSKS

Purpose

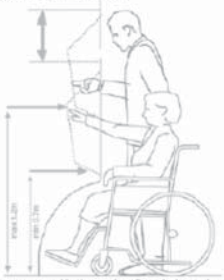
Info kiosks are interactive computer terminals for retrieving information from databases or the Internet, located in public transport terminals or other public spaces. They can also provide information for tourists or on various events.

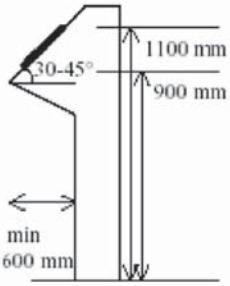
Location

Info kiosks should be located in quiet places that can be monitored. They must be accessible with a wheelchair.



There must be 1.4 to 1.5 m free space around the kiosk. If the space is well-lighted, the touch screen must be equipped with a visor. There must be space under the screen and a small shelf for a wallet as well a hook for a bag or a walking stick. The right height for a screen to be used from a wheelchair can be seen in the figure below.





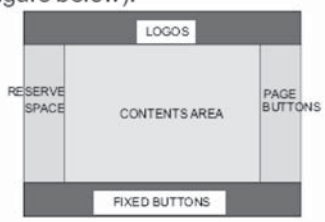
If possible, info kiosks should be so designed that they can be used both from a wheelchair and while standing. It is generally not recommendable to implement user-group-specific solutions.

Interactive Use

Usability can be considerably improved by a simple navigation device (a ball mouse is ergonomically a very good solution), voice direction and a printer. A separate keyboard makes things easier for a user accustomed to using a keyboard and makes more versatile software feasible (more detailed queries, text input etc.). On the other hand, if the data structure is well designed, i.e. if clear and simple commands, symbols and drop-down menus are used, there is no need for text input and the use of the information kiosk will be easier for those not used to a keyboard (e.g. the elderly and children). The touch screen must be sensitive, a light push must be enough. The user must receive a confirmation that the push has been registered and a search started, e.g. an hourglass or a progress bar. In order to eliminate erroneous functions, automatic repetition should be avoided (a long push etc.). It should always be possible to return to the beginning or the main page (a clear separate button).

Layout

The touch screen should measure at least 15.1 inches. The picture area (the touch buttons and the information itself) should not extend to the very edge of the screen in order to ensure that everything essential is visible. In an EU standard, the screen is divided into four parts (see figure below):



- the top area is for the logos of the public transport operators etc.; the date and time should be placed in top right corner
- the right margin is for the title buttons of the pages (for navigation within the site)
- the middle part is for the information contents
- the icon buttons like language selection, "Forward", "Back", "Home" etc. are at the bottom (these remain the same on all pages).

The standard recommends that the same dark colour, e.g. dark blue, be used at the top and bottom. The middle part should be light. Speech can be used both for input (voice recognition) and output. An info kiosk is a special application. There must be sufficient space around it for easy access, and the output information must be well-designed.

See also Visual Disabilities and Public Transport Information, Advance Information and Websites.

Good Practice Card for Info Kiosks

INFO KIOSKS

Text and Graphics

The font size must be as large as feasible: 14 to 19 points -- even as large as 48pt (= 1cm). The titles and help features must be paid attention to. There may be titles missing when timetable pages on the Internet are opened from the kiosk. It is better to have too many titles and too much repetition than vice versa. The figure below presents a sample icon button.

The size of the icon button is 2cm x 2cm. The space between icons should be at least 20% of the icon size. The icon should change colour when pushed. The picture inside the icon measures about 1.6cm x 1.6cm. Virtual three-dimensionality improves discernability. Recommendations concerning different colours are indicated in the table below. It is good to have a clarifying text under the button (font Helvetica 18 to 24pt). The same applies to the contents: both graphics and text should be used to make the result is usable and illustrative. Icons should comply with European standards like ISO 7001.

Helvetica is the recommended font in the EU standard. It can be replaced by Geneva or Arial. Chicago, Courier or Gothic fonts should be avoided. Bold text can be used for highlighting if necessary. The font size should be adjustable.

Proposals for Contents

- journey planner (door to door)
- web-based public transport information
- maps should be simple and fast to download, e.g. a rough general map plus more detailed ones for smaller areas
- tourist attractions on a map; pushing a sight will provide further information and public transport services to it
- calendar of events.

If there is a direct access to normal websites from the kiosk, usability may be compromised: the text may be too small, buttons may be designed for mouse-clicking (and not for a touch screen), or text input from a keyboard may be required. A separate version, customised to be used with a touch screen, should be made for information kiosk use.

TIPS

- the main page is in the official language, other languages can be selected at the bottom of the screen by pushing a flag icon
- the user can cancel his/her choice at any point
- the user can push the "Help" button at any point
- The user can push the "Home"/"Restart" etc. button at any point
- a screen saver will attract users, the screen must not be blank
- the contact information of the responsible maintainer of the kiosks is found in the device (a sticker at the back etc.).

Colour	Purpose	Conspicuous-ness	Contrast good with	Do not use with	Location on screen
Red	Emergency, warning, alarm	High	White	Green	In the middle
Yellow	Preparedness alarm	High	Black, dark blue (green)	White	
Green	Safe normal state	Low	White	Red	In the middle (as background)
Light blue	Instructions, neutral ("water")	Low	Black	Yellow	At sides (as background)
Dark blue	Instructions, neutral	Low	White		
Magenta	Alarm	High	White		In the middle, small area
White	Instructions	Low	All dark colours (+ red)	Light blue, yellow	
Black	"Official"	Low	White, light blue, yellow		

Guidelines and Standards

Draft standard "European Prestandard 450 ja 451, Draft V3.0 Public Access Terminals", made under CEN TC 278 WG3 and the related documents:

European Task Force INPUT and Infopolis 2, Design Guidelines for Information Kiosks in Travel Centres, Ministry of Transport and Communications, Finland, 2002

TELSCAN, Design Guidelines, Usable ATT systems for Elderly and Disabled Travellers, Commission of the European Communities

Good Practice Card for Info Kiosks (*continued*)

ELECTRONIC DISPLAYS ON BUS STOPS

Purpose

Electronic displays on bus stops inform waiting passengers about the arrival times of public transport vehicles. Real-time displays may also be used for providing information on incidents affecting public transport. The goal is to enhance the passengers' trust in the system and their feeling of being in control of the travel chain.

Technology

- a digital display showing the time left before an arrival
- light text (yellow, white) on dark background (black, blue)
- a clear font, e.g. Helvetica, Airport, Futura
- the height of letters should be at least 10 mm for each metre of viewing distance but not less than 22 mm
- brightness of lighting depends on the surroundings but illumination should be in the range of 1000 to 5000 lux.

Location

- on and near stops
- on termini
- on transfer stops
- on park & ride stops
- on stops of shopping centres.

Design and Placement

- the display should be so designed that it fits the other furniture and equipment of the stop and is proof against vandalism
- the display should be so placed that it does not form a barrier to the passengers using the stop and that passengers do not obstruct the view to it
- the screen should have an anti-reflection coating and be protected from direct sunlight
- tilting the display forward towards the viewers improves visibility if it is not possible to place the display to a shaded place (e.g. in the bus shelter)
- the height and tilting angle depend on the type of stop/station:
- the display can be placed in the bus shelter at a height of about 1.8 m; the angle should be about 15°
- on an open stop (see photo, YTV 2002) the display should be placed at a height of at least 2.3 m; the tilting angle depends on the viewing distance: ca. 5° is appropriate for a distance of eight metres.

It should be noted that adding a Bluetooth/WLAN function to real-time displays would enable sending real-time information in predetermined format to PDAs and 3 G mobile phones. For the users of personal navigation system it would be most useful if the real-time display would also offer an IP connection for transmitting guidance information (connection to timetable data, real-time information and certain servers giving guidance information).

Displays on stops should correspond to those on board public transport vehicles in how they function and use symbols.

See also On-board Displays in Public Transport Vehicles and Information Signs.

Good Practice Card for Electronic Displays on Bus Stops

ELECTRONIC DISPLAYS ON BUS STOPS

Information Contents

- the line numbers
- the waiting times in minutes (abbreviated "min") or arrival times in the order of arriving (the next service at the top)
- the approach of an arriving bus when the vehicle is too near for displaying an appropriate time in minutes; a picture of vehicle or a flashing symbol is recommended
- when there are no times to be shown, e.g. at night time when there is no service, there should nevertheless read something in the display (e.g. "no service")
- when out of commission, the display should be blank or inform passengers about the cause of the malfunction
- if a vehicle is prevented from arriving to a stop e.g. as a result of an accident, the arrival time should be left blank or replaced with an informative text
- if the information on the display is not real-time, this must be clearly shown
- the destinations (not necessary if there is fixed information on the destinations of the different lines)
- a free-text field for additional information
- the lengths of vehicles in case of rail traffic
- suitability of the vehicles for special groups (e.g. low-floor buses)
- space for at least four lines
- the current time.

Recommendations Concerning the Text Field

- it must be easily readable and understandable
- it should provide information on possible changes, delays, their causes and durations as well as alternative routes and lines

- the text should remain visible at least
  - eight seconds for messages of one to two lines
  - ten seconds for three- to four-line messages
  - twelve seconds for five lines or more.

References
Gotic (Gothenburg Traffic Information Centre): Rekommendationer for realtidsvisning på monitorer och displayer
Gotic (Gothenburg Traffic Information Centre): Krav på utformning av skyltar för visning av realtid
Infopolis 1-2
TELSCAN, Design Guidelines Usable ATT systems for Elderly and Disabled Travellers, Commission of the European Communities
Helsinki Metropolitan Area Council (YTV) (2002): http://www.ytv.fi/liikenne/kamp/elmi/elmi.html

Good Practice Card for Electronic Displays on Bus Stops (*continued*)

ON-BOARD DISPLAYS IN PUBLIC TRANSPORT VEHICLES

Purpose

On-board displays in public transport vehicles are used for informing passengers about e.g. the stages of the journey, the name of the following stop, changing options and possible traffic incidents. The objective is to enhance the passengers' trust in the system and their feeling of being in control of the travel chain.

Different Display Types

A next-stop display shows

- the name of the following stop/station
- optional information on possible changes in a free-text field.

A route display shows

- the route of the vehicle
- the name of the next stop
- the changing options
- optional information on possible changes in a free-text field.

A time and fare zone display shows

- the precise time and fare zone.

Placement

On-board displays are placed in vehicles such as buses, trams etc.

On-board displays in public transport vehicles should in their implementation and symbols correspond to any displays that are used on stops.

See also Electronic Displays on Bus Stops and Fixed Information on Stops.

The best place for an on-board display is in the front of the vehicle, above the aisle (Gotic: Gothenburg Traffic Information Centre 1995).

In addition to using on-board displays, the bus stops should also be announced audibly, if possible. All information should be given in more than one way. In the future it will be possible to order stop information to one's mobile phone.

Good Practice Card for On-Board Displays in Public Transport Vehicles

ON-BOARD DISPLAYS IN PUBLIC TRANSPORT VEHICLES

Design and Location

- the design is done in accordance with the vehicle in question
- the display is located inside the vehicle horizontally or slightly tilted forward at a height of at least 1.5 metres
- the text should be white or bright yellow on a black background
- the display should be protected from vandalism
- the screen should have an anti-reflection coating
- the font type is e.g. Helvetica
- both upper and lower case characters are used
- a route display should have space for the names of at least 16 stops
- the minimum height of letters is 40mm on a next-stop display and 20mm on a route display
- the minimum size of the character matrix is 7 x 5 pixels, which is not necessarily enough for all languages, 9 x 7 pixels is sufficient for most languages.

Space requirements of on-board displays (independent of technology used):

Display type	Width (mm)		Height (mm)		Depth (mm)	
	min	max	min	max	min	max
Next-stop display	700	1400	60	200	50	120
Route display	1200	1600	200	400	60	250
Precise time and fare zone display	350	400	130	170	28	60

An on-board display type tested in Gotic (Gothenburg Traffic Information Centre). The top row shows the destination of the line. The two text fields below it are reserved for the two following stops. The bottom row is for messages in exceptional situations, e.g. in case of traffic incidents affecting public transport. The display also includes a loudspeaker for sound signals whose purpose is to arouse the attention of the passengers prior to an announcement.

References and Standards

Gotic (Gothenburg Traffic Information Centre): Visuell information omboard på kollektivtrafikens fordon
TELSCAN, Design Guidelines Usable ATT systems for Elderly and Disabled Travellers, Commission of the European Communities
CEN: CEN/TC278/WG3, Visible, Passenger Information On-Board

Good Practice Card for On-Board Displays in Public Transport Vehicles (*continued*)

FIXED INFORMATION IN PUBLIC TRANSPORT VEHICLES

Purpose

The purpose of signs on public transport vehicles is to facilitate the finding of the right vehicles and services during a trip, e.g. to help passengers to recognise the bus to board.

Signs

The external information on public transport vehicles should indicate their destination and line number of public transport vehicles (see photos on the right). In designing external information of public transport vehicles it is important to make the signs to be sufficiently clear and visible. The signs have to be recognisable also during bad weather conditions. However, it has to be kept in mind that even well-designed external information does not help the blind, to whom recognising the correct vehicle is extremely difficult (see Visual Disabilities and Public Transport Information).

In trains, carriages where tickets are sold must be clearly marked on the outside. Other special carriages, such as those meant for allergic people, must also be so marked in order for the passengers to know that they are boarding the right carriage. In long-distance trains with numbered seats, the carriage numbers must be indicated outside the carriages.

Colours

Colour contrasts should be used for marking

- the location of doors: entrances and exits
- the edges of steps (width 30 - 40mm)
- signs indicating the location of the places for disabled people
- push-buttons
- handrails (see photo below).

See also Information Signs, Fixed Information on Stops, Electronic Displays on Bus Stops, Info Kiosks and Phone Services.

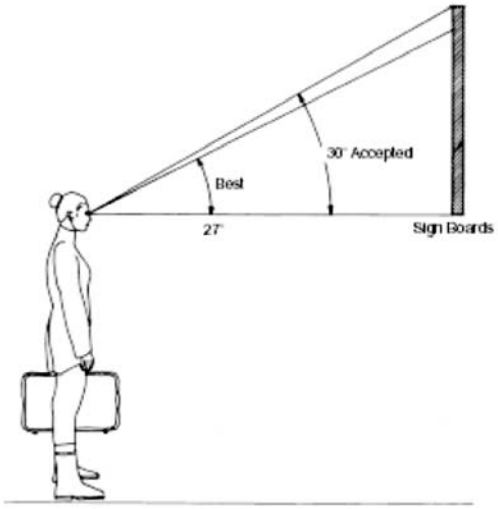
References
Tilgjengelighetsmal offentlig transport, Sosial- og helsedirektoratet, Norge, (2001)
EU: Reducing Barriers to Zero and Low Emission Mobility - A Guide for Cities, Zeus Project (2000).

Good Practice Card for Fixed Information in Public Transport Vehicles

INFORMATION SIGNS

Purpose

Information signs represent the most important services available with pictograms and texts and guide people to find their way in terminals or other areas. Signs are very useful information providers.



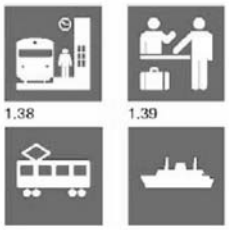
Text Type

A suitable text type is e.g. Helvetica Neue Bold 75 with a normal or 1.1 character spacing. Lower-case characters should also be used (not only capitals).

Pictograms

Typ

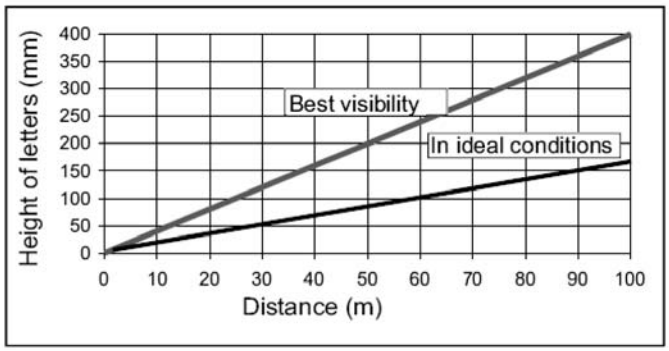
Pictograms are internationally known symbols. The sign manuals of VR Ltd and Finnish Rail Administration as well as Infopolis 1-2 contain pictogram catalogues. When used for guidance, the recommended size of pictograms is 180 x 180mm^2.



Signing needs to be complemented with tactile information. E.g. a coloured line or a guidepath made of different material in the floor helps in orientation. A tactile model can be made of the terminal for people to familiriarise themselves with in advance.

See also Visual Disabilities and Public Transport Information.

Reading Distance (m)	30	10	5	3
Optimum height (mm)	120	40	20	12
Sufficient height (mm)	100	33	17	10



Text Size

The adjacent table presents the relation between text size and reading distance. Text size can be calculated using the formula:
Text size = distance/250-300.

A height of capital letters of 60mm is used in railway signs in Finland, when the text is on two rows, and 120mm when the text is on one row.

Good Practice Card for Information Signs

INFORMATION SIGNS

Lighting

Signs must be well illuminated. A rule of thumb is that lighting is sufficient if a good-sighted person can read a newspaper in the vicinity of a sign.

Indirect lighting is the best option.

Lighting is adequate when the sign is lighted from within or from the side.

Height

It would be best to mount signs so that the viewing angle is less than 15°.

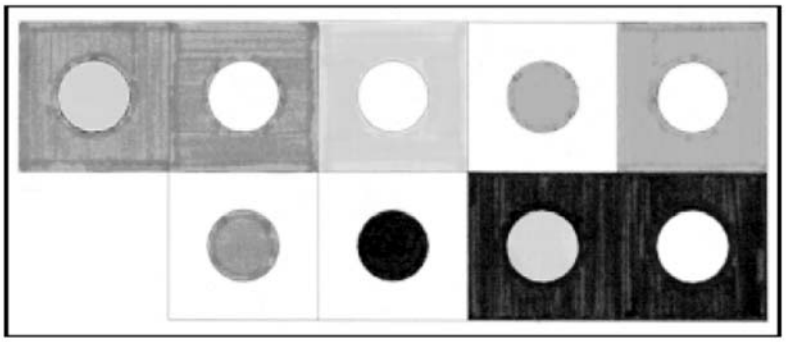
Angles up to 25° are acceptable.

Reflection

Signs should be placed so that no reflections will occur. The best alternative for the surface is a matt coating.

Task, Priority	Contrast Value	Colour Combinations	Luminous intensity, lx
Warning	$0.83 < K \leq 0.99$	blue on green yellow on lilac green on blue black on white white on red	300 - 500, emergency exits preferaby over 500
Guidance	$0.5 < K \leq 0.83$	white on blue black on white yellow on dark white on green	30 - 299

Recommendable Colours for Signs



References:
Sign Manual of the Finnish Rail Administration
VR (Finnish Railways) Manual of Corporate Image
Infopolis1-2
Cost 335 Railwaystation - design

Good Practice Card for Information Signs (*continued*)

HEARING DISABILITIES AND PUBLIC TRANSPORT INFORMATION

Visual information is important for those with impaired hearing. It is difficult for other persons to identify a hearing-impaired person, which is why training is needed: the staff must have communication skills and understanding. People with hearing disabilities are a heterogenous group including the deaf, deafened, and hard of hearing people. Information on exceptional situations must not be based only on announcements through loudspeakers.

Advance Information

People with hearing disabilities can obtain advance information from e.g. teletext or the Internet and by acquiring public transport information to their homes or other places of departure.

Usually information is provided visually in terminals, on vehicles (e.g. signs for identification) and on stops (e.g. timetables). There are different degrees of hearing impairment, and the problems of the fully deaf are not the same as those with reduced hearing. Nevertheless, visual information helps all hearing-impaired.

There are not yet any mobile phone services designed for hearing-impaired persons in Finland. The SMS services naturally serve them also. However, the variety should be increased and ease of use improved.

In Terminals

Ticket desks where the seller and the customer are separated with a glass and their communication takes place through microphones and loudspeakers are problematic for the hearing-impaired as well as for persons with difficulties in speaking. Payphones, information kiosks, etc. might sometimes be located in places where there is disturbing background noise. Services must be located so that they can be used also by hearing-impaired persons. Making enquiries about terminal services may e.g. require writing questions on paper.

Informing passengers of changes in timetables, departure details or routes must not be based solely on announcements through loudspeaker. In a prominent place in terminals there should be a display for presenting this information as text, too. In many places, no real-time data system with displays for the public exists. If no kind of electronic system is in use, a large marker board at the information desk or beside the timetables is necessary.

On Board

On board public transport vehicles there should be a display indicating the next stop or station. Different kinds of videos (such as those used in aeroplanes for presenting the safety procedures) and other presentations, e.g. about station services, are helpful for all passengers regardless of their language or hearing.

The training of drivers, guards, ticket inspectors and bus hostesses is very important. They need to understand the problems of the hearing-impaired and must not e.g. be irritated by a passenger not responding to a request to show his/her ticket. The staff must know how to act in exceptional situations and emergencies. Drivers must always have clear directions concerning the non-oral ways of giving instructions to passengers. It needs to be possible for the driver and a hearing-impaired passenger to agree on a signal for indicating the correct bus stop to disembark at (ordinarily, the driver is just asked to say this). Using clear and simple language and speaking calmly is helpful for hearing-impaired persons.

Exiting and Disembarkment

Getting out of a vehicle or a terminal can be a challenging situation, especially in a foreign place, if one has to ask for instructions concerning connecting services or a direction to proceed to. Instructions and a map printed from a journey planner will be helpful. There may also be an info kiosk in the terminal. A staff representative should be able to come outside and advise on services and directions. In emergencies, flashing the emergency exit sign or some other light will be informative.

Good Practice Card for Hearing Disabilities

ACOUSTICS

The term acoustics refers to all attributes of sound in a given space. All sounds we hear are produced in some acoustics. The audibility of a sound can be affected by designing the acoustics based on the purpose of the sound (e.g. alarm sound/announcement).

About the Hearing Range

A sound wave weakens and transforms while it proceeds, which is why the wave motion that reaches the eardrum is always different from the vibration emitted by the sound source. The most important part of the hearing range is that of speech, approximately 250 to 4000Hz. Many alarm and warning signals have a frequency of 2000 to 6000Hz. The longer the wavelength, the more penetrative the sound is. High-frequency sounds with a short wavelength are more easily absorbed by barriers.

A good acoustics is of essential importance also to visually impaired people for they cannot compensate poor audibility through eyesight.

Location of Loudspeakers

It is better to place many loudspeakers at short distances and have a lower sound volume than to have just a few speakers with a high volume.

Loudspeakers should be placed at distances of less than 15 metres.

The sound level of announcements must be 10 to 20dB above the background noise. (80dB at the height of 1.2-1.7m above floor level). The frequency range should be 150-10000Hz. The announcements need to be spoken in a clear, calm and well formulated standard language. The result must be tested on the spot (it may sound different from what it did in a studio).

Announcements are to be given at least twice.

Loudspeakers (Pasila Station, Helsinki)

From Auditivity to Visuality

The right kind of acoustics is not, nevertheless, always enough. High-quality audio announcements do not benefit fully deaf persons, and real-time displays are needed to complement them.

The key principle in all information provision is the use of multiple channels: information needs to be disseminated in several different ways. Below: public transport information in Gothenburg (Gotic News 1997).

See also Advance Information, Information Signs, Real-time Information in Terminals, On-board Displays in Public Transport Vehicles, Visual Disabilities and Public Transport Information, Hearing Disabilities and Public Transport Information and Personal Service.

References
Gotic News. (1997). On the way to an all-encompassing system for real-time information, No 2 June 1997
Finnish Public Transport Association. Public Transport in Cities, A New Line on Mobility (in Finnish)
Basics of Acoustics (in Finnish)
Http://www.cult.tpu.fi/sound/akusti_1.htm

Good Practice Card for Hearing Disabilities (*continued*)

MOBILITY DISABILITIES AND PUBLIC TRANSPORT INFORMATION

Advance information on the accessibility of public transport services and on-the-spot information are very important. There are many kinds of reduced mobility

Advance Information

Passengers with reduced mobility need particularly precise information on the accessibility of stops, terminals and vehicles. There are very many types of decreased mobility, and it may also be temporary as e.g. when caused by heavy luggage. The disabilities causing reduced mobility also vary to a great deal: one person needs a place to rest whereas another can sit in a wheel chair but is unable to reach a service or enter a train without a wheel chair lift. Therefore, it is important that the accessibility of public transport services be examined from different angles. Terminals must be accessible for persons having differently reduced mobility.

It is good to draw up recommended routes for different groups of people. The important thing is to ensure that nobody suddenly ends up facing a barrier, a dead end. This is done through providing the right information in the terminal. Profiled maps and service routes that can be printed from the Internet are a good form of advance information, e.g. 1) a "wheel chair and baby carriage route" with associated services (accessible toilets, nursing rooms, lifts, low ticket desks etc.) shown on the map; 2) a route with chairs and handrails for persons with some other mobility disabilities; 3) a map of automatic doors (important for both those using a wheel chair and others with reduced mobility) etc.

Advance information on missing services is also very important: e.g. there is a wheel chair lift for boarding the train but no accessible toilet. The sale of tickets and other services must either be accessible or passengers need to be informed of their inaccessibility so that e.g. tickets may be ordered directly to one's home.

In Terminals

Time is important information for slow-moving passengers, for they need to be able to assess if they are going to catch a certain departing vehicle. The map of the terminal should include e.g. distances to platforms in minutes with a normal or a slow pace. If information is continuous along the way, this creates security: the signs must lead one to the destination and there should be departure information on the way; an accessible detour may take a longer time etc. Clear information must be provided in the terminal. If a route is not accessible for all, information on this needs to be included in signs (e.g. with a steps symbol) and the alternative route must be easily found. Information about vehicles' inaccessibility must be provided early enough. Emergency exit routes must be accessible for all so as to eliminate the need for special instructions for disabled persons. In emergencies help must be readily available.

Especially in large terminals it is important for a mobility-impaired person to know the phone number of a taxi centre, where to get guidance assistance, and the location of the nearest taxi centre.

(Below) Signs in the Lappeenranta Travel Centre.

See also Advance Information, Personal Service and Information Signs.

Good Practice Card for Mobility Disabilities

MOBILITY DISABILITIES AND PUBLIC TRANSPORT INFORMATION

On Board

Information on the possible inaccessibility of vehicles and missing services must be given sufficiently early. The staff needs to be educated about the needs of persons with reduced mobility. If e.g. a person using a wheel chair is travelling in an ordinary train, s/he needs to have means for quickly contacting the personnel (e.g. the mobile phone number of the guard must be available). On-board video presentations about the available services and advance information about arriving to a stop or a station needs to be given early enough for the slow persons to reach the door in time.

(Right) The new low-floor metro line in Paris is designed to take persons with reduced mobility into account.

(Below) The InterCity trains of VR Ltd (Finnish Railways) are accessible with a wheel chair.

Exiting and Disembarking

High-quality information concerning accessible routes to connecting services, the street network, parking etc. must be provided. Furthermore, distances, easily openable doors and rest rooms are important matters for persons with reduced mobility.

References
ECMT: Improving Transport for People with Mobility Handicaps (1999)
VR Ltd at:
http://www.vr.fi/heo/palvelut/alaspalvelut.htm

Good Practice Card for Mobility Disabilities (*continued*)

PARK & RIDE

Purpose

Park & ride is an effective way to reduce car traffic in city centres: each vehicle parked reduces the need for parking places in the centre by one and the number of trips to/from the centre by two.

General

Park & ride serves e.g. those who are not able to walk or to come to a station or a terminal by public transport and those for whom it is difficult because of mobility disabilities. Park & ride is an important part of a functioning public transport system and offers the possibility of reducing the number of private cars entering the city centre. Travel centres are also natural places for park & ride.

Part of the feeder trips are made by bicycle, and there must be room for bikes at the immediate vicinity of the station. The walking distance from the car/bike park must not exceed 200 metres.

In order to be attractive, the park & ride terminal must have regular and fast public transport connections. Both the provision of real-time travel information and comfortable waiting and transfer areas increase the attractiveness of park & ride.

Information on Park & Ride Facilities

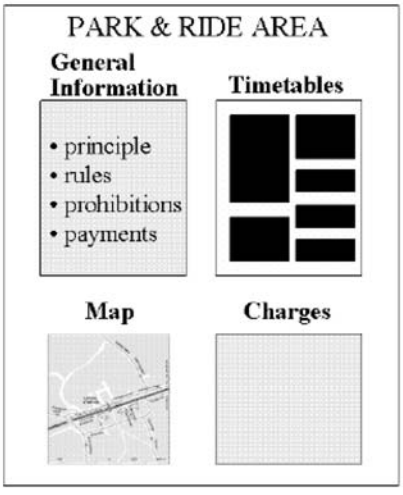
Informing people of park & ride and the related public transport services is an essential component in their overall level of service. Park & ride information consists of the following:

- fixed signposts to the car/bike park
- fixed traffic signs and information boards at the parking area
- real-time information system for car users (with e.g. timetables, the next departure, vacant parking slots etc.)
- real-time information system at the parking place

Park & ride areas are marked with a park & ride sign that prohibits other parking. Alternatively, other parking may be allowed within certain time limits. The parking places for the disabled must be located at the immediate vicinity of the terminal or station.

At the car/bike park there must be an information board that presents the principles of park & ride in a concise form, public transport timetables, fares etc. Additionally, it is good to include a map of the services in the area, e.g. the locations of bus stops or platforms as well as the ways to them. This information should be updatable. More guidelines for board design can be found in the card Information Signs.

The information board must be located conspicuously, in a place passengers pass by on their way to stops, platforms or other destinations. Depending on the size and form of the area, several boards may be needed. Usually the board must also be lighted. An example of the information content of a information board at a car/bike park can be seen below.



See also Advance Information, Information Signs and Websites.

Good Practice Card for Park & Ride

VISUAL DISABILITIES AND PUBLIC TRANSPORT INFORMATION

Audible and tactile information are important for persons with visual disabilities, as are advance information and advance preparations for travelling with public transport.

Advance Information

For the visually disabled, using public transport without guidance assistance requires good advance information and clear instructions. In order that this information can be provided, terminals and the public transport environment in general need to be surveyed from the viewpoint of a visually disabled passenger. The information must then be made available in an audible or tactile form. E.g. The Finnish Federation of the Visually Impaired has tactile representations of Finland's biggest terminals.

Visual impairment can be of very different kinds and degrees. Audible information helps all visually disabled persons. Voice direction of a web-based journey planner (such as the one of the Helsinki Metropolitan Area Council) as well as recording the instructions to oneself or receiving them into a mobile phone would be technically possible even now.

At Terminals and Stops

The markings of guidepaths for the visually disabled may be simple and inexpensive. The place of the door of the bus can be marked in the pavement with a change in level (See Fixed Information on Bus Stops).

There are systems under development, such as indoor navigation, which offer visually impaired persons new possibilities of moving in a complex environment. Navigation is aided with a portable device that gives audio instructions about which direction to proceed into. On stops and in terminals, the visually disabled have difficulty in recognising the right vehicle. Different kinds of navigation systems can be of help in this task also (see Phone Services and Mobile Phones and WAP). In future public transport systems, personal navigation systems could be used in e.g. informing bus drivers in advance of a visually impaired passenger boarding at the next stop.

Rails and guidepaths aid in moving inside terminals. The edges of platforms should be warned of using change of material. The width of a warning guidepath should be 1200mm in the walking direction. This allows a visually impaired passenger walking with a stick to stop in time before e.g. the edge of a platform. A small change in level that can be felt under one's foot helps those with visual disabilities without causing problems for anyone. More information on guidepaths can be found on the other side of this card.

Using various machines can be problematic for the visually impaired. Information devices and ticket-vending machines should be designed taking all users into account. A separate niche may be constructed for listening to audio information. A ticket-vending machine may give auditory instructions.

All visual information should be clear and as large-sized as possible. The general lighting must be good and reflections should be eliminated.

Wireless announcements of e.g. visually impaired passengers or tourists can be offered to a mobile phone through GPRS or Bluetooth.

Audible announcements on exceptional and emergency situations reach visually disabled persons well.

On Board

Audio information inside vehicles is important for the visually impaired. In addition to a next-stop display, audio announcements should also be used.

Exiting and Disembarking

Safety needs to be ensured in exiting a terminal or disembarking a vehicle in the way it is done for moving inside terminals.

See also Advance Information, Tactile Information, Fixed Information on Stops and Acoustics.

Good Practice Card for Visual Disabilities and Public Transport Information

TACTILE INFORMATION

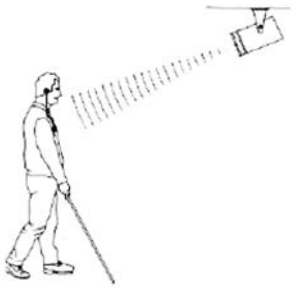
A longitudinal marking indicating a direction should have an elevation of 5mm and be 25 (-60)mm in width, and it must have a good contrast (e.g. a dark stripe in a light floor).

The edges of a walking route should have markings for edge recognition of the width of 35 to 60mm. The material and the colour of the markings should make it easily detectable. It may e.g. have rubber slabs or nodules.

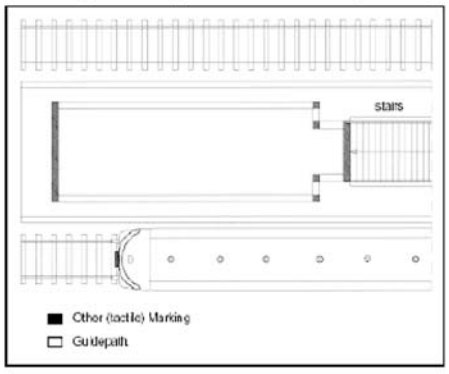
Emergency exits must also be well-lit and clearly marked with colours and material markings. However, markings indicating direction must be easily distinguishable from those denoting a warning.

Illumination should be good, at least 100 lux.

Infrared or radio transmitters can also be used in guiding visually disabled persons inside terminals. Passengers obtain the information through a portable receiver.



Guidepaths leading to a platform (in the edges of stairs and platforms) and tactile markings on edges and corners (below).



The BOS (Blind Orientation System) navigation system in Uthrecht, the Netherlands.

A talking information device at the Kastrup Airport in Copenhagen.

See also Advance Information, Fixed Information on Stops and Acoustics.

Good Practice Card for Visual Disabilities and Public Transport Information (*continued*)

PHONE SERVICES

Purpose

The telephone offers on-line services both before and during a journey. It suits everyone, since it can provide both audible information and textual messages. Phone services can be personal advice or personalised SMS messages - and everything in between.

Help Line

- personal advice is for many the easiest way to obtain public transport information: all one has to do is to find the number and call
- ordering special services still happens by phone

- a national public transport help line is needed.

Personal Advice by Phone

Personal advice by phone is at its best in providing:

- individual advice
- information on routes and timetables
- opening hours
- fares
- transport and storage of large or special luggage etc.
- special services such as guidance assistance, aids etc.
- the possibility of communicating in a foreign language or slowly (machines do not necessarily understand all) and in detail
- personal phone service will be an important information channel in the future as well!

Assistive Listening Devices

- aids for persons with a hearing impairment include different kinds of external or internal phone amplifiers, and payphones in public spaces should be equipped with a telecoil
- a text phone is used for calling to an ordinary phone number through a text phone operator
- for hearing impaired persons there are video phones, which can receive information interpreted to sign language
- a PC can be used like a text phone.

The payphones of public transport terminals should be located in a quiet, sound-insulated places. They must be accessible to wheel chair users.

Speech Recognition

In the near future, it will be possible to order timetables using speech recognition without entering parametres through a keyboard. This is a good way of providing e.g. real-time information.

The "Busman" system is an example of using speech recognition. It is being jointly developed by the University of Tampere and the Tampere University of Technology. The goal is to generate a phone-used system able to provide the local bus timetables of Tampere in clear Finnish. E.g. the following kind of dialogue with the system should be possible:

- When will the next bus to Hervanta leave?
- The next bus number 23 to Hervanta will depart from the Central Market Place at 12:05.
- What about Hallila?
- The next bus number 12 to Hallila will depart from the Central Market Place at 12:25.

The system exploits speech recognition technology developed at the Tampere University of Technology, i.e. the system is operated by voice. The replies are produced through voice synthesis.

Further information
Http://www.cs.uta.fi/research/hci/spi/Bussimies/busman.html
and links
http://www.cs.uta.fi/research/hci/spi/links/recognition.html

In Sweden, Stockholm Transport (SL) and Skånetrafiken have utilised corresponding voice-based phone information services. In both systems, the passenger tells the system at which stop or station s/he is and where and by which means s/he is heading. The list of stops can be ordered to one's mobile phone and also be printed on the Yellow Pages. Tests made have revealed the following:

- the dialogue must consist of short and clear messages (cf. SMS queries)
- the dialogue patterns need to be taught to the public
- implementing a query concerning several trips (a chain) is difficult
- it is good to use two kinds of queries: a short version for frequent users and a longer/guided one for casual users

Further information
Http://www.trafikkontoret.goteborg.se/Gotic

See also Personal Service, Visual Disabilities and Public Transport Information and Hearing Disabilities and Public Transport Information.

Good Practice Card for Phone Services

MOBILE PHONE AND WAP

Mobile Phone

- the mobile phone offers a versatile and handy way of receiving information, including during a journey
- at stops or stations, in lifts and vehicles (e.g. long-distance trains), a help line number that one can call in emergencies or when faced with a problem should be visible; e.g. stickers with the number of the guard may be placed on the walls
- the standard mobile phone services, e.g. (the Finnish Railways) 13121 and Sonera Zed's 16400 SMS timetable services will develop further as more contents become available.

Personalising makes SMS services easier to use: the user can save aliases in the search system of the Helsinki Metropolitan Area, e.g. his/her home address in the KOTI (home) record. The saving takes place by sending in Finnish the command ROUTE OWN X ADDRESS, where x is one's address, to the number 16400. The search software needs to be intelligent and make facilitatory assumptions like that the departure time is the present time unless something else is indicated. Also, the address should not have to be written completely if there is no ambiguity, and the house number should not be required (assumption = 1). In systems covering multiple cities, a city code is needed in order to distinguish between streets with the same name in different cities. Developing and improving public transport SMS services is a significant contributor to the quality of information provision.

The mobile phone is a means for obtaining real-time information. It can also be used in paying for public transport trips. There is a trend in information provision towards more personalised and individualised services.

A personal navigator can be integrated with a mobile phone. E.g. in Prague a system is in use whereby the visually disabled may locate not only approaching buses but also buildings such as shops.

WAP

WAP is like a wireless and simplified version of the Internet, developed to be used by mobile phone. In order to allow the use of WAP services, the mobile phone must have a WAP browser, which is standard in the newest phones. In addition to text, WAP pages contain links, by which one can move from one page to another, and simple bicoloured images.

All clients of Sonera have the Basic Data service for using WAP at their disposal. The WAP connection of Radiolinja is open, and allows the use of WAP services of other operators also. WAP and the Internet can also be accessed with a GPRS phone.

WAP-mediated public transport information will most probably become more abundant when the use of WAP increases. The WAP user interface is more versatile than that of the traditional mobile phone. At present, WAP services are rather expensive and limited but do enable the user to access the latest news and weather forecasts and browse timetables (e.g. those of Helsinki City Transport).

In the coming years, different kinds of information systems by which one can order stop-specific travel information will become more common.

Good Practice Card for Phone Services (*continued*)

FIXED INFORMATION ON STOPS

Purpose

Fixed information is used on stops to inform passengers of the lines using the stop, their operation intervals and arrival times. It can also be used for informing about the timetables of other lines, and it can include maps of the area and its public transport services.

A stop should have the following information:

- the stop sign (local or long-distance or both)
- the name and number of the stop; in the future these will enable the passenger to order detailed, real-time timetable information to his/her mobile phone
- the lines using the stop and their destinations
- a help line number to obtain personal advice.

Additional information may include

- timetables
- route maps
- guide maps (see photo below right)

Further information can be given to the passenger through the colours and materials used. The photo above is from Ystad in Sweden. The stopping point of buses is marked on the ground with light stone surface that is slightly above the surroundings. Additionally, the pavement is lined with yellow stripes for the whole length of the stop.

- stop timetables (font size 19pt)
- displays with real-time information
- a loudspeaker for announcements
- different kinds of visual and tactile aids (see photo below left).

It is recommendable that the contact information of the transport operators be presented at least on long-distance (bus) stops with usually just a few operators. In case of a delay passengers can contact the depot directly and ask about the cause and duration of the delay.

Fixed information has to be up-to-date. The organisation in charge of the fixed information on stops and its updating has to be agreed on.

See also Electronic Displays on Bus Stops, Info Kiosks, Fixed Information in Public Transport Vehicles, Information Signs and Phone Services.

The edges of the stop structures need to be clearly marked with e.g. contrasting colours.

References:
Tillgjengleighetsmal offentlig transport, Sosial- og helsedirektoratet, Norge, (2001).

Good Practice Card for Fixed Information on Stops

FIXED INFORMATION IN TERMINALS

Purpose

In designing terminal information, it is essential to classify the information into two categories: indispensable information (on way-finding, departure times, routes, tickets, luggage) and information and advertisements concerning auxiliary services.

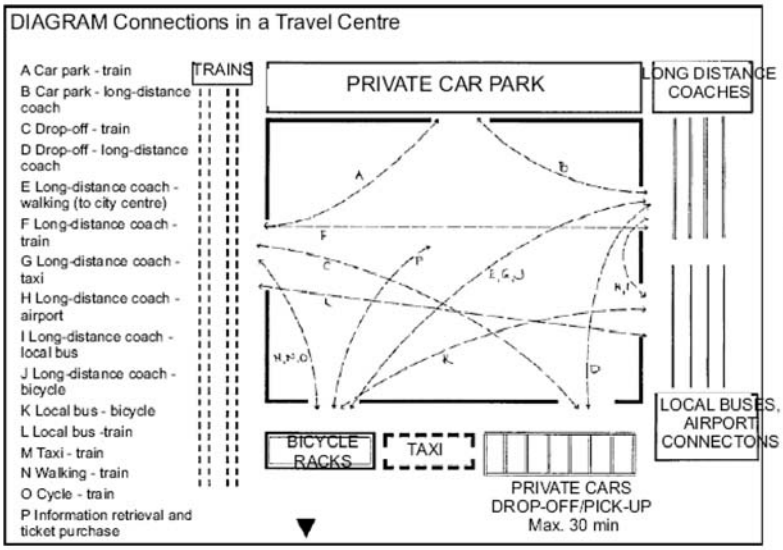
The starting point in designing terminal information is mapping the connections and routes between various services. The figure at the bottom of the card illustrates the various connections in a simple terminal.

The information for pedestrians may utilise the following:

- signs containing e.g. a pictogram and an arrow
- buzzers and other sound signals
- tactile signs with Braille
- guiding or warning materials or tactile surfaces
- a guidepath on the floor along routes to exits
- pylons with fixed or real-time information
- maps for orientation i.e. floor plans whereby passengers can check where they are and where they should be heading (can be mounted on pylons)
- colour contrasts at the edges of steps
- fixed induction loops for hearing-disabled persons
- indoor navigation systems.

The information displays and posters are to be placed along the relevant routes as well as near the departure platforms and in waiting lounges.

All information should follow the same classification hierarchy: travel-related information should be the most prominent. Signs should contain recommended colour combinations and be well-lit.



See also Information Signs, Real-time Information in Terminals and Fixed Information on Stops.

Good Practice Card for Fixed Information in Terminals

FIXED INFORMATION IN TERMINALS

Information on timetable and routes as well as on other travel-related matters are provided, in addition to real-time displays, through fixed posters, info kiosks and timetable publications.

The recommended point size for timetable posters is 19 pt (ca. 4mm) i.e. this size.

The text must be spaced meaningfully and arranged into columns. This aids the perception of the information. The standard poster size is 70cm x 90 - 100cm.

Information to be presented in posters includes e.g. the following:

- which transport modes are available for reaching the desired destination
- where a given service departures (for rail traffic also the direction)
- routes of the service
- departure and arrival times
- fares
- durations of journeys.

Additional information may contain e.g.:

- the number of the bus, code of the line for facilitating the finding of the right platform etc., the equipment and type of the vehicle (e.g. low-floor)
- the numbers of platforms/bus stops
- the order of the carriages in a train, which carriages there are (children's car, restaurant car, service car, etc.)
- instructions for exceptional situations and arrangements.

(Above) Visual guidance together with guidance for visually disabled persons in Holland.

(Left) Fixed and real-time information in a terminal.

References:
Instructions for Guidance and Information System Planning Publications of the Ministry of Transport and Communications, Finland, B13/99 (In Finnish with an English abstract)
Accessible Travel Centre Publications of the Ministry of Transport and Communications, Finland, 9/2000 (In Finnish with an English abstract)
TELSCAN: Design Guidelines - Usable ATT systems for Elderly and Disabled Travellers, Commission of the European Communities.

Good Practice Card for Fixed Information in Terminals (*continued*)

REAL-TIME INFORMATION IN TERMINALS

Purpose

Higher standards are set for real-time timetable displays than posters: passengers trust the correctness of their information, changes can be presented without delay and they are more conspicuous.

Why Information Displays

Real-time displays are conspicuous. Large main displays are located in visible places, e.g. above the doors to the platforms. The text size of matrix displays can be changed if needed. Text can blink or different kinds of signal lights can be used to indicate an approaching or a changed departure. The informative value of real-time displays is great. Often one and the same information system is used for integrating the display and auditory announcements.

Technology

Real-time displays can utilise technologies such as LCD, LED, TFT/LCD, plasm, CRT, "electronic ink" or FLIP. Presently, LCD displays are the most common and the most recommendable.

LED technology is durable and inexpensive and particularly suitable for outdoor use. In a matrix display it is possible to scroll the text. The red colour is common but not recommendable from the viewpoint of protanopic persons. Other colours should be used.

A LED display on a platform

LCD The possibility of modularisation makes it easy to use in differently sized displays (from main displays to small ones with just a few rows). The variability of the font and its size offers plenty of options for different needs. This technology can be used both indoors and outdoors and also with long viewing distances. Only text can be presented. The brightness of the display is automatically adjusted according to the surrounding illumination.

An LCD main display in the Travel Centre of Jyväskylä

Plasm displays are suitable for presenting moving pictures. The screen can be divided into several parts each having different contents. A plasm display has a wide viewing angle but its durability in static presentations is fairly weak.

TFT/LCD is durable and can display moving pictures. It has commonly been used in touch screens. Current displays are small (15") because larger models are expensive. The use of this versatile technology is likely to increase. Outdoor use is limited.

CRT is the inexpensive, traditional monitor. The length of the cathod-ray tube is limiting but has not made CRT uncompetitive in large terminals (e.g. airports). It is not suited for outdoor use.

FLIP displays, and others that contain ink or some other fluid, are rare in Finland. FLIP displays consist of separate, turning modules.

Good Practice Card for Real-Time Information in Terminals

REAL-TIME INFORMATION IN TERMINALS

Placement

The guiding principle is that both indoor and outdoor timetable displays are located along routes and/or in waiting rooms used by passengers, preferably so that they can be viewed while sitting. They are to be placed at an appropriate distance and as low as feasible (the visibility of the text must be ensured) taking care, however, that there is no risk of running into a display. It is advisable that the displays are slightly tilted forward (< 15°).

When placing displays outdoors, a well-sheltered place with a roof is recommended. Indoors, too, reflections need to be eliminated.

Colours

The best combination is yellow text on a black background. Black text on a white background also has a good contrast.

A travel-centre style LCD display showing long-distance coach departures (right).

The real-time display for train timetables in the travel centre of Kouvola (below).

See also Fixed Information in Terminals, Information Signs, and Electronic Displays on Bus Stops.

Information

In Finland, the established order of information in **railway traffic** is, row by row, as follows:

Time, new time, track, train, destination.

There is a maximum of 39 characters per row. The system presupposes that passengers perceive the train code as more important than the destination.

In **long-distance coach traffic**, the established order is this:

Time, platform, destination (via xxx etc.)

Approximately 30 characters per row are needed.

In local traffic, the code of the line is also needed, and it is good to place it first. The information needed is as follows:

Line code, time, destination

Platform displays present the same information as timetable displays with the platform number being shown in the frame of the display.

Additional information can be presented e.g. on the two bottom lines of a display.

Good Practice Card for Real-Time Information in Terminals (*continued*)

WEBSITES

Purpose

The Internet makes it possible to disseminate up-to-date information on public transport for varying needs: on different alternatives, services, reservation, payments and auxiliary services.

General

The main page has the highest publicity and information value. It contains the "instructions" for the website and attracts the user to stay on the site. The main page needs to be clear and simple. Having mainly text on it guarantees short download times. Material that takes longer to download can be accessed via links. The main page should not prompt the user to download e.g. the Macromedia Flash animation software as the first thing.

The user should be able to scale the pages and change their colour and design settings. The user must also be allowed to choose right away if s/he wants to use the text version or the normal one with graphics and other effects. The main page must contain a link to the sitemap in order to facilitate navigation. It must also contain a link to giving feedback, as well as the contact information of the operator. The user has to be able to trust the operator and to ask for further information, especially if the website enables the user to make reservations or to purchase trips or products. Collecting feedback on a website is also an inexpensive way to support the development of the system, which is a continuous task. Updatedness guarantees high quality. Site maintenance must be invested in from the outset.

It is important that information from the site be easily be printable. The user will not want to have the frames or buttons printed. The text should fit to one portrait A4. It is good to have a separate button "Print this information."

The use of web pages is spreading to portable computers and to public computer terminals, so called info kiosks. Databases are thus used multimodally. It is economical to have expandability to different media as a starting point. It also ensures flexibility.

Inviting users to participate in developing a website may prove useful: they may have important information concerning accessibility. The data format should be communicated to the user, and good suggestions may be rewarded.

Guidelines and standards for designing websites can be found on the Internet at e.g.:
Telematics & accessibility, www.stakes.fi/Include
Public Transport Information Web Sites, The Institute of Logistics and Transport, 2001, http://www.iolt.org.uk
Practices and procedures for developing text guides to rail stations, http://www.describe-online.com/intro/manual.htm#contents
Usability guidelines and references of the World Wide Web Consortium, http://www.w3.org/WAI/References/
A good list of EU standards is at:
http://www.centil.dk/include/wp5side6.htm
"Designing accessible web sites", http://trace.wisc.edu
World Wide Web Accessibility to People with Disabilities: www.webable.com
PDF and Adobe Acrobat ® Viewers for the Visually Disabled
Http://www.adobe.com/prodindex/acrobat/Accesswhitepaper.html
Web Accessibility for People With Disabilities (Michael G. Paciello, Mike Paciello), CMP Books 2000
Blind & Visually Impaired Handicapped links, http://www.dpa.org.sg/VH/welcome.html

See also Advance Information and Info Kiosks.

Good Practice Card for Websites

WEBSITES

Colours and Contrasts

- the background should be light and neutral, no graphics
- red and green should not be used together, nor should any other combinations of colours with no contrast as the colours blend
- dark text on light background is better than vice versa
- never light text on light background!
- if colours are used for enhancing the legibility of a table (alternate rows having different colours), the grayscale legibility should be checked.

Graphics

- all browsers do not support graphics!
- when using a picture as a link the alternative text must be provided (the ALT attribute of the <IMG> tag).

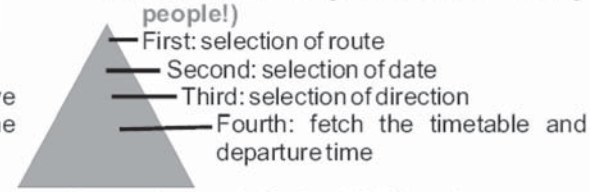
Sound

- there should be a text alternative for any auditory material
- voice direction is possible at present
- web-pages containing transport information should be designed to support the BOBBY program so that also the blind can use them
- text can be converted into audio with e.g. Active Reading (issound.com) or Cast eReader (cast.org's Applied Special Technology).

The BOBBY test (www.cast.org) tests the accessibility of a website, reports on errors and suggests improvements. The Finnish Federation of the Visually Impaired maintains testing pages at: http://www.nkl.fi/suositukset/testaus/index.html (in Finnish).

Information Contents

- presenting the validity period of changing information such as timetables as well as mentioning the date of the last update inspires confidence in the service
- when searching for a route or a service, the street address is the best and most familiar item of information with which users will search for the public transport services they need; everything else (names of stops and stations, codes of routes etc.) will have to be taught to them
- Internet timetables must be designed with care specifically to be viewed on the net and printed from there; pyramid thinking is helpful, see the figure. **(NB understanding timetables is very difficult to many people!)**



Presentation pyramid for timetable information

it is a good extra to present a link to PDF versions of the timetables but it is not recommendable to have them as the only format. Presenting stop timetables requires data on the location of the stop (street address or map); clicking the stop on a map will open the timetable. Also those using a text-based browser must be able to find the timetable using a clear street address. Journey planners (e.g. www.ytv.fi/journeyplanner) are Internet service at its best.

Performing user tests at the beginning results in better websites. Using symbols and language options improves the usability for tourists. The Internet is an important medium for providing advance information on, inter alia, accessibility and services at stations and on board.

References

The Institute of Logistics and Transport. (2001) Public Transport Information Web Sites - How to Get It Right.

Good Practice Card for Websites (*continued*)

Abbreviations used without definitions in TRB publications:

AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
NASA	National Aeronautics and Space Administration
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation