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16. Abstract The lack of readily available, easily understood information about public and private transportation services has been a deterrent to use of the systems. Navigating within a single system can be a challenge, but information has not existed for planning multiple-system trips. With the advent of automated information systems, individual transit systems (both public and private) are beginning to offer trip-planning information to the public via the Internet and telephone customer service lines. Some regions of the country have recently implemented or are developing shared database systems to allow transit trip planning for trips requiring multiple transit providers and, in some cases, trip itinerary planning from point to point. This research effort investigated the state of the practice in regional transit information systems and the possible implementation in three case study areas—the Dallas-Fort Worth metropolitan area, the Laredo area, and the Austin-San Antonio corridor. Researchers produced guidelines, which are contained within this research report, to provide for the consideration of the implementation of systems in the three case study areas.					
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**ONE-STOP TRANSIT INFORMATION: GUIDELINES FOR
DEVELOPMENT OF REGIONAL TRANSIT INFORMATION SYSTEMS
IN TEXAS**

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DISCLAIMER

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- Ms. Emily Van Wagner and Mr. Emilio Escudero, Metropolitan Transit Commission, San Francisco; and
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CHAPTER 1. INTRODUCTION

BACKGROUND AND SIGNIFICANCE OF WORK

Being able to get from point A to point B using any mode of transportation depends to a large degree upon the information available on how to do that. To accomplish that task driving an automobile may require only a map and the basic training received on the rules of the road. However, to get from point A to point B using other modes—local public transit, intercity public and private transit, passenger rail, rural transit, elderly and disabled special transit, or taxicab, for example—requires detailed information about routes, schedules, fares, and qualification requirements. Trips that require the use of multiple providers further complicate the travel plan.

Traditionally, local public transit systems have printed system maps and individual route schedules for both bus and rail service. Most systems provide customer assistance by telephone for trip planning. Transit systems have relied upon telephone assistance operators who use maps, schedule information, and their individual memory and expertise. Some public and private transit systems use automated systems, using computer programs, to provide the telephone operator the best route to pass along to the customer. In some cases, they provide this information directly to the customer via an automated telephone interface or the Internet.

In addition to individual systems providing information about the services offered by their own systems, there are now examples of regional transit information systems. A review of current practice revealed a number of metropolitan regions and one state that are offering an integrated public transit information system to facilitate public mobility.

Given the different stages of development of the systems in place or being planned around the country, Texas transit providers should be able to learn lessons that can significantly contribute to building successful information systems in the state. Preliminary research indicates that point-to-point itinerary planning for transit offered via the Internet is desired by the public and encourages making new trips by transit (*1*).

Public and private transit providers sharing a customer service information database for the benefit of the general public may be a first step in cooperation on a number of fronts. For example, there are a number of intermodal facilities in Texas and elsewhere, where local public providers, rural transit providers, and private intercity bus providers offer service. An individual may purchase a fare or ticket for local public transit service or private intercity service. There could be opportunities in the future for extending this concept even further, with more providers cooperating in the development and operation of facilities, and eventually, the possibility of common fare media.

RESEARCH PROJECT OBJECTIVES

The objectives of the research project “Coordination of Transit Services in Texas” were as follows:

- to evaluate the potential technical solutions available for providing coordinated transit information;
- to document the challenges, opportunities, and lessons learned from others’ experiences in planning and implementing regional coordinated transit information systems;
- to identify special demands and resources in each of the three case study areas; and
- to map out a general process for implementing information systems in each of the case study areas.

ACTIVITIES CONDUCTED

Task 1: Identification of Stakeholders in the Three Case Study Areas

Researchers identified transit and other transportation providers in the three case study areas from TxDOT databases of providers, the North Central Texas Council of Governments (NCTCOG) inventory, and listings of private bus companies (including charter and shuttle buses), car rental companies, taxicab companies, airports, and Amtrak. Lists of stakeholders for each case study area are included at the ends of [Chapter 4](#) (Laredo), [Chapter 5](#) (Austin-San Antonio), and [Chapter 6](#) (Dallas-Fort Worth).

Task 2: Develop and Maintain Project Website

Researchers created the project website (<http://onestoptransit.tamu.edu>) to communicate with the project research staff, TxDOT staff, Project Monitoring Committee, and the stakeholders in the three case study areas. They also used the website during the project to receive feedback from all the above groups on subsequent work tasks ([Figure 1](#)).

Task 3: Develop and Execute Survey of Stakeholders

Working with members of the Project Monitoring Committee and TxDOT staff, the researchers developed a survey instrument to acquire information from the stakeholders in the three case study areas on existing information systems and to gauge interest in an integrated information system or service.

A database was constructed from the information collected on each transportation provider. A sample stakeholder/provider file from the database is included in the [Appendix](#). The full database is housed on the project website.

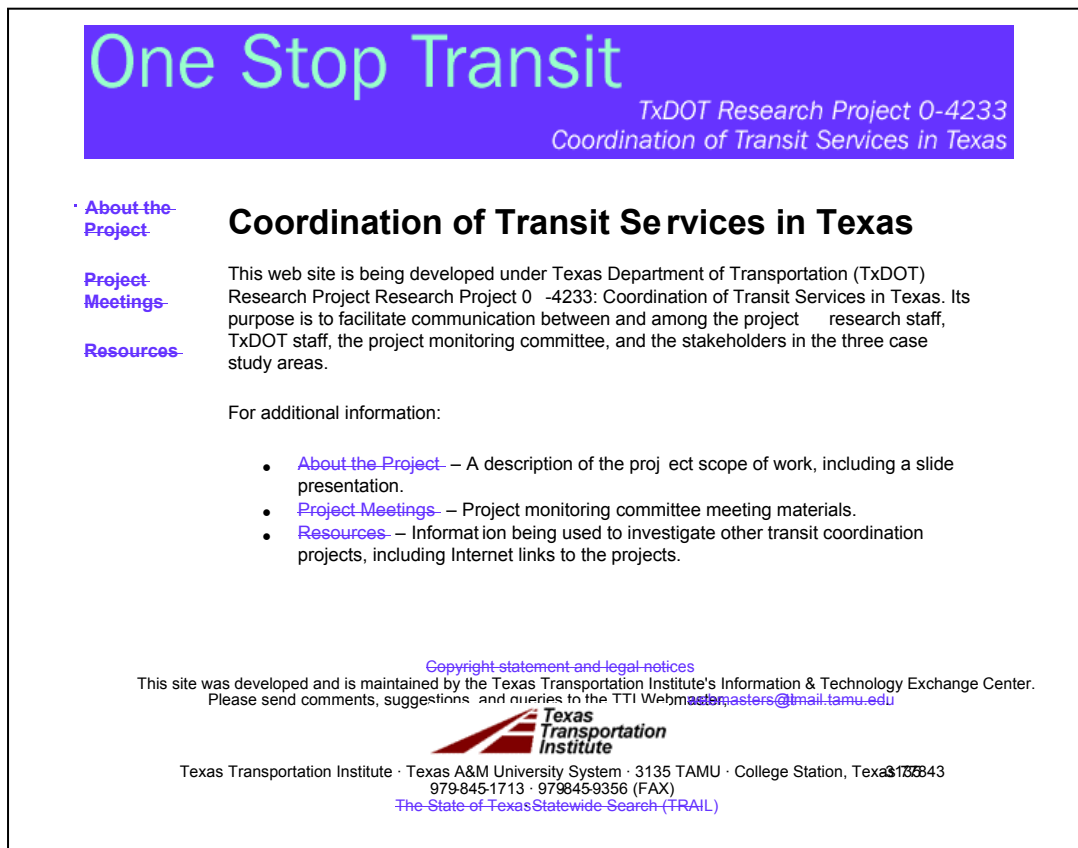


Figure 1. Front Page of Project 0-4233 Website.

Task 4: Produce Descriptions of Multi-System Transit Information Systems in Deployment or Planned

Information was collected on existing and in-development multi-system transit information systems via their websites, published reports, and interviews with staff. Researchers surveyed agency websites, conducted interviews with staff, and reviewed published reports. The results of this task are included in [Chapter 2](#) of this report.

Task 5: Execute In-depth Interviews with Selected Stakeholders in the Three Case Study Areas

Researchers interviewed selected stakeholders in each of the three case study areas in greater detail, either in person or by telephone, to assess their interest in pursuing a regional transit information system. Stakeholders contacted in each of the three areas are listed in Chapters [4](#), [5](#), and [6](#). Potential benefits and obstacles to implementing a regional information system were identified, along with current or past coordination efforts among transit and other transportation-related agencies in the three regions. Stakeholders in all three areas mentioned improved mobility, improved access to activity centers, and potential increases in transit

ridership as potential benefits of a regional transit information system. Potential challenges identified by stakeholders included obtaining funding, reconciling different route schedules and fare structures, and differing priorities among jurisdictions.

Task 6: Facilitate Group Discussions in Each of the Three Case Study Areas

From the information gathered in Tasks 1, 3, 4, and 5, the research team developed drafts of potential implementation approaches for each of the three areas for discussion among the interested stakeholders. Meetings were held in Laredo and Austin to discuss and refine the drafts. No meeting date could be scheduled among the Dallas-Fort Worth area stakeholders, so discussion of the draft was accomplished via telephone and e-mail. Details of these drafts and the discussions are provided in the introductions to Chapters 4, 5, and 6.

Task 7: Produce Guidelines for Potential Regional Information Systems

The research team developed guidelines to assist each of the three case study areas with the establishment of establishing regional transportation information systems. General guidelines developed from the experiences of existing systems are described in [Chapter 3](#), and potential approaches for the three case study areas are presented in Chapters 4, 5, and 6.

Task 8: Produce Research Report and Project Summary Report

This research report is the product of Task 8. The project summary report is available as a separate document from TxDOT.

ORGANIZATION OF THIS REPORT

This report documents the research performed under “Coordination of Transit Services in Texas” and provides general guidelines for implementing a regional transportation information system and potential approaches for implementing such a system in each of the three study areas.

The report is organized into seven chapters. [Chapter 2](#) describes the development and experiences of several existing multi-system transit information systems in the United States. [Chapter 3](#) provides general guidelines for the development of a regional information system. Chapters 4, 5, and 6 describe how such a system might be developed in each of three case study areas in Texas: Laredo, the Austin-San Antonio corridor, and the Dallas-Fort Worth region. [Chapter 7](#) presents recommendations for future research and implementation.

CHAPTER 2. EXISTING REGIONAL TRANSIT INFORMATION SYSTEMS – CASE STUDIES

This chapter describes the experiences to date with selected coordinated transit information systems in Texas and elsewhere in the United States, including operations, development history, and lessons learned.

BUS-STOP.ORG, NORTH TEXAS TRANSIT COOPERATION ASSOCIATION, TEXAS

Bus-stop.org is the result of a demonstration project organized and led by the North Texas Transit Cooperation Association (NTTCA) and the Services Program for Aging Needs (SPAN) to promote coordination among transit providers in the Dallas-Fort Worth area (2). Fixed route and paratransit providers, along with social service agencies, were invited to join in the effort by providing their information to the database, and monthly meetings of all participants contributed to the development process. The website database and interfaces were developed with the aid of a consultant for a total cost of \$10,000 (*Telephone interview with Erika Lissberger, SPAN/NTTCA, February 5, 2002*).

The website allows users to search for transit options by county, by type of service, or by service agency name (Figures 2 and 3). Limited trip planning is possible by entering the counties of trip origin and destination. If there is a transportation provider that serves locations in both counties entered, the applicable routes and stops will be listed (Figure 4). If, however, there are no transportation providers serving both the origin and destination county, the contact information for transit providers in the “origin” county is provided, with the message that the agency(s) have no routes to the destination county. The website provides telephone numbers, addresses, and (where applicable) e-mail and website addresses for each participating agency. Other information provided includes hours of operation, fares, and restrictions for ridership, if any.

Information updates can be performed by each participating agency, using a database personal identification number (PIN) for access. Updates and maintenance of the site have been limited, partially due to a lack of continued funding, but future plans are to resume the monthly meetings of participants and to explore funding for further development of the site and for dedicated staffing.




Figure 2. Bus-stop.org Main Page.



Figure 3. Transit Service Selection Options, bus-stop.org.

home
transit options
route maps
current events
shuttles
special services
about us
contact us



bus-stop.org
We take you from **A** to **B**

Choose your destination here!

transit options

Your source for transportation in North Texas.

Origin: Denton
Destination: Tarrant

Your trip may require more than one agency. The agency listed below is responsible for transportation where your origin is located, and the table below lists points where this agency travels in the area you have chosen as a destination. For more information, please contact the agency listed here.

Denton
SPAN, Inc
Contact: Erika Lissberger
Phone: 940-382-1900
FAX: 940-383-8433
Dispatch Phone: 940-382-1900
Email: sharono@Span-transit.org
Website: www.span-transit.org

need more?

[plan another route](#)
[more about this agency](#)
 Other Entities from **Denton**
 that Travel to **Tarrant:**


Choose Another Agency

 Other Locations in **Tarrant:**

Points of Interest

Destinations in Tarrant County

Type	Destination	Est. Time	Est. Fare	Restrictions	Pre-Book R'Qrd?
All	Arlington	1 HR	\$20	PRIVATE PAY	24 HRS
All	Fort Worth	1 HR	\$20	PRIVATE PAY	24 HRS
Medical	Fort Worth Hospital District	1 HR	0	MEDICAID	24 HRS
Medical	Ft Worth Veterans Clinic	1 HR	0	VETRAN	24 HRS



We take you from **A** to **B**

[home](#) | [transit options](#) | [route maps](#) | [current events](#)
[shuttles](#) | [special services](#) | [about us](#) | [contact us](#)

Figure 4. Trip Options between Two Counties, bus-stop.org.

TRANSTAR TRIP PLANNER, SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS (SCAG)

The TranStar trip planner includes information for all bus and rail providers, including Amtrak, in six counties (Los Angeles, Orange, Riverside, San Bernardino, Santa Barbara, and Ventura), as well as connecting transportation services (3). Fixed route, paratransit, public, and private transportation providers are all included in the trip-planner database, and several use the trip planner in their own call centers. The planner is also used in the call centers of several public service offices and other public agencies. TranStar will soon add San Diego county as well, thus covering all of Southern California.

Full trip planning is available through the website interface, which was developed in partnership with Ventura County. Users enter the street addresses of their trip origin and destination, and they can select fare categories (regular, senior, student, disabled, etc.), special accommodations (wheelchair or bicycle), and itinerary options (fastest trip, fewest transfers, minimal walking). The system then returns a step-by-step itinerary for the trip. Call-center operators have access to a more detailed trip-planning interface, and they are able to provide callers with more complex travel plan options than are available via the web interface. A third type of interface allows trip planning by customers at kiosks in selected transit centers.

TranStar's software was designed to accommodate data from multiple transportation providers across a large geographic area, and to operate with or without active participation from the individual agencies. Involvement and recruitment of transit providers is not, therefore, strictly necessary to the success of the information network; however, the database and software is given to transit providers in exchange for agreements to update their portion of the database. This level of participation makes the system run more smoothly. Some of the larger transit operators update their database information via electronic transfer; SCAG performs updates for a number of smaller operators. Minor updates to the system are performed on a daily basis, with larger updates performed periodically (*Telephone interview with Jim Sims, Director of Information Services, Southern California Association of Governments, January 10, 2002*).

Paratransit information is also available through TranStar. The system provides Geographic Information Systems (GIS) coverage of service areas for paratransit providers within the region, linked to the transit database, which includes such information as hours, fares, and riding restrictions for these providers. From any location within the region, users can access information for both public and private paratransit carriers that serve that location.

TranStar began as a joint effort by SCAG and the non-profit organization Commuter Transportation Services, Inc. in 1988. The initial system was developed and implemented in approximately eight months, and has been continuously upgraded and enhanced since then. The cost of the initial development was \$200,000 in 1988-89, and the subsequent enhancements have totaled \$500,000 as of early 2002. Annual cost for data and software maintenance is also \$500,000. Some of the maintenance cost is borne by participating agencies and other public information agencies that use the system in their own call centers.

TranStar's software, and variants of it, are being implemented in the New York metropolitan area, Atlanta, Denver, and in Jacksonville, Florida. SCAG also provided assistance in the development of the TransitInfo system for the San Francisco Bay Area (described in this report). In Southern California, the call-center version of the system is being used by local social service agencies, the University of Southern California, and the University of California – Los Angeles.

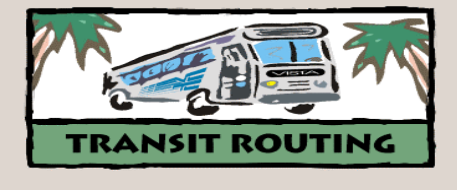
TranStar's trip-planner website receives approximately 10,000 hits per month, and anecdotal evidence indicates that this regional information system is attracting new "choice" riders to transit services in Southern California. SCAG is currently working with state agencies with the goal of expanding to a statewide transit information system.

GOVENTURA, VENTURA COUNTY, CALIFORNIA

Ventura County is one of the SCAG member counties and part of TranStar's information system. The county developed a web interface for TranStar's trip-planning system, and it maintains a separate trip-planning website, GoVentura, focusing on Ventura transit riders but accessing the TranStar database (Figure 5) (4). Ventura County also maintains TranStar database information for its six transit providers.

The web interface was developed in-house, with assistance from a consultant, and the system was implemented over a four-month period. The cost for development and implementation of the interface totaled \$50,000. Negligible maintenance costs have been incurred to date. Ventura County staff perform monthly updates to the transit information database for the six providers operating in the county. The website has generated interest from new riders, receiving approximately 4000 hits per month.

Future plans for Ventura County include "NextBus" equipment on buses to provide real-time location and arrival-time information. They will interface with TranStar information to enhance trip planning (*Telephone interview with Steve DeGeorge, Director of Technology, Ventura County, California, January 17, 2002*).



To find out how to go from anywhere in Southern California to anywhere else using public transit (buses, trains, and ferries), fill out all of the trip information below and then press the "Submit" button at the end of the page to generate itinerary.

[En Español](#)

Where are you starting from?

Address, Intersection or Landmark

Click on the map to select a starting point (optional)

City (Optional)

Zip (Optional)

Select a Starting Landmark (optional):

Ventura County

Around the Southland

Transit Nodes

Where are you going?

Address, Intersection or Landmark

City (Optional)

Zip (Optional)

Select an Ending Landmark (optional):

Ventura County

Around the Southland

Transit Nodes

What day is your trip?

Today

What time is your trip?

I'm leaving my starting point now

I'm leaving my starting point at

I'm leaving my starting point as early as possible

I'm leaving my starting point as late as possible

I must arrive at my destination by

Other Options

Itinerary Preference

Fastest Itinerary

Fare Category

Regular

Special Accommodations

None

Trains (Metrolink / Amtrak)

Any

Figure 5. GoVentura Trip-Planning Interface.

TRAVINFO[®]/TRANSITINFO/TAKETRANSIT, SAN FRANCISCO AREA

TravInfo is a comprehensive system to gather, organize, and disseminate timely information on San Francisco Bay Area traffic and road conditions, public transit routes and schedules, carpooling, highway construction and road closures, van and taxi services for disabled travelers, park-and-ride facilities, and bikeways. Its purpose is to help motorists avoid congestion and to encourage the use of public transit and ridesharing services by giving Bay Area travelers easy access to information, enabling them to choose the most appropriate modes, times, and routes to reach their destinations. Information is provided free-of-charge to travelers via a single telephone number, and also through links from the TravInfo site to web pages showing real-time traffic congestion maps, photos and videos of selected intersections, and highway patrol reports. Road information is available 24 hours a day, seven days a week (5).

TransitInfo began in 1994 as a small website developed by two UC-Berkeley students to provide information on transit options in the nine counties comprising and surrounding San Francisco (6). In 1996, San Francisco's Metropolitan Transit Commission (MTC) and a hired consultant (GIS Trans) joined in further development of the information system, which now provides full transit trip planning via telephone in the nine counties comprising the Bay Area. Currently, all public transit carriers and paratransit providers in the Bay Area are included in TransitInfo's database, along with one airport shuttle; other private transit carriers are not yet in the system. TransitInfo is currently accessible via a local (seven-digit) telephone number, and will be available as a toll-free 511 number starting in late 2002. The website version is now titled "TakeTransit" and offers web-based trip planning for selected transit providers, with complete Bay Area trip-planning coverage expected by the end of 2002 (7).

Like SCAG's TranStar trip planner, TransitInfo constructs itineraries with user inputs including trip origin and destination (entered as street addresses or landmarks), fare/rider category, day and time of trip, and itinerary preferences including "fastest itinerary," "fewest transfers," "minimal walking," and "lowest fare." Updates of transit route and schedule information in the database are performed centrally by the MTC, upon notification by participating transit providers. Some updates are performed via automatic data transfer. TransitInfo call-center operators also make use of TravInfo's data, continually updating real-time information on transit delays and re-routing due to traffic or weather conditions.

The TransitInfo trip-planning software is being developed as a non-proprietary system for future public-sector licensing. The trip-planning software and its call-center and web interfaces are being developed and maintained by an outside consultant, GIS Trans, for a total cost of \$7.5 million over seven years (1997 – 2004). The TravInfo system is currently being developed and maintained by PB Farradine, at a total cost of \$37 million for six years. The costs are paid out of state transportation assistance and transportation development funds and Congestion Mitigation and Air Quality Program (CMAQ) funds (*Telephone interviews with Emilio Escudero and Emily Van Wagner, Metropolitan Transit Commission, February 1, 2002*).

TRANSIT INFORMATION CENTER (TIC), MINNEAPOLIS, MINNESOTA

Metro Transit, which provides transit services in the Minneapolis-St. Paul metropolitan area, purchased a trip planner to be used by customer service representatives in its call center, the Transit Information Center (8). The initial system was implemented in July of 2001. After six months of use, testing, and revision of the system in the call center, a web-based version of the trip planner was implemented as well. Further customer feedback and testing of the web-based trip planner was used to redesign it nine months later. Now, in addition to Metro Transit, 10 transit providers serving parts of the seven-county metropolitan area, including one private-sector carrier, are included in the trip-planning database (*Telephone interview with Dee Molean, Manager of Transit Information, Metro Transit, Minneapolis, Minnesota, February 7, 2002*).

The trip planner uses inputs of trip origin, destination, day and time of travel, and maximum preferred walking distance to produce an itinerary. It also offers options such as “faster trip,” “fewer transfers,” and “less walking,” and the rider may specify routes with wheelchair access. Paratransit providers, however, are not included in the database, and there are currently no plans to do this in the future. Call-center operators in the Transit Information Center (TIC) have a more detailed trip-planning interface, and they can provide more complex trip-planning assistance to riders.

Updates to the database are performed weekly. Major information updates are scheduled to coincide with Metro Transit’s quarterly service changes. The enhanced visibility of the system provided by the website serves as an incentive to participating providers to comply with the schedule to update the database.

Metro Transit purchased the trip planner from Trapeze Software Systems and also contracted with Trapeze for the web interface. The advertising agency Periscope performed customer research and graphic design for the system. The original software purchase (including the rights to use a private GIS mapping system) was \$800,000 in 2000, plus an additional \$35,000 for the first web interface. Metro Transit spent \$60,000 in 2000 – 2001 for customer research and graphic re-design, and \$40,000 for the second (current) version of the web interface. Purchase and implementation of the system was financed through a federal grant and the Minnesota Department of Transportation’s Orion Initiative for intelligent transportation systems (ITS). Ongoing maintenance and enhancement costs are paid by Metro Transit and the Metropolitan Council of Minneapolis.

As mentioned above, customer feedback and user testing have been performed at each stage of development. A feedback questionnaire was included with the first web-based version of the trip planner. Following analysis of customer feedback by the ad agency, prototype screens were developed to test ease of use for both bus riders and non-riders. Results from the prototypes were used to design the second version of the web-based trip planner. Feedback from the website is still being collected for future enhancements and revisions.

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

The state of Oregon has a public transportation system that includes more than 200 transit providers—from small demand responsive systems to Amtrak. The state recently developed a statewide transit trip-planning system to support closer operational ties and to provide enhanced information to their customers. The project produced three reports, the third of which provides specific information to ODOT on system recommendations, including functional elements, potential implementation phases, and cost estimates.

ODOT's objectives for a statewide transit information system include increased efficiencies among individual transit providers as a result of each provider examining how its service connects to and complements the services of adjoining providers; improved transit information for riders; leveraging resources and investments by reducing duplicate efforts in transit information systems by separate agencies; and raising the level of transit customer satisfaction by providing more information and by providing it more quickly.

ODOT uses a phased approach to build its transit information system, with each phase building on the information and infrastructure of the previous phase (9). The first phase is a web-based clearinghouse of transit information that will allow the user to find transit, paratransit, taxi, and rideshare options within a city or county. The clearinghouse also permits a user to find an intercity carrier that links two regions of the state. Elements proposed for this phase include the following:

- map-based interfaces to select a region or regions of travel;
- a database containing listings, contact information, website links, service area boundaries, and route and schedule information for each transit provider in the state, categorized by region;
- interactive GIS maps; and
- maps and information on bike trails, landmarks, and activity centers.

The clearinghouse developed in the first phase will be an enhancement of ODOT's searchable transit directory on the "TripCheck" travel advisory website (10).

The second phase will incorporate automated transit trip planning, with software that will generate a trip itinerary based on user inputs of trip origin, trip destination, and other parameters. Dynamic mapping support is one element of the trip-planning function, to provide walking and transfer directions between segments of the transit trip. Other features planned for this phase include a variety of user interfaces including the web interface, an interface for use by call-center operators, integrated voice response (IVR), and interfaces for personal digital assistants (PDAs) or Wireless Web.

The third phase includes automated reservations for demand-response transit services, integration of real-time traffic and other travel information, and on-line fare/ticket purchase.

CHAPTER 3. GUIDELINES FOR DEVELOPMENT OF A REGIONAL TRANSIT INFORMATION SYSTEM

This chapter presents general requirements and considerations involved in developing a regional transit information system, based on the review of existing systems described in [Chapter 2](#).

As demonstrated by the varying approaches and experiences of the existing transit information coordination efforts, there is no one “best” or “correct” approach to developing a regional transit information system. The unique strengths, challenges, technical capabilities, and environment of the region and its transportation providers will help determine the type of regional information system developed. Steps and elements to consider in the planning and development process are shown in [Figure 6](#) and described in the following sections.

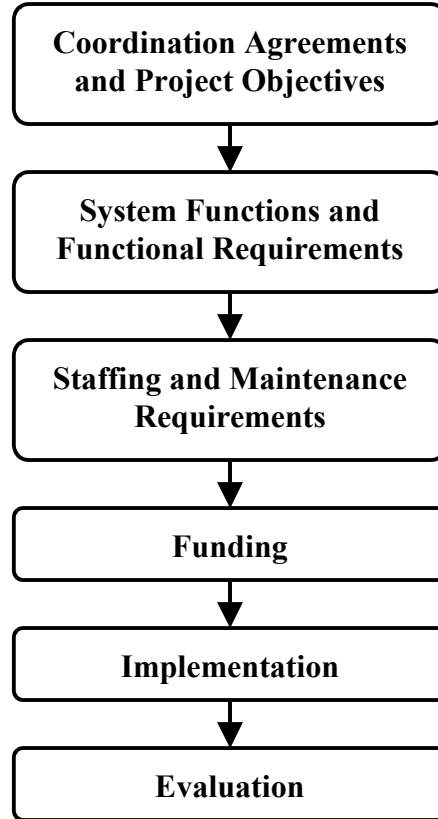


Figure 6. Steps in Development of a Regional Transit Information System.

COORDINATION AGREEMENTS AND PROJECT OBJECTIVES

All participating transit providers and other stakeholders should meet to determine their levels of participation in a regional effort and to develop institutional agreements for providing and updating information, for providing or pursuing funding, and for selecting and contracting with software vendors or consultants. Institutional issues affecting coordination of transit services should also be addressed, although the participating agencies may decide to defer some issues—for example, coordination of fare payment and filling gaps in transit service—to a later point in the coordination process. A lead agency or an interagency committee must be designated to head up the development, implementation, and eventual maintenance of the coordination effort.

Each community and each transit provider will have its own set of objectives for coordinating transit information (and potentially transit service) across a region. Some of the benefits and objectives of regional transit information cited by previous studies are:

- greater quality and more comprehensive transit information,
- greater access to transit information by the public,
- increased transit ridership,
- better coordination of services among transit providers, and
- improved customer service and customer satisfaction.

All transit providers and other stakeholders involved in planning must agree on a common set of objectives for the project/coordination effort. This process can be long, but is an important first step, as the project's objectives will define future evaluation of its success.

FUNCTIONS AND FUNCTIONAL REQUIREMENTS

Once agreements and objectives for regional transit information coordination have been developed, the next step is to determine the desired functions of the system.

While the interfaces described in this section include websites and other user-operated devices such as kiosks and personal data assistants (PDAs), customer service personnel cannot be eliminated from the process. A majority of transit customers will opt to telephone for information and trip planning assistance, even if a website is available. A recent examination of Greyhound customers' trip planning preferences indicated that approximately 25 percent used the Internet to plan trips and find answers to questions, with the remaining percent telephoning Greyhound's automated system or live operators for assistance (*Personal interview with Rick Richards, CIO, Greyhound Bus Lines, Inc., October 3, 2002*). TranStar, TransitInfo, and Minneapolis' TIC all began as telephone-based transit information centers before developing website interfaces.

Transit/Rideshare Information Clearinghouse

A clearinghouse approach to regional transit information provides transit riders (and customer service representatives for transit and rideshare) with a single source of information on transit services in an area. While this approach does not provide customized travel information such as itinerary planning, it is a lower-cost way to coordinate transit information, and can serve as a foundation for more complex functions.

Basic components of a transit information clearinghouse are described below. A sample conceptual architecture is diagrammed in [Figure 7](#), and examples of the information clearinghouse approach and sample costs are shown in [Table 1](#).

Transit Information Database

The database should be designed to accommodate, at a minimum, transit provider and rideshare-coordination information including city or county of service, fares, hours of service, and contact information (including links to the providers' websites, if any). If the clearinghouse will also provide route and schedule information for each of the transit providers, additional components should be added to the database:

- **Route/Time Data:** In order to produce route maps and schedules, each provider must define the locations (by street address or intersection, or by geographic coordinates) and scheduled times of route stops. This information, in addition to providing the basis for non-interactive route maps as part of the clearinghouse, can also form the basis for single- or multi-provider automated trip planning.
- **GIS Map:** Depending on how spatial information is defined and used in the database, a GIS map may not be a necessary component. However, if full trip planning is part of the future development of the system, a GIS basemap that relates transit stop locations to origin and destination addresses, and to the route and stop locations of connecting providers, will become necessary. To be used for a GIS map, the route/time data must be described in terms of geographic coordinates. Service area boundaries for each transit provider should also be added to the GIS map, to more precisely define which provider(s) will serve the rider's trip origin and destination.
- **Note Regarding Long-distance Transportation Providers:** Complete route, schedule, and fare information for Greyhound and other intercity bus companies, Amtrak, and airlines cannot be included in a regional database as described above, because of the volume of data involved and because these long-distance carriers use their own nationwide routing and scheduling systems. In a directory or clearinghouse of transit information, contact information for intercity carriers can be included in the database just like any other transportation provider. The customer can then use the website or customer service number of the intercity carrier to get schedule and route information.

Data Maintenance Tools/Access

To allow transit providers to access and update their own information in the database, the system can include automated tools for importing data, and/or web-based access that allows providers to log on and make changes manually. Either option will reduce the amount of maintenance labor that must be performed by the central/lead agency.

User Interface(s)

Although complete trip planning across multiple providers is not provided with a clearinghouse format, a web or telephone interface should allow users to select transit providers by region of travel, or by other category such as fixed route, paratransit, or rideshare coordination. An interactive map interface and drop-down selection menus are two options to help users select the appropriate provider or providers for their trip. Customer service representatives at each of the transit agencies should also be able to access database information on all providers in the area in order to provide information and assistance to callers.

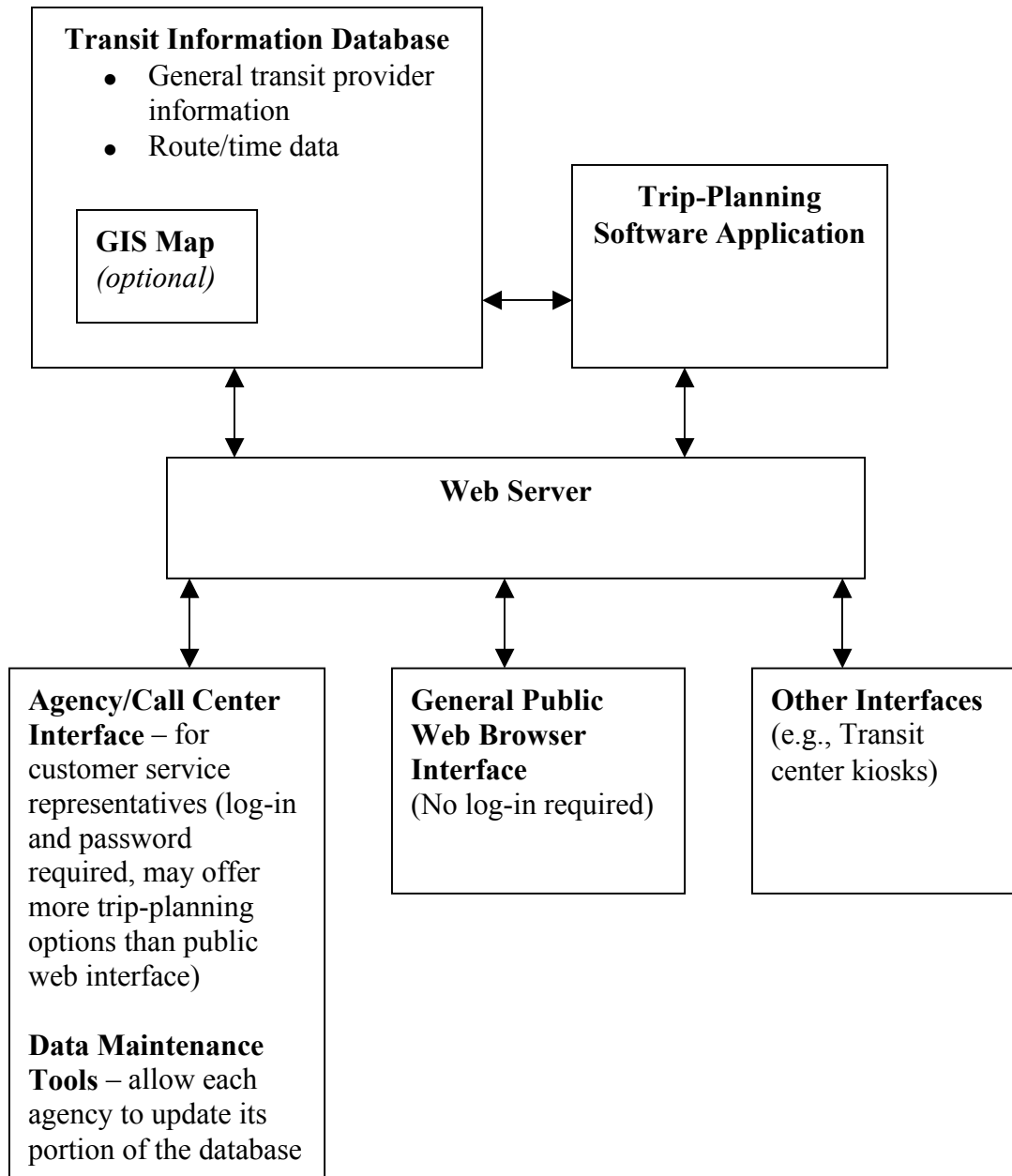


Figure 7. Sample Architecture for a Transit Information Web-Based Clearinghouse.

Table 1. Examples of Transit Information Clearinghouse Features and Costs.

System	Characteristics	Key Elements/Features	Sample Costs
<i>Bus-stop.org</i>	16 counties in the Dallas/Fort Worth area 35 providers and agencies	- Database and user interface - Interactive map interface for selection of services by county - Menus for selection of providers by category - Limited route information; listing of some route stops in destination county	<i>Total:</i> \$10,000
<i>Oregon DOT Transit Trip-Planning</i> (proposed); Phase 1 Web Clearinghouse	Statewide 200 providers	- Database and user interface - Interactive map interface for selection of services by county - Zone-to-zone map interface to identify intercity providers - Transit data management tools; full route and schedule information for each provider - GIS map and service area boundaries - Data collection costs	\$50,000 \$150,000 \$75,000 \$100,000

Automated Trip Planning

Automated trip planning reduces or removes the rider’s need to decipher route maps and timetables and, in the case of a trip involving multiple transit providers, to determine when and where to transfer from one form of transit to another.

The transit information database, data maintenance tools or access, and web server described for the transit information clearinghouse are assumed as the base infrastructure. Additional components of an automated trip-planning system are described below. [Figure 8](#) shows a conceptual architecture for a single-database system.

As stated in the previous [section](#), intercity carriers such as Greyhound (and other intercity buses), Amtrak, and airlines must maintain separate databases and scheduling/reservation systems. To be able to provide customers with these longer-distance transportation options, the regional transit information system should be able to provide customers with available trip schedules for these long-distance carriers, either by directing customers to the carrier’s website for scheduling/reservations or by interfacing with the trip-planning software of the long-distance

carrier to access available schedules. A conceptual architecture including an interface with a long-distance carrier(s) is shown in [Figure 9](#). [Figure 9](#) also shows an option for accessing multiple databases with local transit trip-planning software. When large transit systems such as VIA, Capital Metro, DART, or The T are part of a regional transit information system, this option may be more feasible than assembling all route and schedule information in a single database.

Transit Information Database

See the previous [section](#) under “Transit/Rideshare Information Clearinghouse.”

Data Maintenance Tools/Access

See the previous [section](#) under “Transit/Rideshare Information Clearinghouse.”

Interactive Trip-Planning Software

This software application accepts trip origin and destination inputs from the user (usually in the form of a street address or intersection, or a selection from a list of landmarks) and uses data from the transit information database and from the GIS map to develop an itinerary. The itinerary should specify, in trip order, the transit modes/providers, route numbers, boarding and disembarking locations, fares and transfer information, and walking instructions that take the rider from the trip origin to the first transit boarding, from one transit “leg” to the next, and from the final transit stop to the trip destination. For a regional, multi-provider system, the itinerary generated must provide any additional information the rider will need to transfer from one provider or mode to another. Additional features/criteria for trip-planning software may include:

- allow user-specified constraints or preferences such as:
 - minimum walking distance,
 - minimum travel time,
 - minimum number of transfers,
 - minimum cost, or
 - bicycle-accessible routes; or
- provide route maps with transfers marked.

Trip-Planning Web Interface

The user interface will have more interactive features than the interface for a clearinghouse-type website, accepting user inputs as described above. Inputs will be a combination of text entries and menu choices.

Customer-Service/Agency Trip-Planning Interface

All of the surveyed transit information systems that include automated trip planning have as part of their system a separate interface for transit call-center operators. This interface accesses the same trip-planning software, but it allows the operator additional options and inputs to generate a more complex or specialized itinerary than the customer can construct via the web interface. TranStar and ODOT are developing or planning to develop additional interfaces for transit-center kiosks, PDAs, or other media.

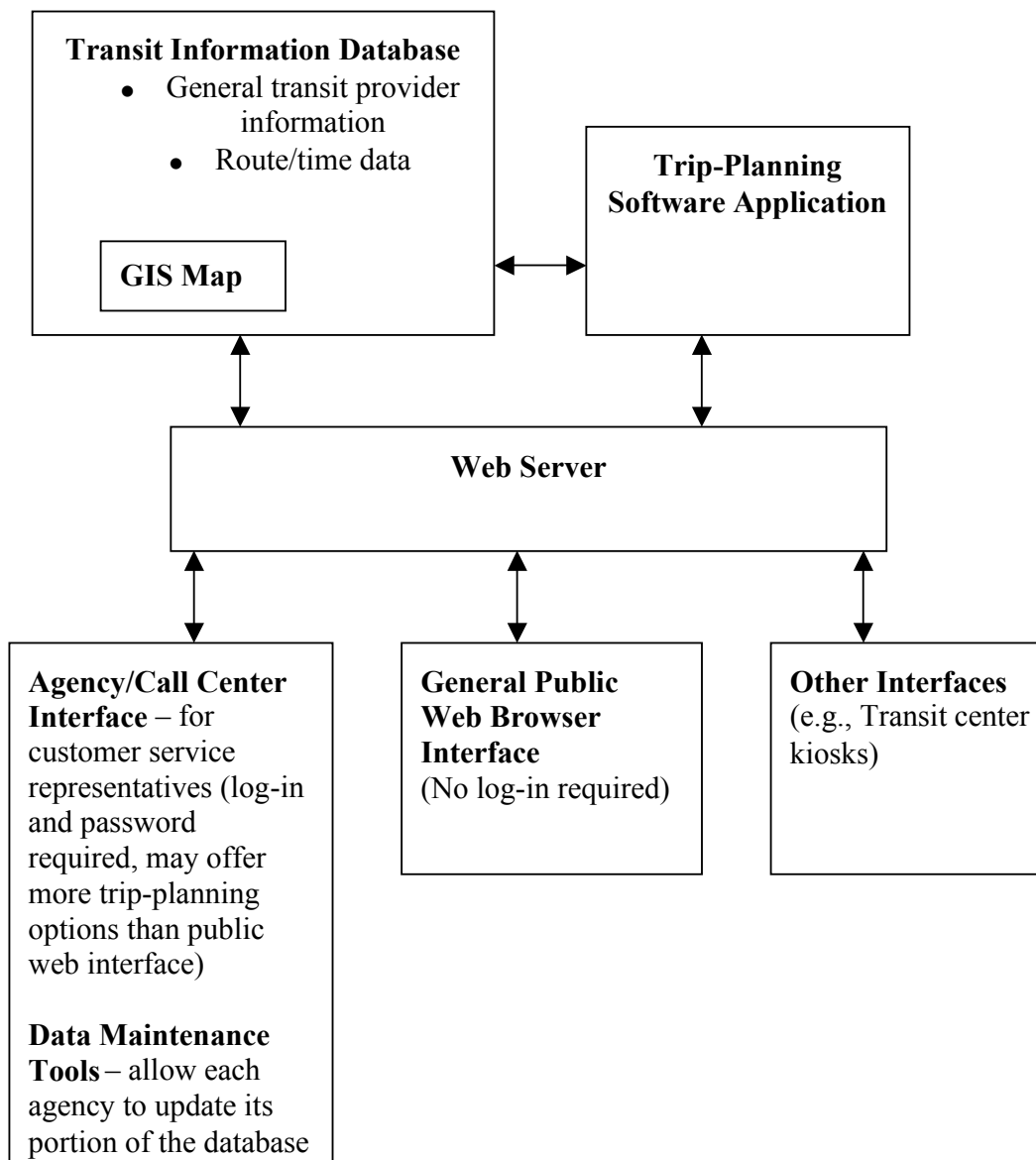


Figure 8. Sample Conceptual Architecture of a Transit Trip-Planning System.

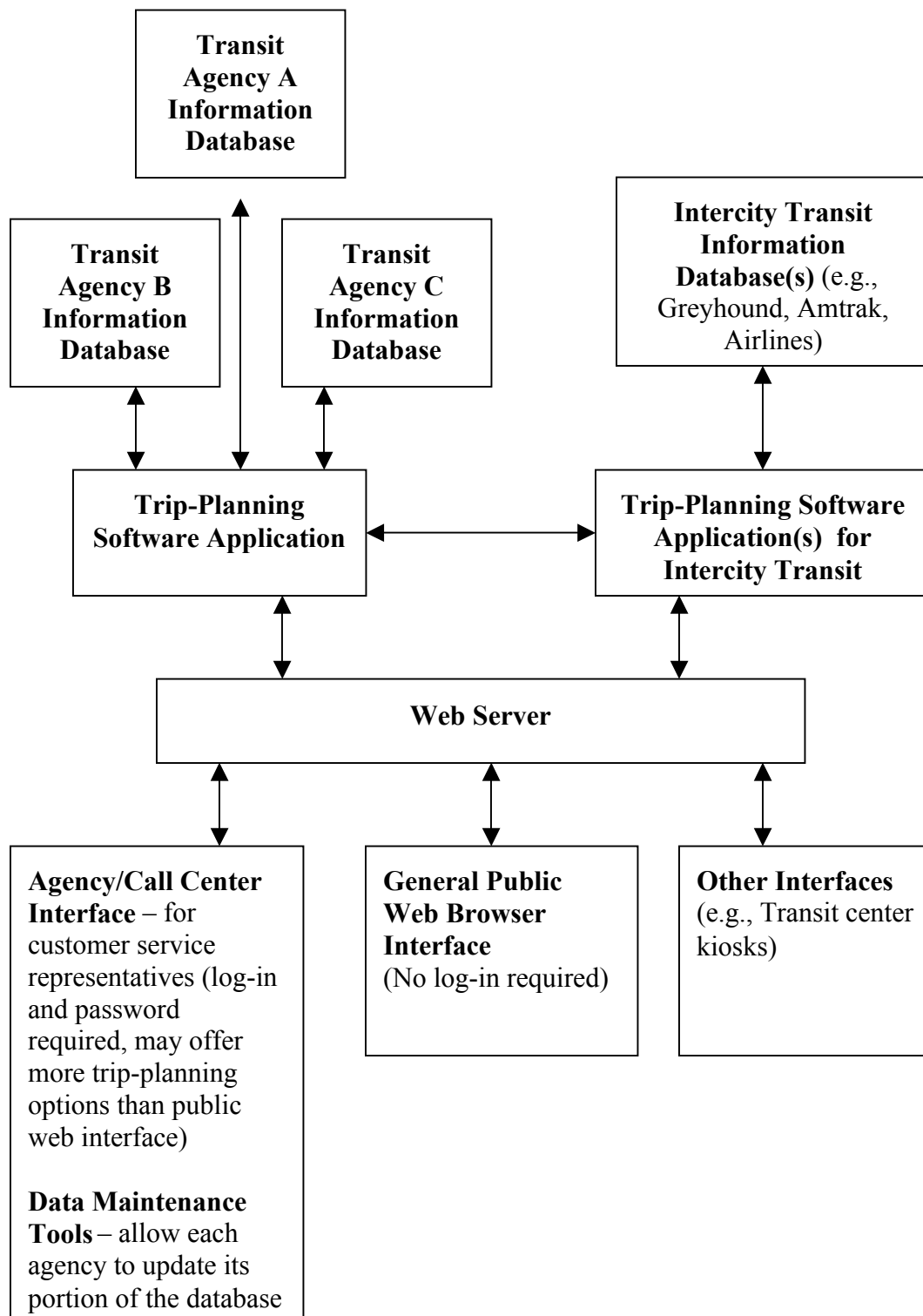


Figure 9. Sample Architecture Showing Multiple Databases and Interface to Intercity Carriers.

Table 2. Examples of Transit Trip-Planning System Features and Costs

System	Characteristics	Key Elements/Features	Sample Costs
TranStar	7 counties in Southern California Approximately 90 providers	- Database w/GIS map, transit route, and schedule information - Network/hardware - Trip-planning software, web interface, call-center interface - Data management access for large providers	<i>Total:</i> \$700,000 from 1988 to 2002 \$50,000 for web interface (paid by Ventura County)
TransitInfo	9 counties in the San Francisco Bay Area Approximately 50 transit providers	- Database w/GIS map, transit route and schedule information - Network/hardware - Trip-planning software, call-center interface, web interface - Data management access for large providers	<i>Total:</i> \$7.5 million from 1997 to 2004 (consultant contract; development and maintenance)
TIC, Minneapolis	7 counties in the Minneapolis area 11 providers	- Trip-planning software (package from Trapeze; includes GIS map) - Initial web interface - Redesigned web interface - <i>Other costs (user evaluation)</i>	\$800,000 \$35,000 \$40,000 \$60,000
ODOT Transit Trip-Planning (proposed); Phase 2, Automated Trip Planning	Statewide 200 providers	- <i>Database and user interface (from Phase 1)</i> - <i>Transit data management tools; full route and schedule information for each provider (from Phase 1)</i> - <i>GIS map and service area boundaries (from Phase 1)</i> - Trip planning software (procured from vendor) - Network/hardware - Web interface - Statistical and evaluation tools - Planning and data collection/integration costs - Implementation costs	\$50,000 \$150,000 \$75,000 \$1 million \$150,000 \$100,000 \$75,000 \$600,000 \$700,000

Further Enhancements and Options

The following transit information system enhancements are in development or being planned by the systems surveyed in [Chapter 2](#).

- **Paratransit reservation capability via Internet.** This enhancement would require a database of eligible clients for elderly/disabled and other paratransit services and a computer-assisted paratransit scheduling system, such as those already in use by a number of paratransit providers. A web-based interface for the system might need to be developed.
- **Carpool/vanpool reservation capability via Internet.** On-line registration for carpool and vanpool services is already in place in many communities. Where feasible (depending on the rules governing particular rideshare programs) commuters looking for existing carpools or vanpools to join could be helped to find those on or near their commuting route by a GIS-assisted database and search engine.
- **Real-time traffic information/real-time bus arrival information.** Several metropolitan areas in Texas, including San Antonio, Dallas-Fort Worth, and Houston, have implemented or are developing ITS networks to monitor traffic levels and speeds, traffic incidents, weather, and road conditions. Several transit providers are beginning to track the locations of their buses with automatic vehicle location (AVL), and next-bus notification systems are in development in some cities. As mentioned in [Chapter 2](#), TravInfo (the traffic monitoring system in the San Francisco Bay Area) and TransitInfo (the transit trip-planning system) are already being used in tandem by TransitInfo customer service operators, and work is underway to fully integrate the two systems. When this is accomplished, users should be able to plan their transit itineraries with the benefit of real-time bus arrivals and traffic information for their planned route.
- **511 telephone system.** Similar in concept to the “911” (emergency) and “411” (telephone directory assistance) numbers, “511” is being developed in many communities as a one-stop telephone information number for traffic and travel information. The simplest telephone information system can be accomplished with a menu system that will forward the caller to the appropriate agency for more information or assistance (see [Chapter 4](#)). Larger systems require more extensive call-routing infrastructure, and some are utilizing software to determine the caller’s general location (for call-routing purposes) and voice-recognition software to increase the caller’s ease of use (*11*).

STAFFING AND MAINTENANCE

Ongoing maintenance of system software and transit data is necessary to a successful system. Costs and staffing requirements will depend partly on the level of functionality of the system and on the number of transit providers, and thus the amount of data that must be kept current. [Table 3](#) provides example maintenance costs and staffing requirements for existing systems.

Staffing hours not included in this [table](#) are those of customer service representatives who staff the call centers (either at individual agencies or at a central regional call center).

Table 3. Sample Maintenance Costs and Staffing Requirements.

System	Characteristics	Staffing and/or Costs for Maintenance
GoVentura	6 providers Trip itinerary planning (through TranStar)	Negligible; minimal staff hours for updates to database
TIC	11 providers Trip itinerary planning	\$40,000 per year plus 1 full-time administrator and 2 part-time staff
TranStar	90+ providers Trip itinerary planning	\$500,000 per year
Oregon DOT (proposed)	200 providers Clearinghouse (phase 1) Trip itinerary planning (phase 2)	\$75,000 per year \$250,000 per year

SUMMARY OF TECHNICAL AND STAFFING REQUIREMENTS

[Table 4](#) summarizes the technical and staffing requirements for consideration when planning a regional transit information system as described in the preceding sections of this chapter. As far as possible, staffing requirements noted are over and above that which would be already in place in individual transit agencies.

Table 4. Summary of Technical and Staffing Requirements.

Function	Participant Provider Requirements	Regional/ System Requirements
Transit Provider Directory, Telephone-Based	<u>Technical</u> – none <u>Staff</u> <input type="checkbox"/> Periodic information updates	<u>Technical</u> <input type="checkbox"/> Telephone branching/forwarding network with touch-tone menus <u>Staff</u> <input type="checkbox"/> Periodic information updates
Transit Provider Directory, Web-Based	<u>Technical</u> – none <u>Staff</u> <input type="checkbox"/> Periodic information updates	<u>Technical</u> <input type="checkbox"/> Web server <input type="checkbox"/> Website interface (can be interactive or non-interactive) <u>Staff</u> <input type="checkbox"/> Periodic information updates
Transit Information Clearinghouse	<u>Technical</u> <input type="checkbox"/> Data management access (via web access, or communicated to regional/system staff for manual updates) <u>Staff</u> <input type="checkbox"/> Periodic information updates (including route and schedule updates)	<u>Technical</u> <input type="checkbox"/> Database <input type="checkbox"/> Web server <input type="checkbox"/> Interactive website interface <input type="checkbox"/> Interactive interface for customer service staff <input type="checkbox"/> Data maintenance tools/access <input type="checkbox"/> GIS map (optional) <u>Staff</u> <input type="checkbox"/> Regular information updates and maintenance <input type="checkbox"/> Customer service for trip-planning assistance
Automated Trip Planning	<u>Technical</u> <input type="checkbox"/> Data management access (via web access, or communicated to regional/system staff for manual updates) <u>Staff</u> <input type="checkbox"/> Regular information updates (including route and schedule updates)	<u>Technical</u> <input type="checkbox"/> Database <input type="checkbox"/> Web server <input type="checkbox"/> Interactive interface for customer service staff <input type="checkbox"/> Interactive website interface <input type="checkbox"/> Data maintenance tools/access <input type="checkbox"/> GIS map <input type="checkbox"/> Trip-planning software application <u>Staff</u> <input type="checkbox"/> Regular information updates and maintenance <input type="checkbox"/> Customer service for trip-planning assistance

FUNDING

Funding sources used by the agencies surveyed ([Chapter 2](#)) to develop regional transportation information systems include the following:

- state transportation assistance and transportation development funds,
- Congestion Mitigation and Air Quality (CMAQ) funds, and
- FHWA/Federal Transit Administration (FTA) grants.

Current grant programs aimed at improving transit coordination projects include the Intelligent Transportation Systems Integration Program (Metro-Rural) under FHWA's ITS Deployment Incentives Program, which provides funds for demonstration projects that integrate two or more ITS infrastructure elements, or one infrastructure element (such as regional multimodal traveler information services) over multiple jurisdictions ([12](#)).

A new (at the time of this report) FTA program will provide grants for operational tests of implementation of advanced public transportation systems (APTS) in rural transit service. The grants are intended to promote coordination of services among rural transit providers ([13](#)).

IMPLEMENTATION

Functional Testing

Prior to launching and promoting the transit information system to the public, the agency should test the system for missing information, missing links between web pages, or other operational errors. Metro Transit in Minneapolis initially implemented its trip-planning system (later to become the Transit Information Center) for use by customer service representatives in the Metro Transit call center. The system was launched on the website for customer use only after six months of use and revision by call center staff.

Marketing and Promotion

When possible, the agency should incorporate a public awareness/marketing component into the development process and contracts; some of the surveyed systems have received favorable reviews from those customers who have seen the website but see low overall awareness of the website among the general public, which limits the potential of the information system to attract new transit riders.

Opportunities for low-cost promotion of the service include printing the name and telephone number/website address of the regional information system on bus stop signs, city or transit agency maps, and other travel-related media. A link to the system's website (and a

telephone number) should be provided on the websites of the city and county chamber of commerce and tourist bureau websites, as well as on any local transit provider websites.

SYSTEM EVALUATION

User Evaluation

A feedback mechanism should be included on the web interface to collect user comments and questions on the interface design, the usefulness and accuracy of the transit information provided, and other aspects of the information system. GoVentura has collected comments since its launch via e-mail from website users identifying needed improvements and updates. Metro Transit included a survey questionnaire with its initial web interface, using customer responses to re-design the interface nine months later. SCAG is developing a software module to capture feedback on gaps in available transit service, as a step in improving transit coverage and coordination in Southern California.

Public Awareness

Some information on public awareness of a transit information system can be obtained via a website counter that records the number of times it is accessed by users. This number of website “hits,” however, will not provide information on how many people choose to ride transit after planning a trip using the system (unless ticket purchase is available online and is tracked), nor is it a good measure of how many people in the community know about this trip-planning option.

On-board, telephone, or mail-out surveys of riders and non-riders in the community will help to provide information on public awareness of the transit information system, and on the link, if any, between public awareness and transit ridership changes. An on-line survey will also provide some information on awareness versus ridership, though its respondent pool is obviously limited to those who have visited the site.

LESSONS LEARNED BY EXISTING SYSTEMS

The following “lessons learned” are based on the experiences of the existing regional information systems and agencies surveyed.

- **Gaining Participation.** When recruiting providers to be a part of the system, the agency should emphasize the added exposure they will gain from the “one-stop” customer information service and other coordination efforts. One of the biggest obstacles encountered by several of the systems surveyed was territorialism—providers unwilling to participate because of perceived competition from other providers.

- **“Walk, Then Run.”** The agency should establish interagency working groups and coordination agreements, and begin with simple coordination activities: for example, providing links to other transportation provider websites within the region.
- **Data Coordination and Maintenance.** To ensure accurate information is available to users, a central person or staff should lead the task of maintaining and updating information for the system. Even if each agency has the ability to perform updates to its own section of the database, experience has shown that updates may not be made regularly without reminders.

CHAPTER 4. POTENTIAL APPROACH TO A REGIONAL TRANSIT INFORMATION SYSTEM – LAREDO AREA.

Located on the Texas/Mexico border, Laredo is a hub for passengers traveling from Mexico to destinations further north. The local urban and rural services carry a large number of international passengers.

BACKGROUND INFORMATION

Transit Providers in Laredo and Webb County

The major public transit providers in the city of Laredo and in Webb County include the following:

- El Metro (Laredo),
- El Aguila Rural Transportation (Webb County),
- Greyhound,
- El Conejo,
- Latinos de Greyhound Autobuses,
- Latinos Azabache De Greyhound, and
- Valley Transit Company.

Local public transportation services are provided within the city of Laredo by El Metro and in surrounding Webb county by El Aguila Rural Transportation. The two services connect at the Laredo Transit Center, located in downtown Laredo, which also serves as a boarding point for Greyhound. El Conejo, Latinos de Greyhound Autobuses, Latinos Azabache De Greyhound, and the Valley Transit Company (interlined with Greyhound) also operate intercity services in and out of Laredo. A significant segment of the intercity riders are traveling to and from Mexico.

Current or Past Coordination Projects

El Aguila rural routes are coordinated with El Metro urban routes to allow passengers to transfer from one service to the other. The two transit services both stop at the Laredo Transit Center, which is also a hub for Greyhound.

The Laredo Metropolitan Planning Organization (MPO) and El Metro are exploring the possibility of bus rapid transit for the Laredo area, which would increase the potential benefits of coordinating area transit services in terms of ridership gains.

Status of Transit Information Services in Laredo Area

El Metro's website has been recently upgraded to provide maps and schedules for each of its routes. No online or other automated trip planning assistance is available, but El Metro customer service operators make use of the "MapQuest" website (<http://www.mapquest.com>) to help callers find the El Metro route(s) that best serve their trip origin and destination. Future plans include Trapeze route scheduling software and bus-information telephones at El Metro's major bus shelters.

El Aguila provides customer assistance by telephone for fixed-route trip information and paratransit reservations. At this time, no information except for El Aguila's telephone number is available online.

Of the intercity services, Greyhound provides the most extensive online information. Route and schedule information can be found by entering city names of the trip origin and destination. Reservations and ticket purchase can also be performed online, as well as over the telephone. El Conejo provides no online information at this time; route information and reservations are available via telephone. Latinos de Greyhound Autobuses and Latinos Azabache de Greyhound do not provide separate websites, but likewise offer information and reservations over the telephone. Valley Transit's website directs users to the Greyhound website for intercity service (Valley Transit and Greyhound are interlined); local service information is provided via telephone.

Benefits of Regional Information for Laredo Transit Services

A regional information system would help to promote the variety of transit services in and around Laredo, and it would be a valuable resource to the many people traveling from Mexico into Laredo and other destinations in Texas. Regional information coordination would also benefit future projects planned for Laredo transportation services, including bus rapid transit and a proposed 511 travel information telephone system for the region.

POSSIBLE APPROACH

A telephone-based system would be a feasible and cost-effective approach to regional transit information in the Laredo area. Existing infrastructure, in the form of a branching telephone/voice-mail network in operation at El Metro, makes this approach a low-cost way to introduce a regional information system that may later be expanded into other media.

Phase 1: Determine Coordination Agreements, Leadership, and Responsibilities

All participating transit providers and other stakeholders meet to determine their levels of participation in a regional effort, to agree on objectives for transit information coordination, and to develop institutional agreements for providing and updating information, and for providing or pursuing funding. Institutional issues affecting coordination of transit services should also be addressed, although the participating agencies may decide to defer some issues—for example, coordination of fare payment and filling gaps in transit service—to a later point in the coordination process. A lead agency or an interagency committee should be designated to head up the development, implementation, and eventual maintenance of the coordination effort.

- **Potential Institutional Issues:**
 - Transfers between services/providers
 - Gaps or disconnects between services
 - Different rider restrictions or riding rules (bicycle accessibility, luggage restrictions)
 - Scheduling coordination
 - Fare payment for multiple services
 - Updating information (updating frequency, consistency)
- **Potential Project/Coordination Leader:**
 - El Metro is the logical organizer for this system, as the owner of the telephone and voice-mail system that will serve as the transit information center.
- **Technical Needs:**
 - Voice-mail system (already in place at El Metro)
- **Financial Needs:**
 - Telephone company time for implementation--\$500
 - Periodic staff time for maintenance/updating information, maximum 5 – 10 hours/month
 - Bus-stop signs with regional information--\$300 each
- **Possible Funding Sources:**
 - For planning aspects, some MPO funding might be available.
 - El Metro
 - Greyhound
 - El Aguila

Phase 2: Telephone System – Recorded Information and Call Forwarding

El Metro's telephone network has 1000 separate voice-mail "boxes," of which only 30 to 40 are currently in use. The surplus mailboxes are available for use as a branching telephone

information system, with touch-tone menus leading to recorded information in English or Spanish for each participating transit provider in the area. The caller would also have the option of being connected (through call forwarding) to the offices of any provider for further assistance. The costs for setting up the menus and mailbox contents would total approximately \$500. Each agency would then have a password to their mailbox(es) for changes and updates. [Figure 10](#) shows a diagram of a sample branching system. The system would first ask the caller to select the desired language (e.g., “Press 1 for English, 2 for Spanish”). The next message would allow the caller to select Laredo city bus service (El Metro), Webb County rural service (El Aguila), Greyhound, El Conejo, or other options not shown in this example. The main message for each agency might contain information such as hours of service, fares, and location of major transit stops, and would provide the option of speaking directly with an operator at the agency’s call center (through call forwarding). If an agency wishes to offer additional menu options for further information, additional voice-mailboxes can be used (shown as boxes marked “Info” in the diagram).

A second option (which could be used in addition to the telephone system) would be static signs or posters at transit stops, particularly at hubs, indicating the transit services and providers available, contact information, and nearby boarding locations. The Laredo Transit Center in downtown Laredo is a multi-modal hub from which passengers can board El Metro, El Aguila, or Greyhound. El Conejo has a transit center only a few blocks away. Circular rotating signs for displaying El Metro route information at bus stops (currently under consideration for purchase) are \$300 each, with changeable/replaceable inserts. Similar signs would work for displaying regional transit information. Public service announcements with this information could also be placed in local media and with the Laredo Convention and Visitors Bureau.

Future Development

Future avenues for regional transit information in Laredo could include a web-based transit directory or clearinghouse. Another future option would be to include transit information as part of a 511 system for Laredo.

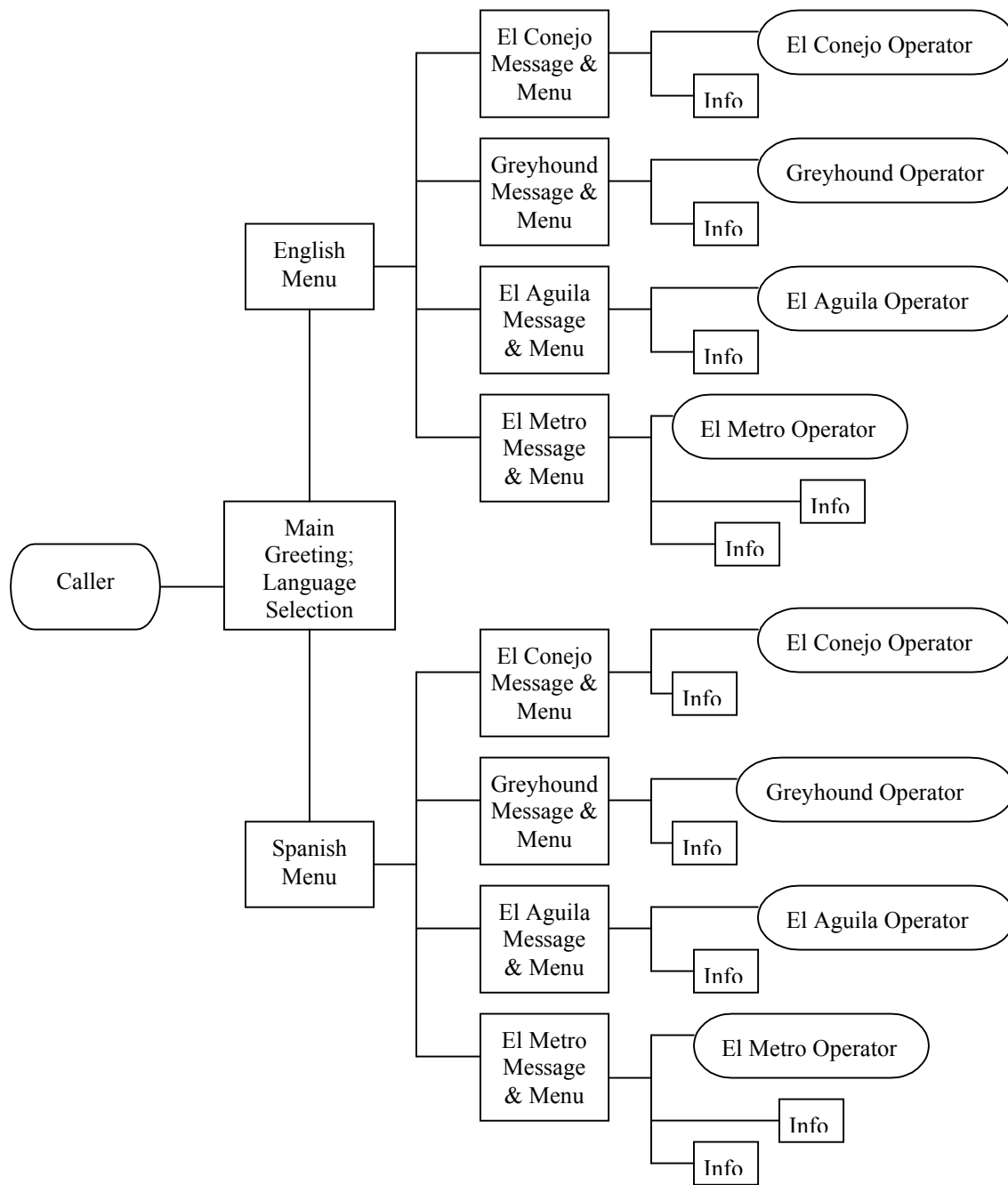


Figure 10. Illustration of Sample Branching System for Laredo.

CHAPTER 5. GUIDELINES FOR A REGIONAL TRANSIT INFORMATION SYSTEM – AUSTIN-SAN ANTONIO CORRIDOR

The Austin-San Antonio corridor includes eight counties and nearly 100 incorporated towns and cities, including San Marcos, New Braunfels, Bastrop, and Round Rock. Significant numbers of commuters travel between cities on a daily basis, with many commutes crossing transit and rideshare jurisdictional boundaries. Regional transit and rideshare information is therefore of interest to many of the transit providers and rideshare coordinators along the corridor.

BACKGROUND INFORMATION

Major Transit and Rideshare Providers and Stakeholders

The major transportation stakeholders in the Austin-San Antonio corridor include the following:

- Capital Metro (Austin),
- VIA (San Antonio),
- Capital Area Rural Transportation System (CARTS),
- San Marcos Transit (operated by CARTS),
- Alamo Area Council of Governments (AACOG)-Alamo Rural Transit,
- Capital Area Metropolitan Planning Organization (CAMPO) (Commute Solutions rideshare),
- AACOG (Commute Solutions rideshare),
- San Antonio/Bexar County MPO
- Amtrak,
- Greyhound,
- Greater Austin-San Antonio Corridor Council, and
- TxDOT.

Current or Past Coordination Projects

South Central Texas Transit Federation expressed an interest in the development of an interactive, integrated trip-planning system for the Austin-San Antonio area; however, this group is not currently active.

Benefits of Regional Information for Austin-San Antonio Transit Services

As mentioned above, the corridor is experiencing an increasing level of intercity commuting and other travel. Transit providers and rideshare coordinators in Austin, San

Antonio, and in the communities between are searching for ways to serve this market of travelers and increase ridership among students and other potential market segments in the corridor. Improving access to points of interest along the corridor, including retail and recreational centers and the San Antonio Medical Center, is another potential benefit of improved transit coordination (of which information coordination is a vital element). Finally, increased transit ridership will help Austin and San Antonio in meeting their air quality goals.

Status of Transit Information Services in Austin-San Antonio Area

Capital Metro is currently implementing trip-planning software for its customer service operators. A web-based system for customers using Trapeze software is planned for the end of 2002. Route maps, route schedules, and the system map are currently available to customers on Capital Metro's website.

VIA likewise offers route and system maps and schedules on its website, and the VIAINFO telephone number provides callers with bus schedule information for specific bus stops via an automated touch-tone system. Web-based trip planning, via Trapeze trip-planning software, is planned for the future, depending on funding.

CARTS is developing a search engine, using a Microsoft Access database, which will locate available transportation services using city names or other search words entered by the user. Route maps and schedules are also offered for each of the fixed-route services. Trapeze PASS software is used to schedule demand-response paratransit.

APPROACH

There is an interest among the major transit providers, as well as at AACOG and CAMPO, in pursuing a regional transit and rideshare information system. Initial issues involved in implementing such a system along this corridor include collecting, formatting, and meshing the necessary data from transit providers and establishing a lead agency or agencies (or a leadership committee from multiple agencies) to develop, administer, and maintain a regional information system. A potential phased approach to coordinating transit information in the corridor is outlined below.

Phase 1: Determine Coordination Agreements, Leadership, and Responsibilities

All participating transit providers and other stakeholders meet to determine their levels of participation in a regional effort and to develop institutional agreements for providing and updating information, for providing or pursuing funding, and for selecting and contracting with software vendors or consultants. Institutional issues affecting coordination of transit services should also be addressed, although the participating agencies may decide to defer some issues—

for example, coordination of fare payment and filling gaps in transit service—to a later point in the coordination process. A lead agency or an interagency committee should be designated to head up the development, implementation, and eventual maintenance of the coordination effort. Possible candidates suggested by stakeholders to lead the effort include the Austin-San Antonio Corridor Council, CAMPO, and/or AACOG.

- **Potential Institutional Issues:**
 - Meshing and standardizing data for all services
 - Transferring between services/providers
 - Service area boundaries and transfer points between services
 - Gaps or disconnects between services
 - Different passenger/riding rules (bicycle accessibility, luggage restrictions)
 - Scheduling coordination
 - Fare payment
 - Updating service, route, and schedule information
 - Staffing needs
 - Americans with Disabilities Act (ADA) accessibility—of particular importance at transfer points between services

- **Potential Project/Coordination Leaders** (identified by stakeholders in Austin/San Antonio corridor):
 - Austin-San Antonio Corridor Council
 - CAMPO or AACOG
 - Leadership committee or partnership based in Austin and San Antonio

- **Possible Funding Sources** (identified by stakeholders in Austin/San Antonio corridor):
 - CMAQ, FHWA, FTA or other transit funds
 - Capital Metro
 - VIA
 - CAMPO (possibility as part of planning budget)

Phase 2: Collect and Integrate Data

- **Complete GIS Data for the Corridor.** To prepare for point-to-point trip-planning capability across the region, transit service locations must be readable as geographic data points on a GIS map, which will relate those locations to the origins and destinations input by users and to the transfers (route to route, or from one provider to another) along the way. Capital Metro and VIA already have their bus stops geo-coded, and CARTS has the capability to do the same. Service areas of all transit providers, including demand-response providers such as Alamo Regional Transit, should also be coded for the GIS map.ⁱ Stop/arrival times must also be provided for each geocoded transit stop.

ⁱ Geocoding service area boundaries is the method proposed by the Oregon Department of Transportation's (ODOT) report (9) to identify the transportation provider(s) that serve the passenger's trip origination or destination. If

- *Option 1:* Capital Metro and/or VIA perform geo-coding for CARTS, Alamo Rural Transit, etc.
- *Option 2:* Fund position or staff hours at Austin-San Antonio Corridor Council, CAMPO, AACOG to lead this effort.
- **Develop Regional Database.** Integrate the existing transit routing information from Capital Metro and VIA, plus the information collected for other transit providers in the area. The database should include the GIS and time data described above, plus general customer information for each provider, including telephone numbers, website address (if any), hours of service, fares, and any riding restrictions.

Phase 3: Automated Trip Planning and User Interfaces

With institutional agreements in place, database(s) established, and data collected in the proper format, the foundation is in place for providing automated transit trip planning within the region. Elements required for this function are software that will perform trip planning using the geographic and scheduling data contained in the database and software/hardware to provide user interfaces.

- **Trip-Planning Software Criteria.** Trip-planning software should fulfill the following functional requirements for the Austin-San Antonio corridor:
 - allow linkages between multiple transit providers, with connection/transfer information provided where applicable
 - allow user-specified constraints or preferences such as:
 - minimum walking distance,
 - minimum travel time,
 - minimum number of transfers,
 - minimum cost, and
 - bicycle-accessible routes;
 - provide dynamic mapping support for:
 - walking directions between stops and origin/destination endpoints, and
 - route maps with transfers marked; and
 - optionally, direct user to appropriate demand-response provider or rideshare provider, based on input address and service area boundaries.
- **User Interfaces.** Possible user interfaces include a web-based interface for the public, an internet or intranet password-protected interface with additional inputs and more complex planning options for customer service operators, and interfaces designed for transit center kiosks and other devices. Criteria for development of user interfaces should include a mechanism for customer and operator feedback (e.g., a survey or comment form on a

another method or criteria can serve this purpose (such as identifying appropriate transit providers by counties or cities served), service boundaries may not need to be geocoded for the GIS map.

website, online error reporting and documentation for customer service operators), and possibly an agreement for a redesign of the interface(s) after a testing period.

- **Contracting Options for Software/Hardware.** Depending on the leadership and organizational structure for regional coordination defined in Phase 1, two possible options for Phase 3 contracting and development are described below.
 - *Option 1:* Regional lead agency or committee (see Phase 1) contracts with Trapeze, GIS Trans Ltd., or other vendor/consultant for regional trip-planning software function and user interfaces, to be licensed for use by individual transit providers and other stakeholders. The lead agency/committee also administers the development and maintenance of a regional transit information website for use by transit and rideshare customers.
 - *Option 2:* Capital Metro, already implementing Trapeze software for automated trip planning on its own routes, can begin using (and testing) the regional database to provide users with trip-planning options using information from all regional providers. VIA, CARTS, and other agencies individually contract with Trapeze or other software vendor for trip-planning software and website/user interfaces using the same database (or refer customers to the websites of those agencies that are equipped with automated trip planning). This option would still require a central leader/administrator to coordinate updates to the database.

Future Development: Expanded Trip Planning

Future enhancements to the information system, based on the suggestions from transit and rideshare providers along the corridor, include the following:

- demand-response transit/paratransit reservations on-line;
- carpool and vanpool reservations on-line;
- incorporation of transit trip-planning and other information into a 511 telephone information system; and
- real-time and other ITS information incorporated into trip-planning function:
 - real-time bus arrival information, and
 - real-time trip times/lengths.

CHAPTER 6. GUIDELINES FOR A REGIONAL TRANSIT INFORMATION SYSTEM – DALLAS-FORT WORTH AND NORTH CENTRAL TEXAS

The North Central Texas area includes 16 counties and 228 incorporated cities and towns, the largest being Dallas and Fort Worth. A significant amount of commuting and other travel across city and county lines has already led to coordination efforts among area transit providers. The Trinity Railway Express, a collaboration between Dallas Area Rapid Transit (DART) and Fort Worth's "The T" metropolitan transit agencies, is one answer to city-to-city travel, and the agencies are pursuing further coordination and regional transportation planning.

BACKGROUND INFORMATION

Public Transit Providers and Other Stakeholders

The major transportation stakeholders in the Dallas-Fort Worth area include:

- Dallas Area Rapid Transit (DART);
- Fort Worth Transit Authority (The T);
- Trinity Railway Express (DART/T joint project);
- Greyhound;
- City of Arlington-Handitran;
- City of Cleburne;
- City of Denton;
- City of Grand Prairie;
- City of Lewisville;
- City of Mesquite;
- Collin County Committee on Aging;
- Community Services Inc.;
- Northeast Transportation Service/ YMCA Urban Services;
- Palo Pinto County Transportation Council, Inc. (Public Transit Services);
- Services Programs for Aging Needs (SPAN);
- The Transit System, Inc.;
- Parker County Transportation Services;
- Kaufman County Senior Citizen Services;
- North Central Texas Council of Governments (NCTCOG);
- North Texas Transit Cooperation Association (NTTCA); and
- Texas Department of Transportation (TxDOT).

Current or Past Coordination Efforts

DART and The T, recognizing the importance of serving the large number of intercity travelers, have been working to coordinate their passenger information services and fare media. Both agencies are implementing Trapeze software for transit scheduling and for automated trip planning both on the web and through their customer service call centers.

The Trinity Railway Express connecting downtown Dallas, the DFW International Airport, and downtown Fort Worth is another collaboration project between DART and The T, expanding regional travel options in North Central Texas.

Bus-stop.org, developed by NTTCA, provides a one-stop resource for transit riders to locate the appropriate transit provider(s) for their travel needs in North Central Texas. NCTCOG is also developing a database of transit provider information, described in more detail in [Chapter 2](#).

Benefits of Regional Information for Dallas-Fort Worth (DFW) Area Transit Services

The high levels of intercity and county-to-county travel in the area have already prompted coordination between transit providers as mentioned above. Increased transit ridership would help the Dallas-Fort Worth area to achieve its air quality goals.

Status of Transit Information Services in DFW Area

DART's website currently offers maps and schedules of its routes, along with information on how to ride DART to special events, customer service contact information, and online fare purchasing. Point-to-point automated trip planning is now being implemented. DART's telephone information service uses intelligent voice recognition (IVR) to assist in answering and routing customer calls: the IVR feature acts similarly to a touch-tone menu system, using spoken requests and responses from the caller to provide automated information and/or to forward a call to the appropriate live operator for further assistance.

The T also provides maps and schedules on its website, with automated trip planning to be implemented in fiscal year 2004. Other customer information sources include information kiosks at commuter rail platforms and some major bus stops; future plans include next-bus notification signs and a real-time travel information map.

The Trinity Railway Express has a separate website, also providing route and schedule information. The site links to the sites for both DART and The T. Other North Central Texas transit provider websites include those for the City of Denton's LINK (with route information) and for SPAN (contact information).

POSSIBLE APPROACH

North Central Texas already has a regional transit directory available to the public (bus-stop.org), and the NTTCA, led by SPAN, is planning an update to the site. NCTCOG is developing a database of transit providers in the region.

Phase 1: Determine Coordination Agreements, Project Leadership, and Responsibilities

Participating transit providers and stakeholders should meet to determine their levels of participation in a regional effort and to develop institutional agreements for collecting information, for pursuing and/or providing funding, and for selecting and contracting with necessary vendors or consultants. The NTTCA participants list could form the basis for a coordination team, and as mentioned above, efforts are already underway to resume meetings of this group. Institutional issues affecting the coordination of transit information or services should also be addressed, although the participants may decide to defer some issues—for example, filling gaps in transit service—to a later point in the coordination process. A lead agency or an inter-agency committee should be designated to head up the development, implementation, and eventual maintenance of the coordination effort. Candidates suggested by stakeholders to lead the effort include NCTCOG, DART, and The T.

- **Potential Institutional Issues:**
 - Meshing and standardizing data from all transportation providers
 - Passenger transfers between providers
 - Service area boundaries and transfer points between services
 - Gaps or disconnects between services
 - Different passenger/riding rules (bicycle accessibility, luggage restrictions)
 - Scheduling coordination—DART and The T are already working on coordination
 - Fare payment—DART and The T are already working on coordination
 - Updating service, route, and schedule information
 - Staffing needs
 - ADA accessibility—of particular importance at transfer points between services

- **Potential Leaders:**
 - NCTCOG
 - DART
 - The T

- **Possible Funding Sources:**
 - CMAQ, FTA, FHWA
 - DART
 - The T
 - NCTCOG

Phase 2: Update Bus-stop.org Online Transit Directory

- **Update providers and provider information.** NCTCOG’s inventory of transportation providers and/or the database developed by the research project “Coordination of Transit Services in Texas” can serve as the basis for adding new transportation providers and updating the transit information currently provided by Bus-stop.org:
 - city and/or county of service;
 - contacts, telephone numbers, website addresses;
 - service hours, restrictions, fares; and
 - locations served (if any) in other cities/counties.

- **Expand database with route and schedule information.** Depending on the overall goals for regional transit information, route and schedule information can be added to the database in different ways.
 - *Option 1:* Route map graphics and schedules/timetables can be added as files accessible via links or menu selections from each provider’s main information page.
 - *Option 2:* Code transit stops as GIS data points. If point-to-point trip-planning capability is a goal for the website (or for telephone-based assistance), bus stop locations must be readable as geographic data points on a GIS map, which will relate those locations to the origins and destinations input by users and to the transfer points along the way. These data can also be used to generate route maps and timetables. DART transit stops are already geo-coded, in readiness for DART’s point-to-point trip-planning function (being implemented as of the summer of 2002), and the T will similarly have its stops geo-coded in preparation for planned point-to-point trip planning in fiscal year 2004. Service area boundaries for all transit providers, including demand-response providers, should also be geo-coded for the GIS map. For transit providers that follow fixed routes on the passenger “flag-down” system rather than employing designated stops, locations should be chosen at intervals along the routes to be coded as “stops” for the purpose of the database. Stop/arrival times must also be provided for all routes that serve each geographic transit stop.

Phase 3: Automated Trip Planning

With institutional agreements in place, database(s) established, and data collected, the foundation is built for providing automated point-to-point transit trip planning within the region. Elements required for this function are software that will perform point-to-point trip planning using the geographic and scheduling data contained in the database and software/hardware to provide user interfaces.

- **Trip Planning Software Criteria.** Point-to-point trip-planning software should fulfill the following functional requirements for the Dallas-Fort Worth area:

- allow linkages between multiple transit providers, with connection/transfer information provided where applicable;
 - allow user-specified constraints or preferences such as:
 - minimum walking distance,
 - minimum travel time,
 - minimum number of transfers,
 - minimum cost, and
 - bicycle-accessible routes;
 - provide dynamic mapping support for:
 - walking directions between stops and origin/destination endpoints, and
 - route maps with transfers marked; and
 - Optionally, can also direct user to appropriate demand-response provider or rideshare provider, based on input address and service area boundaries.
- **User Interface.** Besides the public website, an intranet or password-protected Internet interface should be provided for transit customer service operators, with provisions for additional inputs and more complex trip-planning options. Other possible interfaces include transit center kiosks and PDAs. Criteria for development of user interfaces should include a mechanism for customer and operator feedback (e.g., a survey or comment form on a website, online error reporting and documentation for customer service operators), and possibly an agreement for a redesign of the interface(s) after a testing period.
 - **Contracting Options:** Depending on the leadership and organizational structure for regional coordination defined in Phase 1, two possible options for Phase 3 contracting and development are described below.
 - *Option 1:* Regional lead agency (see Phase 1) contracts with Trapeze, GIS Trans Ltd., or other vendor/consultant for regional trip-planning software function and user interfaces, to be licensed for use by individual transit providers and other stakeholders. The lead agency/committee also administers the development and maintenance of a regional transit information website for use by transit and rideshare customers.
 - *Option 2:* DART, already implementing Trapeze software for point-to-point trip planning on its own routes, begins using (and testing) the regional database to provide users with trip-planning options using information from all providers in the North Central Texas region. The T likewise uses the regional database upon implementing point-to-point trip planning in FY 2004. Other providers and stakeholders contract for use of the software and the database, or refer their customer service operators (and customers) to the web-based trip planner (if provided by DART and/or The T). This option would still require a central leader/administrator to coordinate updates to the regional database.

Future Development

Future enhancements to the information system, based on the suggestions from transit and rideshare providers along the corridor, include the following.

- demand-response transit/paratransit reservations online;
- carpool and vanpool reservations online;
- incorporation of transit trip planning and other information into a 511 telephone information system; and
- real-time and other ITS information incorporated into trip-planning function for:
 - real-time bus arrival information, and
 - real-time trip times/lengths.

CHAPTER 7. FOLLOW-UP IMPLEMENTATION AND RESEARCH ACTIVITIES

SUMMARY OF THIS PROJECT

This project reviewed the experiences of several existing regional transit information systems, and based on those experiences the research team provided guidelines for the development of similar systems in Texas. The project also described how these guidelines might be applied in each of three case study areas in Texas.

POTENTIAL IMPLEMENTATION IN THE THREE CASE STUDY AREAS

The North Texas Transit Cooperation Association, who previously collaborated to develop bus-stop.org, is planning to resume meetings and is a likely group to participate in further implementation of transit information coordination across the Dallas-Fort Worth region. Transportation providers include Dallas Area Rapid Transit, Fort Worth Transit Authority, Trinity Railway Express, Greyhound, City of Arlington-Handitran, City of Cleburne, City of Denton, City of Grand Prairie, City of Lewisville, City of Mesquite, Collin County Committee on Aging, Community Services Inc., Northeast Transportation Service/ YMCA Urban Services, Palo Pinto County Transportation Council, Inc. (Public Transit Services), Services Programs for Aging Needs (SPAN), The Transit System, Inc., Parker County Transportation Services, and Kaufman County Senior Citizen Services. The North Central Texas Council of Governments (NCTCOG) and the Dallas and Fort Worth district offices of TxDOT are other likely participants.

The South Central Texas Transit Federation in the Austin-San Antonio corridor is not currently active, but the former members are potential participants in future implementation efforts. Transportation providers and stakeholders include Capital Metro, VIA, CARTS, San Marcos Transit (operated by CARTS), AACOG and Alamo Rural Transit, CAMPO, San Antonio/Bexar County MPO, Amtrak, Greyhound, and the Greater Austin-San Antonio Corridor Council.

El Metro, El Aguila, and the Laredo MPO have expressed a willingness to work together to coordinate transit information, and El Metro has offered to provide space on its telephone voice-mail system for recorded transit information and call routing to the local transit providers. Greyhound, El Conejo, Latinos de Greyhound Autobuses, Latinos Azabache De Greyhound, the Valley Transit Company, and the TxDOT Laredo District Office are other potential participants in coordination efforts for this area.

Implementation Assistance

The following are some of the ways in which TxDOT could provide assistance in implementing regional transit information coordination:

- provide state funding assistance;
- assist local jurisdictions in applying for federal funding;
- provide coordination assistance and resources, including maintenance of the project website, assistance in developing coordination agreements, and assistance in development of requests for proposals for transit trip planning software and hardware; and
- encourage MPOs to support coordination activities.

Monitoring and Evaluation

If one or more of the case study areas pursues implementation of a regional transit information system, evaluation of one or more performance measures would help to quantify benefits of this level of transit coordination. Some potential before-and-after measures are:

- transit ridership levels for each provider in the system and overall for the region;
- customer comments:
 - received by providers, and
 - collected via transit information website; and
- public awareness of transit services and/or the information resource.

OTHER ACTIVITIES

Research can be conducted on further coordination efforts, both in Texas and elsewhere; some of the systems profiled in this research are planning or implementing further coordination projects, including analysis of gaps and disconnects in transit service and the integration of real-time traffic information with transit information and scheduling.

Multi-modal fare media, multi-modal transit centers, schedule coordination, and other steps toward “seamless” travel on public and private transit carriers are additional topics for future research and implementation.

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APPENDIX

**SAMPLE RECORD,
TRANSPORTATION STAKEHOLDER DATABASE**

TRANSPORTATION PROVIDER INVENTORY

PROVIDER/ORGANIZATION

Provider :

Known as:

Address 1:

Address 2:

City:

County:

State: **Zip:**

Website:

CONTACT

Name:

Title:

Phone No: **Alt No:**

Fax No: **Email:**

AGENCY

Type: **No. Employees:**

Funding:

MODE/TYPE OF SERVICE

Mark all that apply.....

- Curb to Curb Demand Response Fixed Route
- Door to Door Paratransit
- Subscription (Pre-arranged standing order trip requests)

Other Types of Services

SERVICE AVAILABILITY - CLIENTS

Mark all that apply.....

- General Elderly (please specify):
- Job Access Persons with Disabilities
- Welfare to Work

Other Eligibility Requirements:

SERVICE AREA

Service Area Defined As:

Services into Austin from Park-n-Ride locations in Elgin, San Marcos, Smithville, and Bastrop

Please be specific, indicating street, city, and/or county boundaries.

Case Study Area:

Austin-San Antonio (Austin)

SERVICE AVAILABILITY - TRIPS

Mark all that apply.....

- General
- School
- Social/ Recreational
- Welfare to Work
- Shopping
- Medical
- Other (please specify):

OPERATIONAL INFORMATION

Hours of Operation

WEEKDAY	WEEKEND		HOLIDAYS
	Sat	Sun	
From:	From:	From:	From:
8:00 am			
To:	To:	To:	To:
4:00 pm			

Reservation Required

Notice Required

Phone: 1-800-456-7433

How much?: 24 hours

Service Window:

Fare Structure

Adults:

Seniors:

Students:

Children:

Defined as:

Discounts:

Guest Policy

Guest Policy:

If applicable

Vehicles

Number of Vehicles:

0

Types of Vehicles:

Trip Segments (Defined as):

One Way

Reimbursement:

Other:

Accessibility of Vehicles

ADDITIONAL NOTES

PROFILE STATUS

Initial Contact Made:

Follow-Up:

Profile Completed:

Completed By:

Updated:

By:

Updated:

By:

Updated:

By:

Updated June 28, 2001