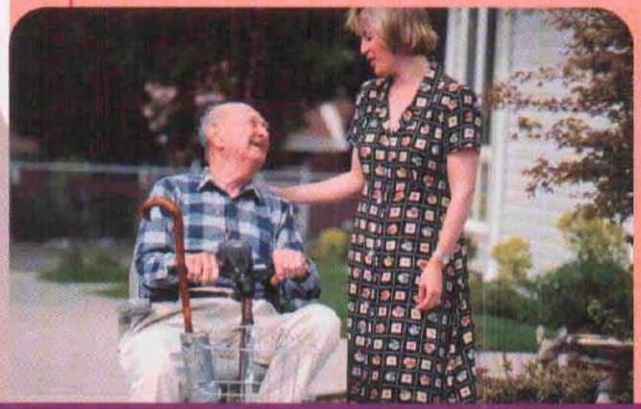
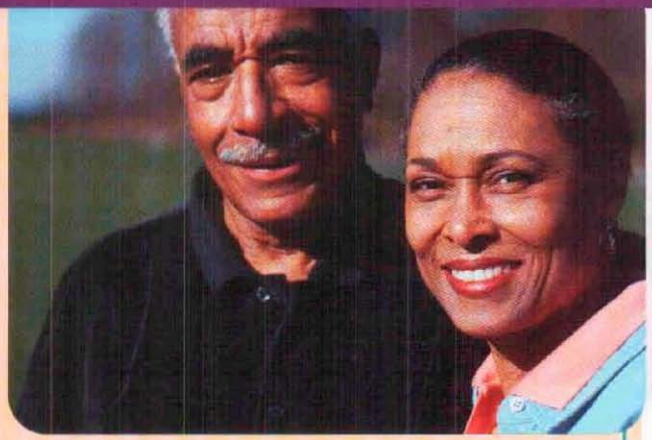


TECHNOLOGY IN RURAL TRANSIT: LINKING PEOPLE WITH THEIR COMMUNITY



U.S.Department of Transportation
Federal Transit Administration
Federal Highway Administration

Notice

This document is disseminated under the sponsorship of the U.S. Department of Transportation, Federal Transit Administration, in the interest of information exchange. The United States Government assumes no liability for the contents or use thereof.

The United States Government does not endorse manufacturers or products. Trade names appear in the document only because they are essential to the contents of the report.

REPORT DOCUMENTATION PAGE

OMB No. 0704-0188

AGENCY USE ONLY (LEAVE BLANK)	REPORT DATE	REPORT TYPE AND DATES COVERED
	JANUARY 2002	FINAL REPORT

TITLE AND SUBTITLE
Technology in Rural Transit: Linking People with Their Community

FUNDING NUMBERS

AUTHOR(S)
Thomas N. Harvey, Ph.D., William T. Hathaway IV, P.E., and Marina Melchiorre, E.I.T.

PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Harvard Design and Mapping Company, Inc. (HDM)
30 Spinelli Place
Cambridge, MA 02138

PERFORMING ORGANIZATION REPORT NUMBER

SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

U.S. Department of Transportation
Federal Transit Administration
Research, Demonstration and Innovation
400 Seventh Street, SW
Washington, DC 20590

U.S. Department of Transportation
Federal Highway Administration
ITS Joint Program Office
400 Seventh Street, SW
Washington, DC 20590

SPONSORING/MONITORING AGENCY REPORT NUMBER
FTA-MA-99-0356-01-1
FHWA-OP-02-028

SUPPLEMENTARY NOTES

DISTRIBUTION/AVAILABILITY STATEMENT

DISTRIBUTION CODE

ABSTRACT

This report documents the work performed for the FTA's Office of Research, Innovation and Demonstration in support of the Mobility and Accessibility Strategic Goal and the outcome goal of employing the latest technology to meet the increased needs of mobility and accessibility.

The goal of this report is to provide rural transit systems with the tools to implement Rural Intelligent Transportation System (ITS) applications to help improve their ability to link people with their community. The report identifies and documents transit agencies that illustrate best practices in implementation of technology to advance rural transit. It further documents research undertaken to identify steps to successfully plan and implement technology in rural transit.

SUBJECT TERMS
Rural Intelligent Transportation Systems, ITS, Advanced Rural Transportation Systems, Advanced Public Transportation Systems, APTS, Advanced Technology Transit Applications, Transit Information Systems

NUMBER OF PAGES

PRICE CODE

SECURITY CLASSIFICATION OF REPORT	SECURITY CLASSIFICATION OF THIS PAGE	SECURITY CLASSIFICATION OF ABSTRACT	LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	

Technology in Rural Transit: Linking People with Their Community

Report No. FTA-MA-99-0356-01-1
FHWA-OP-02-028

Prepared by

Harvard Design and Mapping Company, Inc.
30 Spinelli Place
Cambridge, MA 02138
www.hdm.com
Elena Bleakley, Editor

Prepared for

U.S.Department of Transportation
Federal Transit Administration
Federal Highway Administration

Federal Transit Administration
Office of Research, Demonstration and Innovation
400 Seventh Street, SW
Washington, DC 20590
www.fta.dot.gov

Federal Highway Administration
Intelligent Transportation System Joint Program Office
400 Seventh Street, SW
Washington, DC 20590
www.its.dot.gov

Designed by KBB Communications Design, Newton, MA

January 2002

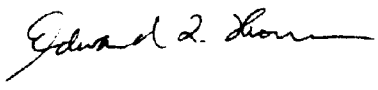
Foreword

Dear Colleague:

For millions of people living in rural communities, public transit is the vital link that connects them to work, school, health care, services, resources, friends and families. As reflected in the U.S. Department of Transportation's Strategic Goals, the Federal Transit Administration and Federal Highway Administration is committed to ensuring that these individuals, like all Americans, have access to transit to meet their basic mobility and accessibility needs.

Working together with our local and state partners, we can ensure that we have credible programs to meet this demand for reliable, safe and convenient transit. Many rural transit systems have explored the use of technology to improve transportation service efficiency and human mobility. There is much to be gained by sharing the experiences of these systems and establishing a shared body of knowledge.

The work that is presented in this report supports these efforts and will provide a valuable tool for rural transit systems.



Edward L. Thomas
Associate Administrator
Office of Research, Demonstration and Innovation
Federal Transit Administration

Christine M. Johnson
Program Manager, Operations Director
ITS Joint Program Office
Federal Highway Administration

Preface

The disappearance of jobs in rural areas and the urbanization of our society have combined to isolate individuals and small communities. Not having access to transportation in a rural area frequently means not having access to essential needs such as health care, jobs, education, and even family and friends – the most basic human needs.

However, the innovations in technology, notably Intelligent Transportation Systems (ITS), during the past two decades have made possible major changes in the transportation system. The application of the personal computer and the expanding capabilities of computer hardware and software have provided powerful tools for rural transit managers.

These innovations in technology, the establishment of ITS America, and the Intermodal Surface Transportation Efficiency Act of 1991 have resulted in the United States Department of Transportation's initiative in ITS. ITS applies current and emerging technologies in the fields of electronics, communications, navigation, information processing, information displays, computers and control systems to all forms of transportation. The ITS subset applicable to transit created by the Federal Transit Administration has been labeled Advanced Public Transportation System (APTS) technologies. The term, Transit ITS, is used to designate APTS deployed in the actual day-to-day provision of public transportation. Effectively integrated and deployed, ITS technologies can enhance safety and make transportation more widely and efficiently available to rural areas.[1]

Transit ITS technologies most relevant to rural systems include:

- Accounting Software
- Automatic Passenger Counters
- Automatic Vehicle Location Systems (AVL)
- Communications
- Customized Spreadsheet and Databases
- Demand-Responsive Transit Software
- Geographic Information Systems (GIS)
- Internet Web site
- Maintenance Software
- Silent Alarm System
- Mobile Data Terminal
- Palmtop Electronic Manifest Device
- Personnel Management Software
- Signal Priority
- Transit Operations Software
- Traveler Information Systems

Initial applications of Transit ITS took place within urban systems that, for the most part, developed and applied the technology. Since the implementation within urban systems proved successful and additional applications for Transit ITS were identified, it became apparent that the application to rural transit systems would enhance not only their operations, but also the workforce's quality of life.

Each tool has advantages and related implications. The most widely used of these is the transit operations software for the scheduling and dispatching of trips. It is important to note the tools described above may not necessarily address the needs of or be appropriate for every system. Each system is unique and has its own needs and capabilities that must be examined to determine the technology that will be most beneficial.

[1] "Rural Public Transportation Technologies: User Needs and Applications," TECHBRIEF, September 1998, FHWA-RD-98-146. Highest priority needs are the Rural Transit Operator Information Kit (Planning Guidebook), the Rural APTS Success Story Booklet (Best Practices) and demonstrations of low-cost technologies.

Organization of this Report

This report is designed to act as a planning tool for implementing Transit ITS in rural systems. While presented as a single integrated document it contains four distinct sections as described below:

A Guidebook for Planning Rural Transit ITS Applications
A Guidebook for Planning Rural Transit ITS Applications contains an ordered set of suggestions for choosing new information-management technology to improve the performance of a rural transit system. It is built on the experience of transit professionals from throughout the United States.

Best Practices in Rural Transit ITS
The Best Practices in Rural Transit ITS document is the result of a review of Transit ITS and its application to rural transit operations in the field. The document is organized to address the planning, research, procurement, implementation and evaluation of technologies and applications. Included are a series of best practices, consisting of suggestions and guidelines, intended to provide guidance and to minimize the learning curve in evaluating, selecting and implementing Transit ITS technologies and applications.

Transit ITS Case Studies
The *Transit ITS Case Studies* were derived from interviews with transit systems at various stages of Transit ITS implementation. The case studies are intended to showcase the approach used by individual systems. They describe the motivations for considering Transit ITS, approaches taken, final results, and lessons learned. Each case study also summarizes the transit system's characteristics including the service area, fleet description, service types, passenger trip statistics, and project funding sources.

Transit ITS Resources
The Transit ITS Resources contain a variety of information useful to the planners of Transit ITS applications. Included is a copy of a Transit ITS field survey questionnaire, a bibliography of relevant print and Internet publications, a useful list of federal and state agency rural transit contacts, and a glossary of terms and acronyms.

The information contained in this report will be an important resource to help improve and ensure mobility and access in rural communities.

Acknowledgements

The authors would like to thank the many individuals and organizations who assisted in the development of this report. Their input was invaluable in creating a practical planning tool for implementing Transit ITS technology in rural transit systems.

Our sincere appreciation is extended to William Wiggins of the Office of Research, Demonstration Innovation for his direction and guidance throughout this project.

We are also grateful to the individuals who participated in the expert panel to kick off this effort. They provided insight into the challenges facing rural transit systems and helped guide this project. The field personnel lending their expertise included:

- Michael Connelly, Blacksburg (Virginia) Transit
- David Eckern, Minnesota Department of Transportation
- Annette Emery, California Department of Business and Transportation
- Edward Griffin, Florida Commission on Transportation for the Disadvantaged
- Dr. Ann Hamilton, Forsyth County (North Carolina) Social Services
- Susan Jeffers, Blue Grass Community Action Organization, Kentucky
- Michael Landry, OATS, Missouri
- Robin Phillips, Oregon Department of Transportation
- Dennis Walsh, Cape Cod (Massachusetts) Regional Transit Authority
- Pamela Ward, Ottumwa (Iowa) Transit Authority

FTA staff participating in the expert panel included William Wiggins, Charlene Wilder, Douglas Bernie, Paul Verchinski and Charles Goodman. Michael Freitas and Dianne McSwain of FHWA and HHS, respectively, and Joseph Coughlin, Ph.D. of the Massachusetts Institute of Technology Center for Transportation Studies provided additional support. Individuals who provided assistance in setting up the panel and visiting the transit systems include Jean Palmateer, William Gardner, Peter Spaulding, and Chris Ziegler.

A special note of appreciation goes to the rural transit system operators and their associates who participated in the interview process. Without the time that they took to candidly recount their experiences implementing technology in rural transit, this document would be incomplete. These individuals included:

- Larry Alflen - Zuni Transit, Zuni, NM
- Julie Brown - Rogue Valley Transportation District, Medford, OR
- Donna Cart - Marion County Senior Services, Ocala, FL
- Thomas Cruikshank - St. Cloud Metropolitan Transit Commission, St. Cloud, MN
- Dale DeRoest - South Lane Wheels, Cottage Grove, OR

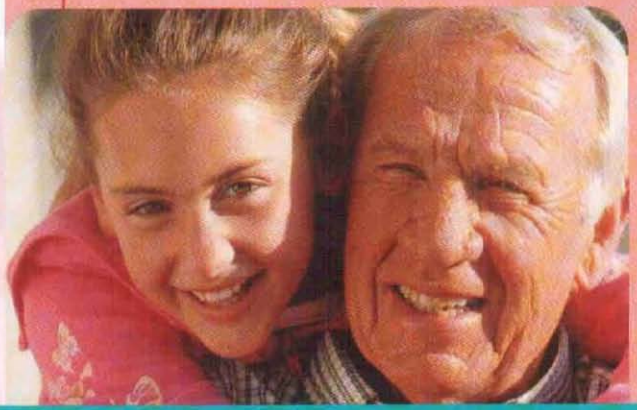
- Ramona Dillard, Melissa Talahaftewa, Brandon Mariano - Shaa'srk'a ("Roadrunner") Transit, Laguna, NM
- Elizabeth Falk - Montachusett Regional Transit Authority, Fitchburg, MA
- Mark Hoisser - Dakota Area Resources & Transportation for Seniors, West St. Paul, MN
- Ric Ingham - Central Oregon Intergovernmental Council, Redmond, OR
- Steven Jones - Lorraine Toner Flagler County Transit, Palm Coast, FL
- Jack Larson - Arrowhead Transit ,Virginia, MN
- Richard Maddern and Don Mohawk - Minnesota DOT
- Brian Nourse - St. John's Council on Aging, St. Augustine, FL
- Terry Parker - Lane Council of Governments and Lane Transit District, Florence, OR
- Dawn Pike - Josephine County Health & Community Action, Grants Pass, OR
- Fred Stoffer - Special Mobility Services, Inc., Eugene, OR
- Sandra Strieby - Sunset Empire Transit District, Astoria OR Sunset Empire Transportation District
- Dennis Walsh - Cape Cod Regional Transit Authority, Cape Cod, MA
- Perry B. Yazzie - Navajo Transit System, Window Rock, AZ

Special thanks go also to Elaine Brouillard, Amy D. Estelle, Judith M. Espinosa, Miguel F. Sarria, and Mary E. White from the ATR Institute at the University of New Mexico, and Josette Lucero from the New Mexico State Highway and Transportation Department Public Transit Programs Bureau.

Finally, thanks to Carol Schweiger of Multisystems, and Matthew Hardy of Mitretek Systems for their review and comments on this report.

U.S.Department of Transportation
Federal Transit Administration
Federal Highway Administration

innovation



A GUIDEBOOK FOR PLANNING RURAL TRANSIT ITS APPLICATIONS

opportunity

TABLE OF CONTENTS *A Guidebook for Planning Rural Transit ITS Applications*

INTRODUCTION

1.1 Purpose of the Guidebook

The purpose of *A Guidebook for Planning Rural Transit ITS Applications* is to assist transit systems, especially their managers, in identifying their present and future needs, assessing those needs and then addressing them. This Guidebook provides insight into how Intelligent Transportation System (ITS) technologies can help address those needs, as well as an understanding of available and currently used ITS applications and financing mechanisms.

The Guidebook contains an ordered set of suggestions for choosing new information-management technology to improve the performance of your rural transit system. Finally, it provides a glimpse of the reasons why a number of transit systems have adopted ITS technology to solve their problems. We have tried to include the key elements and considerations involved in such a process. Although readers with experience in transit and/or ITS will find some parts familiar, we hope the guide will be helpful to all who read it.

1.2 Overview of the Guidebook

Section 2: "The Challenge of Identifying Transit System Needs"
Building on material found in the accompanying report, *Best Practices in Rural Transit ITS*, Section 2 focuses on identifying the potential needs of your system, some of which may be addressed using Transit ITS applications. First, it identifies the nature of the challenge facing the transit manager. Then it covers three steps to identifying transit system needs for the new technology. They are to evaluate the existing system, predict future needs, and analyze current business processes. The section culminates with a fictitious example illustrating one manager's approach to the problem of identifying transit system needs and how these needs may be addressed by Transit ITS solutions.

Section 3: "Identifying the Technologies Available to Meet the Needs"
Section 3 provides sources of information and techniques for learning about the nature of the various Transit ITS applications. This section is directed toward the individual who has little acquaintance with these new tools. Consequently, it covers virtually all types of tools that are currently available. The section is also designed to present the reader with the fundamentals needed to understand new applications as they come to market. A number of references are given to sources of pertinent information, both those in print and on the Internet. The section gives examples of the more widely used types of information, including training courses. Once again, an example is given showing one manager's approach to learning about the various Transit ITS technologies available.

Section 4: "Planning the Implementation"
This section is a step-by-step guide to the Transit ITS implementation process. It starts by suggesting a prioritization of the applications that have been identified as meeting a system's particular need. It explains various criteria and methods that can be used to estimate them. Considerations such as system capital, maintenance, and operating costs are included. Also covered are the staff skills needed to implement the system, focusing on those that may be new to a rural transit operation. The section identifies types and examples of collaborative agencies that the transit system must work with to initiate and operate the new Transit ITS applications.

This section also covers the selection of both the computer hardware and software required for some Transit ITS applications. Rural transit management needs to be aware of the pitfalls that others have experienced in this aspect of the implementation process. Therefore, the section also includes the experience of other systems, pointing out specific ingredients of success with hardware and software selection.

The final component of this section includes an emphasis on training. The time and cost of successful training are two requirements of system implementation that are most often underestimated. The types of options available and their relative merits are discussed. As well, key elements of system installation planning are covered, along with some of the "dos" and "dont's" emerging from prior experiences around the country. Finally, Section 4 concludes with an example of the approach taken by one system in implementation planning.

Section 5: "Evaluating the Implementation"
This section focuses on the assessment of new applications after they are up and running. It includes recommendations on the type of information that should be kept to evaluate technology implementations. It also contains suggestions about parallel operations and other forms of back-up that help protect against early system flaws and installation failures. Examples are given of implementation problems, successes, and evaluations already experienced by rural transit systems around the country.

Section 6: "Where Does ITS Rural Planning Go from Here?"
This section briefly explains how the Guidebook provides a framework for managing the future. It can help rural transit managers organize, assimilate, and make use of technological information coming at them at an ever increasing rate. It can help them plan for the future by participating in the development of new collaborative relationships with social service agencies, businesses, and other transit providers interested in improving services for rural area communities.

THE CHALLENGE OF IDENTIFYING TRANSIT SYSTEM NEEDS

2.1 The Nature of the Challenge for Transit Managers

The expanding capabilities of computer hardware and software have created new and more powerful tools for rural transit managers. Many are described in the accompanying report, *Best Practices in Rural Transit ITS*. Better communications among drivers, dispatchers, and riders increase the potential for better service. Greater efficiencies can come from new routines for scheduling runs and trips. Geographic Information System-based vehicle locators as well as more comprehensive and accessible vehicle inspection and maintenance records can improve system safety and security. Even the use of e-mail and other features of the Internet can improve the efficiency and effectiveness of transit systems. These are just a few of the new capabilities.

The challenge for rural transit managers is how to take advantage of these new capabilities. One of the first things to be recognized is that computer-based technologies can be applied to virtually every aspect of rural transit system operations. Consequently, the first step that the transit manager should take is to identify current needs of the system for improvement. Any one of these identified needs could be a candidate for the application of one or more Transit ITS technologies. It is important to recognize that not every need will best be met with a Transit ITS application. Careful examination of administrative processes, for example, often reveals outdated, outmoded, or redundant procedures that merely need to be reorganized or replaced.

The manager should also keep in mind that a transit system is a constantly changing organization. He or she must not only respond to today's needs but also recognize that the transit system will change over time. This change may be the result of modifications to operations, service area expansions, acquisition of new equipment, new customer groups, altered environmental regulations, and many other influences. The transit system will not be the same tomorrow or in one, five or ten years.

Transit ITS applications can assist managers in managing the development of their systems to respond to these anticipated changes. In order for a transit system to fully take advantage of the technologies and tools that are available do this, the needs of the transit system need to be identified.

Transit ITS can assist managers in managing change in their systems over time.

One means of approaching the challenges is given in: Schweiger and Marks, "Needs Assessment for Transit ITS: A Structured Approach," **World ITS Congress, Turin, Italy, 2000.**

2.2 Identifying the Needs for New Technology

2.2.1 Assess the Existing System

The first level of identifying needs for new technology is the ongoing process of assessing your existing system for problems or opportunities for improvement. Those who operate or use the system, such as first line supervisors, employees and customers, may be most familiar with these problems and opportunities. Seeking out their concerns and suggestions often pays dividends. Not every need uncovered is going to have a good solution among Transit ITS applications, however. Consequently, it is good to approach needs identification in the first instance without concern for the type of solution it might have.

Three Steps to Identifying Needs

- **Assess the existing system**
- **Predict future needs**
- **Analyze current business processes**

There are several questions to ask when looking at your existing operations to determine the extent to which the transit system is responding to patrons' needs.

- Are you meeting the service demand?
- Are there a lot of complaints?
- Where are complaints directed?
- Do you talk with and listen to the suggestions of your patrons, the communities you serve, or your employees?

When you look at the following list of goals, which ones do you want to accomplish?

- Increased ridership?
- Fewer complaints?
- Happier employees?
- Lower operating costs?
- More service for the same or less cost?

It is important to identify the goals that you have for your system.

Meeting these goals may require changes in the quantity and quality of transit service. ITS technologies and applications might be able to help you achieve them.

It is helpful to have objectives that will identify actions that lead toward the goal. Many of these actions may involve the additions of Transit ITS technology to your system. Particular changes call for particular types of computer hardware and software. Candidate activities for improvement include passenger booking, run scheduling, vehicle dispatching, vehicle routing, vehicle maintenance, and fare collection. Any choices that you make should be made with an eye toward the goal. The fulfillment of system needs should be directly related to achieving the goal.

2.2.2 *Predict Future Needs*

A second level of looking at what you need or how you might expect your system to change is to consider the planning that you or someone else has already done for the future. Although you may not have had the time to really plan anything, you have probably been thinking about possible changes. Whatever thoughts you have had about future needs and system changes should be put on a list and placed in a readily accessible file. You will later want to check this list to see if Transit ITS technology can meet some of the future demands placed on your system. Ask yourself how meeting each of those future needs will contribute to your goal for the system.

It is also important to take advantage of the fact that you are part of a larger community system. People may have done planning for you as part of another organization or have a vision of where they expect your system to be going as time progresses. In essence, your system may not have its own long-term plan, but be part of the plan of another planning or social service organization. This could identify your system's direction in future years.

Planning organizations typically include agencies at the state, regional, metropolitan area, county, or local level. You will need to convert the plan - yours, the potential client's or the planning organization's - into appropriate terms for planning transit services. Their plans for future development in the area that your system serves will provide important clues about where residences, workplaces, and other activities of your future clients may be located. Expanding service to the developing areas should be added to your list of future needs. Any other changes that will be required to make the service expansion possible should be added to your list.

Social service agencies are another type of organization with plans that may affect your system. Many have clients with needs for transportation to and from locations where the agencies provide their various services. Some of these agencies may currently provide transportation for their clients. Several federal programs of assistance to people in rural areas are in operation around the country today. You may want to contact those agencies to determine which ones have clients or facilities in your service area. If you think that any of these agencies and their clients may want your system to provide transportation for them in the future, you should add them to your list.

Each focus on a particular need, and most have transportation requirements. The transit planner and the transit-operating agency can benefit by mapping locations of beneficiary residences and service-delivery facilities using GIS software. Once these locations are acquired and plotted on a map using GIS, the transportation need can be easily visualized in operating terms.

The transit planner can use this same approach to plot the ends of trips for other purposes. These purposes include journeys to work, shopping, recreation, church and meetings, and also trips to clinics and other social services for persons who are not beneficiaries of social service agencies. One trip end is usually the residence of the trip-taker, while the other is the location of the activity. When the frequency and timing of the trips are added to the GIS database, the demand for transportation is visually presented in a form that directly supports transit service planning and transit operations.

The accompanying *Transit ITS Resources* contain lists of federal and state agencies as well as other organizations with potential needs for rural transit. The Community Transportation Association of America (CTAA) has an annually updated resource that offers more program details and contacts, particularly at the regional (multi-state) and state levels.[3]

Keep in mind that your system is part of a larger community. Other agencies and organizations could impact your system's direction in future years.

[3] The CTAA publishes an annual guide that consists of a directory of federal funding resources along with federal, state and regional contacts. The "Resource Guide 2000" may be obtained by contacting the CTAA National Transit Resource Center at 1-800-527-8279 or emailing resources@ctaa.org. The CTAA is also on the web at www.ctaa.org.

2.2.3 Analyze Current Business Processes

The third facet of needs identification is to scrutinize the business processes performed by your agency. These include business functions such as billing, cash management, procurement, payroll, personnel records, and training. Cost-reduction opportunities may not always be obvious, yet business processes and the functions they encompass can be inefficient. Benchmarking, that is comparing the performance of your system with that of other systems, based on the prior experience of the managers or other staff members may be helpful. This requires an uncompromising look at how each process is organized and the resources that are being used to accomplish it.

Business Process Analysis – An Example

Identify activities that appear to take too much staff time and/or cost to accomplish. Are the tasks involved unnecessarily complex or circuitous? Are the tasks redundant or just plain unnecessary? Any suspect process should be documented on an action chart. Figure 1 shows an example process action chart. Something similar can be done with pencil and paper.

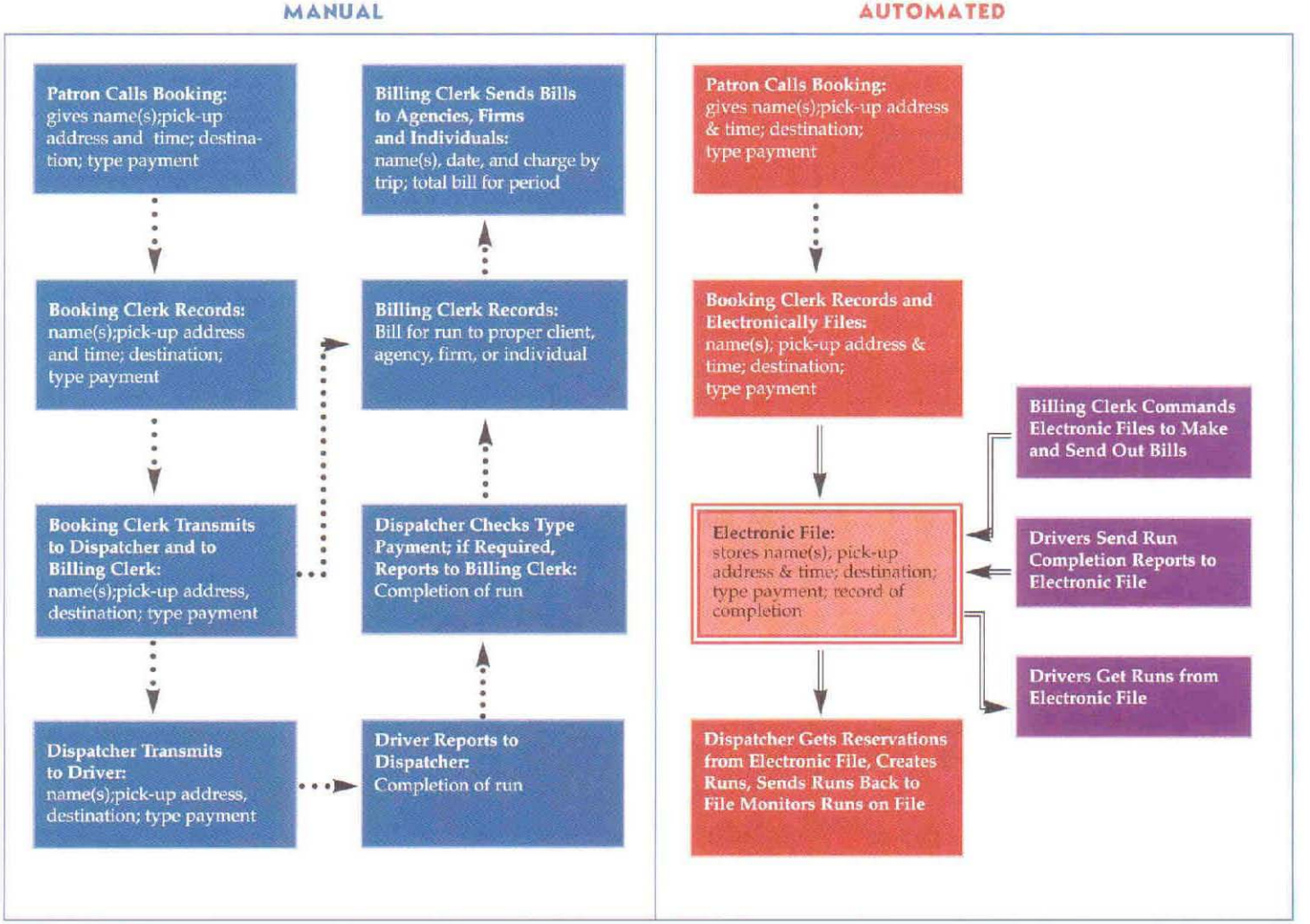
To prepare a useful process action chart:

- Ensure that all actions are included in the process.
- Provide the time sequence and the flow of action in the process.
- Show the time required to perform each action.
- Indicate the level of expertise required to perform each action.

After you have prepared the process action chart, ask the following questions for each action:

- Is this action needed?
- Is the action flow unnecessarily circuitous or redundant?
- Can the required actions be simplified or eliminated?
- Can the time required to perform the action be reduced?
- Can the level of expertise be reduced?

*Figure 1: Process Action Chart**



* see key on next page

Figure 1 depicts a demand-responsive transit service process chart for billing fares. It compares a manual system with an automated system. Note that it includes all the actors and their related actions. Fares can be billed to the rider's sponsoring social service agency or employer. They can also be billed to the individual riders or paid into a farebox by the riders as they board the vehicle. The time line is more or less U-shaped for both the Manual and Automated cases, moving through the process down the left-hand column and back up the right-hand one.

Figure 1 shows the changes in the actions required of the booking clerk, the dispatcher, the driver, and the billing clerk due to the installation of transit operations software.

The impacts on resources required to perform booking, billing, and dispatch can be estimated by comparing the manual and automated processes shown in Figure 1. First, a *personal computer (PC)* equipped with the booking, billing, and dispatch *software* is required for the Automated version. A significant amount of *training* is needed for the staff members who will be working with the new electronic capabilities.

The *Booking Clerk's* duties change from taking orders for service and transmitting them manually to the Dispatcher and Billing Clerk to taking orders for service and entering them directly into the electronic file at the time of the call. This reduces the human resource requirement by 50% or more.

Under the manual system, the *Billing Clerk* takes the billing and run completion information from the Booking Clerk and Dispatcher, respectively, enters billing information in a billing ledger, and prepares and sends out bills. With the automated system, the tasks are simplified to commanding the computer to send out the bills once each billing period. The human resource requirement is reduced by 99%, or is essentially eliminated.

Process Action Chart Key

- A single-bordered rectangular box represents an action or set of actions by a person or persons.
- Arrows depict the flow of information.
- A double-lined box represents the personal computer.
- Bold dashed lines illustrate manual or telephone transmissions.
- Bolded, double line depict electronic transmissions.

The *Dispatcher's* original tasks included taking trips from the Booking Clerk, preparing runs and delivering them to the drivers, followed by taking reports on run completion and forwarding them to the Billing Clerk. With the new electronic capabilities, the Dispatcher's duties include preparing runs by working with the electronic file and run-development software.
The Dispatcher's requirement is comparable in terms of time spent, but the opportunity to improve driver and vehicle productivity within the same amount of time is greatly increased.

Drivers can now get their runs and any updates by direct communication with the electronic files. Their time, along with that of their vehicles, can now be used more efficiently, thus impacting performance measures such as passenger-miles per vehicle-hour.

Similar analyses can be performed on the other business functions of a rural transit operation such as cash management, procurement, payroll, personnel records, and training.

Interagency Cost Comparisons

Another form of benchmarking business practices is to compare performance and cost statistics of similarly sized systems. FTA, APTA, and CTAA maintain these statistics at the national level.

Many state DOTs maintain them for the rural transit operations in their state. Operating information can be shared directly with other systems as long as definitions of items being compared are consistent.

Statistics that deserve examination and comparison when pursuing cost savings include the following:

- cost per passenger
- cost per passenger-mile
- cost per vehicle-mile
- vehicle maintenance costs
- vehicle maintenance costs per vehicle-mile
- billing costs
- cost per bill
- total purchase costs
- purchase cost per purchase
- cost per employee
- booking process costs
- booking process costs per booking
- dispatching costs
- dispatching cost per vehicle-trip (route-based service)
- dispatching cost per person-trip (demand-based service)

Comparison of these costs with those of other rural transit systems can reveal the parts of your system that should be examined for cost-reduction opportunities.

2.3 One Manager's Approach to Identifying Transit System Needs

To illustrate, the process for estimating the potential for Transit ITS applications in a rural transit agency, we have included the following illustrative example based on the composite experience of several managers interviewed for this report. The example agency and manager are fictitious, but the situations are not. They include both best practices and lessons learned.

Our fictitious agency is Edgar County Rural Transit (ECRT) located in the northwestern quadrant of a midwestern state. The county contains about 800 square miles and has a population of about 90,000. While its main industry is agriculture, the County Seat, with a population of 40,300, has several small to mid-sized manufacturing plants that draw employees from the entire county. It also has the only full-service hospital in the county. A smaller town of 13,000 people has two clinics that serve its portion of the county in addition to a portion of two neighboring counties.

Tim Stark is the manager of ECRT. He is in his mid-forties, a college graduate, and has worked for social service agencies throughout his entire career. For five years, he has been in charge of various forms of person transportation, at least part-time. Just ten months ago, it became his full-time responsibility.

ECRT has thirty 21-passenger buses and ten 15-passenger vans. All are equipped with lifts. The operation is a combination of fixed routes and demand-responsive services. The staff includes drivers, dispatchers, mechanics, and administrative personnel.

Recently, the State DOT received a grant from the FTA for the development of new ITS capabilities for rural transit. The DOT has asked interested county transit agencies to prepare a plan to substantiate funding for new hardware and software to improve the operation of their systems. The first step was to examine the needs of the system that might be candidates for the new technology. Tim followed the advice of DOT staff and used the three-level approach.

Assess the Existing System

When Tim became manager ten months ago, he started keeping a notebook of observations of the system and its operation. He included "to do" notes to himself as well as questions to ask staff members, task deadlines, and various service and administrative problems that he needed to address. He used these notes to make a list of the problems that still existed in the operation at that time. He then sat down in turn with the dispatchers, drivers, mechanics, and administrative staff, respectively, to listen to their suggestions regarding what the system needed. Tim also examined the files on customer complaints and suggestions. Tim discussed the issue with his contact on the Edgar County Board of Supervisors who supported his efforts and offered Tim an idea or two.

Next, Tim put all the suggested needs into one annotated list and gave them an initial rank from most urgent to least important. He based the ranking on his consideration of all the evidence that he had received. Here are the top eight ranked needs of ECRT's existing system resulting from a first level evaluation:

1. *More reliable communication between dispatchers and drivers, especially when changes or glitches arise in the schedule.*
2. *Maintenance priority setting and management together with more effective vehicle trouble reporting.*
3. *More efficient scheduling of trips for demand-responsive riders.*
4. *Reduction of errors and delays in billing subscription riders.*
5. *Safer and more efficient routing on and across major highways.*
6. *Reduction of missed pick-ups and stops.*
7. *More efficient billing and accounting.*
8. *Improved dispatcher workplace.*

Tim recognized that the needs identified for the existing system could be met with Transit ITS applications. He realized, however, that decisions made about new hardware depend on the requirements of the software. What is more, he realized that decisions made regarding both hardware and software depend on how the system's needs might be expected to evolve in the future. Consequently, he extended the need identification process to the Second Level - Predicting Future Needs.

Assess the Existing System

- **Keep notes on your observations.**
- **Solicit input from all levels of staff.**
- **Review customer feedback.**
- **Discuss your issues with other agencies and organizations.**
- **Prioritize your needs.**

Predict Future Needs

After talking with his contacts at the DOT and the County Board of Supervisors, Tim decided to focus on how ECRT might develop over the next five years thus adopting a five-year horizon for the Transit ITS plan. In reaching this decision, he noted that computer hardware and software capabilities have evolved rapidly. He expects that Transit ITS capabilities will change similarly as quickly. He also observed that the population of the county is aging so that incomes will likely increase. Tim was aware that new government programs could substantially increase the demand for rural transit. Due to the uncertainty associated with these factors, he did not want to base any decisions on what technology to acquire by looking too far into the future.

During his first few months as manager, Tim had recorded in his notebook the results of several conversations that he had with local citizens and other transportation professionals about the future of ECRT. Those discussions confirmed the selection of the five-year planning horizon. Tim's notes also reminded him that he had talked with his DOT contact and fellow rural transit managers in the *Community Transit Association of America (CTAA)* concerning Transit ITS applications. He had spoken with these people regarding what others systems were already doing with Transit ITS and its impacts on their operations. In particular, Tim noted the use of mobile data terminals (MDTs) on vans and buses to improve communication and flow of digital information among dispatchers, drivers/vehicles, and riders. As well, he remembered his interests in automatic vehicle location systems (AVL) and Smart Cards.

Tim also remembered his visit with the planning staff at the Northwest *Regional Planning Agency* (NWRPA), which includes Edgar County in its area of responsibility. He now went back to them to obtain more information about the 5-year *forecasts of activities and land use*. He learned that one of the clinics not in the County Seat was expected to be purchased by the hospital. As a result, its services would be transferred to the County Seat in about two years. The planning staff also told him that developers had been looking at various sites around the county to build a large retirement community. Both projects could have significant effects on the demand for rural transit in Edgar County and needed to be included in the estimate of future transit needs. Tim also found assistance to estimate future demographics and economic base of Edgar County that could impact the needs of ECRT.

Predict Future Needs

- **Establish a reasonable time frame.**
- **Identify potential demographics, economic and technological changes.**
- **Solicit feedback from colleagues, state, local and federal government agencies.**

On the CTAA web site, Tim found contact information about the several state and federal social services agencies that need transportation for their clients in rural areas. ECRT was already providing transportation for the clients of the State Agency for Assistance to the Elderly and Handicapped. He and his staff had been working with them to eliminate billing errors caused by both agencies. Tim called the offices of several other state and federal agencies to ascertain their plans. He went to the state capital to visit two agencies that were recommended to him by his state DOT contact as being interested in the possibilities of using public transit to serve their clients in Edgar County.

As a result of the second level look at the future, Tim was able to add the following items to his list of needs that could evolve over the next five years:

9. *More accurate location of existing and potential rider origins and destinations as well as real-time vehicle location.*
10. *Improved communication with riders and client agencies.*
11. *Means for drivers to immediately notify the dispatcher of emergencies.*
12. *Improved fare collection and management.*

Envisioning better communications with client agencies and improved fare collection and management, Tim decided to take a more rigorous look at ECRT's business processes. From what he had learned from the Internet and other Transit ITS technology resources, it appeared that greater improvements could be made than he originally thought.

Analyze Current Business Processes

Tim and his administrative staff decided that before they engaged in a time-consuming assessment of their business processes, they should check their performance against that of other rural transit systems. From the state DOT and CTAA, they were able to obtain measures of operating performance from other rural transit systems to benchmark against their own.

First, they determined the types of quantitative information that was available on their system and other rural transit systems. As a result, they decided to base the comparison on the following measures:

- administrative cost per passenger
- administrative cost per passenger-mile
- administrative cost per vehicle-mile
- billing cost per invoice
- purchasing cost per purchase
- administrative cost per employee
- booking process costs per booking
- dispatching cost per vehicle-trip (route-based service)
- dispatching cost per person-trip (demand-based service)

They found that ECRT's costs were generally higher, more expensive, than those of most systems of similar size and environment, especially when wage rates were equalized. As a check, they compared their performance in billing, purchasing, and booking using labor hours instead of dollar cost. The comparisons were similar.

As a result of the benchmarking, Tim and his staff decided to take a more detailed look at their business processes comprised of accounting, billing, reporting, personnel records management, purchasing, booking, and dispatching. They charted each process carefully and estimated average performance times for each task in labor hours per document processed. As soon as they began charting, before assigning performance times, they realized that some of their processes contained a great deal of unnecessary or poorly organized tasks.

Based on implementing this three-step process, Tim and his staff redesigned or eliminated tasks within the accounting, billing, and purchasing processes. While improvements were made with the redesign, they are now considering new off-the-shelf software (OTS) for these processes as well as for personnel management.

Analyze Current Business Processes

- **Benchmark your system's performance against other comparable systems.**
- **Identify business processes in need of improvement.**
- **Chart Processes.**
- **Identify redundancies and inefficiencies.**
- **Redesign processes.**

3 IDENTIFYING THE TECHNOLOGIES AVAILABLE TO ADDRESS THE NEEDS

Once the needs of a system are identified, the next step is becoming aware of and understanding the available Transit ITS technologies and applications. It is important to recognize that not all of the applications presently available will be applicable to all transit systems. As described in the previous section, each system manager must be aware of the needs of his or her system to determine the best technical solution. At this stage, he or she must have access to sufficient knowledge and understanding of ITS applications to be able to determine which ones are appropriate for his or her system.

Best Practices in Rural Transit ITS identifies and elaborates upon the following ways to learn about Transit ITS:

- Read literature.
- Attend conferences.
- Visit other transit systems.
- Work with other systems.
- Develop a relationship with local educational institutions.
- Educate yourself about ITS through training.
- Know your stakeholders and look at the possibilities.
- Work with and learn from your State and County governments.
- Apply for grants.

Not all of the applications presently available will be applicable to all transit systems.

3.1 What Can Transit ITS Technologies Do?

The most important facts about the new computer-based tools are just what functions they perform. The following list shows the major Transit ITS technologies grouped by function:[4]

- **Accounting Software**
  Electronically processes, stores, tracks, and reports standard accounting data.
- **Automatic Passenger Counters**
  Collect data on passenger boarding and alighting by time and location. This information can be used to increase the overall operating efficiency through better service planning.
- **Automatic Vehicle Location Systems (AVL)**
  Measure real-time positions of vehicles using onboard computers and a positioning system (such as global positioning system, signpost, or dead reckoning) and relay the information to a central location.

National Research Council. Washington D.C. December, 2000 (Draft) Transportation Research Board. Transit Cooperative Research Program (TCRP) Project B-17 Report: Selecting Appropriate Technology Systems - A Guidebook. Washington DC: National Research Council, 2000 (Draft), Tables 2.0, pp. 18-19.

- **Communications**
  Provides voice and/or digital communication among vehicles and base stations. Both radio and cell systems are available.

- **Customized Spreadsheet and Databases**
  Store, manipulate, and report on clients, trips, schedules, bookings, runs, and other business and operations information.

- **Demand-Responsive Transit Software – Automated**
  Expedites call taking; automatically schedules trips and routes vehicles; collects and maintains client service and vehicle data; and generates standard and customized reports.

- **Demand-Responsive Transit Software - Computer-Assisted**
  Expedites call taking; prepares driver manifests; collects and maintains client, service, and vehicle data; and generates standard and customized reports.

- **Electronic Payment Systems**
  Allows travelers to pay for transportation services with electronic cards or tags. One goal of ITS is to provide travelers with a common electronic payment medium for all transportation modes and functions. This includes automated fare payment systems such as Smart Cards, bar codes, and magnetic stripe cards.

- **Geographic Information Systems (GIS)**
  Computerized database management system in which databases are related to one another using a common set of location coordinates. GIS is used to display fleet and route data on a display map. It has been used in the "Welfare-to Work" programs to locate and match a potential employer and welfare recipient.

- **Internet Web Site**
  Allows personal computer users to easily exchange or display transit service information such as trip requests, route schedules and maps.

- **Maintenance Software**
  Electronically processes, stores, and reports detailed vehicle maintenance and repair data, including parts and supplies inventories.

- **Silent Alarm System**
  Allows a vehicle operator to trip an inconspicuous on-board switch to alert base station of an accident, crime, medical, or other emergency.

- **Mobile Data Terminal**
  Serves as the information link between control center and driver to relay relevant information such as dispatch, trip, route, and rider data. This can be a hand-held personal electronic device such as a Palm Pilot.

- **Palmtop Electronic Manifest Device**
  Electronically stores and updates vehicle schedules (e.g., driver manifests) and provides capabilities similar to mobile data terminals.

- **Personnel Management Software**
  Processes, stores, tracks, and reports detailed payroll benefits, hours worked, and personnel information.

- **Signal Priority**
  Holds a traffic signal at green so that a particular vehicle may pass through the intersection more quickly.

- **Transit Operations Software**
  Automates, streamlines, and integrates many transit functions and modes, including computer-aided scheduling and dispatching, service monitoring, route planning, supervisory control and data acquisition.

- **Traveler Information Systems**
  When applied to rural transit, traveler information can take many forms, including pre-trip information, in-vehicle information, and in-terminal/wayside information. Examples are automated trip itineraries, in-vehicle annunciators, variable message signs and monitors, and interactive information kiosks.

The transit manager should understand the function of each technology on the preceding list. Visits to other transit systems with Transit ITS applications in operation can be highly enlightening. Perhaps most important is to see where each technology fits within the business processes, maintenance, or transportation operations of a transit system.

The answers to the following four questions essentially define the function of each technology:

- What data goes into it?
- What does it do with or to the data?
- What information does it provide?
- How is the information provided useful?

Once the manager can answer these questions, he or she can determine the implications of this array of technologies to his or her system. Searching out those implications is the subject of the next section.

3.2 Sorting Out the Implications

3.2.1 Software and Hardware

Each Transit ITS technology can be applied to meet one or more needs of a transit system. There are a number of suppliers of software for every tool. Some suppliers have ready-made, off-the-shelf (OTS) software. OTS software can usually be purchased and readily installed by people familiar with computers. Other tools for a particular system or particular group of systems must be built on a custom basis by software developers.

At this stage, the system manager should know the rough cost of purchasing, installing, activating, maintaining, and upgrading new software or hardware. He or she can then compare this cost to available resources to determine whether or not it is affordable. If it is not, he or she should probably set it aside as an option or he or she should search for additional resources to make its acquisition possible.

Before making a choice of either OTS or the custom software, it is essential to understand the implications that it will have for your system. In order for the new software to operate properly and produce its promised benefits, the transit system manager must be aware of the changes required in the entire system. These changes will encompass business processes, staff skills and training, job requirements, computers and related hardware, and all of the applicable costs, including maintenance contracts. The system manager should know the nature and magnitude of the *expected benefits* as well. At this point, the computer-literate individual who has all the capabilities described in the following section becomes important.

3.2.2 New Capabilities and Skills Needed

Every rural transit agency contemplating the acquisition and use of new technology needs access to someone who is computer literate. This person needs to be familiar with the structure and operation of computer systems, should be sympathetic to the agency's goals and be readily available to the agency manager. The rural transit managers that we have interviewed feel that the time commitment required of someone with these capabilities is somewhere between half-time and full-time during the planning, installation, and system-testing processes. Of course, the time commitment depends upon the size of the system and the number and type of applications being implemented. This person needs to be readily available until all systems are up and running essentially error-free. Liaison with hardware and software vendors is one of the main functions performed by this person.

There is also a need for another person who has worked with and is familiar with computers, but not necessarily with computer systems. By "familiar", we mean capable of installing common software packages on PCs, setting up hardware such as PCs and printers, and fixing routine software and hardware glitches. This individual can be an existing employee. He or she should be readily available to the staff that is using the new computer-based systems. A seemingly small problem can seriously impair system operations if there is no one available who can fix it in a timely manner. The overall time requirement for this function is probably half time or less, depending on system size and condition. It is most critical that this person be on-site when needed.

The need for outside help will diminish as the staff assimilates the new capabilities and gains the required new skills.

3.2.3 Sources of New Capabilities and Skills

The first place to look for new skills is among the managers and staff of the rural transit-operating agency itself. Some rural transit operations are housed in an agency that performs other functions. These closely allied organizations can be the source of the needed skills and capabilities if they can be responsive enough to transit needs. This includes formally allocating the needed time of a staff person on a daily basis. In short, it should be part of the person's job description.

The next source of help is another rural transit agency. Someone who has just been through this kind of assignment can be the best outside talent. Such help should be obtained on a full-time basis either as a new-hire or a loan. Any lesser type of commitment runs the risk of the individual not being available when most urgently needed.

An urban transit organization or a state agency with a transportation-related mission might also be the source of needed talent. Candidates should have had relatively recent experience that exemplifies the kind of computer-knowledge required by your organization.

A qualified person on loan can also serve as the trainer to upgrade the computer-related capabilities of existing staff. The training should be done, if possible, at the transit agency employing the trainee or trainees.

Software/ Hardware Considerations

- Off-the Shelf vs. Custom Software
- Cost of purchasing, installing, maintaining system
- System-wide changes required
- Level of effort to implement
- Expected Benefits

Staff Skills Needed

- Computer-Literate: Familiar with computer systems structure and organization
- Computer-Familiar: Familiar with computer hardware/software use

Sources of Technical Support

- In-house talent
- Affiliated organizations
- Other rural transit agencies
- Urban transit organizations
- State Agencies

It may also be possible for a transit manager to work closely with a qualified, computer-literate person currently employed at a transportation-related state agency to upgrade his or her knowledge. This should be done at the manager's agency with some formal commitment of time on both sides. To work, the success of the effort has to be important to both individuals.

A determination of needed resources must be followed by efforts to obtain them within the allowable limits of affordability. The planning effort itself should not begin until resources, both financial and human, but especially the human, are secured.

The need for the system manager to have computer-literate expertise at his or her elbow to sort out the implications of the new technology for system operations cannot be overemphasized.

The manager needs to have rational and reasonable expectations of what affordable computer-based technology can do for his or her organization.

3.3 One Manager's Approach to Identifying the Available Technologies

To illustrate the process for identifying available technologies, we continue with the experiences of our hypothetical Edgar County Rural Transit (ECRT) system and its manager, Tim Stark. While the location and individuals are fictitious, the situations represented in this example are based on the experience of several managers interviewed for this report.

Tim Stark, Manager of Edgar County Rural Transit (ECRT), has used a personal computer (PC) in his work for about 8 years. He has been using e-mail for over 2 years and occasionally surfs the web for news, weather forecasts, and information from various web sites including the FTA's and the state DOT's. In his prior job, he served on a committee overseeing the development and installation of a new database management system containing essential information on his agency's clients. Tim has never been responsible for a project involving conversion of a manual function to an automated computer operation. In short, he is a user of computer systems, but has never been a systems developer to any significant extent.

Consequently, Tim feels he needs some education about the computer-based tools that are potentially available to improve the operations of ECRT. A branch of the state university is located just 30 miles from the County Seat of Edgar County where his office is located. He called the Dean's Office of the Business School and made an appointment to see the Associate Dean. The Dean reported that the Business School does have courses in business information systems, but he felt that Tim's need was broader, deeper and more urgent than a single course could meet. He introduced Tim to Fred Posner, an Associate Professor in the School's Computer Systems Department. In addition to his academic credentials, Fred was on the board of a community social service agency located near the university campus.

Tim and Fred went over both the list of needs that Tim and his staff had developed for ECRT, and the list of potential improvement tools that he had obtained from his contact at the state DOT. Tim and Fred agreed that finding the right solution or group of solutions was not an easy task. Tim asked Fred for ideas about the kind of assistance that he should get. Fred said that he would be glad to

advise Tim from time to time, but that he did not have the kind of time required. He recommended one of his brighter graduate students and a recent Master's degree recipient who was in the process of making a career change.

The next day Tim contacted both people recommended by Fred. They were equally familiar with all of the applications on the tools list, at least in their basic forms. The recent graduate was looking for a full-time position, and Tim did not have the budget to support him for this purpose. The graduate student was available either to work as a part-time employee or to conduct the necessary research and analysis for credit at the university. Fred also considered hiring an individual on loan from another county transit agency in the state. This individual had recently participated in a Transit ITS development project there. In the end, Tim was able to obtain this individual on loan for the duration of the project.

Tim based his choice on several factors. The first was that the recent graduate, while quite competent, had fairly high salary expectations. Also, Tim was not sure just how the individual would fit into ECRT over the long term. Tim was concerned that the graduate student had too many obligations and might not be available when needed most. The experience, cost, availability, and longer-term disposition of the person from the other transit agency seemed to fit ECRT's requirements. This individual, Mary Koppel, proved capable of filling in when needed in both operating and administrative capacities, in addition to carrying the ball on this project during her tenure at ECRT.

Mary had been Assistant Computer Systems Manager with the Calhoun County Vocational Rehabilitation Agency for five years when Calhoun County Rural Transit (CCRT) was created and put under its wing. That was about three years ago. Two years ago she went to CCRT to lead the upgrading of its systems. At that time, she became familiar with transit operations and administration, as well as with some of the applications on Tim's tool list.

At ECRT, Mary worked directly for Tim. She arranged for each of them, at separate times, to work with the staffs at CCRT and at another county rural transit agency in the state. They learned about the data requirements, operations, outputs, and costs, both initial and ongoing, of each Transit ITS application on their list. They also learned of the difficulties that the other two counties had experienced in their Transit ITS efforts, as well as with various vendors. She also obtained publications that she had found helpful in the past as well as some more recent ones from the State DOT. She also visited the FTA, FHWA, APTA, TCRP, and CTAA web sites, among others, to obtain additional information. All this was accomplished in her first few weeks on the job.

In the meantime, Tim formed a *Technology Task Force*, made up of himself, Mary, and one individual from each part of the ECRT staff. Dispatchers, drivers, mechanics, and administrative staff were represented. The Task Force would serve to advise Tim and Mary during the ITS planning and implementation process. The Task Force along with Mary and Tim discussed the material that Mary had gathered in order to select the most appropriate new technologies to implement.

The Task Force also decided to ask Tim's contacts on the County Board of Supervisors and at the state DOT, as well as Professor Fred Posner, to serve as advisors during the planning process. All three accepted. At Mary's suggestion, Tim invited the Executive Director of the Northwest Regional Planning Agency, NWRPA, to provide a representative. The Executive Director selected the agency's chief transportation planner to represent it on the Task Force.

They were now ready to begin the process of planning the implementation.

Learn from the experience of others. What tools and/or vendors have helped to achieve the desired results?

4 PLANNING THE IMPLEMENTATION

4.1 Key Considerations

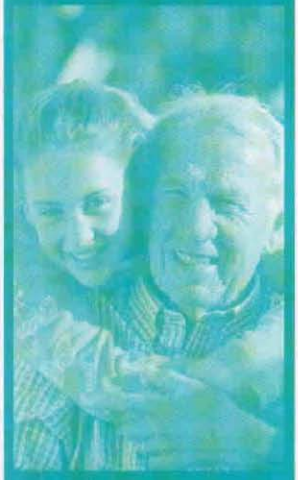
Having identified your transit system needs and the ITS technologies and applications available to address those needs, you can now decide what combination of Transit ITS applications is appropriate for your system.

There are several ways to evaluate and decide which application is the best match for a given need. *Best Practices in Rural Transit ITS*, the companion report to this guide, provides guidance from rural transit operators throughout the United States. The following suggestions are taken from that report. (The report contains more detail on each one.):

- Use local colleges or universities to get help and learn.
- Interview other transit systems.
- Learn from urban transit systems.
- Learn from other, similar industries such as local trucking and package delivery firms.
- Have a GIS specialist at hand before comparing alternative tools or solutions.
- Be aware that Transit ITS is not a stand-alone system. It must be integrated into transit system operations and business processes.
- Understand what resources are available in your local area.
- Identify existing infrastructure that could be useful.
- Secure a project manager with the right expertise and capabilities.
- Select a system that you can build on.
- Determine the level of finances allocated for your various activities such as planning, purchase of equipment, and training.

Considerations in Selecting Transit ITS Applications

- Availability of financial resources
- Identifying alternative solutions for each need
- Estimating impacts
- Making your choices



4.2 Availability of Financial Resources

Resource availability is often the key limiting factor for rural transit systems.

Any planning effort that does not start with identifying financial resources risks making its findings irrelevant. It is just as imprudent to underestimate your resources as to overestimate them. To err on the conservative side by ignoring sources of available funds, valuable knowledge and technical assistance, or potential alliance partners, limits the ability of a system to make highly beneficial technological improvements. On the other hand, setting your goals too high can lead to unnecessarily expensive planning efforts. It can produce expensive plans that cannot be implemented, in addition to widespread disappointment.

Funding for both the capital and operating expenses of rural transit systems is available at federal, state, and local levels. The critical factor with any transit-funding program is whether or not it covers expenditures on computer hardware and software, technology consultants, and training. When investigating new potential sources of funding, it is also important, of course, to determine the relevant requirements of each potential funding program. The eligibility of expenses may be limited, for example, by type, amount, or share.

Explore federal, state and local funding opportunities.

funding

Funding sources authorized by the Federal Transit Act are described below:

Section 5307
Authorizes grants to public transit systems in all urban areas. Funds authorized through Section 5307 are awarded to states to provide capital and operating assistance to transit systems in urban areas with populations between 50,000 and 200,000. Transit systems in urban areas with populations greater than 200,000 receive their funds directly from FTA.

Section 5309
Authorizes discretionary grants to public transit agencies for capital projects such as buses, bus facilities and rail projects.

Section 5310
Authorizes capital assistance to states for transportation programs that serve the elderly and people with disabilities. States distribute Section 5310 funds to local operators in both rural and urban settings, who are either nonprofit organizations or the lead agencies in coordinated transportation programs.

Section 5311
Authorizes capital and operating assistance grants to public transit systems in rural areas with populations of less than 50,000.

In addition, FTA's Rural Transit Assistance Program (RTAP) offers training materials, technical assistance and other support services for rural transit systems across the country. RTAP funds help to support the National Transit Resource Center.

Federal resources also include health management and social service agencies that offer various programs requiring transportation. The departments and sub-departmental agencies most likely to have such programs include the following:

- Department of Agriculture
- Department of Education
- Department of Health and Human Services
- Department of Housing and Urban Development
- Department of Labor
- Department of Veterans Affairs
- Administration on Developmental Disabilities
- Administration for Native Americans
- Head Start Bureau
- Office of Community Services

The U.S. Department of Agriculture also has funds available for rural transportation assistance through state Departments of Agriculture.

The accompanying *Transit ITS Resources* lists federal agencies with assistance programs for rural clientele that purchase transportation for their clients from rural public transit agencies. The CTAA web site, (www.ctaa.org), maintains an up-to-date list of these contacts. These federal sources and their state counterparts are also listed in *Transit ITS Resources*.

Another key point is to investigate the possibility of sharing costs with other organizations. The basis for sharing costs is the common use of facilities or services. Some rural transit operators in Minnesota are sharing communications facilities and AVL systems with Minnesota highway maintenance forces and the Minnesota State Police.

Our field investigations revealed that a number of different funding sources are being used around the country. For example, the Dakota County United Way in the West St. Paul, MN area funnels private contributions into rural transit. The use of in-kind services by the grantee of up to 20% of the cost is frequently seen. Section 5311 funds coming from FTA through the state DOTs are common. State and local tax funds also go to support rural transit in many states.

Consult Transit ITS Resources for federal and state funding sources.

For rural transit operators that provide subscription transportation services to clients of federal, state, or local social service agencies, it may be possible to share the costs of installing computer and Internet-based systems that lower the cost or improve the efficiency of billing and payment.

Some legwork or telephone work is necessary to identify what funds are available, and when they are distributed, for the purpose of acquiring Transit ITS capabilities. In many states the most useful initial contact for questions on fund availability is the transit assistance office of the state DOT. In the absence of such an office, a good starting point may be to contact your Regional FTA Office.

Once sources of funds are identified, determine:

- *The level and timing of funding available to your system for Transit ITS system development.*
- *The requirements for plans and other information in order to qualify for the various sources of funding.*

You must, of course, know the availability of funds in order to choose new applications of Transit ITS technology that meet the needs of your transit system.

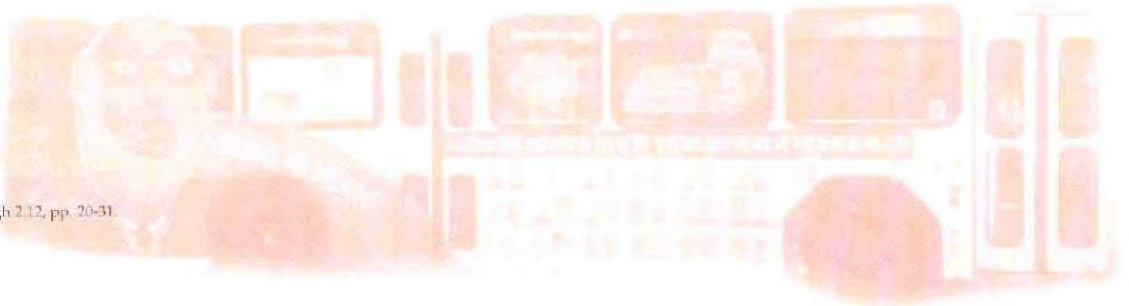
4.3 Identifying Alternative Solutions for Each Need

Table 1 shows alternative solutions from the list for each of twelve generic transit system needs.[5] There are several solutions for each generic need, because the actual needs of different transit systems can vary substantially. Transit systems vary by not only size, but organization, nature of their clientele, load factors, distances over which they operate, type of terrain in which they operate, and climate in which they operate, to name a few. A more extensive version of Table 1 can be found in the Transit ITS Guidebook recently produced by the Transit Cooperative Research Program.[6]

The column headed "Applications" shows the presumed relevance of the solution to the stated need. You can develop your solution, or set of solutions, for each of the needs that you identify. Table 1 shows one way to organize this information that will facilitate finding the preferred solution.

It appears that the choice can be made just by inspection of the information shown in Table 1. In most instances it is possible to eliminate several alternatives for each need just by inspection. In fact, it is not necessary to even consider all those shown in Table 1. Not every alternative applies to each rural transit system. However, more information on the consequences of a choice, such as cost, required skills, and some measure of benefit, can make the final choice more apparent by comparison of the remaining alternatives.

Explore the possibility of cost sharing with other organizations



[5] *TCRP Project B-17*, op. cit., Tables 2.1 through 2.12, pp. 20-31.
[6] Ibid.

Table 1: Needs and Alternative Solutions

NEEDS	APPLICATIONS														
	Accounting Software	Automatic Passenger Counters	Automatic Vehicle Location Systems (AVL)	Communications	Customized Spreadsheet and Databases	Demand-Responsive Transit Software-Automated	Demand-Responsive Transit Software- Computer Assisted	Electronic Payment Systems	Geographic Information Systems (GIS)	Internet website	Maintenance Software	Silent Alarm System	Mobile Data Terminal	Palmtop Electronic Manifest Device	Personnel Management Software
More Accurate, Easier Reporting and Record Keeping	X				X									X	X
More Efficient Service Coordination		X	X	X	X	X	X		X				X		
Safer, More Accurate Cash Handling					X								X	X	
Improved Operations, Staff Performance, and Productivity			X		X	X	X		X				X	X	
More Effective Maintenance Tracking					X						X		X		
Clearer Communications			X	X									X	X	
More Effective Dispatching			X	X	X	X	X				X			X	
Faster, More Efficient Trip Request Processing						X	X		X	X					
Improved Scheduling Productivity			X		X	X	X		X				X		
Improved Service Quality			X		X	X	X		X				X		
Greater Safety			X		X	X	X						X		
More Accessible, More Useful Customer Information			X		X	X	X		X	X					

4.4 Estimating Impacts

Estimating the impacts, or consequences, of possible choices greatly eases the task of deciding what to do. Up front, you can decide which set of consequences is most important to your choice. We suggest a few of them here.[7]

Table 2 illustrates some of the impacts that may be important to rural transit systems. The set that you select should bear some direct relation to the goal you set for the Transit ITS applications that you are comparing and choosing. If your goal is to increase the effectiveness and the efficiency of your rural transit system, the impacts that you select should measure effectiveness and efficiency of the application in question.

TABLE 2: Impacts of Transit ITS Applications

COSTS	BENEFITS
Purchase Price	Capacity
Maintenance	Reliability
Operating	Recoverability*
Staff Training	Increased performance

* Recoverability is the relative accessibility of information after it has been obtained and stored.

4.4.1 Costs

Cost impacts measure the expenses that must be incurred to obtain the benefits of the Transit ITS application that you are assessing. The costs included here are Capital, Maintenance, and Operating.

Capital Costs includes the initial purchasing price of the software or hardware involved and the cost to get them up and running, the so-called installation costs. Purchase price covers what it costs to obtain the computer software, whether it is OTS or must be developed by a software firm especially for your transit system. Purchase price also includes the cost of any new hardware you might need for the option you are costing, from general-purpose personal computers to Smart Card readers or mobile data terminals. Be sure to include the installation costs for all hardware and software.

Maintenance costs include just what you estimate it will cost to keep the new software and hardware up and running. If any bugs turn up in the software, what will it cost you to get it fixed? If a personal computer, mobile data terminal or card reader needs to be repaired, what will it cost? These costs can vary greatly among alternative pieces of software or hardware that do essentially the same job. The less experience there has been with any given piece of software or hardware, the more difficult it is to get a reliable estimate of these costs. The best sources of maintenance cost estimates are people who have been using the item in question for at least several months in essentially the same environment as you intend to use it. There are user groups, both formal and informal, that can provide good maintenance cost estimates. Your contacts at CTAA or the state DOT or FTA can put you in touch with some of them. Vendor estimates are not always reliable, because the information that they have may be for an entirely different environment than yours. Also, the product they offer may be too new to have an adequate maintenance history. Great care is needed to get reliable estimates of electronic hardware and software maintenance costs.

[7] Further information on the benefits of ITS applications is contained in the FTA publication, *Benefits Assessment of Advanced Public Transportation System Technologies– Update 2000*, listed in the Bibliography in Appendix C.

Operating costs includes *Staff training* as its the primary component. The level of complexity varies among different versions of computer hardware and software. Consequently, the cost of making staff members competent users of new systems, and keeping them that way, also varies. Both staff turnover and the release of new versions of the software, and sometimes of the hardware, add to this cost. It is important to recognize this cost and to account for it. The cost of staff training reflects the relative user-friendliness of the different systems. The training cost should include both classroom and on-the-job (OJT) training. Once again, the most reliable source of this information is another rural transit system that has a significant amount of experience with the software or hardware involved. Additional components of Operating Costs may include differences in electricity use from the local electrical utility or from increased consumption of batteries.

4.4.2 Benefits

Benefits are defined here as the improvements in system performance with new hardware or software in place compared to performance without that software or hardware.

Benefits can be described in terms of Capacity, Reliability or Recoverability.

Capacity refers primarily to the amount of work that can be done in a given amount of time or the time it takes to do a particular amount of work. For example, an Automatic Vehicle Location (AVL) system might increase the capacity of the dispatcher to schedule pick-ups from fifteen to twenty per hour. In this instance, the average time to schedule a pick-up goes from four minutes to three. The use of AVL might also increase the average number of pick-ups per vehicle-hour from twelve to fifteen.

Reliability is the benefit achieved through the reduction of errors. Automatic passenger counters typically reduce errors in counting. Errors per 100 passengers could go from ten to less than one, for example. Smart Cards reduce billing errors substantially. New accounting software together with customized spreadsheets and databases greatly increase the reliability of the data stored and developed. Transit system operations efficiency increases through improved reliability of the information that these applications provide.

Recoverability is an important benefit of Transit ITS applications. Information kept on paper is subject to misplacement or loss and can be difficult to find at times. It is also cumbersome to obtain needed data from paper files for data analysis. Electronic data systems increase the accessibility, availability, and, therefore, the ***recoverability*** of data and information. It directly impacts the efficiency and effectiveness of transit system operation.

The estimation and comparison of the impacts of each option is very important when choosing Transit ITS applications. The next section covers the use of impact estimates to make choices.

4.5 Making Your Selection

4.5.1 Focus on Your Goal

Whatever you have determined your goal to be, your choice of Transit ITS application(s) should make the best possible contribution to achieving it, subject to financial and other operating constraints. This may not be as easy as it sounds if your goal has more than one dimension to it. For example, your goal for Transit ITS may be to increase the effectiveness and the efficiency of your system. These two separate dimensions, effectiveness and efficiency, may require making a trade-off between two Transit ITS options. One option may provide the most additional effectiveness to the system and the other, the greatest increase in efficiency. Some form of compromise between effectiveness and efficiency, as they would accrue to the choice of one or the other option, must be made.

Focusing on a goal also requires that you determine how the impacts that you estimate will contribute to the achievement of that goal. It disciplines the comparison process and requires a causal chain between the impacts and the goal. You can also show the degree to which a certain level of a given impact contributes to the goal. For example, if you can apply monetary values to all the benefits and costs on a common time scale, you can obtain a monetary estimate of the degree to which the various alternatives contribute to the goal.[8]

Perhaps it is most important to be able to reason plausibly that your measurement of the impacts of alternative Transit ITS applications indicates which one best contributes to your goal. The staff and governing body of your system, as well as yourself, need to be convinced. Not every impact or reason needs to be "monetized". You merely need to be able to distinguish between the two alternatives relative to their net contributions to your goal. Some of the training courses at NTI and in the FTA-FHWA Professional Capacity Building (PCB) Program teach students how to conduct these analyses.[9]

4.5.2 Examine Your Priority of Needs

As you proceed, you need to ask yourself if the priority of needs that you developed before looking at the Transit ITS applications in depth is still valid. Are the needs ranked in some sort of a priority consideration of the relative contribution to meeting your goal with the new applications? If not, you may want to consider re-ranking them in terms of the estimated impacts of those applications under consideration at this stage.

Now, you should have an idea of the funding that you have available. As you estimate the impacts of the alternative ways of meeting the needs, you will be able to estimate the costs of meeting each successive need. Comparing available funding with expected costs will enable you to determine just how many of the needs you can meet now and in the future. Those needs that cannot be met will have to wait for further funding.

At the end of this step, you will have estimated the impacts of all the reasonable alternatives for meeting each need within the expected level of funding. Then, you are ready to make the comparisons and choose the preferred alternative for meeting each need that you can fund.

[8] Much thought has been given to applying benefit-cost analysis to choosing between alternative investments, particularly in the public sector. A large body of literature exists on the subject. One fairly succinct but rigorous coverage of the principles and fundamentals of benefit-cost analysis is given in the following book: Lee G. Anderson and Russell F. Settle: Benefit-Cost Analysis: A Practical Guide, Lexington Books, Washington DC: Heath and Company, Lexington, MA, 1977.

[9] One example is the NTI course entitled, "ITS for Transit: Solving Real Problems."

4.5.3 Compare the Preferred Alternatives

Beginning with the highest priority need, you now have the necessary information to choose among the two or more alternative ways of meeting it. Of course, if you are sure that there is only one way, then no comparison of alternatives is required. However, this is rarely the case. Not only are there different applications, there are also different vendors for the same application. Each vendor's solution varies to some degree from the others, in aspects such as functionality, cost, or time to deliver and install.

Our goal is to improve our quality of service and the efficiency of our operations. We have selected electronic payment systems as the Transit ITS solution to meet our need. The analysis includes some of the impacts that may be important to rural transit systems as outlined in Table 2, page 25. For the purpose of this illustration, we will use both the incremental benefit-cost and net present value methods to make the comparison. Our example system includes a fleet of 20 vehicles and a 20-person staff. Table 3 illustrates a comparison of alternatives.

Table 3: Sample Comparison of Alternative Ways to Meet a Priority Need

Electronic Payment Systems				
IMPACTS	ALTERNATIVES A	B	C	RANKINGS
Costs				
Purchase Price	$ 34,000	$ 34,000	$ 50,000	A/B>C
Maintenance	9,500	11,400	15,000	A>B>C
Training	+ 30,000	+ 26,100	+ 35,000	B>A>C
Total	$ 73,500	$ 71,500	$ 100,000	B>A>C
Benefits				
Capacity	$ 124,000	$ 124,000	$ 190,000	C>A/B
Reliability	53,000	53,000	80,000	C>A/B
Recoverability	+ 17,000	+ 17,000	+ 30,000	C>A/B
Total	$ 194,000	$ 194,000	$ 300,000	C>A/B
Benefit/Cost (B/C)	2.64	2.71	3	C>B>A
Incremental B/C		(B>A) 0	3.72	C>B>A
Ranking	3	2	1	
PV Benefit	$ 194,000	$ 194,000	$ 300,000	
PV Cost	- 73,500	- 71,500	- 100,000	
PV Net Benefit	$ 120,500	$ 122,500	$ 200,000	C>B>A
Ranking	3	2	1	

Interpreting Table 3

The ">" symbol can be translated in this chart as "is preferred to." "/" means "is equivalent to."

The development of the comparison is explained on the following pages. To make it easier to understand, we have put the steps of development in bullet form.

ALTERNATIVE A

Alternative A is an electronic payment system based on cards with magnetic strips, much like credit cards or ATM cards. Each rider would have such a card. The card can apply to a single ride or to all rides in a one- or two-year period for a given traveler. It can either be prepaid or accumulate charges for monthly payment by the rider or the agency supporting her or his transportation.

Costs for Alternative A

Purchase Price: $34,000 (approximately)

- $1200 per vehicle, including installation for a total of $24,000.
- $4400 for home-base equipment plus $5500 for the software and its installation.
- The cost of the cards is less than one cent per ride.

Maintenance Costs: $9,500

- $2500 per year for an equipment maintenance contract, for 5-years, discount rate 10%, gives a present value of $9,500.

Training $30,000

- $100 per student for an initial two-day training course.
- $320 per day is the average fully loaded of cost for each of the 20 employees.
- The total initial training cost has a present value of approximately $15,000.
- $4000 for annual upgrading and the training costs of new employees due to turnover.
- An equivalent initial cost for 5 years at a discount rate of 10% is $15,000.
- Initial training at a present value of $15,000 plus upgrading and new employee training at $15,000 gives a total present value of $30,000 in training costs.

Benefits of Alternative A

Capacity Benefits $124,000

- Magnetic strip cards reduces dwell time per stop by an average of 20 seconds per passenger or about half-an-hour per bus per day.
- This will enable us to get another run per day out of the fleet as a whole.
- This is worth about one-fifth of a vehicle and driver per day, or about $15,000 per year.
- Over five years with a 10% discount rate, this equates to a present value of about $58,000.
- The reduction in time spent counting fare income and keeping records is the equivalent of about one clerical person per year or $25,000 per year.
- The present value of this benefit over a five-year period with a 10% discount rate is about $66,000.
- The sum of vehicle capacity and office process benefits is a present value of $58,000 plus $66,000 or $124,000.

Reliability Benefits: $53,000

- Correcting bookkeeping errors from cash fare collections amounts to about 15% of somebody's time or about $4,000 per year.
- Pilferage and free rides are estimated to amount to about $10,000 a year for this system.
- This $14,000 a year in reliability benefits for five years with the discount rate at 10% has a present value of about $53,000.

Recoverability Benefit $17,000

The recoverability benefit of electronic fare collection derives from the more accurate and readily available information from unloading the fare information directly into the accounting system housed on a personal computer. The more accurate information eliminates the need for making estimates of fare income and billing information on the basis of imperfect data. It improves estimates of the impact of service changes on ridership and revenue as well as the potential for good management and service planning.

How, therefore, should this benefit be valued? Perhaps it is the value of the administrative and management time that no longer has to be expended making rough estimates of fare income for billing, operations management, and planning tasks. If we assume that this amounts to 3 hours a week, then the total for a year is 156 hours. At the rate of $30 per hour, this roughly totals $4,500 per year. The present value of this benefit with a discount rate of 10% over five years is about $17,000.

We can now estimate the values of the costs and benefits of Alternatives B and C by comparing them with Alternative A.

ALTERNATIVE B

Alternative B is also electronic payment system based on the magnetic strip card. Its operation is essentially the same as Alternative A. However, the classroom training is free and the maintenance requirements are somewhat more complex.

Costs for Alternative B

Purchase Price $34,000

- The purchase price of Alternative B is equal to Alternative A

Maintenance $11, 400

- Alternative B magnetic strip system is a bit more complex than that of Alternative A. This results in a somewhat higher maintenance cost for Alternative B. The annual maintenance contract is $3,000, for a present value of approximately $11,400.

Training Reduced by $3,900

- The classroom training is free, which results in a reduction in training cost of $2,400 in the first year and $400 per year thereafter (with a present value of $1,500). The total present value of these reductions is $2,400 plus $1,500, or $3,900, for a net training cost of $26,100.

Benefits of Alternative B

The benefits of Alternative B are virtually equal to those for Alternative A.

ALTERNATIVE C

Alternative C is an electronic payment system based on Smart Card Technology.

Costs of Alternative C

Purchase Price $50,000

- The purchase price is higher than that for Alternative A or Alternative B.

Maintenance $15,000

Training $35,000

- The training costs are only slightly higher, primarily for the administrative staff because of the additional capabilities of Smart Cards.

Benefits of Alternative C

The benefits extend to the customer, particularly the agencies that subscribe to transportation for their clients. As a result they are a bit more difficult to quantify.

Capacity Benefits $190,000

- Required work is reduced by an additional clerk per year. Half is estimated to come out of the Transit system administrative staff and the other half out of client staff.
- The capacity benefits reduce the required work by an additional clerk per year. Half is estimated to come out of the transit system administrative staff and the other half out of client staff. This additional gain has a present value of $66,000. Added to the gain for Alternatives A and B of $124,000, the capacity benefit for Alternative C equals $190,000.

The benefits of both reliability and recoverability increase also, because of the additional types of data they cover and because of the direct billing capability provided by Smart Card technology. The monetary values of these benefits are:

Reliability Benefits $80,000

Recoverability Benefit $30,000

4.5.4 Making Your Choice

Which of the alternatives would best contribute to the goal of improving customer service and efficiency?

Looking at the Costs Rankings of Table 3, we note that:

- Purchase prices of Alternative A and B are identical and significantly less expensive than Alternative C.
- Maintenance cost for A is less than B, and both are significantly less than C.
- Training cost of B is less than A, and both are again significantly less than C.
- Total costs of A and B are equal and are significantly less than C.

Checking the ranking of benefits, we find C consistently higher than and preferred to A or B, which are ranked as equivalent.

The question is, does C best meet the goal? It clearly has both the greatest costs and the greatest benefits. It appears to give the greatest improvement in service to the customer. Now, does it do the best job of increasing the efficiency of operations? From the nature of the benefits, it appears that is the case. But we need to make sure that those benefits offset the increases in cost. From B to A, the costs go up by $2,000, but the benefits stay the same. Consequently, we get more net gain from B than A. When we move from B to C, we find that the benefits increase substantially more than the costs. Consequently, the additional cost is more than justified, and C is preferred to B.
It is the best of the three alternatives. The row in Table 3 labeled, "Incremental B/C," shows the benefit–to-cost ratios of each of those incremental moves, B to A and B to C.

Since we also have the benefits and costs of the three alternatives on the same time basis, in terms of their present value or "PV", we can compare the alternatives on the basis of the present value of their net benefits. The row near the bottom of Table 3 marked "PV Net Benefit" shows the present value of the net benefits, "PV Benefit," for each alternative. This value is obtained by subtracting the present value of the costs of the alternative, "PV Cost," from the present value of its benefits, "PV Benefit." It is clear that alternative C has the greatest net benefit followed by B, then C. This corresponds with the ranking using the incremental Benefit-Cost ratio.

For illustrative purposes, this numerical example employs benefit-cost and net benefit comparisons to decide which alternative best meets the overall goal of improving fare management in our example rural transit system. Different kinds of information can be used for choosing the best way to meet various needs of rural transit system. Many choices can be made without the kind of calculations we used in the example. [1]

We now turn to our composite case study of the hypothetical Edgar County Rural Transit (ECRT) and its manager, Tim Stark, to illustrate how transit managers around the country are making choices about how to meet the needs of their system with the resources they have.

[1] A compact disk produced by the Western Transportation Institute is available. It contains adaptable presentations on several aspects of Rural ITS, including Transit Management. See web site: www.its.cot.gov for ordering information. A compact disk produced by the Western Transportation Institute is available. It contains adaptable presentations on several aspects of Rural ITS, including Transit Management. See website: www.its.dot.gov for ordering information.

Regardless of your quantitative analysis, you must be able to convince yourself, your staff, your governing Board, and your customers that you have chosen the best alternative.

4.6 One Manager's Approach to Planning for Implementation

The ECRT Technology Task Force has taken great efforts to identify its needs and learn about the new tools that are available to improve transit system operations. The members have become more aware of both the opportunities and challenges confronting them.

These new personal computer-based tools provide opportunities for improved service and business operations. An important benefit of these tools is more efficient ways to cooperate with other organizations. Links with social service agencies could be developed that would remove many of the difficulties in providing transportation for these agencies' clients. The tools would help to streamline the flow of information between the agency and its clients. They also found that they could share the facilities and costs of the new tools with agencies providing other services in Edgar County.

A major challenge was to understand the various sources of funds that were available to improve rural transit. The state DOT representative was able to provide a great deal of information and good contacts from various state agencies. He also reinforced the connections between ECRT and the Section 5307, 5309, 5310, 5311, and RTAP managers from the state DOT. Additionally, the chief transportation planner of the regional planning agency, NWRPA, helped develop contacts with the agencies for which they provided regional plans. Professor Fred Posner was able to add more contacts from his experience with the social service agency board he had served on. Some of these agencies were already working with ECRT in Edgar County.

Mary Koppel and ECRT Manager Tim Stark followed up with all of the contacts and had prioritized potential funding sources. Then, the Task Force drafted a budget for the current and outlying years of their Transit ITS development program. It included the identification of grant funds and necessary grant-matching funds, including in-kind services that allowed ECRT to get financial credit for its work on these programs.

Working with the rest of the Task Force, Tim and Mary reviewed the needs priorities that had been developed. This allowed them to compare the list and establish how many items they could implement within the budget that they developed.

At Tim's request, Mary worked with other ECRT staff and Task Force members to identify one or more ways of using transit ITS tools to meet each need in the list covered by the budget. One thing that became clear in this process was the impact that the implementation process would have throughout the operation of the transit system. The new tools had to be built into the overall system. Many staff members' jobs would change significantly. Orientation and training were an important part of the effort required. Everyone on ECRT's staff had to understand how these changes would affect not only them as individuals, but also everyone with whom they came in contact through their work.

Implementing Transit ITS tools will affect your entire staff. It is important that the staff is oriented to these technologies and understands how these changes will affect their jobs.

Learn from the experiences of other systems of similar size and complexity. Find out if the selected tools met the system's expectations. Learn about the system's experience with the supplier.

With the help of Fred and the graduate student that he had recommended earlier to Tim, Mary identified the impacts each alternative Transit ITS application would have on meeting the priority needs. For some needs and applications, the choice was almost a "no-brainer", or in other words, very obvious. On the other hand, other needs and requirements called for more careful development and analysis. Mary took care to show how each choice supported the ECRT goal of improving both the quality of its service and the efficiency of operations.

Mary kept in mind that she wanted to avoid repetition of the near-disaster that had occurred at CCRT two years earlier. CCRT determined that they needed not only to book trips and dispatch vehicles more efficiently, but also to improve the billing and accounting system. The need for the latter set of capabilities, billing and accounting, was made urgent by the need to become Y2K-compliant. Time was running short. They found that another county in the state had engaged a software development firm to produce similar overall capabilities. The same source of funds was available to CCRT that was available to the other county to acquire the software and new hardware.

CCRT engaged the same software supplier to fulfill their needs. They purchased hardware that met the specifications of the software developer. When CCRT installed the software on the hardware, purchased from a hardware vendor, the application experienced some bugs. This was not an unusual occurrence in these situations. However, the booking and accounting operations inexplicably became very, very slow at times.

The developer was slow to take responsibility for this problem and to act upon it. The result was that CCRT had to spend a great deal of money for extra personnel and overtime to run the operation manually in order to keep the transit service going. CCRT finally was able to convince the state DOT, who provided the funding, to intervene.

It was found that the software developer had underestimated both the hardware and software requirements for the CCRT system. The under-specified system consequently worked very slowly when heavily loaded, which was often. The other county had a similar difficulty, but had caught it in time to avoid serious problems. The state DOT provided additional funds for the needed upgrade. Ultimately, the software vendor upgraded the software and fixed some of the other bugs. Now, after more than a year of problems and increased operating expenses, the CCRT system is running properly.

As Mary continued to identify and prioritize each alternative Transit ITS application for ECRT, GIS was included as one of the capabilities on the list for acquisition. It turned out that the NWRPA chief transportation planner, a member of the Technology Task Force, had in-depth experience with GIS. The planning agency had acquired the capability about ten years ago and found it highly valuable. He was able to show how GIS impacted the work of the planning agency and how it could benefit ECRT.

Once Mary had selected the tools she felt best supported ECRT's goals, the Task Force carefully reviewed the array of choices and the analyses supporting them. Tim presented the choices to the County Board of Supervisors who subsequently approved them. Then, Tim asked Mary to coordinate the preparation of grant applications for the funds that they had identified. The NWRPA offered considerable assistance to this effort.

As part of this process, Tim had contacted several social service agencies serving Edgar County concerning their needs for public transit, particularly in the rural areas. He was able to work with the regional planning agency and their GIS specialist to identify some of the future needs with greater specificity than earlier.

After selecting a Transit ITS application, Tim began to prepare for evaluating the operation of the new technology that he expected to obtain over the next year or so. He wanted to be sure that he had adequate "before" information on system performance that he could use to conduct a good comparison with the "after" situation.

5 EVALUATING THE IMPLEMENTATION

5.1 Purpose of Evaluation

Evaluating the implementation essentially means measuring the degree to which an application met your objectives and thus, your goals. The ideal time for capturing meaningful results is after the application is fully implemented and has been operating successfully for at least three months.

The measures to determine how well you have met the objectives are, to a large extent, those that are ordinarily used to monitor transit operations and business processes. Nonetheless, these measures need to be defined at the time the goals and objectives are set. In other words, they need to be tailored to measure how well each of your objectives is met. These include measures of service, cost, and process efficiency. Some examples are shown in Table 4.

Table 4: **Example Evaluation Measures**

SERVICE	COST	PROCESS EFFICIENCY
• Waiting time per call • Booking time per call • Passenger-miles per vehicle-hour • Origin-to-Destination passenger trip times • Vehicle run times	• Vehicle operating cost per vehicle-mile • Vehicle maintenance cost per vehicle-mile	• Labor hours per booking • Labor hours per bill • Passenger-miles per vehicle-hour

Taking the time to evaluate newly implemented Transit ITS applications also provides an opportunity to observe how their performance compares to the estimates and expectations that you developed earlier in the planning process. Discovering which estimation processes worked well and which did not can be a great help in improving the planning process for the future.

5.2 Database Development

5.2.1 Data Acquisition

The data collected needs to correspond to the evaluation measures that you choose. When you define your goal and your objectives, you essentially determine the candidate evaluation measures and the data that you will need.

To compute measures used for "Costs" and "Process Efficiency," the data needed are normally found in the accounting records of a transit agency. Obtaining the data that is required to measure "Service" might be more challenging. For example, the time that a caller waits for his call to be answered, or the time required to make a booking may not be routinely recorded. Table 5 lists possible sources for the required data.

Table 5: Data Sources

REQUIRED DATA ITEM	SOURCE
Vehicle Operating Cost	**Driver wages, fuel cost, oil cost accounts**
Vehicle Miles	**Daily vehicle odometer readings**
Vehicle Maintenance Cost	**Mechanic wages/contract, parts accounts**
Booking agent and related clerk hours	**Time sheets**
Billing clerical and supervisory hours	**Time sheets**
Number of bookings	**Daily ride-booking record**
Number of bills by type and complexity	**Daily billing record**
Call waiting time	**Device or software from telephone company**
Booking time	**Same as call-waiting time or manually**
Number and length of calls	**Manual or automated call record**
Passenger miles	**Calculated from driver or billing records**
Vehicle hours	**Driver or vehicle records**
Origin-to-Destination passenger trip times	**Driver and/or dispatcher logs**
Vehicle run times	**Driver and/or dispatcher logs**

5.2.2 Database Creation

The first task of database development is to assure that all items of source data are available and kept up to date. It is also useful to create a separate file for each required data item. These files should be revised whenever constituent source items are updated. Some items should be stored within their respective files by date or by day-of-the-week. Others that vary significantly by time of day, such as call-waiting time and booking time, may need to be segregated into the peak and off-peak periods for each day. Still others may be recorded appropriately for intervals that are less frequent.

Some data items might be acquired on a sampled basis. A reason for doing so could be the difficulty or excessive cost of acquiring the data on a more frequent basis. For example, manually recorded booking times might fall into this category. Other items that can be sampled periodically include trip times for riders, run times for vehicles, and passenger counts at each bus stop.

The most important point is that the data present reliable estimates of whatever they purport to measure. This need for reliability applies to the measures of service, cost or process efficiency. The entire subject of statistics, as a tool or as an academic discipline, is devoted to obtaining reliable estimates. [11]

Transit ITS and other computer software applications can result in potential increases in efficiency and reliability of data collection and information development. We use the term, potential, advisedly here, because the creation and the proper maintenance of such a database require considerable care and effort.

[11] See any basic statistics textbook or a chapter on statistics and performance measurement in a textbook on transportation management. An example is Clark, Jordan and Stockton, John R. and Charles T Clark. *Introduction to Business and Economic Statistics, 7th Edition*. Cincinnati OH: South-Western Pub. Co., 1985. For a broader perspective on measurement, see Fielding, Gordon. *Managing Public Transit Strategically*. New York: Jossey-Boss. 1987 (out of print).

5.3 Creating and Reporting Evaluation Measures

5.3.1 Creating Evaluation Measures

Evaluation measures are formed from the required data items. There are a number of OTS software programs available to organize data. One of the most versatile is the spreadsheet. It is possible to create an algebraic definition for each evaluation measure you want in a cell of the spreadsheet. The definition can represent each constituent data item in a form that automatically extracts it from its resident database for the purpose of the calculation. Similar capabilities exist in several OTS database programs.

5.3.2 Reporting Evaluation Measures

The desired reports can be derived directly from the spreadsheet or other programs in which the evaluation statistics are calculated. In fact, reports can be the spreadsheets themselves or the output of database programs. No other means is necessary to prepare the desired reports.

The reports should be designed to arrange the measures so that progress toward objectives and goals can be determined. This requirement can be fulfilled for the example shown in Table 4 by listing the measures under the heading, "Service," "Cost," or "Process Efficiency" of the objective it measures. Each measure reports the value of one of the objectives, hence defining progress toward achieving its goal.

5.4 Performing the Evaluation

5.4.1 Defining the Base Case

The Base Case defines the state of the system against which future progress and goal achievement is to be measured. Normally it is designated to be the existing system before any proposed Transit ITS applications are employed. Reliable estimates of the performance of the Base Case system are needed.

5.4.2 Measuring Progress

As mentioned in section 5.1, the measurement of the impact of any new Transit ITS applications should not be made before the application has been in successful operation for at least three months. After that time, the same three steps done for the Base Case should be completed for the system with the new Transit ITS application(s). When comparing the system with the new Transit ITS applications with the Base Case, the change in the values of evaluation measures is the overall measure of progress toward achieving your goal.

Steps to establish Base Case

1. Create the database as depicted in Tables 4 and 5.
2. Populate the database with enough data to provide reliable performance estimates for the Base Case.
3. Prepare reports that provide values of the evaluation measures, and therefore, the Base Case status of goal achievement.

Steps to establish Progress Measurement

1. Create the database as depicted in Tables 4 and 5.
2. Populate the database with enough data to provide reliable performance estimates for the new Transit ITS application. The evaluation should cover system performance for at least three months.
3. Prepare reports that provide values of the evaluation measures, and therefore, the level of goal achievement for the new Transit ITS applications.

5.5 Backing-Up the Database

The development and maintenance of the evaluation database requires considerable time and effort. It is important to protect this investment against destruction or damage. Power failures, lightning strikes, computer viruses, computer failures, software bugs, and operator errors are possible sources of computer system failure that could harm or eliminate the evaluation database.

Consequently, we recommend that the evaluation database be backed-up daily. For very small systems weekly back-ups may be adequate. As many readers know, backing up the database merely means copying it onto a disk, tape or CD. To guard against fire, theft, or some other disaster, the database back-up disk should be stored off-site in a bank or some other fireproof vault.

5.6 One Manager's Approach to Evaluating Implementation

Once again, to illustrate the process of evaluating Transit ITS implementation, we will continue with the experiences of our hypothetical Edgar County Rural Transit (ECRT) system and its manager, Tim Stark.

After months of planning, obtaining funds, and selecting tools, ECRT is about to implement a number of Transit ITS applications. Tim recognizes that it is important to be able to measure the impact of these applications on improving service and process efficiency, as well as on decreasing costs.

To lay the groundwork for the eventual evaluation of these Transit ITS capabilities, Tim is developing Base Case information. Tim reviewed the performance measures that he had developed to assess the needs of ECRT during the Transit ITS planning process. He selected a set of measures that he thought would enable ECRT to track its progress toward meeting its objectives and achieving its goal of improving both the quality of transit service and the efficiency of ECRT operations.

Tim reviewed the set of evaluation measures with his Information Technology (IT) assistant, Mary Koppel, and then with the Technology Task Force. After incorporating their suggestions, Tim and Mary identified the data items that ECRT needed to calculate the evaluation measures. They checked the ECRT database that they had developed early in the Transit ITS planning process to be sure the required data items were all there. A few were missing, but Mary and the graduate student were able to establish them using the required source data now available and accessible in the ECRT database.

At Tim's request, the Technology Task Force determined that three months of source data were needed to develop reliable estimates of the evaluation measures for the Base Case. Consequently, the Base Case recording period began once the database file structure for all the required source data was established. At the end of the three-month recording period, the evaluation measures for the Base Case were computed. These measures were based solely on the information from the operation of ECRT for that three-month period.

From that point on, the evaluation measures have been reported on a monthly basis. The reports are developed in-house with some technical assistance from the State DOT. Because of the structure of the database, ECRT was able to produce the report containing the measures for a given month on the first business day following the close of the month. The report showed the results for all the previously reported months as well. When a full year has elapsed, the report contains results for only the subject month and each of the previous twelve months. Later on, a rolling annual summary was developed. It was reported each month for the prior twelve months. The entire ECRT database is now backed up at the close of each business day with zip disks deposited for safekeeping in a local bank.

Under Tim's overall direction, Mary continued to supervise the installation of the selected Transit ITS applications. All of the applications, except that for Smart Card technology, were readily available in off-the-shelf versions. The Smart Card application was a joint development of the state DOT and three social service agencies operating in the state.

As the new applications have come into use, the evaluation report has continued to show their collective impact on the service quality and efficiency of ECRT. It has also served as a guide for ECRT management and staff to measure the transit system' s effectiveness.

Mary has become the permanent full-time IT Director at ECRT. At this point, Tim is seeking greater and more effective collaboration with the agencies, business firms, and groups of citizens served by ECRT.

6 WHERE DOES RURAL TRANSIT ITS PLANNING GO FROM HERE?

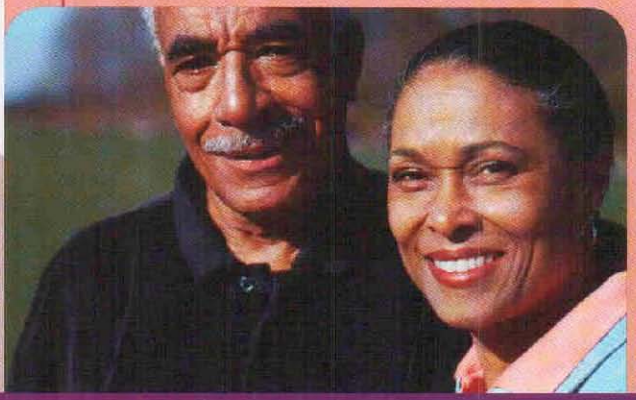
The needs for public transportation in rural areas continue to emerge and grow. New technology for providing and managing rural transit continues to develop with encouragement from FTA programs. Rural transit managers have growing opportunities to serve their communities. They also have continuing challenges to manage improvement through technological and organizational change.

New institutions are emerging in order to help rural transit managers locate and benefit from the information that is most useful to them. State transportation agencies are helping in diverse ways by managing financial assistance and cooperatively developing new Transit ITS tools. Increasing collaboration among federal and state transportation and social service agencies are producing, not only new riders, but also innovations in transit and transit-related services. Industry associations, such as APTA and CTAA, produce publications and sponsor conferences that are increasingly addressing rural Transit ITS and other topics of value to rural transit operators.

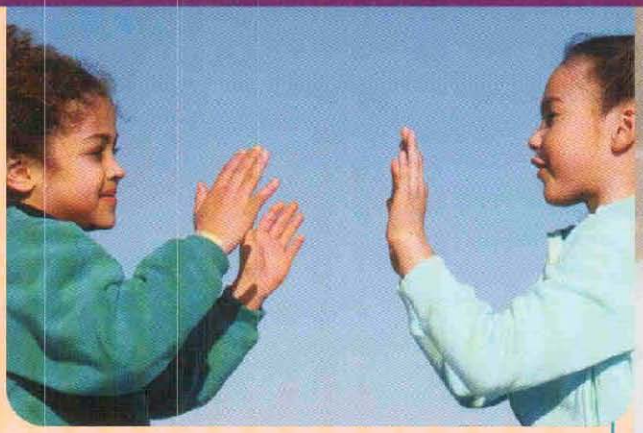
The flow of this information is ever increasing and sometimes seems to reach unimaginable proportions. This Guidebook provides a framework for assimilating new information and managing change. We hope that rural transit managers will find the framework useful. It can accommodate the results of research, development, and the experience of rural transit managers around the world.

We have a continuing interest in the development of better methods and techniques for planning rural Transit ITS applications. The Federal Transit Administration is also beginning work on an interactive web site that will enable transit systems to share their experiences in implementing Rural Transit ITS.

U.S.Department of Transportation
Federal Transit Administration
Federal Highway Administration



BEST PRACTICES IN RURAL TRANSIT ITS



BEST PRACTICES IN RURAL TRANSIT ITS

1 INTRODUCTION

1.1 Purpose of Best Practice

This report on Best Practices in Rural Transit ITS is the result of a thorough review of the current application of Transit ITS technologies in rural transit operations. This report is organized to specifically address the planning, researching, procuring, implementation and evaluation of Transit ITS technologies and applications for rural transit systems.

These best practices are intended to provide guidance, minimize the learning curve for transit systems, and further enhance the results of Transit ITS evaluations. They provide a foundation of knowledge on which its companion document, *A Guidebook for Planning Rural Transit ITS Applications*, is based.

Although directed primarily at rural transit systems, these are best practices that have been identified by both urban and rural systems. The initial adoption and evaluation of most Transit ITS technologies has taken place in urban transit systems. The lessons learned by these systems have been translated into best practices.

Technology in general and Transit ITS specifically are dynamic and constantly evolving. As Transit ITS evolves, new lessons are learned and best practices identified. This is a continuing process. As such, this document is a snapshot in time and presents the best practices known to date.

Going forward, the FTA intends to establish a web site to serve as an online repository of rural ITS experience and useful documents. The Rural Transit ITS Success Electronic Story Booklet, will be a Internet-based information exchange system that allows current and potential ITS users to search, post, and review successful experiences with ITS technologies.

1.2 What Is a Best Practice?

A best practice is a method, strategy, technique, procedure or philosophy that has been used successfully and can be used as a model for other systems to follow. Best practices are a set of practical, rational, simple, comprehensive and reliable tools that have evolved from lessons learned. They are "practices" that work and have been validated by withstanding the test of time.

For purposes of this review, best practices have been drawn from the experiences of both urban and rural systems. For the most part, with the exception of scheduling and dispatching, not many Transit ITS applications have been implemented in rural transit systems. Numerous urban systems have employed Transit ITS applications and developed a considerable amount of experience that can be shared with other systems. It is, however, important to recognize that a best practice identified by an urban system may not always be suitable for a rural system.

There are several operational criteria used to identify a best practice:

- **Saves time, money, and effort**
- **Works all the time**
- **Has been validated and withstood the test of time**
- **Has wide application in Rural Transit**
- **Provides better customer service**
- **Enables easier decision-making**
- **Utilizes existing resources**
- **Should be shared**

A Best Practice is something that people want to share with other members of the rural transit community.

1.3 Best Practice Identification

In preparing this report, best practices were identified through a process that included a review of available literature as well as a meeting of an expert panel to discuss their experiences with Transit ITS and to guide the best practice identification process. In addition, telephone interviews were conducted and, finally, numerous site visits and interviews were performed. The Transit ITS Field Survey Questionnaire used to conduct these interviews is contained in the companion document, *Resources for Rural Transit ITS*.

The literature review revealed that considerable effort has been expended to implement Transit ITS applications into urban transit systems, but that implementation in rural systems has been quite limited. The expert panel, comprised of members of the rural transit community, including both transit system operators and state coordinators, confirmed this situation. The panel indicated that, to the best of their knowledge, while the introduction of Transit ITS applications into rural transit operations has been growing, it is still very limited. The panel shared their experiences and identified many of the "best practices" that are presented in the following sections.

The selection of the transit systems to be visited was accomplished with guidance from the expert panel. The transit systems selected spanned the spectrum from systems that are considering the introduction of Transit ITS, starting the implementation of technologies, or having completed successful implementations and moving forward with additional Transit ITS technology applications. Some of the systems have experienced failure in the introduction of Transit ITS and have had to start over. Failures are considered learning opportunities whose results are presented here in a positive form to assist transit systems in avoiding the mistakes others have made. Many transit systems identified the same best practices and most contained herein were identified by more than one system.

Nineteen rural and small urban transit system sites were visited and interviewed

- Navajo Transit System - Window Rock, AZ
- Marion County Senior Services - Ocala, FL
- Flagler County Transit - Palm Coast, FL
- St. John's Council on Aging - St. Augustine, FL
- Cape Cod Regional Transit Authority – Cape Cod, MA
- Montachusett Regional Transit Authority - Fitchburg, MA
- St. Cloud Metropolitan Transit Commission - St. Cloud, MN
- Arrowhead Transit - Virginia, MN
- Dakota Area Resources & Transportation for Seniors - West St. Paul, MN
- Virginia Dial-A-Ride - Virginia, MN
- Shaa'srk'a ("Roadrunner") Transit - Laguna, NM
- Zuni Transit - Zuni, NM
- Sunset Empire Transit District - Astoria OR
- South Lane Wheels -Cottage Grove, OR
- Special Mobility Services, Inc. - Eugene, OR
- Lane Council of Governments & Lane Transit District - Florence, OR
- Josephine County Health & Community Action - Grants Pass, OR
- Rogue Valley Transportation District & Valley Lift - Medford, OR
- Central Oregon Intergovernmental Council - Redmond, OR

The reader is referred to this document's acknowledgements that identifies both expert panel members and interviewees. The companion document, *Transit ITS Case Studies*, includes case studies of selected rural transit systems. These case studies illustrate specifically how some systems have put Transit ITS into practice and the challenges that they met along the way.

1.4 Best Practice Overview

The best practices identified are grouped into categories that follow the process a transit system will go through to identify, select and implement a Transit ITS application. In several occasions, the same best practice is repeated because it is applicable to more than one category. The categories are discussed in detail in the following five sections:

Section 2	**Best Practices in Planning**
Section 3	**Best Practices in Research and Procurement**
Section 4	**Best Practices in Implementing Transit ITS**
Section 5	**Best Practices in Evaluating Transit ITS**
Section 6	**Best Practices in Doing Business**

2 BEST PRACTICES IN PLANNING

The initial step in the planning phase is to understand your transit system, its needs, and the issues that it faces. Knowing the needs and issues of the transit system enables transit management to examine what Transit ITS applications may be suitable. Before change can occur, the transit system must be aware that change is needed.

The second step is to become aware of what Transit ITS is, the types of Transit ITS applications, and what they do. Transit ITS is not applicable to every system. After a transit operator or planner is aware of and has knowledge and understanding of Transit ITS, he or she can explore whether Transit ITS applications are appropriate to meet the needs of his or her system. The companion document, *A Guidebook for Planning Rural Transit ITS Applications*, contains an ordered set of suggestions for choosing new information-management technology to improve the performance of your rural transit system.

By combining the knowledge gained in the first two steps, the transit system can proceed to match the benefits of Transit ITS applications with the previously defined needs. More specifically, benefits, effectiveness and cost of implementing Transit ITS can then be examined. A plan can be put in place that reflects your vision of the future.

Steps in Planning Phase

- **Understand your system's needs and issues.**
- **Learn about Transit ITS.**
- **Match the Transit ITS benefits to your needs.**
- **Recognize your system will change in the future.**

2.1 Understand Your System and Its Needs

Before you can evaluate whether Transit ITS is appropriate, you must understand your own system. Define your goals and needs before you decide whether Transit ITS is for you. What does your system need? How can the technology that you are considering solve your problem?

There are several ways to identify the needs of a transit system. The first and most obvious is to look at your existing operation and how the transit system is responding to the needs of its patrons. Are you meeting the service demand? Are there a lot of complaints? What are complaints directed at? Do you talk with and listen to the suggestions of your patrons or the communities you serve?

The next question is will Transit ITS technologies and applications help you achieve some of the objectives and address your needs? If so, are these the results that you want?

Will the technology that you are considering result in:

- Increased ridership?
- Fewer complaints?
- Happier employees?
- Lower operating cost?
- More service for the same or less cost?
- More effective customer management?
- Improved reporting and schedule generation?

2.2 Learn about Transit ITS

Transit system personnel are constantly faced with change. Transit ITS technologies have been developed in an effort to improve the transportation infrastructure. Even when the transit operator may not be thinking of Transit ITS, it is wise to be aware of what it is and what it does. There are many sources for learning about Transit ITS. Transit personnel have made the following recommendations:

Read literature

The literature contains many references to Transit ITS technologies and applications. A bibliography is contained in the companion document, *Resources for Rural Transit ITS*. It includes Internet, periodical, and document references. Industry trade magazines and professional organizations are an additional source of information. Many systems have also learned from information on the Internet.

Attend conferences

Transit ITS has become a widely used technology that is often featured at specialty conferences as well as at major meetings of organizations such as the American Public Transit Association (APTA) and Community Transportation Association of America (CTAA). Attendance at conferences and meetings is an excellent means of improving your knowledge of Transit ITS. You will learn, not only through presentation sessions, but also through exchange with people from other systems in order to discover what they have done and how it solved their problem.

Visit other transit systems

Virtually all the transit systems mentioned the importance of talking with and visiting other transit systems. Interaction with the staff of other transit systems provides the opportunity to learn and even to obtain some hands-on experience. A transit system with ITS experience can provide an enormous amount of insight into the problems you may have and how they can be overcome.

Work with other systems

If your system is a feeder, works with or supports other larger systems, then work with that system. Not only can you learn from them, but you may also be able to use their resources to assist in solving your problem.

Develop a relationship with local educational institutions

If you have nearby colleges or universities, let them become active in your research efforts. Learn from them and let them learn from you. There are opportunities for pairing with universities to obtain government grants supporting system development, especially to demonstrate new ideas or to serve special groups of people.

Educate yourself about ITS through training

There are numerous training resources available to educate yourself about Transit ITS. Two major sources are the National Transit Institute (NTI) and the FTA/FHWA Professional Capacity Building (PCB) Program. They can be accessed through their respective web sites. State DOTs and the field offices of both FTA and FHWA can provide information on how to contact these and other sources of Transit ITS training.

Know your stakeholders and look at the possibilities

Involve all of the stakeholders at the beginning of your efforts and keep them abreast of what you are doing. Understand their needs and their resources along with the ways that they can help you. Local employers may have an interest in the transportation that you are providing, to help get their employees to and from work. These same employers may also have tremendous technical capabilities that you can tap into.

Work with and learn from your State and County governments

Governments have resources and can do many things for you. One common suggestion from several successful systems was to join with the state in the procurement of Transit ITS technologies and applications.

Apply for grants

To assist in learning about Transit ITS and in planning an implementation, you should consider working with your State personnel to apply for a Planning Grant. This was noted by a state official who has awarded grants to assist transit operators in planning for and implementing Transit ITS. Grants may also be available from the Federal government and other local sources.

Don't try to reinvent the wheel

Where possible use existing resources that may have been developed by other organizations but are applicable to your transit system. As an example, some local utilities or other local organizations may already have prepared maps or GIS database that you can share. Communications is another area where there are often existing resources that you can employ. There may be no need to build your own communications towers when there are other organizations in the community that have towers you can share.

2.3 Match the Transit ITS Benefits to Your Needs

Once you have identified the needs of your system and learned about Transit ITS Technologies, other important considerations for matching the technology to your needs include:

Take advantage of other people's successes.

Ask for help and you might just get it.

Find others who are using the technology that you are considering

Are there comparable systems that have tried this ITS application?

How well did it meet their needs?

Evaluate staffing needs

How will the application of this technology affect your staffing needs?

Will it require new skills, and consequently, new staff?

Will you be able to implement it with your existing staff?

Can your existing staff be retrained?

Take small steps

You may want to use a phased approach and take manageably sized steps.

Have a long-term plan that is flexible

Who will maintain your equipment after the warranty has expired?

Remember that once you embark on this, you must be prepared to finish it.

Have a plan for when things do not work out.

Determine life-cycle costs

Examine not only the initial cost, but also the long-term cost that will be incurred for maintenance and future upgrading of the Transit ITS.

Know the benefits

What are the benefits to you and those that you serve? How will your employees and patrons respond?

2.4 Recognize Your Transit System May Change in the Future

No transit system remains stagnant. Change is constant and a transit system is constantly reorganizing. This change may take many forms and can impact operations, service areas, equipment, times, schedules, staffing, or the environment. Transit management must not only respond to today's needs, but also consider the future. One of the challenges for rural transit managers is how to take advantage of new Transit ITS technologies in an ever-changing environment.

To assist in adapting to change, the transit system must recognize and plan for where it will be in one, five or ten years. The manager must evaluate the present operation and project expected changes. For this reason, it is important that transit managers provide leadership and have a vision for the system. It is important that the transit system have a vision for the future, be aware of how that vision can be realized and provide the leadership to achieve the vision through continuous improvement in personnel and equipment.

Community planners are a great asset to help define this vision. The future plans of the community will provide insight as to how the transit system must adjust in order to respond to future community needs. Also contained in community plans are the expectations the community may have for the transit system.

It is essential that the transit system respond to change by taking advantage of the technologies and tools that are available.

Consider the Future

- **Have a vision for your future.**
- **Develop a one, five and ten year plan.**
- **Work with community planners to determine changes to respond to future needs.**

Decide what you want, why you want it, and how you will implement Transit ITS to get it.

3 BEST PRACTICES IN RESEARCH AND PROCUREMENT

Once you are aware of the potential application of Transit ITS technologies, a decision can be made on whether Transit ITS is appropriate for your system to address the identified need and achieve the goals of the system. First, applications must be researched in greater detail and specifications determined. Then, the system must be procured keeping in mind that it is important to choose a vendor that will deliver. Proposals are evaluated and finally a contract awarded.

Step in Research and Procurement Phase

- Researching the Application
- Procuring the System
- Selecting the Vendor
- Evaluating the Proposals
- Award the Contract

3.1 Researching the Application

An in-depth understanding of the technology is required to ensure that the appropriate factors are considered in the preparation of the system specification. Several of the best practices identified earlier in the planning phase are just as pertinent in researching the application and are repeated here to stress their importance. There are several recommended ways to obtain the necessary technical expertise:

Use not-for-profit institutions

Local colleges, universities, research centers and transportation associations provide many opportunities to learn about Transit ITS.

Interview other transit systems

Learn what similar systems have done and follow their pattern. Learn from their mistakes. When you identify comparable systems, ask what they are doing and how it has worked. This is particularly important when looking at software applications, where adequate training is required to fully benefit from the application. Use the interview questionnaire contained in the companion document, *Resources for Rural Transit ITS*, to assist you in gathering information on their experiences.

Learn from urban transit systems

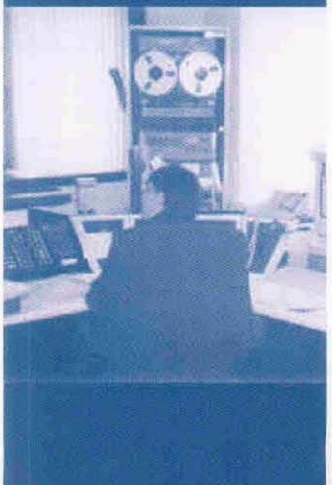
Work with and learn from the urban systems in your area and state.

Learn from other industries

Other related industries use ITS technology and applications. Some examples are the trucking industry, car rental agencies, package delivery firms, and airport shuttle companies. One transit organization learned from the mining industry in their area. The mining company was concerned with tracking their trucks. Learn from the experiences of others, because you will not live long enough to make enough mistakes of your own before you get it right!

Engage a GIS specialist

GIS have been used by many industries and for a variety of applications. Many existing GIS applications that have been implemented in your local area may be applicable to and easily adaptable by your transit system. A GIS specialist can help you define your needs and identify potential solutions to assist you in meeting those needs.



Be aware that Transit ITS is not a stand-alone system

The Transit ITS application must be integrated into the transit system operations. The system selected and implemented should be one that you can build on.

Understand what resources are available in your local area

Do you have the financial resources to support the implementation and maintenance of the system? Are there qualified personnel in the area that are able to support the development, implementation and maintenance of your system? The availability of both internal and external personnel should be considered.

Identify existing infrastructure

Seek out infrastructure or equipment that may already be in place to save the effort of obtaining permits or constructing your own. For example, you can use existing communications towers, perhaps those of a local utility, emergency services, or public provider.

Engage a project manager

Find a project manager who has expertise, street smarts and will stay with you throughout the procurement and implementation process. This is critical to your success.

3.2 Procuring the System

The procurement process can be long and cumbersome. Understand that the procurement and deployment will be very complex and require technical expertise. It is important that you realize this and be prepared from the beginning. Taking the time to understand the system and what will be done before starting will save considerable effort later. Make sure you or your staff possess the expertise to understand the Transit ITS technology that you are getting and how it will address your objectives. Involve all of your employees who will be expected to work with or adapt to this new system. They can provide valuable insights into what will meet their needs.

Recommendations to assist in procurement are:

Engage a project manager

A project manager can supervise the procurement, implementation, and evaluation. Find one who will stay with you until completion and preferably for the longer term.

Join a consortium

Consider using or joining a consortium similar to the insurance approach of the 1980s. If you are a very small system, work with several other systems in the area to implement ITS. If you do not have the resources, have the state do much of the footwork.

Develop partnerships

Partner with other agencies to learn from them and to utilize their resources and technical expertise.

Make use of State procurement contracts

Consider using State procurement contracts, as you will benefit from both their expertise in developing the specification and obtaining the vendor services.

Learn from others

See what comparable systems have done and, if they were successful, follow their pattern, learn from their mistakes and, when possible, piggyback on their efforts.

Consider life cycle costs

What is the true cost? Do not get sold on a low initial cost and then be faced with a large maintenance cost.

Buy local

Seek out local vendors that have the expertise that you need. The local vendor is more accessible for technical support and has both an investment in the community and a reputation to protect.

Use local information sources

For GIS and other applications, you can often purchase or obtain the information from a local source. For example, one system was able to procure maps from the local telephone company. Information may also be available from other local sources such as state or county agencies. If you do this, be sure that you have a clear understanding of how you are going to use the data or models.

Buy a package

Problems can arise when splitting the procurement. If you buy the hardware from one supplier, and the software from a different supplier, getting the two to work together can be a problem. In one instance, issues relating to hardware interfacing with software precluded ever getting the system to work.

Examine off-the-shelf (OTS) systems

If OTS software packages address your needs and the vendor can demonstrate that it works for your system, then use it. The key is having the vendor demonstrate that it works for your system.

Have performance-based payment schedule

Set forth a defined payment schedule that is tied to the progress of the implementation. Do not pay until you are completely satisfied. One system suggested making the first payment when the test of the system was completed satisfactorily. Another recommended holding payment until the system is up and running and your staff are trained.

Share with others

Share what you have with others and they will share with you.

Remain focused

Do not lose sight of the problem that you are trying to solve with the Transit ITS application you want to acquire.

3.3 Selecting the Vendor

During the process of researching the application, considerable information can and should be obtained from vendors or manufacturers of the Transit ITS technology. Aside from the obvious caution that the vendor is interested in selling the transit system her or his product, most of them do have considerable experience and will be willing to share with you and educate you on their Transit ITS applications.

Considerations in selecting a vendor include:

Urban versus rural

Software developed and applied in urban situations does not always work in rural systems.

Size of operation

The size of the rural system, the area served and in which you operate, is important and will influence your needs and the solution.

On-site project management

Select from in-house staff or hire a project manager who will supervise the selection, procurement, implementation, training and evaluation of the system. This person should obtain from the vendor the knowledge and experience to maintain the system and train other employees when the vendor is no longer involved.

Vendor knowledge of transit operations

Vendors may know their product but may not always understand transit system operations. Avoid the situation of the tail, in this case, the vendor, wagging the dog.

Vendor demonstrations

If you have your specification drafted, give it to the vendor, and ask for a demonstration of their system. Ask them to demonstrate how their system meets your specifications and address your needs.

Vendor references

Make sure that the vendor's application is reliable. Talk with other systems that have been involved with the contractor or are using their application. Learn from their experiences. Do not limit yourself by asking only local systems. Call references around the country. A telephone call can save you thousands of dollars. Carefully check references of products with others who use the vendor and his or her software.

Adequate training from the vendor

Recognize that software developers may be very technically sophisticated, but not necessarily good trainers. Get a commitment that the contractor will provide the transit system staff with the appropriate training and technical support. Obtaining adequate training and technical support was identified by several transit systems as a major problem.

3.4 Evaluating the Proposals

There are a number of issues considered in the procurement evaluation process. Often, evaluating proposals can be like shooting darts: Sometimes you may hit the target, but not the bull's eye. During the proposal evaluation process, develop your own scoring system that addresses the contractor's understanding of the problem, methodology, personnel experience, management approach and experience in the field.

The following are some specific criteria to use when evaluating proposals:

Understanding

Does the contractor really understand your system and what you want to do?

Approach

From the proposal, do you understand the contractor's approach? How will they do the job? If you do not understand how they will accomplish your goals, ask before you award the contract. Take the time at this point, to understand exactly what is to be done and how it addresses your objectives.

Experience

Does the contractor have experience that is applicable to what you want to do? This experience may be in a different field but similar in the application.

Quality

The quality of the proposal will give you an insight into the quality of their final product.

Level of effort

The number of people over which the hours are spread is important. Think about the job and how long it would take you to do it.

Milestone reporting

Does the contractor offer a reporting system that will keep you informed on the implementation's progress? Ask for formal on-site briefings at important milestones.

Overall cost

Consider the price versus hours for each of the contractors. How do they compare?

If it looks too good to be true then it probably is.

Once the contract has been awarded, be aware of that most contractors require some degree of direction so it is important to find a contractor you can work with. It is also important to be sure that the contractor has an open mind and has not prejudged the situation. Be sure to remind them about your specific needs. Maintain frequent communication and share your goals with them.

The contract is only as good as your relationship with the contractor.

4 BEST PRACTICES IN IMPLEMENTING TRANSIT ITS

Having procured a Transit ITS application, it is time to address the issue of implementation. Implementing Transit ITS technology will require major changes in how the transit system operates. It will also require that the transit system personnel work closely with the vendor staff. The contract between the vendor and the transit system is, in many instances, only as good as the rapport between the two. Ultimately, the success of the implementation will depend on the transit system staff and their level of training.

4.1 Empower Your Staff

It is important to recognize that the success of the Transit ITS application will depend on the quality and the desire of the staff to make it work. The transit system will achieve its goal only if the staff is motivated and provided with the training to empower them to make the application work. Additionally, the vision of the transit manager will only be realized if the manager provides the leadership and recognizes the need for change in the transit system operation and its staff.

Keys to Successful Implementation

- **Empower your staff**
- **Training**

The following recommendations from other transit systems are made to assist in the implementation:

Staff professionalism will have to change

Recognize that the new technology and the changes in how things are done in the system will require a new level of professionalism in the staff.

Work with your staff and listen to them

Your staff members are the end users and you need them to make it work.

Develop in-house technical expertise

If you do not have the technical expertise, develop it in an employee. Try to pick an employee who will stay with you. Having a knowledgeable staff member will provide you with a better understanding of the value of Transit ITS applications and how to make them work for you.

Involve all the stakeholders in the system

The Transit ITS application will affect all aspects of the system. Invite all employees to participate in the system demonstrations.

Be prepared and have patience

Be aware that it will take considerable time to educate all involved and to get the system up and operating. No matter how much time you estimate the process taking, it will take longer.

Keep staff members informed

Staff needs to understand that this new application will make it easier for them to do their job and will better serve the patrons. Some of the tasks that the staff had to do in the past will be automatically accomplished by the new applications. Furthermore, the goal of the new technology may be to enhance safety and efficiency of the overall operation, and is not to monitor employee performance. Several systems informed their staff that applications of AVL and GIS provide a new level of safety. Now, when they have a breakdown or accident they can get immediate help and not be stranded, in the cold or heat, waiting for someone to notice that they are missing.

Invest in training

Use existing programs like the FHWA and FTA "Intelligent Transportation Peer-to-Peer" program.

4.2 Training

A key issue that was mentioned by every transit operator interviewed was the need for adequate training. In most instances the training was sufficient, but not much more than that. When asked what was the most important aspect of their technology implementation, more than one system responded: "Training, training, training and more training." Training recommendations from other transit systems include:

You cannot get enough training
Obtain all the training you can, especially from the vendor.

Have the vendor provide hands-on training at your facility
Classroom training is good, but remember the old saying, "I forget what I hear, I remember what I read, and I understand what I do."

Obtain additional training at conferences or other sources
Take a course in computers. Remember that the computer is here to stay and that it will influence the rest of your life.

Be selective in the quality of the training
Understand that many software developers are not good trainers and can sometimes be too sophisticated for beginners.

Train as many staff members as you can
Avoid the situation of having a single employee knowing everything and taking advantage of training opportunities, with no other employee being comparably trained. You never know where the hidden jewel of a staff member may be.

4.3 General Implementation Issues

During the interviews, several issues that did not fit into any categories were identified. These issues are provided here for your information:

Learn from this implementation
Consider that the present implementation may be just the first phase of a longer-term effort. Keep notes and benefit from your own experiences.

Secure your equipment
Equipment security is important. One transit system recounted that they had their computers stolen during their application's implementation. It is important that equipment is not only marked as to ownership but also secured to a base such as a desk. Furthermore, equipment should be kept in a secure area with controlled access.

Evaluate contractor performance
Recognize that when the battle to get the vendor to complete the system installation is lost, cut your losses and move on. Terminate the contract.

Do not waste time trying to get on the communications towers of organizations that are not supportive
If you share a communications tower with an organization that is not supportive, you will likely have problems. One system noted that their communications needs were low priority and thus became sporadic and difficult for them.

Remember that other systems may not have ITS components
Realize that although you have a Transit ITS application, there may be other transit systems that you interface with who have no capability, and perhaps, not even a computer.

Look for low-cost or no-cost solutions
One often cited solution was to call and talk to other systems and get advice.

Sometimes, a simple call can provide a priceless amount of knowledge.

5 BEST PRACTICES IN EVALUATING TRANSIT ITS

Once a Transit ITS application has been implemented, an evaluation determines whether the selected system has addressed your goals. The evaluation assesses the system's performance, focusing on the two primary components to be evaluated, the software and the hardware.

5.1 Software Evaluation

Software acquisitions or the development of new software always seems to involve problems that must be resolved. The following are recommended to assist in evaluating software:

Remember that not all software is created equal
Software needs differ from system to system. Accordingly, it must be tailored to your system's requirements.

Buy the software instead of trying to build it
Do not try to reinvent the technology if someone has a "tried and true" solution.

Develop a precise and clear set of requirements
You will have a hard time evaluating if you do not know what aspects to examine. What works for one system will not necessarily work for a second system.

Have a professional(s) assist you
Experience and expertise of someone else is invaluable.

Be aware of extensive development delays
Remember that the service that you get during software development will be the best you will get. The technical support that follows may not be any better.

Have a test program
Plan an extensive formal testing program to test all of the limits of the software. Have a firm testing schedule for the software (and hardware). Be sure that the tests will replicate what you require the software to do. Have the people you expect to use the system test it.

Include system acceptance criteria in the contract
Have acceptance tests take place at your facility with your hardware and your people involved. If the software does not work at your facility, work with the contractor to resolve the problems.

Go outside the envelope
Remember demonstrations always work. Make mistakes with the software and see how it responds. Test the limits of the software to see how it will respond.

Have a contingency plan
If tests fail, what will you do?

Use a checklist to conduct a thorough evaluation
There are several checklists available or you can use your own based on your original specifications .[1]

Perform frequent back-ups
Make sure that the installation software is backed up. Have a program to constantly back up the software in the event of a failure.

Make sure that you own the software that you are buying
Get disks for not only the application software, but also the operating system. Obtain or create a restoration disk. Be sure that you have operating and trouble-shooting manuals for software.

[1] Checklists can be found in the Federal Highway Administration's The Road to Successful ITS Software Acquisition, by Mitretek, July 1998, available from the Federal Transit Administration, CD ROM, "Advanced Public Transportation Systems Publications", Mira Digital Publishing, Inc, e-mail, cdsupport@miracd.com.

5.2 Hardware Evaluation

Evaluating the hardware goes hand in hand with the evaluation of the software. To have a successful system, hardware and software must work together. Several of the software recommendations previously mentioned are just as applicable to the hardware. In addition, the following suggestions are provided for the hardware:

Develop adequate hardware specifications

Be sure that the duty cycle of the hardware selected is sufficient to meet the operational expectations of the system.

Have a test plan

As with the software, have a test plan for the hardware and use it to test the hardware.

Be aware of warranty terms

Make sure that you have vendor warranty documentation and understand how to obtain service. Also, obtain operating and trouble shooting manuals for hardware.

Know where to get replacement parts

If you need special replacement parts, do you know where can you obtain them? Will you have only one source, the original vendor? Or, can you obtain replacement parts from other distributors?

Identify equipment maintenance providers

How or where will you obtain equipment maintenance? Is it local?

Test

Test, test and test some more.

6 BEST PRACTICES IN DOING BUSINESS

When you implement a new technology or application to improve your operation, many of your business practices may change. This change may result in the adjustment of your staffing needs and your operations. Moreover, it will require that you modify your thinking about how you operate. In any event, you will no longer be doing things the way you were before. Hopefully, your operations will be more productive and you will find that you can do more with less.

Changes in your system that may come about following implementation of a new technology include:

Business processes

New applications may require that you change some of your processes such as trip booking, record keeping, and patron needs tracking, to mention a few.

Staffing

Recognize that your staffing will need to change to address the technology. Your staff will need to be familiar with computers. Staff professionalism will be important.

Service requirements

Recognize that you will need to change service requirements and transportation coordination with agencies that you serve.

Community needs

Try to tie your operation in with other services that people use. For example, can you have your van service stop at a childcare center so that parents can pick up their children? Become an invaluable service provider to the community.

Resource sharing

Consider sharing communications frequencies with the local utility or other company. Do this only if you can be assured of receiving priorities that you require for your normal and emergency communications.

Most importantly, adopt the philosophy that you will learn something every day. You will need to remain abreast of the technology that the application you have adopted employs.

FINAL OBSERVATIONS

After interviewing numerous members of the rural transit community and reviewing the literature to determine the present status of rural Transit ITS, it is clear that the ITS technologies and applications are slowly being incorporated into the everyday operation of rural transit systems. Also identified by the rural transit operators and state officials were the barriers to the selection and implementation of Transit ITS.

Some barriers that were identified as preventing progress in the selection and implementation were:

Lack of general knowledge
The lack of knowledge regarding Transit ITS was cited by some systems as the reason that they had not moved to incorporate advanced technologies into their system. This barrier disappears with more prevalent use of Transit ITS. Also, information about Transit ITS becomes easier to obtain. Many systems are not aware that the FTA has information available to help them.

Not knowing where to obtain information
Transit systems also cite the lack of a central place to go to learn about the experiences other transit systems with individual applications. They want to know what works, what does not and why. Reports such as this are geared to provide a shared body of information.

Being overwhelmed by the many technological options available
Transit systems that are aware of Transit ITS, along with its potential to address their needs, are concerned that they do not know which technologies and applications to choose. There is a concern about how the applications will fit into their system and the changes will be required in other system operations. The application will most probably not be independent but will have to be linked with other system operations.

Fearing that ITS is too complex
A common concern was the perception of Transit ITS as being too complex and not having access to the technical expertise necessary to select and implement Transit ITS applications. Systems' managers do not always know about the free resources that are available to them such as the ITS Peer-to-Peer Program or training courses offered by a variety of agencies.

Finding the right ITS technology
There is also the question: "Will it really benefit my system?" This concern is valid, as some of the technologies are not applicable to certain systems. A very small system with few riders and less than 30 trips a day does not need AVL or a software program to schedule trips.

Training staff
Systems with few resources are concerned not only with obtaining the initial expertise required, but also with training people to operate and maintain the system. This includes the need to change the level of professionalism in the system and the continued training of new and existing employees. The implementation of Transit ITS technologies and applications will change the operation of the system and requires a long-term commitment on the part of the transit system.

Having limited resources
Finally, to the surprise of no one, the issue of the cost and the lack of funding were cited as very real obstacles.

To overcome the previously cited barriers, transit systems need to take full advantage of the available resources. They need to learn about what information and assistance is available and where they need to go to obtain it. The following are the key suggestions of the Best Practices document and cannot be repeated too many times.

Work with and utilize the resources of State, other local transit associations and State Transportation Agencies.

Participate in available conferences and training sessions. Provide input into what you would like to see the conferences address.

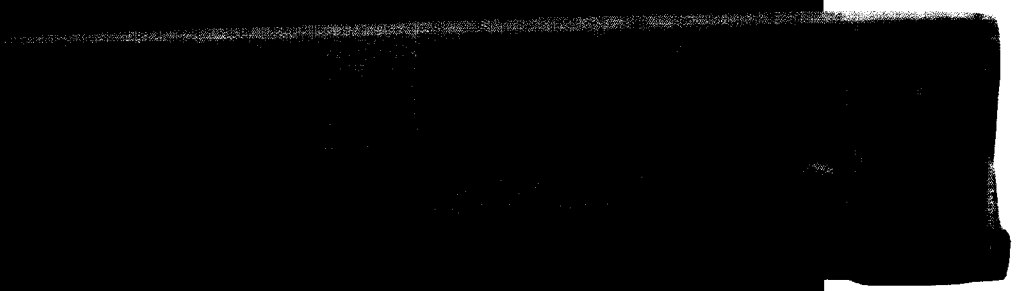
Read all the materials that you can find in print or on the Internet about Transit ITS. Take training courses.

Ask questions. Share your experiences and fears with colleagues and peers. Learn something everyday and move ahead.

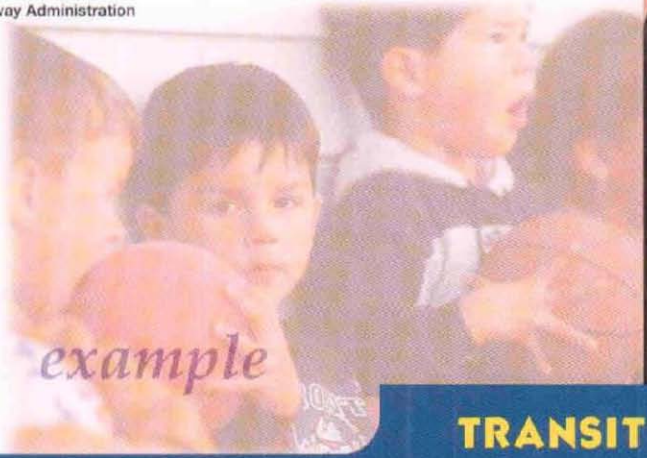
Take advantage of what is available through the Internet. The computer is not going away.

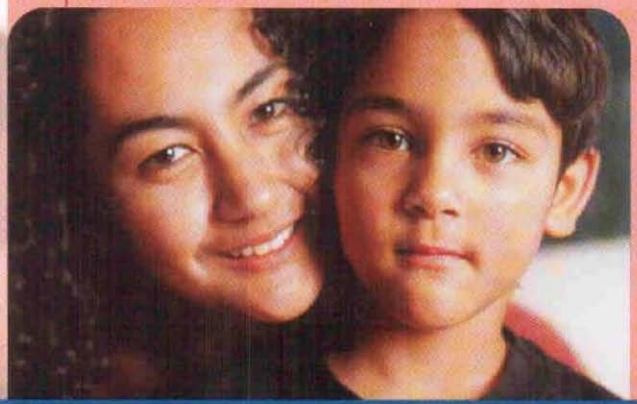
If you are worried about making a mistake or doing the wrong thing, then start small and take manageable steps.

Create a home page for your transit system on the web. It will be a great learning experience for you and your staff and allows your patrons to better understand who you are. Continue to improve your site as time goes on. Work toward providing patrons with the ability to use it to schedule and book their trips.

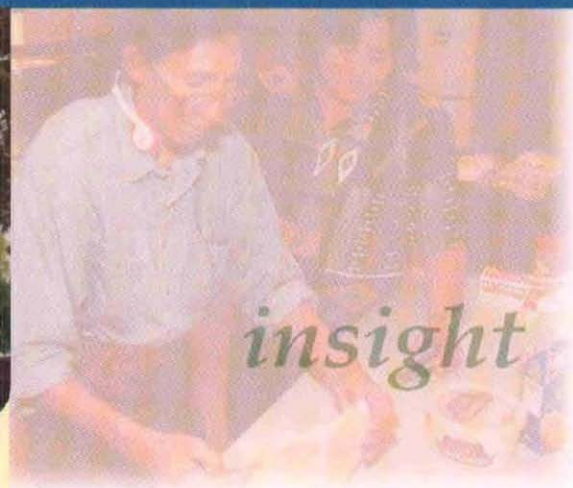


U.S. Department of Transportation
Federal Transit Administration
Federal Highway Administration





TRANSIT ITS CASE STUDIES



TRANSIT ITS CASE STUDIES

INTRODUCTION

These case studies were derived from interviews with rural transit systems at various stages of Transit ITS implementation. An expert panel guided the selection of transit systems to be visited. Transit system interviewees took the time to talk about their successes and lesson learned with Transit ITS applications. While it is recognized that many more transit systems are employing systems of their own, those interviewed for these studies are considered to be representative of the state of Transit ITS in rural communities. The interviews formed the basis for suggested practices and lessons learned that are incorporated in both *A Guidebook for Planning Rural ITS Transit Applications* and *Best Practices in Rural Transit ITS*. The case studies are intended to showcase selected approaches taken by the individual systems. They describe methods that worked and present the reasons that they did.

Every transit system experienced successes in more than one area, making it difficult to label each system into a single best practice category. For this reason, the case studies are ordered by state. The following table summarizes, for each transit system, the technologies employed together with resulting benefits and key best practices. The table indicates which Transit ITS application is currently active or planned for that system. Benefits are the positive impacts resulting from implementing the new technology.

Each case study consists of a summary of the transit system's characteristics including the service area, fleet description, service types, passenger trip statistics, and project funding sources. The case study narrative describes the system's motivations for considering Transit ITS, approaches taken, final results, and lessons learned. Those who reported hope that their efforts benefit those who are considering implementation of their own systems.

Table 1: Summary of Case Studies

	TECHNOLOGIES							BENEFITS	KEY BEST PRACTICES
	AVL	Electronic Fare Collection	GIS	Internet Web Site	MDT	Signal Priority	Transit Operations Software		
Arizona *Navajo Transit System* (Window Rock, AZ)				X				Development of a system to serve a community along with thorough research of planning and communications solutions.	• Planning solutions • Improving communications
Florida *Flager County Transit* (Palm Coast, FL)	X		X	X			X	Increased ridership, fewer complaints, less stressed employees, and cost effectiveness.	• Working with the vendor to customize software • Staff Sharing • Evaluating the project
St. John's Council on Aging (St. Augustine, FL)	X		X	X			X	Increased ridership due to augmented schedule as well as more efficient billing procedures.	• Addressing the needs of a changing systems at the time of implementation
Massachusetts *Montachusett Regional Transit Authority* (Fitchburg, MA)	X	X	X	X				Improved visibility, safety, security and productivity.	• Easing drivers' minds about AVL at the planning stage
Minnesota *St. Cloud Metropolitan Transit Commission* (St. Cloud, MN)	X	X	X			Planned	X	Increased efficiency in scheduling paratransit trips and driver communications and more effective management of client and trip information	• Piggybacking on larger procurements • Sharing communications resources
Arrowhead Transit (Virginia, MN)	Planned		X		Planned		Planned	Shared communications systems with State agencies.	• Streamlining DOT, state police and transit operations • Pioneering in rural transit technology applications
Dakota Area Resources & Transportation for Seniors (West St. Paul, MN)	Planned		X		Planned		X	Better scheduling management and ability to secure future community funding.	• Sharing resources • Forming community and academic partnerships
New Mexico *Shaa'srk'a (Roadrunner") Transit* (Laguna, NM)	X			X				Standardized electronic reporting form for multiple agencies and a comprehensive community needs evaluation resulting in new transit service.	• Identifying community needs • Establishing interagency, public, and academic cooperation
Zuni Transit (Zuni, NM)				X				Efficient planning with solid leadership.	• Planning with simplicity using experienced leadership

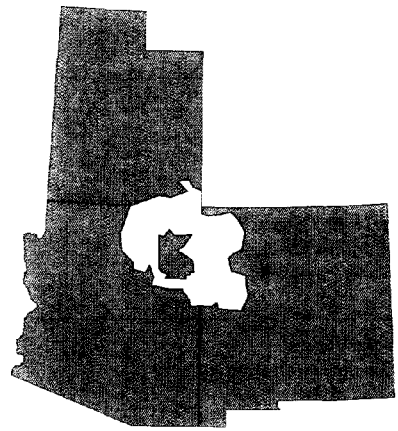
	TECHNOLOGIES							BENEFITS	KEY BEST PRACTICES
	AVL	Electronic Fare Collection	GIS	Internet Web Site	MDT	Signal Priority	Transit Operations Software		
Oregon *Special Mobility Services, Inc.* (Eugene, OR)				X	X		X	More efficient ridership reporting and scheduling.	• Expanding and customizing a system with in-house software
Lane Council of Governments & Lane Transit District (Florence, OR)			X				X	Broadened transit discussion and community needs assessments resulting in expanded service.	• Identifying community needs
Josephine County Health & Community Action (Grants Pass, OR)				X			X	The creation of a new transit system in less than 6 months.	• Learning from others
Rogue Valley Transportation District & Valley Lift (Medford, OR)			X	X			X	Centralized transportation scheduling and dispatching services.	• Coordinating a call center with partnerships • Investigating and procuring Transit ITS
Central Oregon Intergovernmental Council (Redmond, OR)			X				Planned	Coordinated transportation initiative among three counties with stakeholders involved during the planning.	• Access to Jobs GIS mapping project • Coordinating regional public transportation

Case Study 1

Navajo Transit System
Window Rock, AZ

ITS Components Implemented: Internet

Benefits Realized: Development of a system to serve a community along with thorough research of planning and communications solutions.



Counties Served: Navajo Nation (AZ, NM, UT)
Geographic Area Covered: 25,351 square miles

Fleet Description:

22 drivers (with 18 on fixed routes and remainder operating charters)
1 dispatching and scheduling staff
4 maintenance staff
12 large buses and 7 mid-size buses
3 vans
Special equipment details

Service Type: Fixed Route & Charter
Annual Passenger Trips: 75,122 (in 2000)
Daily Trips: 350 (in 2000)

Planning Solutions

The primary goals of the Navajo Transit System (NTS) are to provide low-cost public transportation to the residents of the Navajo Nation and to make the basic necessities of health and social service, consumer service, and educational and employment opportunities more accessible. The NTS provides intercity fixed route and charter services. The fixed routes link the headquarters cities and reach some of the Sub Regional and Island chapter cities.

Development of the NTS system gave first priority to providing an alternative to the automobile for transportation between the several regions of the Navajo Nation. Routes link the most highly populated areas in each region with each other. Vehicle size is a function of route length as well as demand, while the frequency of service depends on the level and peaking of demand. The system, through its charter service, also provides a means for groups to travel to locations outside the Nation.

The next step in the development of the Navajo Transit network is the expansion of local routes in growth-center communities throughout the Nation. The local services will include some combination of fixed-route and demand-responsive offerings. One prime objective is to serve new welfare and handicapped/disabled programs. Another objective is to increase the number of trips to work, secondary schools, and colleges to help increase employment and the level of education among the Nation's people. The plans include new maintenance, operating, and passenger facilities for the growth-center areas.

Improving Communications

Further development of the NTS network will require improvements in communications. Using the present two-way radio system provided by the vendor to Navajo Communications, the telecom arm of the government, bus and van drivers can communicate with Navajo Transit dispatchers and emergency response personnel about 75 percent of the time they are en route. Seeking to improve coverage, a number of alternatives are under consideration.

To enable more efficient communication, NTS explored the use of cell phones. The charter buses use them, but they, too, have limitations on their coverage. Besides, cell phones are thought to be too expensive for either the fixed route or the demand-responsive transit systems.

The Navajo Tribal Police, whom the drivers first contact in emergencies, have their own radio system that essentially has complete coverage in the Nation. However, the police system does not have the additional capacity needed to handle transit communications, even emergency ones.

At this time, the solution appears to be some form of satellite-based system. The strategic team of the Tribal Police has a mobile satellite communication system, but the equipment is awkward and tends to be unreliable. More reliable versions used by other law enforcement agencies are deemed too costly for the NTS while higher use applications particularly used for transit would still expensive for a small system. Finally, the NTS could use telephone services in the major activity centers around the Navajo Nation, to employ AVL and related satellite-based applications. In spite of this, the deployment of such a system has been ruled by Arizona Department of Transportation to be an unallowable expense under the FTA Section 5311 program.

At this point, Navajo Transit has not identified a preferred approach to improve communications. Further investigation is needed. Due to the rapidly advancing technology and options such as high-orbiting and low-orbiting satellites, management will investigate equipment-leasing options to avoid getting locked in to some technology that is soon out-of-date.

Case Study 2

Flagler County Transit
Transportation Department, Flagler Senior Services
Palm Coast, FL

ITS Components Implemented: GIS, Transit Operations Software, AVL, and Internet
Benefits Realized: Increased ridership, fewer complaints, less stressed employees, and cost effectiveness.

Counties Served: Flagler (FL)
Geographic Area Covered: 491 square miles

Fleet Description:

23 full and part time drivers
4 operations staff & 5 full- and part-time support staff
1 maintenance employee
20 vehicles
6 vehicles wheelchair lift equipped

Service Type: Demand Response
Annual Passenger Trips: 76,367 (in 2000)
Daily Trips: 302 (in 2000)
Funding Source: FTA ITS Demonstration Grant through Florida Commission for the Transportation Disadvantaged

Working with the Vendor to Customize Software

As an initiator and participant in the Rural Florida ITS Demonstration Project in 1997, Flagler County Transit (FCT) became an active leader in the deployment and understanding of Transit ITS applications. FCT, already using GIS, became the test site to employ RouteLogic, an off-the-shelf transportation management software package developed primarily for routing and scheduling with the use of Automatic Vehicle Location (AVL) systems and mobile data terminals (MDT). Knowing that enhancements were necessary to meet the reporting and billing needs of the rural transit providers, the FCT along with Demonstration ITS Project managers formed a technical team to work closely with the software developer.

The primary goal of the technical team was to develop reports and related functions that would be imbedded within the RouteLogic application. The Florida Commission for the Transportation Disadvantaged (TD Commission), the state-administered independent agency, requires community transportation coordinators to submit annual operating reports consisting of several data elements. The

technical team worked with the vendor to develop a specific report that would fulfill this requirement. FCT was the 'beta test' site for all updates to the software and worked closely with the vendor to ensure that enhancements were free from "bugs" before official release to other users. Additionally, FCT hosted a "Users Group" forum for RouteLogic users from around the country to discuss problems, successes, and needed enhancements to the product.

FCT took full advantage of the opportunity to collaborate with the RouteLogic vendor. RouteLogic was especially interested in developing enhancements to their product because of the spotlight that the ITS project brought from both the state and federal level. With input from the technical team, enhancements were developed quickly at no additional charge to the users. Through dialogue with the vendor along with staff that kept abreast with the technology development, FCT ensured that its needs were being met.

Staff Sharing

Over and above managing their own system, FCT provided technical assistance and management to adjacent county systems during their transition to ITS technology. St. Johns County Transportation (SJCT) experienced turnover in operations and management staff and did not have the technical and management expertise to make the transition. The new management recognized this dilemma and developed a contractual relationship with FCT. FCT agreed to provide three of its staff members to assist in the initial start up and conversion of RouteLogic. This proved to be a sound decision as the SJCT has made significant strides since. In its technology leadership role, FCT is providing staff training and on-site technical assistance to two other new participants in the ITS project. The FCT continues to be a reliable resource for other transit providers that seek to employ similar ITS technology.

Evaluating the Project

Overall, FCT operates efficiently with few day-to-day service problems. Transit ITS applications have provided a great degree of system stability and have allowed for more efficient scheduling of vehicles and driver resources. Benefits achieved were increased ridership, fewer complaints, stress-reduced employees, and lower operating costs. The chief cost savings have been realized with FCT staff producing all of the next day's schedules in one hour from the listed bookings. Furthermore, FCT has been able to add new services including new routes.

The Center for Urban Transportation Research and the University of South Florida performed a formal evaluation of FCT's system for the TD Commission. More regular informal evaluations are conducted as FCT's own management and staff check to see if changes worked and to make modifications as needed. As part of the ITS deployment, FCT sought to maintain a continuous improvement process, always searching for new ways and off-the-shelf technology to enhance their mission of serving the transportation disadvantaged.

Training after implementation of the software involved more time for staff, management and drivers. FCT learned that for successful implementation of technology, more in-depth training with extensive follow-up was necessary to convert a non-technological staff to a technology-enabled staff. An incremental training program was suggested that would give staff what they needed in small doses as their experience with the new software and system grew. As a result of this project, FCT's staff has become one of the most knowledgeable groups using RouteLogic. FCT managers train users from other transportation systems and provide on-site technical assistance in addition to making presentations at national conferences.

FCT attributes its success to a combination of preparation, focus, persistence, and pleasant surprises among personnel. FCT cites its greatest challenges to be to adopt new ways based on the demands of the technology tool and to discard the older ways, that if continued will impede successful transition to the "new tools of technology." Computer knowledge and adequate training were also stressed by FCT as tools for success. FCT's new system works well and has additional promise where the technology's capabilities can be expanded when needed.

Additional References:

- Commission for the Transportation Disadvantaged. *"Rural Florida Intelligent Transportation Systems Demonstration Project Year-End Report for 1999"*. 2000.

- Commission for the Transportation Disadvantaged. *"Rural Florida Intelligent Transportation Systems Demonstration Project Year End Report for 2000."* 2001.

Case Study 3

St. John's Council on Aging

St. Augustine, FL

ITS Components: GIS, Transit Operations Software, AVL, and Internet
Benefits Realized: Increased ridership due to augmented schedule as well as more efficient billing procedures.

Counties Served: St. Johns (FL)
Geographic Area Covered: 617 square miles

Fleet Description:

34 full and part time drivers
5 operations staff & 8 full-time support staff
35 vehicles
11 vehicles wheelchair lift equipped

Service Type: Demand Response
Annual Passenger Trips: 128,545 (in 2000)
Daily Passenger Trips: 550 one-way (in 2001)
Funding Source: Federal Transit Administration ITS Demonstration Grant through Florida Commission for the Transportation Disadvantaged.

Addressing the Needs of Changing System at the Time of Implementation

The goal of St. John's Council on Aging (SJCT) was to improve efficiency in trip scheduling and billing because the administration of such tasks were paper-intensive. To accomplish this, an operations study was conducted to identify the needs of the system. As a result, like other participants of the Rural Florida ITS Demonstration Project, SJCT decided to employ RouteLogic software. SJCT selected RouteLogic as the most affordable option that would automate its scheduling and dispatching operations.

At the same time as improvements and testing were completed at another site, SJCT had difficulty obtaining reasonable performance from their hardware. Specifically, when conducting mapping applications or when three workstations were taking trip requests at the same time, the PC workstations locked-up. Equipment upgrades along with later versions of RouteLogic solved those problems. One of the causes attributed to the hardware difficulties was that at the time of the original operational study, the system did not schedule as many different trips. It was a case of the transit system's specifications changing during the course of the implementation.

The billing of services, previously an extremely paper-intensive process for SJCT staff, is now a quick process, partly due to the use of pre-determined geo-coded calculation of trip mileage. This application involved the geo-coding of addresses into the GIS. A challenge in that undertaking was the conversion of the client database and obtaining street names for rural PO box addresses. However,

after operation of the new system, some lingering problems still existed with Medicaid billing. This issue was resolved by the creation of an integrated billing interface solely for Medicaid written into RouteLogic.

As another measure, the size of the staff required to administer the program was reduced by nearly 45 per cent. At the time of the operations study, there were eight staff responsible for conducting administrative oversight of the program, including call intake, customer service, trip logging and reconciliation, billing, driver management, scheduling and routing, and eligibility determination. Four and a half full-time employees are now providing these functions.

SJCT identified the need for additional training on the product, particularly in the use of the numerous reporting and query functions. Also needed was extra training on software enhancements contained in the frequent version changes. The feeling of SJCT staff is that the vendor should write a comprehensive step-by-step instruction book so users can quickly troubleshoot and conduct peer training. Although training was provided by the vendor, it was deemed too sophisticated to teach the basics to beginners. ITS project managers are working with the vendor to make a training manual available.

As a final operations note, at this time AVL functions are not active and need to be expanded to create a more workable system. This task will be one focus of the second phase of the grant. It will now be more practical with the installation of hardware capable of running the latest versions of RouteLogic.

Additional Reference:

- Commission for the Transportation Disadvantaged. *Rural Florida Intelligent Transportation Systems Demonstration Project Year End Report for 2000.* 2001.

Case Study 4

Montachusett Regional Transit Authority

Fitchburg, MA

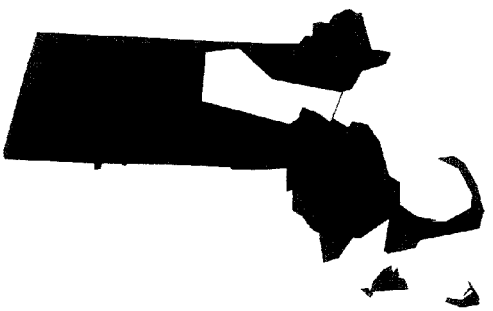
www.montachusettrta.org

ITS Components: GIS, Electronic Fare Collection, AVL, and Internet
Benefits Realized: Improved visibility, safety, security and productivity.

Counties Served: Fitchburg, Leominster, Gardner with shuttles to Worcester and Boston (MA)
Geographic Area Covered: 700 square miles

Fleet Description:

130 drivers
9 dispatching/scheduling staff
12 maintenance staff
150 vehicles (bus/vans)
All vehicles wheelchair equipped



Service Type: Fixed Route & Demand Response
Annual Passenger Trips: 1,525,487 (in 2000)
Daily Trips: 6,500 (in 2000)
Funding Source: Federal and State.

Easing Drivers' Minds About AVL at the Planning Stage

Montachusett Regional Transit Authority (MART) first learned about potential benefits of AVL technology from other systems. Since MART's system covers a wide area of central Massachusetts, management determined that safety, security, as well as productivity, would improve by knowing the location of each vehicle on a real-time basis. With the ultimate goal of increasing ridership, MART decided to employ the technology.

With an appreciation that the introduction of advanced technologies creates changes in the workplace, MART took account of all stakeholders, including operators, during the planning process. With this approach, it became better understood that the new technology would not only affect those who use the service, but also impact those who run the service. Typically, issues such as privacy, user acceptance and adaptability emerge. In particular, operators raised concerns that the AVL system would, in essence, be "Big Brother" looking over them. While it is true that the control software permits supervisors to closely monitor operator behavior, it also enables the comparison of departure times that can later be used to attend to customer complaints. MART addressed this through education and training that emphasized the security aspects of the technology. With the system's staff on board, MART is on its way to procuring its ITS system.

Case Study 5

St. Cloud Metropolitan Transit Commission – Paratransit Operations

St. Cloud, MN

ITS Components: GIS, Transit Operation Software, Electronic Fare Collection, and AVL

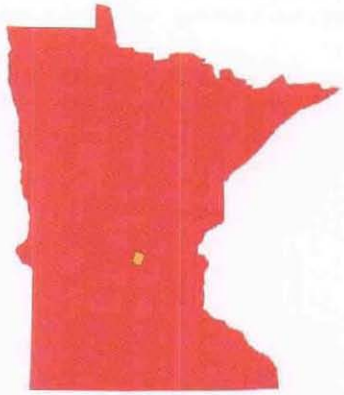
Benefits Realized: Increased efficiency in scheduling paratransit trips and driver communications and more effective management of client and trip information.

Counties Served: Cities of St. Cloud, Sauk Rapids, Waite Park (MN)
Geographic Area Covered: 25 square miles

Fleet Description:

24 drivers
6 dispatching/supervisory staff
2 maintenance staff
16 Orion II buses with 25-foot ramp-equipped low-floor accessibility

Service Type: Demand Response (Driver-assisted ADA paratransit and curbside general public services)
Annual Passenger Trips: 97,185 (in 2000)
Daily Trips: 350 (in 2000)
Funding Source: Federal, State and local.



Piggybacking on Larger Procurements and Sharing Communications Resources

The St. Cloud MTC had the opportunity to reap the benefits of the development of the multi-modal Transportation and Operations and Communications Center (TOCC) ITS project, an initiative supported by the Minnesota Department of Transportation (Mn/DOT). The goal of the TOCCs is to establish an integrated statewide transportation communications network serving rural and smaller urban areas of Minnesota. In essence, the individual TOCCs are to act as regional centers for gathering and disseminating transportation information with real-time roadway operations, traveler and weather information. The interagency cooperation in incident response, operations, maintenance, traveler information systems, and integrated transit operations serves to increase the efficiency for all involved.

The St. Cloud MTC took advantage of the opportunity to participate in the TOCC, particularly in the area of real-time computerized paratransit dispatching. Fitting into the TOCC's goals, the St. Cloud MTC wished to better manage their paratransit dispatching and

vehicle communications systems. The process followed by St. Cloud MTC was developed and funded by Mn/DOT. It involved a scoping study followed by preliminary engineering and final design documents before procurement began. Being part of the large-scale TOCC project helped the St. Cloud MTC determine their needs and how they could best be met. The St. Cloud MTC talked to many other transit systems in the upper Midwest as well as numerous software and hardware vendors before selecting their own vendors.

Finally, the St. Cloud MTC chose to purchase computer hardware from a local vendor so that they could take advantage of using local service for primary computer hardware support, with the remaining Mobile Data Computer, AVL/GPS hardware and dispatching software supplied by industry vendors. The St. Cloud MTC ultimately decided upon Trapeze PASS software to meet their dispatching needs.

The greatest challenges for the St. Cloud MTC involved training dispatch and driver staff to use the software and hardware equipment. The hardware and software vendors provided the initial training, with remaining training being essentially "on the job". It helped a great deal that the Operations Director could act as an internal technical expert. He was knowledgeable about software and computer hardware so that the St. Cloud MTC staff did not have to depend solely on the vendor's support to troubleshoot problems.

On the whole, the impact of the ITS application has been positive with customers now being able to schedule trips with more real time information from the computerized dispatching system. The paratransit system has realized more effective management of client information and trips as well as increased efficiency in scheduling paratransit trips. They are able to maintain additional ridership databases from the Trapeze software and Mobile Data Computers.

Taking two years to complete from start to finish, the St. Cloud MTC project emphasizes careful management plus being able to piggyback on the larger Mn/DOT procurement to the success of their ITS endeavor. Mn/DOT's consultant in coordination with the St. Cloud MTC and their vendors completed a formal evaluation of the system that resulted in only minor adjustments. Having completed operational tests, the St. Cloud MTC is planning to utilize other ITS technologies. Transit priority is being studied for the fixed route system to give buses an advantage navigating through traffic signals to improve headway performance and accommodate the additional time needed when the fixed route system becomes fully accessible. In addition, electronic fareboxes have been installed in the St. Cloud MTC's entire fleet of buses. A future project includes installation of on-board digital video surveillance cameras in all buses. The system's Director believes that if they had to do it again, they would not do anything differently!

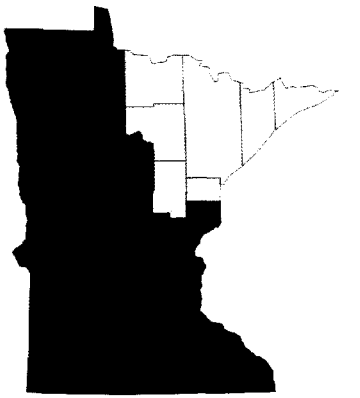
Additional Reference:

- Mn/DOT, *Transportation and Operations Communications Center - Project Description and Status*, www.dot.state.mn.us, 2001.

Case Study 6

Arrowhead Transit
Arrowhead Economic Opportunity Agency
Virginia, MN

ITS Components: GIS, Transit Operation Software, AVL, and MDT
Benefits Realized: Shared communication systems with State agencies.



Counties Served: Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, and St. Louis (MN)
Geographic Area Covered: 19,620 square miles

Fleet Description:

44 drivers
6 dispatching/scheduling staff
5 maintenance staff
22 "Class 400" buses, 18 "Class 500" buses and 14 "Class 600" buses
All buses are wheelchair accessible.

Service Type: Demand Response
Annual Passenger Trips: 349, 4111 (in 2000)
Funding Sources: Federal Highway Administration and State.

ARTIC Program: Streamlining DOT, State Police and Transit Operations

The Arrowhead Transit system was to be a part of the ITS project known as the Advanced Rural Transportation Information and Coordination (ARTIC) program located in the Arrowhead Region of Northeastern Minnesota. The objective of the project focused on combining resources and streamlining dispatching operations for four transportation agencies: District 1 of the Minnesota Department of Transportation (Mn/DOT), Minnesota State Patrol (MSP) District 3100, City of Virginia Dial-a-Ride, and Arrowhead Transit Services. Overall, the results were very positive with the major accomplishment of a newly formed relationship of Mn/DOT and the MSP. With respect to the transit component, however, the results are forthcoming.

Arrowhead Transit started to look at ITS technology as a means to manage the fleet, enhance schedule adherence and update their scheduling and dispatching practices done by hand. In general, Arrowhead Transit hoped to improve customer service. New scheduling and dispatching software would serve to greatly modernize the existing system. The AVL would provide the benefit of safety and security in knowing where the vehicles were in remote areas. Such knowledge would be beneficial in the winter during severe weather situations or emergencies. As well, Arrowhead Transit did not have full radio communication coverage of its service area. Its system consisted of five dispatch locations, each with its own radio tower site. Because the towers are relatively short ranged, the

coverage was limited to less than 35 percent of the transit service area. The ARTIC system would provide the opportunity to locate transit radio equipment on Mn/DOT radio towers and bring radio communications into the ARTIC communication center and an additional transit facility.

The larger ARTIC operational system in which Arrowhead Transit participated in was characterized by the following: a communications center; mobile unit equipment, including global positioning system receivers, satellite transceivers, and mobile data terminals (MDT); new radio console equipment; and a computer network with shared workstations configured with the FLEETMAN software package for joint dispatching and call center activities.

Pioneering in Rural Transit Technology Applications

Arrowhead Transit worked with Mn/DOT and a consultant in planning for the effort and decided to contract through a request for proposals. Trade shows, conferences, and demonstration provided most of the information in order to specify the work and products needed. Arrowhead Transit notes that this research was done in the early 1990s and there was not much available on the Internet. At the time that they embarked on this effort there was not much ITS experience in general and no other rural systems that they knew of using the technology. Planning began in 1993, with a yearlong test period from mid-1997 when the system as designed and implemented had failed. Whereas the bulk of funding was from both federal and state sources, Arrowhead Transit used some of their operational funds in effort to get the system to work and to resolve some security issues that arose while moving dispatching operations to a new facility.

Arrowhead Transit system's shortcoming was caused by the inability to get the software and hardware, namely the MDTs, to properly interface. The software, it turned out, was best suited to large urban systems. The contractor provided some training but could not overcome the problems that existed. Much more staff time was spent on the components that failed and had to be removed. Arrowhead Transit subsequently terminated the contract with its vendor. Mn/DOT is implementing alternative transit solutions for other Minnesota projects (Twin Cities Area Southwest Transit Link program). As these solutions are implemented, they are expected to be applied to the ARTIC project. Arrowhead Transit's hardware remains, and it is hoped that it will be used with a new system.

Arrowhead Transit stresses the importance of payment milestones. Agreeing on how the system will operate and establishing a payment schedule that corresponds with system performance should be priorities. Arrowhead Transit suggests carefully checking references and client lists of potential contractors. As a result of their experience with their particular contractor, Arrowhead Transit advises potential buyers to be skeptical and to research currently available technology.

Despite their difficulties, Arrowhead Transit management believes that the partnership with Mn/DOT has been a major benefit and technical resource. While it was exciting to be part of a pilot project, Arrowhead Transit would have rather seen the system at work on another system. Still, Arrowhead Transit along with Mn/DOT, are pioneers in ITS deployment and anticipate an efficient system once their transit ITS component is in operation.

Additional Reference:

- Short Elliott Hendrickson Inc. & C.J. Olson Market Research, *Advanced Rural Transportation Information and Coordination (ARTIC) Operational Test Evaluation Report*, Prepared for MN/DOT - Office of Advanced Transportation Systems. July 2000.

Case Study 7

Dakota Area Resources & Transportation for Seniors
West St. Paul, MN
www.darts1.org

ITS Components: GIS, Scheduling and Dispatching Operations Software, AVL and MDT

Benefits Realized: Better scheduling management, data integrity and ability to secure future community-based transportation funding.

Counties Served: Dakota County including the Minneapolis-St. Paul Metropolitan Area (MN)
Geographic Area Covered: 385 square miles

Fleet Description:

65 Drivers
10 Scheduling & Dispatching Staff
4 Full-time Mechanics
34 Small bus/vans

Service Type: Dial-a-ride & ADA Demand Responsive; Small Bus Fixed & Flex Routes
Annual Passenger Trips: 135,000 (in1999)
Daily Trips: 600 (in 2000)
Funding Sources: Federal Highway Administration, State, Metropolitan Council, Regional Transit Capital Bonding, County, United Way, and Donations.

Sharing Resources

Originally discussed with local consultants, Dakota Area Resources & Transportation for Seniors (DARTS) determined that new scheduling and dispatching software could increase both production and ridership. With some investigation and assistance from the Minnesota Department of Transportation (Mn/DOT) DARTS decided to implement the new technology. Upon proceeding, the DARTS project members thoroughly researched the options available. Not limiting themselves to the information provided by the vendors, DARTS staff talked with people using the technology, visited systems employing technology of interest, attended conferences, conducted research on the Internet, and searched the literature.

Funding was secured through the FHWA, Mn/DOT, the Metropolitan Council, Dakota County and capital bonding programs. Also, private funding was obtained from individuals and corporations. This collaboration with local public and private agencies, served to develop a network of partnerships that would help evaluate the system and provide resources in the future.

Planning and implementation started in the early 1990's with the installation of scheduling and dispatching software, UMA Quo Vadis™, now Trapeze™ in 1995. The incorporation of automatic vehicle location (AVL) systems and mobile data computer capabilities are scheduled to follow late in 2001. Throughout the process, DARTS developed a close working relationship with Mn/DOT as well as the project consultants and the software vendor. Project implementation involved a lot more time that anticipated, with training occupying the bulk of the effort. A major benefit was that DARTS hired a former employee of the software vendor to work for them. This allowed a technically knowledgeable person to help staff use the system as well as troubleshoot as problems arose.

The impact of the new technology has been the better management of their scheduling along with the ability to schedule closer to the time of the ride. With a ride denial rate of less than one percent, operating efficiency has been enhanced. Moreover, the new system has improved DARTS' response to weather emergencies and the provision of more "same-day" service.

As a best practice of doing business, DARTS was successful at creating collaborations that will be used in the future, particularly in obtaining funding to expand their system. DARTS made an informed choice regarding ITS and worked with the vendor directly.

Forming Community and Academic Partnerships

DARTS has shared its experiences and resources with community agencies and funding groups beyond the boundaries of Dakota County. Staff has participated in local community collaboratives, worked directly with other county providers to serve joint clients, and facilitated meetings to discuss community needs and expectations. Additionally, DARTS has partnered with other metro-area agencies to expand the opportunities to serve a broader base of families seeking senior services.

Mid-2000, DARTS received a technology grant from the Minneapolis United Way as part of their Service Through Technology initiative. The grant supported DARTS' development of web-based services for caregivers of seniors. Such services included an e-mail connection to a DARTS advisor, resources about aging-related issues, a caregiver bulletin board, and a regularly updated current affairs column.

DARTS also partnered with the Greater Twin Cities United Way in two projects. One to establish DARTS Logistics Support Services that can be shared with other non-profits. Services include operations planning, driver training, vehicle maintenance and technology support. On other projects, DARTS was asked to lead a six-member agency collaborative to help them operate transportation services more efficiently and effectively in getting clients to needed services in the United Way area. Using DARTS technology and professional expertise, new service options, including the implementation of AVL technology, will be developed and evaluated as to long-term impact on service and reproducibility. The collaborative partners are Volunteers of America of Minnesota, Opportunity Partners, Minnesota Age and Opportunity (MAO), East Side Neighborhood Service Inc., Elderide, and Accessibility.

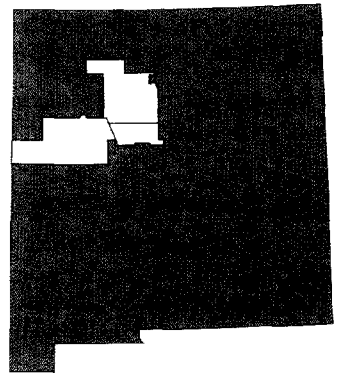
Additional References:

- Dakota Area Resources & Transportation for Seniors. *DARTS 2001 Plan.* 2000.
- Dakota Area Resources & Transportation for Seniors. *DARTS: Meeting Needs, Serving Seniors - 1999 Annual Report.* 2000.

Case Study 8

Shaa'srk'a ("Roadrunner") Transit
Pueblo of Laguna
Laguna, NM

ITS Components: AVL and Internet
Benefits Realized: Standardized electronic reporting form for multiple agencies and a comprehensive community needs evaluation resulting in new transit service.



Counties Served: Between Laguna and 7 villages and to Albuquerque and Grants, NM
Geographic Area Covered: 780 square miles

Fleet Description:

4 drivers/dispatching/scheduling staff
3 fifteen-passenger vans
(2 vans wheelchair lift-equipped)

Service Type: Fixed Route, Deviated Fixed Route, Demand Response
Annual Passenger Trips: 8,961 (in 2000)
Daily Trips: 20 (2001)
Funding Sources: Tribe, State, Tribal HIS 638 funds.

Identifying Community Needs

Following the receipt of federal grant funds and prior to the initiation of transit service, it was recognized during the transit-system development process that the Pueblo of Laguna could use this effort for community outreach. A number of such outreach practices have emerged such as distributing flyers and other forms of printed information, bringing trainers and speakers to the villages or bringing people together in the capital at Laguna for meetings and consultations. The anticipated service area reached not only to all the villages of the Laguna Pueblo but to Grants, Albuquerque, and the neighboring Canoncito Reservation.

Notably, the Laguna Community Services Department conducted a house-to-house home interview survey of household transportation needs. It included responses from 669 households. The survey determined that 33 percent of homes within the Pueblo do not have a working motor vehicle. The survey results identified more needs than could be initially met. Accordingly, the Pueblo adopted the philosophy of starting where the needs were greatest and doing what is possible. They felt that it was important not to create unreasonable expectations among the potential beneficiaries of the service. Consequently, Laguna Pueblo Council Resolution authorized the operation of the Shaa'srk'a Transit Program.

The Pueblo's outreach effort identified the need for intercultural differences to be recognized. For example, charging fares was an issue at first within the Pueblo of Laguna because of the tradition of no-fee tribal services. There are also intertribal differences in culture that needed to be acknowledged in determining appropriate approaches to various problems. The lack of recognition of these differences is sometimes a barrier to determining what the real needs are for a particular tribe and situation. Another intercultural issue has been the occasional lack of understanding of tribal sovereignty on the part of federal and state program personnel.

The newly formed Shaa'srk'a Transit improvement program was based not only on requirements of the community but also on the needs of their system. Shaa'srk'a has identified the need for GIS-coded mapping of streets, homes, and other buildings, especially in the absence of a street-address system. They have also noted the need for a GPS-based location and communication system for normal as well as emergency management of transit service. The coverage area of the existing radio system is limited. Shaa'srk'a Transit has established that it is not possible to piggyback on the existing ambulance/hospital system, because there is no spare capacity for transit use. Hence, Shaa'srk'a Transit is still seeking cost-effective communication solutions.

Establishing Interagency, Public and Academic Cooperation

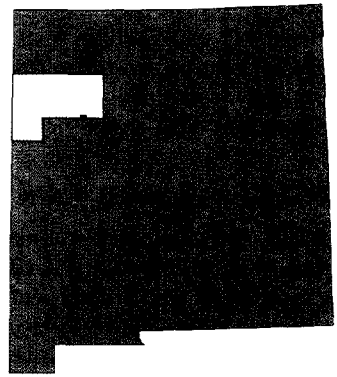
The Alliance for Transportation Research Institute (ATRI) of the University of New Mexico and supporting agencies, New Mexico Department of Labor (NMDOL) and Public Transit Program Board (PTPB) of the New Mexico Highway and Transportation Department (NMDSHT), worked with Shaa'srk'a Transit to create a reporting form common to all agencies. First, a set of data items was developed that would fulfill the requirements of the federal and state agencies involved. Then, the form was created for reporting the data. Taking a year to accomplish, the form is now being used throughout the state and elsewhere. Moreover, the filing of transit system reports with these supporting agencies is now being done by e-mail. Shaa'srk'a Transit hopes to expand the concept to other services and their supporting agencies.

Shaa'srk'a Transit has also researched the implementation of web-based business applications, since the use of the Internet substantially reduces the requirements for equipment, software, and in-house knowledge and expertise. Candidate applications that have been identified include ridership data management, accounting, database management, revenue tracking, and applications software training, maintenance, and support. Shaa'srk'a Transit recognizes the need for both technical and capital assistance to accomplish these goals and is exploring options. As a result of previous work, the system has identified ATRI of the University of New Mexico and NMSDHT as an excellent source of well-informed expert assistance and project coordination. Shaa'srk'a Transit expects to capitalize on their partnerships to further increase their service and resources.

Case Study 9

Zuni Transit
Zuni Entrepreneurial Enterprises
Zuni, NM

ITS Components: Internet
Benefits Realized: Efficient planning with solid leadership.



Areas Served: Zuni Reservation to Gallup (University of New Mexico) and Ramah located in McKinley County (NM)
Geographic Area Covered: 625 square miles

Fleet Description:

5 drivers
2 dispatching/scheduling staff
5 vans
(1 van wheelchair lift-equipped)

Service Type: Fixed Route & Demand Response
Annual Passenger Trips: 30,000 (in 2000)
Daily Trips: 110-120 (in 2001)
Funding Sources: Federal Transit Administration Section 5311 and Welfare to Work, New Mexico Department of Labor and Department of Human Services.

Planning with Simplicity Using Experienced Leadership

Zuni Transit provides services to not just the disabled, but also to the public. For their system to meet the reservation's needs, Zuni Services for the Disabled engaged a private consultant to prepare its transportation plan. The resulting transit operation, Zuni Transit, includes demand-responsive service on the Reservation and scheduled fixed-route service to Gallup.

Currently, Zuni Transit uses a paper-based booking-and-dispatch system where the dispatcher books all demand-responsive trips and assigns them to the respective buses. The drivers keep logs that includes arrival and departure times at key points as well as the origins and destinations of each demand-responsive trip. Communication and dispatch of the buses is done using an FM radio system. The coverage of the system is good because of the nature of the terrain, the size of the area served, the location of its antenna atop a mesa five miles east of Black Rock, location of the Zuni transit operation center and the existence of a repeater station located about halfway between Black Rock and Gallup.

Periodic reports to the Public Transit Program Board (PTPB) of the New Mexico Highway and Transportation Department (NMDSHT) and its billings to a Gallup support agency are based on dispatcher and driver logs. The system now submits the reports and billings to

the receiving agencies by e-mail. The system's director notes that this practice saves considerable effort in producing and sending the reports and bills, as well as making them more timley, and increases the accuracy of reporting and billing.

Zuni Transit has identified its needs and future steps. The director sees the use of new electronic computing technology and the Internet to replace paper-based reporting systems as means to great improvements in the efficiency and effectiveness of rural public transportation. Zuni Transit realizes that the use of a centralized database and report generation system would be highly advantageous. As well, automated vehicle location and other high-tech applications such as maintenance management and vehicle-monitoring as similarly valuable to the system.

Throughout the Zuni systems' efforts, they have found the NMDSHT and the Alliance for Transportation Research Institute (ATRI) of the University of New Mexico very helpful and easy to work with. The basing of centralized, Internet-accessible databases and applications with these organizations would do a great deal to improve the efficiency and effectiveness of rural public transit in New Mexico.

One vital aspect of the Zuni Transit's success is the experience of its director who has over twenty years of experience managing non-profit organizations with the past ten years having been spent with Zuni Entreprenеurial Enterprises. This experience has been valuable in starting Zuni Transit and operating it for the past two years. It has made it possible for Zuni Transit to work with PTPB and the ATR Institute and to seek alliances with other organizations to develop solutions to their common problems.

Zuni Transit, like that of Laguna Pueblo, has started by doing what it can to meet transportation needs given the opportunities and resources it currently has. At the same time, there is a plan for improvement in service and efficiency that can be implemented piece-by-piece, as the resources become available. The management and staff are always looking for ways to improve and continue their success.

Case Study 10

Special Mobility Services, Inc.

Eugene, OR

ITS Components: Transit Operations Software, MDTs, and Internet
Benefits Realized: More efficient ridership reporting and scheduling.

Counties Served: Lane, OR
Geographic Area Covered: 4,595 square miles

Fleet Description:

25 (plus 10 volunteers) full & part time drivers
10 (plus 2 volunteers) dispatching/scheduling staff
1 maintenance staff
22 minibus, 2 minivans and 1 service truck
(All buses lift-equipped & all minivans ramp-equipped)

Service Type: Demand Response
Annual Passenger Trips: 87,039 (in FY 2000)
Daily Trips: 302 weekday and 86 weekend (in 2000)
Funding Sources: Federal Transit Administration (Section 5310 & 5311), State of Oregon, Lane Council of Governments, and own sources.

Expanding and Customizing a System with In-House Software

In the 1980's, before the boom of ITS technology, Special Mobility Services (SMS) determined that computers could help them meet reporting requirements placed on them, and to keep better track of their rides. Consequently they developed their own database system that could generate reports. Over the years, that database has been modified with additional features and functions allowing SMS to better serve clients. The next step for SMS was to develop scheduling and dispatching functions that could be incorporated into their existing system.

Wishing to retain control of their own data, SMS opted to continue with their current software, R:Base, an off-the-shelf product that could be customized with some programming using Structured Query Language (SQL). SMS deemed the software easy to use and readily available. Besides, SMS had excellent in-house computer capability not requiring significant contracting for services. Typical off-the-shelf dispatching software was not considered because SMS was content with their existing database structure. Having started small to meet their needs, SMS' application had grown as needed and as SMS' time and expertise allowed. SMS has gained a reputation for being technically knowledgeable and has happily assisted other transit systems with software development in Oregon.

The most challenging and time-consuming part of the project was interfacing between the database and Mobile Data Terminals (MDT). This was a new and complex technology whose components' specifications, inconveniently, happened to change during the transit system's implementation. At the beginning of the venture, SMS needed to rethink how much work the MDT's would be for the drivers, and then how to make MDT's useful to the drivers. Basically, they realized that it was not just a matter of applying the technology, but that human factors issues needed to be addressed also. SMS needed to redesign the MDT interface and accompanying forms so they were like the forms the drivers were accustomed to. This proved useful by limiting the amount of additional training that was needed, because the revised forms looked like the forms they were already using.

With respect to communications, SMS' radios had to be made digital to work with the system. SMS now uses a shared frequency for voice and data, furthering their success in implementing such a system.

One thing that made the ITS technology work for SMS is that their users can obtain to a level of detail with the software that cannot be achieved by existing off-the-shelf software. For example, dispatchers can now easily access more complete rider histories. SMS attributes the accomplishment to using a database that staff was comfortable with. Because of the high quality and stability of the staff, there has been no need to invest in more complex software. SMS has used a tool that works for them with continued success. They have thought carefully about their functional needs and subsequently expanded their system slowly to meet those needs while recognizing the limits of their system. In other situations with less experienced staff and less stability in the managers, it would be more likely that the SMS would have invested in a newer system and migrated the database to something more common.

SMS has implemented more advanced technology slowly, one step at a time, to provide a customized, efficient dispatching system. Next steps will be to complete MDT installations and GIS implementation. In the future, SMS wishes to add automated scheduling, AVL and smart cards to their technology inventory.

Case Study 11

Lane Council of Governments and Lane Transit District
Florence, OR
www.lcog.org www.ltd.org

ITS Components: GIS and Transit Operations Software
Benefits Realized: Broadened transit discussion and community needs assessments resulting in expanded service.

Counties Served: Lane, OR
Geographic Area Covered: 4,595 square miles

Fleet Description:

1 driver
1 dispatching/scheduling staff
1 vehicle with taxi service back-up
Special equipment details (wheelchair equipped)

Service Type: Small City Deviated-Route, Fixed Route & Demand Response
Funding Source: Federal Transit Administration Section 5311, and State Special Transportation Funds for the Elderly and People with Disabilities and City of Florence local contribution

Identifying Community Needs Using GIS

Having a 25-year history with GIS, Lane Council of Governments (LCOG) manages GIS data throughout Lane County. LCOG maintains data layers for Lane County government, Lane Transit District (LTD), the City of Eugene, City of Springfield and many of the smaller communities and local jurisdictions within the County. LCOG has provided coordinated access to information and shared the information throughout the County. In addition, at the time of the project LCOG worked on contract on behalf of LTD to oversee a network of services designed to meet the needs of older people and people with disabilities residing within Lane County, Oregon.

A planning grant composed of FTA Section 5311 and Oregon's Special Transportation Fund gave LCOG the resources to conduct a study of the needs in and around the City of Florence. Florence is a small community of around 7,300 people on the Oregon coast about 60 miles west of Eugene. It is now considered a retirement community. There are a high number of older residents that have moved to the area within the last ten years. The transportation service that had been offered, a taxi voucher program, had far exceed its limits and was in effect providing a low level of service to a limited number of participants and a relatively high cost. The goal of the project was to learn about the current and potential riders' behavior and demographics. The project involved the creation of geographic layers depicting senior and disabled populations, food stamp use and low-income housing with this targeted rural area of Lane County. LCOG

also surveyed existing riders for their origins and destinations as well as their frequency of use. To conduct the mapping, LCOG used their in-house expertise while being advised by a local stakeholder committee and City of Florence staff.

There were several problems with the information developed from the GIS maps. Some of the issues had to do with technical issues, others with implementation of service. When embarking on the creation of new geographic layers for rural areas the source data is often in a form that needs significant revisions or updating. This was in the case in Florence. Extra time and staff resources were needed to clean the data and prepare it for analysis. LCOG also had to satisfy privacy requirements for using Oregon Department of Human Services data that provided locations of people who received services due to income, age or disability.

The area where the maps were developed is a small community where people and residences are well known to each other. When information is portrayed on a map used for public discussion, people can often identify who might be receiving services. Adding to the implementation time, LCOG had to make special maps that could be used for public involvement that applied shading instead of points to protect the confidentiality of the information. Further, the information on the maps limited the specificity of information that could be applied to meet a specialized population's needs. With limited funding and a seemingly broader clientele, LCOG, through public hearings, changed the nature of the service by using the character of the ridership that was portrayed by the GIS findings. The service design was developed to serve those already getting the limited taxi service that had been available so as not to cause a loss for those riders. The new service also incorporated a different mode of delivery that could include more riders at about the same annual cost by setting up a type of service route. Service went from a predominately senior and disabled service to a general public service but targeted specific locations where people on low-incomes, seniors and people with disabilities were most to need the service. Local surveys are planned to identify changes that might give seniors and disabled persons better access to the service. Six months after implementing the local "circulator", "deviated-route" service was initiated to address some of the concerns that were discovered in the start-up phase of the project.

To circumvent geographic data problems, LCOG suggests talking to peers to first determine that the required data exists and to understand the format. Ascertain what the data actually tells you. It also helps to be knowledgeable of data standards. This can be done by staying current with various data-user organizations. LCOG recommends evaluating existing resources in your community, region, or state before investing in technology or a project. This entails the consideration of the type of information you need along with determining which organizations may have it. Such an approach fosters the development of new relationships and partnerships that will certainly benefit the community.

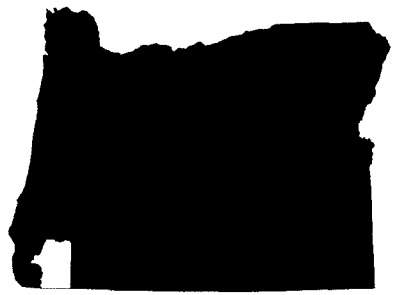
The implementation process, especially the needs survey, allowed the community to identify needs and protect service for seniors, low income and disabled citizens while making system design changes that made the service more accessible to the general public. Transportation discussion within Lane County was broadened, resulting in a transit system that continues to pay attention to the community's needs.

Case Study 12

Josephine County Health & Community Action

Grants Pass, OR

ITS Components: Transit Operations Software, and Internet
Benefits Realized: The creation of a new transit system in less than 6 months.



Counties Served: Josephine (OR)
Geographic Area Covered: 1,581 square miles

Fleet Description:

9 drivers
2 dispatching/scheduling staff
Maintenance done by Public Works Department
8 minibuses and 3 fixed route buses

Service Type: Fixed Route & Demand Response
Annual Passenger Trips: 55,282 (in FY 2000-01)
Daily Trips: 212 (in FY 2000-01)
Funding Sources: State, County, City and Community Partners.

Learning from Others to Create a New Transit System

Josephine County's Community Action Agency (JCCAA) undertook an extensive regional planning process in the middle of 2000. A community planning group, including city and county officials, local social service providers, educational institutions, and transportation providers, encouraged the JCCAA to develop the services and use technology to support regional rider needs. Thus, JCCAA embarked on the process of creating an expanded transit service for the Grants Pass area.

To provide transit services, the system needed to employ some means for scheduling and dispatching. With no prior experience, JCCAA learned about the types of software available from another local system, the Rogue Valley Transit District (RVTD) in Medford, Oregon. The RVTD also proved to be a good resource by providing insight about their implementation experience, as well as the operations software that they use. JCCAA evaluated the costs and functionality of similar software. For that reason JCCAA considered the cost of the Mobilitat software as reasonable, thereby deciding to adopt it for their new system. Because the system is part of the County, Internet and email was also readily available for internal and external communication.

To meet an immediate need, the planning and implementation of the new transit system took about a month. Unlike other systems, the JCCAA did not encounter the common problem of fitting the technology into an existing system or infrastructure because the software and the service were put into operation almost simultaneously. Moreover, to accelerate the process, JCCAA was assisted further by the RVTD.

Unfortunately, during the implementation, the computer equipment was stolen from the JCCAA facility. The JCCAA chalked it up to a learning experience, and highlighted the need to identify system security risks as well as establishing reliable computer data back-up procedures.

The JCCAA demonstrates that ITS deployment helped them handle their system development and meet client expectations. The system is currently operating at capacity with 8 minibuses providing 130 paratransit rides a day. A fixed route adds 5,000 rides a month to that total. Worth mentioning is that JCCAA provides as many rides per day as much older, larger systems who have much more experienced staff and less software. The JCCAA attributes their success to asking for and receiving help from others to get their software up and running. They advise agencies initiating rural transit services to talk to others and learn what they are doing and what issues they faced, and then to adapt that knowledge to your own system.

Case Study 13

Rogue Valley Transportation District & Valley Lift

Medford, OR

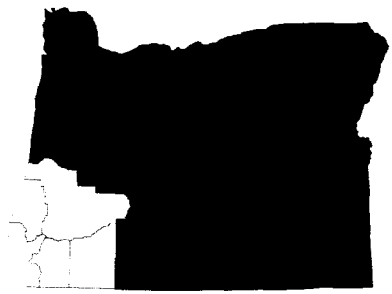
www.rvtd.org

ITS Components: GIS, Transit Operations Software, and Internet
Benefits Realized: Centralized transportation scheduling and dispatching services.

Counties Served: Jackson, Josephine, Douglas, Coos, and Curry (OR)
Geographic Area Covered: 12,400 square miles

Fleet Description:

45 employees including drivers, dispatchers and maintenance staff
30 buses
13 wheelchair lift equipped vans and mini-vans



Service Type: Fixed Route & Demand Response
Annual Passenger Trips: 600,000 fixed route (in 2000) and 60,000 DRT (in 1999)
Daily Trips: 3,125 (in 2001)
Funding Sources: Federal Transit Administration Job Access program, State, and local.

Coordinating a Transportation Call Center with Partnerships

The Rogue Valley Transportation District (RVTD) wanted to be more efficient and make the most of what they have. The present ITS implementation effort will make scheduling, dispatching and reporting easier with the development of a centralized transportation call center to be called 'TransLink'. RVTD 's preparation began with the receipt of a planning grant to bring all the counties together and the right people to the table to talk about coordinated transportation. The planning also served to get buy in from local agencies and other providers. The stakeholders evaluated their changing system to assess where they were now and where they would be in five years.

The first level of planning was to assess service needed in outlying communities by low income families and those receiving Temporary Assistance for Needy Families (TANF). Proponents for the Job Training Partnership Act (JTPA) initially led the planning dialogue. This dialogue demanded that people work together that did not have similar perspectives. Transportation people had to understand social service people. As a consequence, the concept of client orientation as opposed to customer orientation was introduced. After the group developed consensus on an action plan, the local government and the RVTD took the lead on developing and implementing the operational aspects of the plan. The RVTD had been designated as the ride broker for the area and was in a position to initiate procurement of the software, hardware and infrastructure for the new call center.

Funding was received not only federally, but also from the State through the Title 19 Transportation and the State Special Transportation Funds. Oregon has developed 'coordination' grants that match the money provided through Title 19 for setting TransLink and brokering qualifying rides. Additional local funding was obtained from the FTA Job Access program. Nevertheless, RTVD continued to explore other local funding sources. The RTVD convinced funding groups that after ITS deployment, their system would be able to offer more rides for the same amount of money. Moreover, RTVD would be able to supply better information that would be more accessible to all of the participating agencies.

Investigating and Procuring Transit ITS

RTVD's TransLink will employ a transit operations software package that will have the capability to fully integrate existing programs into a coordinated, seamless, effective ridership program. The assortment of services includes Oregon Medical Assistance Program (OMAP) contract providers, RVTD's fixed-route services, paratransit programs, student programs, rideshare programs, and the region's Special Transportation Fund. In addition, TransLink will schedule rides for RVTD's Valley Lift system of complimentary ADA paratransit services as well as scheduling rides to senior and disability clients. TransLink will also coordinate the Valley Rideshare program, a regional rideshare service within Jackson and Josephine Counties.

Specifically, the system will handle trip reservations, scheduling, dispatching, routing, management reports, and financial reports for TransLink. Furthermore, the new system will coordinate the screening of OMAP recipients, determine eligibility, schedule non-emergency medical rides for OMAP recipients, and arrange and handle payments to contracted providers for actual transportation. The reservation system will be easier for clients because they will call just one number to set up their rides to appointments.

To learn how to put TransLink into operation, the RVTD visited local call centers of other industries. They invited vendors to give demonstrations, not just bids and proposals, to learn more about the available technology and software. After the initial three-year investigation of talking to others, searching the Internet, and getting advice from the State, they issued a request for proposals (RFP) for the GIS and scheduling/dispatching portion. The RVTD asked for a presentation from the potential contractor showing a fully implemented and functioning system.

RVTD found, however, that their software specifications in the RFP were too detailed . They had eight companies interested in the project. However, as the proposal due date approached, all but two dropped out because they could not meet the requirements. As a result, the RVTD is evaluating a second round of simpler proposals and hope to have TransLink operational in 2001.

Additional Reference:

- Rogue Valley Transportation District, *RFP Dispatching and Scheduling Software*, January 2001.

Case Study 14

Central Oregon Intergovernmental Council

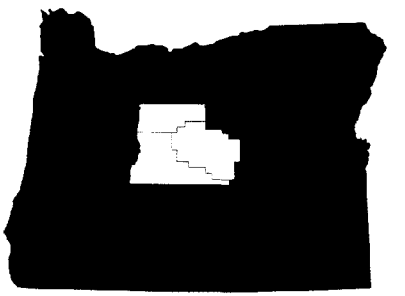
Redmond, OR

www.coic.org

ITS Components: GIS and Transit Operations Software (planning stages)
Benefits Realized: Coordinated transportation initiative among three counties with stakeholders involved during the planning.

Counties Served: Crook, Deschutes, and Jefferson (OR)
Geographic Area Covered: 7,787 square miles

Funding Sources: Adult & Family Services Division of the Department of Human Resources, Federal Transit Administration, Oregon Department of Transportation and, Central Oregon Intergovernmental Council.



Access to Jobs GIS Mapping Project

The GIS project was intended to address the transportation barriers of both low-income families and those individuals categorized as economically disadvantaged. The Council is a planning and coordinating agency that works with individuals, businesses, and communities to create a healthy economy.

The rurality of central Oregon is unique for its rapid growth and absence of public transit. It has been noted that an obstacle to employment for low-income populations is the difficulty of maintaining reliable transportation that effectively meets the needs of work, child-care, health care and basic daily activities. Based on this knowledge, the Central Oregon Intergovernmental Council (COIC) participated in the Access to Jobs Transportation Plan to increase options for low-income residents to get to work. GIS was used to identify residents and potential places of employment. As a result, grants have been submitted to implement specific transportation strategies.

The COIC worked with the Adult & Family Services (AFS) Division of the Department of Human Resources staff to secure funding for the project. Hardware and ArcInfo and ArcView software was provided to the organization as part of a grant award. A staff person hired to coordinate the project obtained data, purchased base maps needed for the region, coded data, and worked with Deschutes County to have maps developed.

One of the greatest challenges in the project was securing base maps and employer data for rural counties. Base maps and employer data for the counties without GIS had to be purchased from an out-of-state company. Progress was slightly delayed due to problems getting employer codes from the vendor. After project completion, the COIC found out that they could have saved a lot of time and money by purchasing base maps for the rural counties from the telephone company.

Furthermore, at the time the COIC had a staff person who was familiar enough with the GIS applications to help with much of the mapping, not requiring a much initial training. However, since the conclusion of the project, the COIC lost that staff member and did not have anyone that could use the GIS software. Hence, the maps created are not being used. The COIC feels that it is important to plan ahead as to how GIS data is going to be maintained, and whether there is sufficient knowledge and infrastructure within the organization to make good use of the investment.

Still, the COIC realizes that maps produced are very useful tools - they enable people to see what the data expresses. The COIC desires to have the resources to keep the data up to date and analyze changes especially as they relate to community transportation recommendations in the region. Given the resources available, the COIC is thankful that they invested when they did. They now have a basis on which to build, as new resources and personnel become available.

Coordinating Regional Public Transportation

As a result of the redirection of funds by the Oregon Department of Transportation (ODOT), the COIC received funding to manage a regional coordination project for Central Oregon. COIC staff worked with stakeholders from throughout Central Oregon to convene a Stakeholders' Advisory Committee (SAC) representing a wide range of interests. The SAC included: Crook, Deschutes, and Jefferson county governments, Redmond School District, American Council of the Blind, Crook/Deschutes Head Start, the regional hospital, major employers, Seniors' Task Force of the Central Oregon Health Council, Bend Dial-A-Ride, Central Oregon Council on Aging transportation provider, and other private transportation providers. As a result, the SAC developed an Action Plan for transportation coordination in the region that was adopted by the COIC's Board of Directors on June 15, 2000.

ODOT has asked that COIC coordinate allocation of the set-aside funds to implement the Action Plan. COIC staff continued to work with members of the SAC and the project's Technical Advisory Committee (TAC) to identify and refine elements of the Action Plan for implementation and funding. Stakeholders whose interests are not represented in either group also had the opportunity to comment. The resulting proposal outlined three projects that the two groups have recommended for funding.

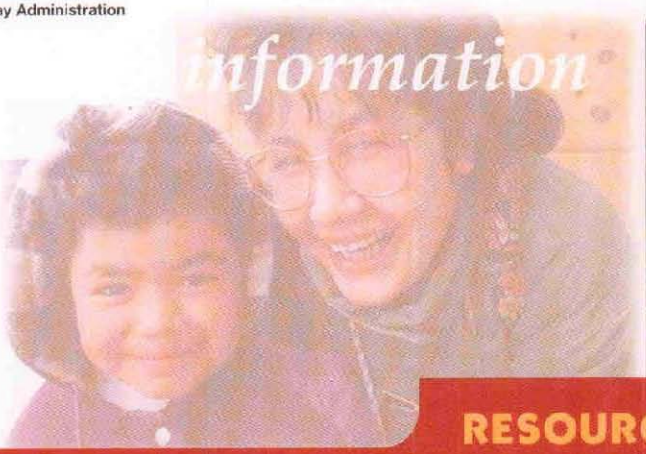
The SAC identified improved communication among providers as a high priority. A number of people helped guide their decision-making as to what to ITS components should be used. Visits were conducted through the ITS Peer-to-Peer program. As well, the City of Bend hired a Dial-A-Ride manager with experience using GIS and scheduling and dispatching software. The SAC's expectation is the creation of a coordinated communication system that will allow providers throughout the region to better manage rides, and will give them the ability to schedule more efficiently and make better use of resources.

The COIC anticipates that the City of Bend will play a key role in the regional coordinated communication system, and expects to secure additional funding as they progress. The COIC continues to work with SAC and TAC members, community transportation partners, its Board and other local officials. Through this process, the COIC suggests a phased approach with partners on board from the beginning. They also stress the importance of understanding each partner's resources and capabilities as well as including and working very proactively to involve all stakeholders.

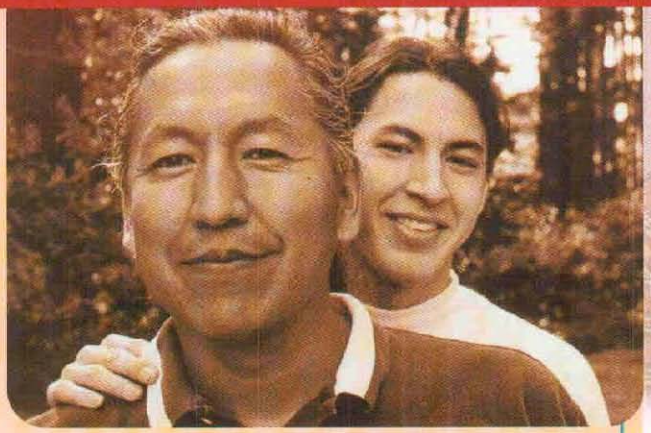
Additional References:

- COIC, Central Oregon Transportation Coordination – Action Plan, January 2000.
- COIC, Community transportation Resource Allocation – Proposal, October 2000.

U.S.Department of Transportation
Federal Transit Administration
Federal Highway Administration



RESOURCES FOR RURAL TRANSIT ITS



RESOURCES FOR RURAL TRANSIT ITS

TRANSIT ITS FIELD SURVEY QUESTIONNAIRE

The following interview questions can be used to gain insight into rural transit systems' planning, procurement, implementation, and evaluation of Transit ITS. The interview questions were tested and established in order to be able to "ask the right questions" and obtain useful, helpful advice and recounts of experiences.

System Name:

Date of Implementation:

ITS Technologies Used:

Prior to making a site visit, information should be collected on the ITS Technologies currently available to the system and how the technologies are being used. Available technologies include:

- Geographic Information systems
- Auto Passenger Count
- Scheduling and Dispatching
- Automatic Passenger Count
- Signal Priority
- Electronic Fare collection
- Automated Trip Itineraries
- In-vehicle Annunciators
- Variable Message Signs and Monitors
- Interactive Kiosks
- Automatic Vehicle Location
- Smart Cards
- Internet
- Other (specify)

Interview Questions to Elicit Input and Identify Best Practices:

Planning Experience

- How did you decide to employ ITS and what did you expect it to do for you?
- Who did you have to convince and how did you do it?
- How did you decide on this particular application?
- What sort of planning process, if any, did you use?
- What agencies or private firms were involved in the planning process?
- Did you involve the stakeholders? Which ones?
- Where did you get the most informative ITS information or advice?
- How long did the planning and implementation process take?
- Did the planning and implementation of ITS involve more or less of your time, staff time, driver time than you anticipated?

Procurement Experience

- What funding did you secure?
- What was the match requirement?
- Did you receive any funding from local sources? Who?
- Did you have difficulty convincing local funding sources of the benefits of ITS? If you were successful, what convinced them?

Implementation and Operational Experience

- What were the greatest challenges in implementation?
- What problems arose, and how did you overcome them?
- Did the implementation of ITS involve more or less of your time, staff time, driver time than you anticipated?
- What type of new training did the ITS application require? How did you provide the training?
- What was the cost to the system in dollars/time?
- Were there any new safety issues that arose from the ITS implementation?
- What basic hardware and software do you employ on your system?
- What sort of databases do you maintain? What impacts have your ITS applications had on the number, type, and content of your databases?
- What sort of interactions do you have with your customers?
- How do you reach your patrons to keep them informed or to receive feedback?

Impact of ITS Application

- What do your patrons think of the ITS application?
- What changes have you seen in the system since you adopted this ITS Application?
  - Increased ridership?
  - Fewer complaints?
  - Happier employees?
  - Lower operating costs?
  - More service for the same, or less, cost?

Evaluation of ITS Application

- Have the benefits you envisioned been realized? How so?
- What has made it a success? Can you identify one or two things?
- Why have you stayed with the system?
- Did you establish an evaluation procedure for the new processes, equipment, and outcomes?
- What was your timetable for the evaluation? Who did the evaluation?
- What changes were made to the system as a result of the evaluation? What other changes have you made and why?
- Do you have any plans to expand the system?

Lessons Learned

- Are there lessons learned or things you could say are good approaches to implementing and using ITS?
- What were your smartest moves?
- What is the one thing that made the system work for you?
- If you had to do it again, what would you do differently?
- What do you wish you knew before you started?
- Was the level of training you received adequate?
- Was the funding adequate?
- What is the best thing you can do that costs you little or nothing?
- What advice would you give to anyone considering it or trying to implement ITS?
- What do you plan on doing next?

2 BIBLIOGRAPHY

2.1 Books

Anderson G.Lee and Russell F. Settle. *Benefit-Cost Analysis: A Practical Guide.* DC Heath and Company, Lexington, MA, 1977.

Burkhardt, Jon E. *User's Manual for Assessing Service-Delivery Systems for Rural Passenger Transportation.* Washington DC: National Academy Press, 1995.

Center for Systems and Program Development. *Best Practices in Specialized and Human Services Transportation Coordination.* Washington, DC: United States Department of Transportation, 1989.

Damiano, Peter C., Elizabeth T. Momany, Norman S. J. Foster, and Hermine T. Mcleran. *Transportation of Rural Elders and Access to Health Care.* Iowa City, IA: Ames University of Iowa, Public Policy Center, 1995.

Fielding, Gordon. *Managing Public Transit Strategically.* New York: Jossey-Boss. 1987 (out of print).

Goble, Robert T. Workshop Manual: *Planning Intermodal and Operations Facilities for Rural and Small Urban Transit Systems.* Washington, DC: United States Department of Transportation, 1995.

ITS Joint Program Office. *ITS Resource Guidebook 2001.* Washington, DC: United States Department of Transportation, Federal Highway Administration, 2001.

Howard, David M. *A Handbook on Rural Elderly Transportation Services: A Practical Introduction to Operating and Evaluating a Rural Elderly Transportation System.* Kansas City, MO: University of Missouri, National Resource Center for Rural Elderly, 1990.

King, David. *What are the "Best Practices" of Rural Subarea Planning?* Phoenix, AZ: Arizona Department of Transportation, 1998.

Mitretek Systems. *The Road to Successful ITS Software Acquisition, Volume I: Overview and Themes.* Washington, DC: United States Department of Transportation, Federal Highway Administration, ITS Joint Program Office, 1998.

Mitretek Systems. *The Road to Successful ITS Software Acquisition, Volume II: Software Acquisition Process Reference Guide.* Washington, DC: United States Department of Transportation, Federal Highway Administration, ITS Joint Program Office, 1998.

Rosenbloom, Sandra. *Service Routes, Route Deviation, and General Public Paratransit in Urban, Suburban, and Rural Transit Systems.* Washington, DC: United States Department of Transportation, Federal Transit Administration, Office of Technical Assistance and Safety, 1996.

SG Associates. *Workbook for Estimating Demand for Rural Passenger Transportation.* Washington, DC: National Academy Press, 1995.

Stone, J. and A. Nalevanko. *Small Urban and Rural Advanced Public Transportation Systems.* Raleigh, NC: Department of Civil Engineering, North Carolina State University, February, 1999.

Transportation Research Board. *Transit Cooperative Research Program (TCRP) Report 6: Users' Manual for Assessing Service-Delivery for Rural Passenger Transportation.* Washington, DC: National Research Council, 1995.

Transportation Research Board. *Transit Cooperative Research Program (TCRP) Report 60: Using Geographic Information Systems for Welfare to Work Transportation Planning and Service – A Handbook.* Washington, DC: National Research Council, 2000.

Transportation Research Board. *Transit Cooperative Research Program (TCRP) Report 64: Guidebook for Developing Welfare-to-Work Transportation Services.* Washington, DC: National Research Council, 2000.

Transportation Research Board. *Transit Cooperative Research Program (TCRP) Project B-17 Report: Selecting Appropriate Technology Systems – A Guidebook.* Washington, DC: National Research Council, 2000 (Draft)

Volpe National Transportation Systems Center. *Advanced Public Transportation Systems: The State of the Art Update 2000.* Washington, DC: United States Department. of Transportation, Federal Transit Administration, Office of Research, Demonstration and Innovation, 2000.

Volpe National Transportation Systems Center. *Benefits Assessment of Advance Public Transportation System Technologies Update 2000.* Washington, DC: United States Department of Transportation, Federal Transit Administration, Office of Research, Demonstration and Innovation, 2000.

Wallace, Charles E., Andrew K. Kilpatrick, and Keith R. Schneider. *Rural Applications of Intelligent Transportation Systems.* Knoxville, TN: University of Tennessee, Transportation Center, 1996.

Walther, Erskine S. Ruralization of Risk Management: *A Handbook for Small Transit Operators: Final Report.* Washington, DC: United States Department of Transportation, Federal Transit Administration, 1992.

2.2 Periodicals

Community Transportation Association of America. *Community Transportation: Resource Guide 2000.* (Winter 2000).

Robb, Drew. "Tech Challenges on the Reservation." *Government Technology,* February (2001): 054-056.

Smith, Jean. "Rural Transit Raising the Standards." *Community Transportation.* 15-8 (1997): 12-14.

Stone, John R., Tahsina Ahmed, and Anna Nalevanko . "Internet-Based Decision Support for Advanced Public Transportation Systems Technology." *Transportation Research Record* No. 1731, National Research Council, Washington, DC (2000): 63-67.

2.3 Other (Newsletters, Brochures, Papers)

Boenau, Ronald E. *"Technology Route."* Paper presented at the Transportation Research Board Conference on Rural/Intercity Transportation, Lake Tahoe, Nevada. 13 November 2000.

Federal Highway Administration, ITS Joint Program Office. *"Intelligent Transportation Systems Standards Fact Sheets."* Washington, DC: United States Department of Transportation, 1999-2000.

National Associations Working Group For ITS. *"Intelligent Transportation Systems Standards Sheet: Intelligent Transportation Systems Improve Travel Safety and Transit Service in Rural Areas."* Washington, DC: United States Department of Transportation, 1999-2000:

Nelson, Gary, and Matt Hardy. *"Development of a Technical Deployment Guidebook for APTS."* Paper presented at the Rural Advanced Transportation Technology Workshop, Flagstaff, AZ, August 1999.

PB Farradyne. *"ITS Deployment Guidance for Transit Systems-Executive Edition."* Washington, DC: United States Department of Transportation, 1997.

PB Farradyne. *"ITS Deployment Guidance for Transit Systems-Technical Edition."* Washington, DC: United States Department of Transportation, 1997.

Proceedings of the Transportation Research Board's 14th National Conference on Rural Public and Intercity Bus Transportation, *"Rural Mobility Solutions for the 21st Century,"* Lake Tahoe, Nevada. 12-15 November 2000.

"Rural Public Transportation Technologies: User Needs and Applications," TECHBRIEF, FHWA-RD-98-146. Washington, DC: United States Department of Transportation, September 1998.

Schweiger, Carol L and J. Buck Marks, *"Needs Assessment for Transit ITS: A Structured Approach,"* World ITS Congress, Turin, Italy, 2000.

Transit Cooperative Research Program. *"Report 18: A handbook for Acquiring Demand-Responsive Transit Software."* Washington, DC: Transportation Research Board - National Research Council, National Academy Press, 1996.

2.4 World Wide Web Resources

Advanced Rural Transportation Systems Compendium. Turner Fairbank Highway Research Center. <*www.tfhrc.gov/its/newarts.htm*>

American Public Transportation Association. <*www.apta.com*>

Community Transportation Association of America. <*www.ctaa.org*>

Electronic Reading Room. Federal Highway Administration, United States Department of Transportation. <*www.fhwa.dot.gov/pubstats.html*>

Federal Transit Administration. United States Department of Transportation. <*www.fta.dot.gov*>
ITS America. International ITS Information Clearinghouse. <*www.itsa.org*>

ITS Joint Program Office. United States Department of Transportation. <*www.its.dot.gov*>

ITS Resource Guide 2001. ITS Joint Program Office, United States Department of Transportation. <*www.its.dot.gov/guide.html*>

National Transit Institute. <*www.ntionline.com*>

National Transit Resource Center. Community Transit Association of America. <*www.ctaa.org/ntrc/its*>

National Transportation Library. United States Department of Transportation. <*ntl.bts.gov*>

Professional Capacity Building Program. United States Department of Transportation ITS Joint Program Office. <*www.pcb.its.dot.gov*>

Regional Transportation Online Center - ITS Cooperative Deployment Network. The National Associations Working Group for ITS. National Association of Development Organizations. <*www.nawgits.com*>

Rural ITS Free Press. <*www.ruralits.org*>

Technology Option for Small Urban and Rural Transit Operations. Department of Civil Engineering and Institute of Transportation Research and Education, North Carolina State University. <*www2.ncsu.edu:8010/eos/service/ce/research/stone_res/tahmed_res/www/*>

Transit Intelligent Transportation Systems. Federal Transit Administration, United States Department of Transportation. <*www.fta.dot.gov/research/fleet/its/its.htm*>

2.5 CD ROMs

Western Transportation Institute, Civil Engineering Department, Montana State University, Bozeman and Science Applications International Corporation. *Advanced Rural Transportation Systems: Rural Challenges and the Application of Advanced Technology must be a "Community" Investment.*

Federal Highway Administration, United States Department of Transportation. ITS Joint Program Office. *ITS Greatest Hits: Intelligent Transportation Systems.*

3 FEDERAL RESOURCES

3.1 National Assistance Programs

Intelligent Transportation Peer-to-Peer Program

The Intelligent Transportation Peer-to-Peer Program is a Federal Highway Administration, Federal Transit Administration, and Federal Motor Carrier Safety Administration Technical Assistance Program that provides public sector transportation stakeholders with a convenient method to tap into the growing knowledge base of ITS experience and receive short-term assistance.

Intelligent Transportation Peer-to-Peer Program
An FHWA & FTA Technical Assistance Program
c/o Michael Baker, Jr., Inc.
180 Admiral Cochrane Drive, Suite 210
Annapolis, MD 21401
Tel: 1-888-700-PEER or 1-888-700-7337
Fax: 1-410-571-6400
Email: dotpeer@erols.com
Web: www.its.dot.gov/peer/peer.htm

3.2 Federal Funding Resources

The following are descriptions of federal funding programs that may provide capital, planning or technical assistance in the application of APTS technology. The program is described briefly followed by contact information. More programs may be found in the Community Transportation Association of America (CTAA) "Resource Guide 2000" published annually. The "Resource Guide 2000" consists of a directory of federal funding resources along with federal, state and regional contacts. The Resource Guide may be obtained by contacting the CTAA National Transit Resource Center at 1-800-527-8279 or emailing resources@ctaa.org. Portions of the guide are also on the web at www.ctaa.org.

Department Of Transportation - Federal Transit Administration

Transit Major Capital Grant Program
Commonly known by its authorizing legislation as Section 5309, this program provides capital assistance for new and replacement buses and facilities. Only public bodies are eligible applicants. For more information, contact your FTA regional office, or Joyce Larkins, Office of Program Management, Federal Transit Administration, 400 Seventh Street, S.W., Washington, DC 20590. Tel: 202.366.1660. Fax: 202.366.7951. Web: www.fta.dot.gov/office/prgmmgmt/index.html

Metropolitan Transit Planning Grants
This is a program of formula funding for the transportation planning activities of metropolitan planning organizations (MPOs) that are the only eligible recipients. For more information, contact your local MPO, state transit administering agency, or Charles Goodman, Chief, Metropolitan Planning Division, Office of Planning (TPL-12), Federal Transit Administration, 400 Seventh Street, S.W., Washington, DC 20590. Tel: 202.366.1944. Fax: 202.493.2478. Web: www.fta.dot.gov/office/planning/index.html

Nonurbanized Area Formula Transit Grants
Commonly known by its authorizing legislation as Section 5311, this is a program of formula funding to states for the purpose of supporting public transportation in areas with a population of less than 50,000. Funds may be used to support administrative, capital or operating costs of local transportation providers. States are to spend 15 percent of their funding allocation on rural intercity bus needs, unless their governor certifies that these needs already are being met. In addition to this program, the Rural Transit Assistance Program (RTAP) provides $5.3 million in formula funding to states for rural transit training and technical assistance. States may distribute funding to public, private non-profit or tribal organizations. For more information, contact your state 5311 or state RTAP contact, or Mary Martha Churchman, Office of Program Management, Office of Capital and Formula Assistance, Federal Transit Administration, 400 Seventh Street, S.W., Washington, DC 20590. Tel: 202.366.2053. Fax: 202.366.7951.
E-mail: mary.churchman@fta.dot.gov. Web: www.fta.dot.gov/office/prgmmgmt/index.html

Transit Capital Assistance Program for Elderly Persons and Persons with Disabilities
Known by its authorizing legislation as Section 5310, this program provides formula funding to states for the purpose of assisting private nonprofit groups and certain public bodies in meeting the transportation needs of elders and persons with disabilities. Funds may be used only for capital expenses or purchase-of-service agreements. States receive these funds on a formula basis. For more information, contact your state 5310 representative, or Sue Masselink, Office of Programs Management, Federal Transit Administration, 400 Seventh Street, S.W., TPM-10, Washington, DC 20590. Tel: 202.366.2053. Fax: 202.366.7951.
E-mail: sue.masselink@fta.dot.gov. Web: www.fta.dot.gov/office/prgmmgmt/index.html

National Transit Planning and Research
This is a program of public transportation research, demonstration and special projects that are in the national interest, such as advanced technology, Clean Air Act compliance, transit finance initiatives, transit accessibility and human resource development. Ongoing major activities include state and national RTAP activities, Project ACTION, JOBLINKS, and the National Transit Institute. For more information, contact Edward Thomas, Associate Administrator for Research, Demonstration and Innovation (TTS-1), Federal Transit Administration, 400 Seventh Street, S.W., Room 6431, Washington, DC 20590. Tel: 202.366.4052. Fax: 202.366.3765.
E-mail: edward.thomas@fta.dot.gov. Web: www.fta.dot.gov/research/index.htm

Statewide Transit Planning and Research
This program provides formula funding to states to carry out statewide public transportation planning, research, demonstration and technical assistance activities. For more information, contact your state transit administering agency, or Paul Verchinski, Metropolitan and Environmental Planning Division, Office of Planning, Federal Transit Administration, 400 Seventh Street, S.W., TPL-12, Washington, DC 20590. Tel: 202.366.1626. Fax: 202.493.2478. E-mail: Paul.Verchinski@fta.dot.gov.
Web: www.fta.dot.gov/office/planning/index.html

Job Access and Reverse Commute Grants
The Job Access and Reverse Commute grant program was created to promote transportation services in urban, suburban and rural areas that assist welfare recipients and low income individuals in accessing employment opportunities. Discretionary grants are awarded to state and local units of government and private nonprofit entities, and may be used for transit operating and capital assistance. For more information, contact your FTA regional office or Doug Birnie, Office of Research Management, Federal Transit Administration, DOT, 400 Seventh Street S.W., Washington, DC 20590. Tel: 202.366.1666. Fax: 202.366.3765. E-mail: douglas.birnie@fta.dot.gov. Web: www.fta.dot.gov/wtw

Department Of Transportation - Research and Special Programs Administration

University Transportation Centers Program
Funded with a mixture of transit and highway funds, these centers form a network of academic institutions whose mission is to carry out university-based research and technology transfer on all types of transportation issues. For more information, contact Fenton Carey, Research and Special Programs Administration, Office of University Research and Education (DRA-1), Department of Transportation, 400 Seventh Street, S.W., Room 8417, Washington, DC 20590. Tel: 202.366.4434. Fax: 202.366.3272. Web: utc.dot.gov

Department Of Transportation - Federal Highway Administration

Highway Planning and Construction
FY 2000 Funding: $27.7 billion
The funding of federal aid for highways has many components, most of which can only be used for highway construction and rehabilitation projects. However, two major highway programs, the Surface Transportation Program (STP) and the Congestion Mitigation and Air Quality Improvement Program (CMAQ), plus a number of smaller, more specialized programs, may be used for either highway or public transportation capital projects, as determined by state-approved transportation planning processes. The majority of these funds are awarded to state transportation departments on a formula basis, although some, such as Indian Reservation Roads (IRR) and other public lands highway funds, are administered through separate mechanisms. For more information on grants and programs for states, contact Cynthia Burbank, Planning and Environment Program Manager, Federal Highway Administration, 400 Seventh Street, S.W., Washington, DC 20590. Tel: 202.366.0116. Fax: 202.366.3043. E-mail: cindy.burbank@fhwa.dot.gov. For information on Forest Highways, Indian Reservation Roads and Park Roads and Parkways, contact Arthur Hamilton, Federal Lands Highway Program Manager, Federal Highway Administration, 400 Seventh Street, S.W., Washington, DC 20590. Tel: 202.366.9494. Web: www.fhwa.dot.gov

Department Of Agriculture - Office of Rural Development

Rural Community Advancement Program (RCAP)
Funds support activities which promote economic vitality and quality of life in rural America. Transportation facilities and services may benefit from RCAP loans and grants. For information, contact your state's office of rural development or contact the office of Jill Long Thompson, Under Secretary for Rural Development, USDA, 14th and Independence Avenue, S.W., Mail Stop 0107, Washington, DC 20250. Tel: 202.720.4581. Web: www.rurdev.usda.gov
Note: CTAA manages the RCAP-funded Rural Passenger Transportation Technical Assistance Project, a program of ongoing short- and long-term technical assistance to improve public transportation in rural areas. For information, contact Charles Rutkowski, CTAA, 1341 G Street N.W., 10th Floor, Washington, DC 20005; Tel: 202.661.0219. Fax: 202.737.9197. E-mail: rutkowski@ctaa.org.

Rural Economic Development Loans
Grants are targeted to purposes such as community development, medical care, educational technology, job training, business incubators and technical assistance, and can be used for transportation activities that fit within those purposes. For information, contact Donald Scruggs, Specialty Lenders Division Director, Rural Business - Cooperative Service, USDA, 14th and Independence Avenue, S.W., Room 2245-S, Washington, DC 20250. Tel: 202.720.1400. Fax: 202.720.2213. Web: www.rurdev.usda.gov/rbs/index.html
Transportation opportunity: apply to a local RUS lending agency for a business or community development loan.

Department Of Commerce - Economic Development Administration

Economic Development Grants
Grants support capital facilities in economically distressed areas, including transportation facilities and infrastructure improvements. Funds also are available for planning and adjustment assistance in communities experiencing severe economic deterioration. Public bodies, private nonprofit organizations and Indian tribes are eligible applicants. For information, contact Chester J. Straub, Jr., Deputy Assistant Secretary, Economic Development Administration, Dept. of Commerce, 14th and Constitution Avenue N.W., Mail Stop 7814A, Washington, DC 20230. Tel: 202.482.5081. Fax: 202.273.4781. E-mail: cstraub@doc.gov. Web: www.doc.gov/eda

Department Of Housing And Urban Development - Office of Community Planning and Development

Community Development Block Grants
The Community Development Block Grant (CDBG) program supports a wide variety of community and economic development activities, with priorities determined at the local level. Some communities have used CDBG funds to assist in the construction of transportation facilities or for operating expenses and vehicle acquisition for community transportation services. Most CDBG funds are distributed on a formula basis to entitled cities, states and urban counties. For information, contact your local community development agency, state CDBG administering agency, or Richard Kennedy, Director of Block Grant Assistance, Office of Community Planning and Development, HUD, 451 Seventh Street, S.W., Room 7286, Washington, DC 20410. Tel: 202.708.3587. Fax: 202.401.2044. E-mail: richard_kennedy@hud.gov . Web: www.hud.gov/cpd/cdbg.html

Department Of Housing And Urban Development - Office of Public and Indian Housing

Indian Community Development Block Grant Program
This program supports a wide variety of tribally determined community and economic development activities, including decent housing, a suitable living environment and economic opportunities, principally benefiting persons of low- and moderate-income. Some tribal organizations have used these funds to assist in the construction of transportation facilities or for operating expenses and vehicle acquisition for community transportation services. For more information, contact Deborah Lalancette, Director of Grants Management, Office of Native American Programs, HUD, 1999 Broadway, Suite 3390, Denver, CO 80202. Tel: 303.675.1600 ext. 3325. Fax: 303.675.1660. Web: www.codetalk.fed.us/Community_Develop.html

Environmental Protection Agency - Pollution Prevention Division

Environmental Protection State and Tribal Assistance Grants
State and tribal pollution control agencies receive these funds to carry out numerous pollution control and prevention activities. Transportation services or facility improvements that are part of a pollution prevention innovation can be supported. Only state and tribal agencies may apply for these funds, but the Environmental Protection Agency encourages states to work in partnership with local governments and private entities. For more information, contact your state pollution control agencies, or David Kling, Pollution

Prevention Division Director, Environmental Protection Agency, 401 M Street, S.W., Room CY3134, Washington, DC 20460. Tel: 202.260.3557. Fax: 202.260.0178. Web: www.epa.gov/p2

Department Of Health And Human Services - Administration for Children and Families

Temporary Assistance for Needy Families

States receive these formula grants, known as TANF, to provide cash assistance, work opportunities, and necessary support services for needy families with children. States may choose to spend some of their TANF funds on transportation and related services needed by program beneficiaries. For more information, contact your state TANF administering agency, or Alvin Collins, Director of Family Assistance, Administration for Children and Families, DHHS, 370 L'Enfant Promenade, S.W., 5 th Floor, Washington, DC 20447. Tel: 202.401.9275. Fax: 202.205.5887. E-mail: acollins@acf.dhhs.gov. Web: www.acf.dhhs.gov/programs/ofa

3.3 National Organizations

The following is a list of national organizations of interest to transit. For the most part, these organizations operate at the national level, although some may have state and local components. These organizations may fund transit activities including technology infrastructure and operations assistance.

American Association of State and Highway Transportation Officials
American Association of Homes and Services for the Aging
American Associations of Retired Persons (AARP)
American Hospital Association
American Public Human Services Association
American Public Transit Association
American Public Works Association
American Red Cross
American Transit Services Council (ATSC)
Center for Community Change
Consortium for Citizens with Disabilities
Easter Seals
Families USA
International Taxicab and Livery Association
Intertribal Transportation Association
ITS America
Multi-State Technical Assistance Project
National Association of Area Agencies on Aging
National Association of Community Action Agencies
National Association of Counties
National Association of Development Organizations
National Association of Workforce Boards
National Association of State Units on Aging
National Caucus and Center on the Black Aged

National Community Action Foundation
National Conference of State Legislators
National Congress of American Indians
National Head Start Association
National Indian Council on Aging
National Rural Health Association
National School Transportation Association
Public/Private Ventures
Rural Community Assistance Program
State Medical Director's Association
Surface Transportation Policy Project
United Way of America
USAction
Welfare Information Network
Welfare to Work Partnership

4 STATE RESOURCES

4.1 State Department of Transportation Contacts

Many nationally funded programs are administered at the state level. State and regional transit associations offer community transportation resources in the form of funding, training, and lobbying. Many hold regular conferences, publish newsletters, and offer technical assistance. The following are state department of transportation program contacts, specifically Section 5307, 5309, 5310, 5311 and RTAP managers from whom you can seek more information regarding transit related ITS applications.

ALABAMA

Section 5307, 5309, 5310,5311, RTAP, MPO
Mr. Steve Ostaseski
Alabama Dept. of Transportation
Multimodal Transportation Bureau
1409 Coliseum Boulevard
Room G101
Montgomery, AL 36130
Tel: 334.242.6096
Fax: 334.262.7658
E-mail: ostaseskis@dot.state.al.us
Web: www.alrtap.org

ALASKA

Section 5307, 5309, 5311, RTAP
Mr. Bruce Wells
Alaska Dept. of Transportation and Public Facilities
3132 Channel Drive
Room 200
Juneau, AK 99801-7898
Tel: 907.465.6991
Fax: 907.465.6984
E-mail: bruce_wells@dot.state.ak.us
Web:www.dot.state.ak.us

Section 5310
Ms. Gail Roust
Alaska Dept. of Transportation and Public Facilities
3132 Channel Drive
Room 200
Juneau, AK 99801
Tel: 907.465.2883
Fax: 907.465.6984
E-mail: gail_roust@dot.state.ak.us
Web: www.dot.state.ak.us

AMERICAN SAMOA

RTAP
Ms. April Tu'ufuli
American Samoa Power Authority
Civil/Highway Division
P.O. Box PPB
Pago Pago, AS 96799
Tel: 684.644.2772
Fax: 684.644.1337

ARIZONA

Section 5307
Mr. Dale Buskirk
Arizona Dept. of Transportation
206 South 17th Avenue
Suite 300-B
Phoenix, AZ 85007
Tel: 602.255.8143
Fax: 602.256.7563
E-mail: dbuskirk@dot.state.az.us
Web: www.dot.state.az.us

Section 5309
Mr. Bill Sapper
Arizona Dept. of Transportation
206 South 17th Avenue
Suite 340-B
Phoenix, AZ 85007
Tel: 602.255.7465
Fax: 602.256.7563
E-mail: bsapper@dot.state.az.us
Web: www dot.state.az.us

Section 5310
Mr. Gregg Kiely
Arizona Dept. of Transportation
206 South 17th Avenue
Suite 340-B
Phoenix, AZ 85007
Tel: 602.255.6736
Fax: 602.256.7563
E-mail: gkiely@dot.state.az.us
Web: www.dot.state.az.us/ about/transit/index.htm

Section 5311, RTAP
Mr. Sam Chavez
Arizona Dept. of Transportation
206 South 17th Avenue
Suite 340-B
Phoenix, AZ 85007
Tel: 602.255.8956
Fax: 602.256.7563
E-mail: schavez@dot.state.az.us
Web www.dot.state.az.us

ARKANSAS

Section 5307, 5309, 5310, 5311, RTAP
Mr. James L. Gilbert
Arkansas State Highway and Transportation Dept.
P.O. Box 2261
10234 Interstate 30
Little Rock, AR 72203
Tel: 501.569.2471
Fax: 501.569.2476
E-mail: jlgpl62@ahtd.state.ar.uss

CALIFORNIA

Section 5307, 5309, 5311, RTAP
Mr. David Cabrera
California Dept. of Transportation - CALTRANS
Mass Transportation Program
P.O. Box 942874
Mail Station 39
Sacramento, CA 94274-0001
Tel: 916.654.8144
Fax: 916.654.9366
E-mail: david.cabrera@dot.ca.gov
Web: www.dot.ca.gov/hq/MassTrans

Section 5310
Mr. Ralph Caudillo
California Dept. of Transportation- CALTRANS
Mass Transportation Program
P.O. Box 942874
Mail Station 39
Sacramento, CA 94274-0001
Tel: 916.654.9770
Fax: 916.654.9366
E-mail: ralph.caudillo/hq/caltron/CAGov

COLORADO

Section 5307
Mr. Tom Mauser
Colorado Dept. of Transportation
DTD Transit and Rail Unit
4201 East Arkansas Avenue
B-606
Denver, CO 80222
Tel: 303.757.9768
Fax: 303.757.9727
E-mail: tom.mauser@dot.state.co.us
Web: www.dot.state.co.us

Section 5309
Ms. Jeanne Erickson
Colorado Association of Transit Agencies (CASTA)
225 East 16th Avenue
Suite 1070
Denver, CO 80203
Tel: 303.839.5197
Fax: 303.832.3053
E-mail: casta@msn.com
Web: www.coloradotransit.com

Section 5310, 5311, RTAP
Ms. Pat Loose
Colorado Dept. of Transportation
4201 East Arkansas Avenue
B-606
Denver, CO 80222
Tel: 303.757.9769
Fax: 303.757.9727
E-mail: pat.loose@dot.state.co.us
Web: www.dot.state.co.us

CONNECTICUT

Section 5307, 5309
Mr. Duane Campbell
Connecticut Bureau Public Transportation
2800 Berlin Turnpike
PO. Box 317546
Newington, CT 06131-7546
Tel: 860.594.2815
Fax: 860.594.2859
E-mail: duane.campbell@po.state.ct.us

Section 5310
Ms. Ellen Lawrence
Connecticut Dept. of Transportation
P.O. Box 317546
2800 Berlin Turnpike
Newington, CT 06131
Tel: 860.594.2912
Fax: 860.594.2913
E-mail: ellen.lawrence@po.state.ct.us

Section 5311, RTAP
Mr. Ricardo Almeida
Connecticut Dept. of Transportation
Transit and Ride Sharing
Division, Public Transportation
P.O. Box 317546
2800 Berlin Turnpike
Newington, CT 06131
Tel: 860.594.2839
Fax: 860.594.2848
E-mail: ricardo.almeida@po.state.ct.us
Web: www.state.ct.us/dot

DELAWARE

Section 5307, 5309, 5310, 5311, RTAP
Mr. Alton H. Hillis, CCTM
Delaware Transit Corporation
655 Bay Road
Blue Hen Mall
Suite 206
Dover, DE 19901
Tel: 302.739.3278 ext. 3138
Fax: 302.739.3104
Web: www dartfirststate.com

DISTRICT OF COLUMBIA

Section 5307, 5309, 5310, 5311
Ms. Michelle Pourciau
Washington DC Dept. of Public Works
2000 14th Street, N.W.
7th Floor
Washington, DC 20009
Tel: 202.673.6836
Fax: 202.939.7185
E-mail: michellepourciau_@_~dpw2-reeves@ccmail.dcgov.org
Web: www.dcgov.dpw

FLORIDA

Section 5307, 5310, 5311, RTAP
Ms. Catherine Kelly
Florida Dept. of Transportation
Public Transit Office
605 Suwannee Street
Mail Stop 26
Tallahassee, FL 32399-0450
Tel: 850.414.4500
Fax: 850.922.4942
E-mail: catherine.kelly@dot.state.fl.us

Section 5309
Ms. Elizabeth Stutts
Florida Dept. of Transportation
Public Transit Office
605 Suwannee Street
Mail Stop 26
Tallahassee, FL 32399-0450
Tel: 850.414.4530
Fax: 850.922.4942
E-mail: elizabeth.stutts@dot.state.fl.us

GEORGIA

Section 5307, 5309, 5311
Mr. Luke Cousins
Georgia Dept. of Transportation
Office of Intermodal Programs
276 Memorial Drive, S.W.
Atlanta, GA 30303
Tel: 404.651.9201
Fax: 404.657.4221
E-mail:luke.cousins@dot.state.ga.us

Section 5310
Mr. Mike Casper
Georgia Dept. of Human Resources
Transportation Services Section
2 Peachtree Street, N.W.
Suite 32-270
Atlanta, GA 30303-3142
Tel: 404.657.6211
Fax: 404.657.6215
E-mail: mecl@dhr.state.ga.us

RTAP
Mr. Wayne Jackson
Georgia Dept.of Transportation
Office of Intermodal Programs
276 Memorial Drive, S.W.
Atlanta, GA 30303
Tel: 404.651.9209
Fax: 404.657.4221
E-mail:wayne.jackson@dot.state.ga.us

GUAM

RTAP
Mr. Willie Flores
Guam Dept. of Public Works
P.O. Box 2950
Agana, GU 96910
Tel: 617.646.5831
Fax: 617.647.5835

HAWAII

Section 5307
Ms. Cheryl Soon
Hawaii Dept. of Transportation
711 Kapiolani Boulevard
Honolulu, HI 96813
Tel: 808.523.4529
Fax: 808.523.4730

Section 5309, 5310, 5311, RTAP
ML Harold Lao
Hawaii Dept. of Transportation
Statewide Transportation
Planning Office
869 Punch Bowl Street
Honolulu, HI 96813
Tel: 808.587.1845
Fax: 808.587.2362

IDAHO

Section 5307, 5309
Mr. Steve O'Neal
Idaho Dept. of Transportation
Division of Public Transportation
P.O. Box 7129
Boise, ID 83707-1129
Tel: 208.334.8286
Fax: 208.334.4424
E-mail: soneal@itd.state.id.us

Section 5310
Mr. Butch Ragsdale
Idaho Dept. of Transportation
P.O. Box 7129
Boise, ID 83707-1129
Tel: 208.334.8282
Fax: 208.334.4424
E-mail: bragsdal@itd.state.id.us

Section 5311, RTAP
Mr. Marty Montgomery
Idaho Dept. of Transportation
Division of Public Transportation
P.O. Box 7129
Bosie, ID 83707
Tel: 208.334.8848
Fax: 208.334.4424
E-mail: mmontgom@itd.state.id.us

ILLINOIS

Section 5307, 5309
Mr. Dale Fitschen
Illinois Dept. of Transportation
Division of Public Transportation
310 South Michigan Avenue
Room 1608
Chicago, IL 60604-4205
Tel: 312.793.2111
Fax: 312.793.1251
E-mail: fitschendq@nt.dot.state.il.us
Web: www.dnt.state.il.us

Section 5310
Mr. David Spacek
Illinois Dept. of Transportation
Public Transportation
310 South Michigan Avenue
Room 1608
Chicago, IL 60604-4205
Tel: 312.793.2154
Fax: 312.793.1251
E-mail: spacekdt@nt.dot.state.il.us
Web: www.dat.state.il.us

Section 5311, RTAP
Mr. Neil Ferrari
Illinois Dept. of Transportation
Division of Public Transit
310 South Michigan Avenue
Room 1608
Chicago, IL 60604-4205
Tel: 312.793.2111
Fax: 312.793.1251
E-mail: ferrarin@dot.state.il.us
Web: www.dot.state.il.us

INDIANA

Section 5307, 5309, MPO
Mr. Larry Buckel
Indiana Dept. of Transportation
100 North Senate Avenue
Room N901
Indianapolis, IN 46204-2820
Tel: 317.232.5292
Fax: 317.232.1499
E-mail: lbuckel@indot.state.in.us
Web: www.indot.state.in.us

Section 5310
Mr. Brian Jones
Indiana Dept. of Transportation
Public Transit Section
100 North Senate Avenue
Room N901
Indianapolis, IN 46204-2820
Tel: 317.232.1493
Fax: 317.232.1499
E-mail: bjones@indot.state.in.us
Web: www.dot.state.in.us

Section 5311
Mr. Jose Evans
Indiana Dept. of Transportation
100 North Senate Avenue
Room N901
Indianapolis, IN 46204-2219
Tel: 317.232.1498
Fax: 317.232.1499
E-mail: jenglish@indot.state.in.us
Web: www.dat.state.in.us

RTAP
Ms. Betsy Kachmar
RTAP Coordinator
Indiana Institute for Urban Transportation
825 East Eighth Street
Bloomington, IN 47408-3891
Tel: 812.855.8143
Fax: 812.855.8022
E-mail: mkachmar@nidana.edu
Web: www.indiana.edu/~ iutrans/rtap.html

IOWA

Section 5307, 5309, 5310, 5311, RTAP
Mr. Peter Hallock
Iowa Dept. of Transportation
100 East Euclid Avenue
Suite 7
Des Moines, IA 50313
Tel: 515.237.3302
Fax: 515.237.3323
E-mail: phalloc@iadot.email.com
Web: www.dot.state.ia.us

KANSAS

Section 5307, 5310, 5311
Mr. Thomas Dow
Kansas Dept. of Transportation
Metropolitian Planning Organization
217 South East 4th Street
Second Floor
Thacher Building
Topeka. KS 66603-3501
Tel: 785.296.2552
Fax: 785.296.0963
E-mail: tdowQ@dtthpr.wpo.state.ks.us
Web: www.ink.org

Section 5309
Mr. James Van Sickel
Kansas Dept. of Transportation
217 South East 4th Street
2nd Floor
Thacher Building
Topeka, KS 66603-3504
Tel: 785.296.5194
Fax: 785.296.0963
E-mail: jim@ksdot.org
Web: www.ink.org

RTAP
Ms. Patricia Weaver
University of Kansas
Kansas University Transportation Center
2011 Learned Hall
Lawrence, KS 66045
Tel: 785.864.5658
Fax: 785.864.3199
E-mail: weavereukans.edu

KENTUCKY

Section 5307, 5309, 5310, 5311, RTAP
Ms. Vickie Bourne
Kentucky Transportation Cabinet
Office of Transportation Delivery
125 Holmes Street
Third Floor
Frankfort, KY 40622
Tel: 502.564.7433
Fax: 502.564.2058
E-mail: VBourne@mail.kytc.state.ky.us

LOUISIANA

Section 5307
Ms. Emily Callender-Efferson
Louisiana Dept. of Transportation and Development
Public Transit
P.O. Box 94245
Room 400
Baton Rouge, LA 70804-9245
Tel: 225.379.1436
Fax: 225.379.1848
E-mail: callender@dotdmail.dotd.state.la.us
Web: www.dotd.state.la.us

Section 5309
Ms. Carol Cranshaw
Louisiana Dept. of Transportation and Development
Public Transit
P.O. Box 94245
Room 400
Baton Rouge, LA 70804-9245
Tel: 225.379.1436
Fax: 225.379.1848
E-mail: ccranshaw@dotdmail.dotd.state.la.us
Web: www.dotd.state.la.us

Section 5310
Ms. Donna Lavigne
Louisiana Dept. of Transportation and Development
Public Transit
P.O. Box 94245
Room 400
Baton Rouge, LA 70804-9245
Tel: 225.379.1436
Fax: 225.379.1848
E-mail: dlavigne@dotdmail.dotd.state.la.us
Web: www.dotd.state.la.us

Section 5311
Ms. Denise Vutera
Louisiana Dept. of Transportation and Development
P.O. Box 94245
Room 400
Baton Rouge, LA 70804-9245
Tel: 504.379.1436
Fax: 504.379.1848
E-mail: dvutera@dotdmail.dotd.state.la.us
Web: www.dotd.state.la.us

RTAP
Ms. Wanda Walker
Louisiana Dept. of Transportation and Development
P.O. Box 94245
Baton Rouge, LA 70804-9245
Tel: 225.379.1729
Fax: 225.379.1848
E-mail: wwalker@dotdmail.dotd.state.la.us
Web: www.dotd.state.la.us

MAINE

Section 5307
Ms. Rachel Audet
Maine Dept. of Transportation
Office of Passenger Transportation
16 State House Station
Augusta, ME 04333
Tel: 207.287.3318
Fax: 207.287.1030
E-mail: rachel.audet@state.me.us
Web: www.state.me.us/mdot

Section 5309, 5310
Mr. Nathan Moulton
Maine Dept. of Transportation
Office of Passenger Transportation
16 State House Station
Augusta, ME 04333
Tel: 207.287.3318
Fax: 207.287.1030
E-mail: nathan.moultan@state.me.us
Web: www.state.me.us/mdot

Section 5311, RTAP
Ms. Kim King
Maine Dept. of Transportation
Office of Passenger Transportation
16 State House Station
Augusta, ME 04333
Tel: 207.287.3318
Fax: 207.287.1030
E-mail: kim.king@ state.me.us
Web: www.state.me.us/mdot

MARYLAND

Section 5307, 5309, 5310, 5311, RTAP
Ms. Nancy Noonan, CCTM
Maryland Mass Transit Administration
Office of Planning and Capital Programming
6 St. Paul Street
Ninth Floor
Baltimore, MD 21202-1614
Tel: 410.767.3772
Fax: 410.333.0849
E-mail: nnoonan@mdot.state.md.us

MASSACHUSETTS

Section 5307,5310,5311,RTAP
Ms. JoAnne Champa
Massachusetts Executive Office of
Transportation and Construction
10 Park Plaza
Room 3170
Boston, MA 02116
Tel: 617.973.7062
Fax: 617.523.6454
E-mail: jchampa@state.ma.us

Section 5309
Ms. Donna Laidley
U.S. Dept. of Transportation
Federal Transit Administration
55 Broadway
Kendall Square
Suite 920
Cambridge, MA 02142
Tel: 617.494.2055
Fax: 617.494.2865
E-mail: donna.laidley@fta.dot.gov

MICHIGAN

Section 5307, 5309, 5310
Mr. Gus Lluberes
Michigan Dept. of Transportation
UPTRAN Passenger
Transportation Division
425 West Ottawa Street
P.O. Box 30050
Lansing, MI 48909
Tel: 517.373.8820
Fax: 517.373.7997
E-mail: llubereSg@mdot.state.mi.us
Web: www.mdot.state.mi.us/uptran/ptd

Section 5311
Ms. Cathy Mendenhall
Michigan Dept. of Transportaition
UPTRAN Passenger
Transportation Division
425 West Ottawa Street
P.O. Box 30050
Lansing, MI 48909
Tel: 517.335.2555
Fax: 517.373.7997
E-mail: mendenhallc@state.mi.us
Web: www.mdot.state.mi.us/uptran/ptd

RTAP
Ms. Jill Adams
Michigan Dept. of Transportation
UPTRAN Passenger
Transportation Division
P.O. Box 30050
Lansing, MI 48909
Tel: 517.373.2051
Fax: 517.373.7997
E-mail: adamsji@ mdot.state.mi.us
Web: www.mdot.state.mi.us/uptran/ptd

MINNESOTA

Section 5307, 5309, 5311
Mr. Gerry Weiss
Minnesota Dept. of Transportation
Office of Transit
395 John Ireland Boulevard
Mail Stop 430
St. Paul, MN 55155
Tel: 651.296.1612
Fax: 651.297.7252
E-mail: gerald.weiss@dot.state.mn.us
Web: www.dot.state.mn.us

Section 5310
Ms. Jody Jacoby
Minnesota Dept. of Transportation
Office of Transit
395 John Ireland Boulevard
Mail Stop 430
St. Paul, MN 55155
Tel: 651.282.6754
Fax: 651.297.7252
E-mail: jody.jacoby@dot.state.mn.us
Web: www.dot.state.mn.us

RTAP
Ms. Judy Ellison
Minnesota Dept. of Transpotation
Office of Transit
395 John Ireland Boulevard
Mail Stop 430
St. Paul, MN 55155
Tel: 651.296.1376
Fax: 651.297.7252
E-mail: ja.ellison@dot.state.mn.us
Web: www.dot.state.mn.us

MISSISSIPPI

Section 5307, 5309, 5310, 5311, RTAP, MPO
Mr. Charles Carr
Mississippi Dept. of Transportation
Public Transit Division
P.O. Box 1850
Mail Code 61-01
Jackson, MS 39215
Tel: 601.359.7800
Fax: 601.359.7777
E-mail: ccarr@mdot.state.ms.us

MISSOURI

Section 5307, 5309, MPO
Mr. David Awbrey
Missouri Dept. of Transportation
PO Box 270
Jefferson City, MO 65102
Tel: 573.751.9082
Fax: 573.526.4709
E-mail: awbred@mail.mo.state.modot.us
Web: www.modot.state.mo.us

Section 5310
Mr. Donald C. Hall
Missouri Dept. of Transportation
P.O. Box 270
Jefferson City, MO 65102
Tel: 573.526.5500
Fax: 573.526.4709
E-mail: halld@mail.modot.state.mo.us
Web: www.modot.state.mo.us

Section 5311
Ms. Linda Stepenoff
Missouri Dept. of Transportation
P.O. Box 270
Jefferson City, MO 65102
Tel: 573.751.7479
Fax: 573.526.4709
E-mail: stepenol@mail.odot.state.mo.us
Web: www.modot.state.mo.us

RTAP
Mr. John Rice
Missouri Dept. of Transportation
P.O. Box 270
Jefferson City, MO 65102
Tel: 753.751.7480
Fax: 573.526.4709
E-mail: ricej6@mail.modot.state.mo.us
Web: www.modot.state.mo.us

MONTANA

Section 5307, MPO
Ms. Lynn Zanto
Montana Dept. of Transportation
2701 Prospect Avenue
P.O. Box 201001
Room 109
Helena, MT 59620-1001
Tel: 406.444.3445
Fax: 406.444.7671
E-mail: lvzanto@state.mt.us

Section 5309, 5310, 5311, RTAP
Ms. Janis Winston
Montana Dept. of Transportation
Planning Department
2701 Prospect Avenue
P.O. Box 201001
Helena, MT 59620-1001
Tel: 406.444.4210
Fax: 406.444.7671
E-mail: jwinston@state.mt.us
Web: www.mdt.mt.gov

NEBRASKA

Section 5307, 5309, 5310, 5311, RTAP
Mr. Jerry Wray
Nebraska Dept. of Roads
Intermodal Transportation Division
P.O. Box 94759
Lincoln, NE 68509-4759
Tel: 402.479.4694
Fax: 402.479.3888
E-mail: jwray@dor.state.ne.us
Web: www dor.state.ne.us

NEVADA

Section 5307, 5309, 5310, 5311, RTAP
Mr. Jim Mallery
Nevada Dept. of Transportation
1263 South Stewart Street
Carson City, NV 89712
Tel: 775.888.7464
Fax: 775.888.7207
E-mail: jmallory@dot.state.nv.us
Web: www.dot.state.nv.us

NEW HAMPSHIRE

Section 5307, 5309, 5310, 5311, RTAP
Mr. Kenneth Hazeltine
New Hampshire Dept. of Transportation
Bureau of Rail and Transit
P.O. Box 483
Concord, NH 03302-0483
Tel: 603.271.3497
Fax: 603.271.6767
E-mail: n66kah@dot.state.nh.us

NEW JERSEY

Section 5307, 5309
Ms. Katherine Regan-DiCiccio
New Jersey Transit Corporation
Capital Funding
1 Penn Plaza East
Fourth Floor
Newark, NJ 07105-2246
Tel: 973.491.7839
Fax: 973.491.7837
E-mail: cplnkrd@njtransit.state.nj .us
Web: www.njtransit state.ni.us

Section 5310, 5311
Mr. Bob Koska
New Jersey Transit Corporation
Office of Special Services
1 Penn Plaza East
7th Floor
Newark, NJ 07105-2246
Tel: 973.491.7376
Fax: 973.491.7367
E-mail: ccafrpk@njtransit.state.nj.us
Web: www.njtransit.state.nj.us

RTAP
Mr. James R. Holman
New Jersey Transit Corporation
Office of Specialized Services
Paratransit Equipment
1 Penn Plaza East
Newark, NJ 07105-2246
Fax: 973 491.7367
E-mail: jholman@njtransit.state.nj.us
Web: www.njtransit.state.nj.us

NEW MEXICO

Section 5307, 5309, RTAP, MPO
Ms. Patricia Oliver-Wright
New Mexico Highway and Transportation Dept.
P.O. Box 1149
San Mateo Plaza
Santa Fe, NM 87504-1149
Tel: 505.827.1575
Fax: 505.827.0431
E-mail: patricia.oliver-wright@nmshtd.state.nm.us

Section 5310, 5311
Mr. Russell Naranjo
New Mexico Highway and Transportation Dept.
P.O. Box 1149 San Mateo Plaza
Santa Fe, NM 87504-1149
Tel: 505.827.1573
Fax: 505.827.0431
E-mail: russell.naranjo@nmshtd.state.nm.us

NEW YORK

Section 5307, 5311
Mr. Jim Arey
New York Dept. of Transportation
Passenger Transportation Division
Building 4
Room 115
1220 Washington Avenue
Albany, NY 12232-0414
Tel: 518.457.8335
Fax: 518.485.7563
E-mail: jarey@gw.dot.state.ny.us
Web: www.dot.state.ny.us

Section 5309
Mr. Ron Epstein
New York Dept. of Transportation
Passenger Transportation
Division Building 4
Room 146
1220 Washington Avenue
Albany, NY 12232
Tel: 518.457.2100
Fax: 518.485.7563
E-mail: repstein@gw.dot.state.ny.us
Web: www.dot.state.ny.us

Section 5310
Mr. Michael Baker
New York Dept. of Transportation
Special Transit Section
Building 4
Room 115
1220 Washington Avenue
Albany, NY 12232-0414
Tel: 518.457.8335
Fax: 518.485.7563
E-mail: mbaker@gw.dot.state.ny.us
Web: www.dot.state.ny.us

RTAP
Mr. Paul Ouderkirk
New York State Dept. of Transportation
Building 4
Room 115
1220 Washington Avenue
Albany, NY 12232-0414
Tel: 518.457.8335
Fax: 518.485.7563
E-mail: pouderkirk@gw.dot.state.ny.us
Web: www.dot.state.ny.us

NORTH CAROLINA

Section 5307, 5309
Mr. Mike Kozak
North Carolina Dept. of Transportation
Public Transportation Division
P.O. Box 25201
Raleigh, NC 27611
Tel: 919.733.4713 ext. 229
Fax: 919.733.1391
E-mail: mkozak@dot.state.nc.us
Web: www.dot.state.nc.us/transit/transitnet

Section 5310, 5311
Mr. Charles Glover
North Carolina Dept. of Transportation
Public Transportation Division
P.O. Box 25201
Raleigh, NC 27611
Tel: 919.733.4713 ext. 277
Fax: 919.733.1391
E-mail: cglover@dot.state.nc.us
Web: www.dot.state.nc.us/transit/transitnet

RTAP
Mr. Peter Albrecht
North Carolina Dept. of Transportation
Public Transportation Division
P.O. Box 25201

Raleigh, NC 27611
Tel: 919.733.4713 ext. 233
Fax: 919.733.1391
E-mail: palbrecht@dot.state.nc.us
Web: www.dot.state.nc.us/transit/transitnet

NORTH DAKOTA

Section 5307, 5309, 5310, 5311, RTAP, MPO
Mr. Bill Weimer
North Dakota Dept. of Transportation
Local Government Division
608 East Boulevard Avenue
Bismarck, ND 58505-0700
Tel: 701.328.2194
Fax: 701.328.1404
E-mail: bweimer@state.nd.us

OHIO

Section 5307,5309, MPO
Mr. Jerry Workman
Ohio Dept. of Transportation
Office of Public Transportation
1980 West Broad Street
Second Floor
Columbus, OH 43223
Tel: 614.644.8054
Fax: 614.466.0822
E-mail: jworkman@ dot.state.oh.us
Web: www.dot.state.oh.us

Section 5310
Ms. Barbara Piper
Ohio Dept. of Transportation
Office of Public Transportation
1980 West Broad Street
Second Floor
Columbus, OH 43223
Tel: 614.466.2140
Fax: 614.466.0822
E-mail: bpiper@dot.state.oh.us
Web: www dot.state.oh.us

Section 5311
Mr. Brett E. Harris
Ohio Dept. of Transportation
Office of Public Transportation
1980 West Broad Street
Second Floor
Columbus, OH 43223
Tel: 614.466.7440
Fax: 614.466.0822
E-mail: bharris@dot.state.oh.us
Web: www.dot.state.oh.us

RTAP
Ms. Lynn Rathke
Ohio Dept. of Transportation
Office of Public Transportation
1980 West Broad Street
Second Floor
Columbus, OH 43223
Tel: 614.644.7362
Fax: 614.466.0822
E-mail: lrathke@dot.state.oh.us
Web: www.dot.state.oh.us

OKLAHOMA

Section 5307, 5309, 5311, RTAP
Mr. Ken LaRue
Oklahoma Dept. of Transportation
200 North East 21st Street
Oklahoma City, OK 73105
Tel: 405.521.2584
Fax: 405.521.2533
E-mail: klarue@odot.org
Web:www.okladot.state.ok us

Section 5310
Mr. Phil Blue
Oklahoma Dept. of Human Service
Support Service on Aging Transit
Program for Elderly and Disabled
312 North East 28th Street
Oklahoma City, OK 73105-2804
Tel: 405.521.4214
Fax: 405.521.2086
Email: ccblue@telepath.com

OREGON

Section 5307, 5309, MPO
Ms. Linda Willnow
Oregon Dept. of Transportation
Public Transportation Division
555 13th Street, N.E., Suite 2
Millcreek Office Building
Salem, OR 97301-4178
Tel: 503.986.4168
Fax: 503.986.4174
E-mail: linda.j.willnow@ odot.state.or.us
Web: www.odot.state.or.us

Section 5310
Mr. Stephen Dickey
Oregon Dept. of Transportation
Public Transit Division
555 13th Street, N.E
Suite 3
Millcreek Office Building
Salem, OR 97301-4179
Tel: 503.986.3416
Fax: 503.986.4189
E-mail: stephen.p.dickey@ odot.state.or.us
Web: www.odot.state.or.us/tdb/pubtrans/index.htm

Section 5311
Ms. Kathy Straton
Oregon Dept. of Transportation
555 13th Street, N.E.
Suite 3
Millcreek Office Building
Salem, OR 97301-1479
Tel: 503.986.3408
Fax: 503.986.4189
E-mail: kathryn.a.straton@odot.state.or.us
Web: www.odot.state.or.us

RTAP
Ms. Jean Palmateer
Oregon Dept. of Transportation
Public Transit Division
3313 Brett Clodfelter Way
The Dalles, OR 97058
Tel: 541.296.2602
Fax: 541.296.1629
E-mail: jean.m.palmateer@ state.or.us
Web: www.odot.state.or.us

PENNSLYVANIA

Section 5307,5309
Mr. John Dockendorf
Pennsylvania Dept. of Transportation
Urban Transit Division
555 Walnut Street
Eighth Floor
Forum Place
Harrisburg, PA 17101-1900
Tel: 717.787.7540
Fax: 717.772.2985
E-mail: wspiii@psu.edu
Web: www.patransit.psu.edu

Section 5310
Mr. Ben Brosius
Pennsylvania Dept. of Transportation
555 Walnut Street
Eighth Floor
Forum Place
Harrisburg, PA 17101-1900
Tel: 717.787.7540
Fax: 717.772.2985
E-mail: resl8@psu.edu
Web: www.patransit.psu.edu

Section 5311
Mr. William Parkin
Pennsylvania Dept. of Transportation
Rural Transportation Program
555 Walnut Street
Eighth Floor
Forum Place
Harrisburg, PA 17101-1900
Tel: 717.783.3990
Fax: 717.772.2985
E-mail: wspiii@psu.edu
Web: www.patransit.psu.edu

RTAP
Mr. Jim Grier
Pennsylvania Dept. of Transportation
Rural and Intercity Transportation
555 Walnut Street
Eighth Floor
Forum Place
Harrisburg, PA 17101-1900
Tel: 717.783.3990
Fax: 717.772.2985
E-mail: cassidy@dot.state.pa.us
Web: www.patransit.psu.edu

PUERTO RICO

Section 5307, 5309, 5310
Ms. Marta Bernier
Puerto Rico Highway and Transportation Authority
P.O. Box 42007
San Juan, PR 00940-2007
Tel: 787.729.1586
Fax: 787.724.3750
E-mail: mbernier@act.dtop.gov.pr

Section 5311, RTAP
Ms. Maria Dumois
Puerto Rico Highway and Transportation Authority
Strategic Planning Office
P.O. Box 42007
Santurce, PR 00940-2007
Tel: 787.723.3760 ext. 1654
Fax: 787.727.7792
E-mail: mdumois@act.dtop.gov.pr

RHODE ISLAND

Section 5307, 5309, 5310, 5311, RTAP
Mr. Robert Letourneau
Rhode Island Dept. of Transportation
Two Capitol Hill
Room 218
Providence, RI 02903
Tel: 401.222.4203 ext. 4225
Fax: 401.222.2207
E-mail: bletour@dot.state.ri.us

SOUTH CAROLINA

Section 5307,5309
Mr. Carolyn Gratic-Burton
South Carolina Dept. of Transportation
Urbanized Area Formula Assistance
955 Park Street
P.O. Box 191
Columbia, SC 29202-0191
Tel: 803.737.0831
Fax: 803.737.0145
E-mail: burtoncg@dot.state.sc.us
Web: www.state.sc.us

Section 5310
Ms. Patricia Berne Mizell
South Carolina Dept. of Transportation
Division of Mass Transit
955 Park Street
P.O. Box 191
Columbia, SC 29202-0191
Tel: 803.737.0831
Fax: 803.737.0145
E-mail: mizellpb@dot.state.sc.us
Web: www.dot.state.sc.us

Section 5311
Mr. Johnny Mmanuike
South Carolina Dept. of Transportation
Nonurbanized Area Formula Assistance
955 Park Street
P.O. Box 191
Columbia, SC 29202
Tel: 803.737.0831
Fax: 803.737.0145
E-mail: mmanuikejk@dot.state.sc.us
Web: www.dot.state.sc.us

RTAP
Ms. Agnes Hardison
South Carolina Dept. of Transportation
Rural Transit Assistant Program
955 Park Street
P.O. Box 191
Columbia, SC 29202-0191
Tel: 803.737.0831
Fax: 803.737.0145
E-mail: hardisonam@dot.state.sc.us
Web: www.dot.state.sc.us

SOUTH DAKOTA

Section 5307, 5309, 5310, 5311, RTAP
Mr. Willis McLaughlin
South Dakota Dept. of Transportation
Office of Public Transportation
700 Broadway Avenue
East Pierre, SD 57501
Tel: 605.773.3862
Fax: 605.773.3921
E-mail: willism@dot.state.sd.us
Web: www.dot.state.sd.us

TENNESSEE

Section 5307
Mr. Bill Bernhardt
Tennessee Dept. of Transportation
Office of Public Transportation
505 Deaderick Street
JK Polk Building
Suite 400
Nashville, TN 37243-0325
Tel: 615.253.1030
Fax: 615.253.1482
E-mail: bbernhardt@mail.state.tn.us
Web: www.dot.state.tn.us

Section 5309
Mr. Harris Gentry
Tennessee Dept. of Transportation
Office of Public Transportation
505 Deaderick Street
JK Polk Building
Suite 400
Nashville, TN 37243
Tel: 615.253.1038
Fax: 615.253.1482
E-mail: hgentry@mail.state.tn.us
Web: www.dot.state.tn.us

Section 5310
Mr. Terry Hayes
Tennessee Dept. of Transportation
Office of Public Transportation
505 Deaderick Street
JK Polk Building
Suite 400
Nashville, TN 37243-0325
Tel: 615.253.1039
Fax: 615.253.1482
E-mail: thayes@mail.state.tn.us
Web: www.dot.state.tn.us

Section 5311
Ms. Ollie Jackson
Tennessee Dept. of Transportation
Public Transportation Office
505 Deaderick Street
JK Polk Building
Suite 400
Nashville, TN 37243
Tel: 615.253.1040
Fax: 615.253.1482
E-mail: ojackson@mail.state.tn.us
Web: www.dot.state.tn.us

RTAP
Ms. Kathy Dannenhold
Tennessee Dept. of Transportation
Office of Public Transportation
505 Deaderick Street
JK Polk Building
Suite 400
Nashville, TN 37243-0325
Tel: 615.253.1035
Fax: 615.253.1482
E-mail: kdannenhold@mail.state.tn.us
Web: www.dot.state.tn.us

TEXAS

Section 5307, 5309, 5310, 5311
Mr. Bobby Killebrew
Texas Dept. of Transportation
Division of Public Transportation
125 East 11th Street
Austin, TX 78701-2483
Tel: 512.416.2816
Fax: 512.416.2830
E-mail: bkilleb@dot.state.tx.us
Web: www.dot.state.tx.us

RTAP
Ms. Vickie Vitek
Texas Dept. of Transportation
Division of Public Transportation
125 East 11th Street
Austin, TX 78701-2483
Tel: 512.416.2820
Fax: 512.416.2830
E-mail: vvitekEdot.state.tx.us
Web: www.dot.state.us

UTAH

Section 5307, 5309, MPO
Mr. Lowell Elmer
Utah Dept. of Transportation
P.O. Box 143600
4501 South 2700 West
Salt Lake City, UT 84114-3600
Tel: 801.965.4134
Fax: 801.965.4551
E-mail: lelmer@dot.state.ut.us
Web: www.dot.state ut.us

Section 5310
Ms. Glenda Seelos
Utah Dept. of Transportation
P.O. Box 143600
4501 South 2700 West
Salt Lake City, UT 84114-3600
Tel: 801.965.4141
Fax: 801.965.4551
E-mail: gseelos@dot.state.ut.us
Web: www.dot.state.ut.us/progdev

Section 5311, RTAP
Mr. Douglas Mears
Utah Dept. of Transportation
Program Development
P.O. Box 143600
4501 South 2700 West
Salt Lake City, UT 84114-3600
Tel: 801.965.4150
Fax: 801.965.4551
E-mail: srcofso3.dmears@state.ut.us
Web: www.dot.state.ut.us/progdev

VERMONT

Section 5307, 5309, 5311, RTAP
Mr. James D'Agostino
Vermont Agency of Transportation
Policy and Planning Division
133 State Street
Montpelier, VT 05633
Tel: 802.828.2702
Fax: 802.828.3983
E-mail: jim.d'agostino@state.vt.us

Section 5310
Mr. Howard Rexford
Vermont Agency of Transportation
Policy and Planning Division
133 State Street
Montpelier, VT 05633
Tel: 802.828.5750
Fax: 802.828.3983
E-mail: howard.rexford@state.vt.us

VIRGIN ISLANDS

Section 5310, 5311
Mr. Vern Callwood
Virgin Islands Dept. of Public Works
8244 Sub Base
St.Thomas, VI 00802-5805
Tel: 340.774.4844 ext. 260
Fax: 340.774.5869

RTAP
Mr. Harold G. Thomas
Virgin Islands Dept. of Public Works
8244 Sub Base
St.Thomas, VI 00802-5805
Tel: 340.774.4844
Fax: 340.774.5869

VIRGINIA

Section 5307, MPO
Mr. Jack Apostolides
Virginia Dept. of Rail and Public Transportation
1401 East Broad Street
Room 1404
Richmond, VA 23219
Tel: 804.786.1722
Fax: 804.786.7286
E-mail: apostolides@drpt.state.va.us

Section 5309, 5311, RTAP
Mr. Darrel Feasel
Virginia Dept. of Rail and Public Transportation
Transportation Engineering Program
1401 East Broad Street
Richmond, VA 23219
Tel: 804.786.8089
Fax: 804.786.7286
E-mail: feasel_dm@drpt.state.va.us

Section 5310
Mr. Neil Sherman
Virginia Dept. of Rail and Public Transportation
1401 East Broad Street
Richmond, VA 23219
Tel: 804.786.1154
Fax: 804.786.7286
E-mail: sherman_ni@drpt.state.va.us

WASHINGTON

Section 5307, 5309, MPO
Mr. Paul Gamble
Washington Dept. of Transportation
Public Transportation and Rail
P.O. Box 47387
Olympia, WA 98504-7387
Tel: 360.705.7912
Fax: 360.705.6820
E-mail: gamblep@wsdot.wa.gov
Web: www.wsdot.wa.gov

Section 5310, 5311
Ms. Barbara Savary
Washington Dept. of Transportation
Public Transportation and Rail
P.O. Box 47387
Olympia, WA 98504-7387
Tel: 360.705.7926
Fax: 360.705.68Z0
E-mail: savaryb@wsdot.wa.gov
Web: www.wsdot.wa.gov/pubtran

RTAP
Mr. Gordon Kirkemo
Washington Dept. of Transportation
PO Box 47387
Olympia, WA 98504-7387
Tel: 360.705.7914
Fax: 360.705.6820
E-mail: kirkemg@wsdot.wa.gov
Web: www.wsdot.wa.gov/pubtran

WEST VIRGINIA

Section 5307, 5309
Ms. Susan L. O'Connell
West Virginia Dept. of Transportation
Division of Public Transit
1900 Kanawha Boulevard, East
Building 5
Room 830
Charleston, WV 25305-0432
Tel: 304.558.0428
Fax: 304.558.0174
E-mail: soconnell@mail.dot.state.wv.us

Section 5310
Ms. Toni Boyd
West Virginia Dept. of Transportation
Division of Public Transit
1900 Kanawha Boulevard, East
Building 5
Room 830
Charleston, WV 25305-0432
Tel: 304.558.0428
Fax: 304.558.0174
E-mail: tboyd@mail.dot.state.wv.us

Section 5311, RTAP
Ms. Cindy Fish
West Virginia Dept. of Transportation
Division of Public Transit
1900 Kanawha Boulevard, East
Building 5
Room 830
Charleston, WV 25305-0432
Tel: 304.558.0428
Fax: 304.558.0174
E-mail: cfish@mail.dot.state.wv.us

WISCONSIN

Section 5307, 5309
Mr. Dick Martin
Wisconsin Dept. of Transportation
Urban Transit Program
P.O. Box 7913
Madison, WI 53707-7913
Tel: 608.266.6812
Fax: 608.267.6748
E-mail: richard.martin@dot.state.wi.us
Web: www.dot.state.wi.us

Section 5310
Ms. Elizabeth Trautsch
Wisconsin Dept. of Transportation
P.O. Box 7913
Madison, WI 53707-7913
Tel: 608.266.0560
Fax: 608.267.6748
E-mail: etrautsc@mail.state.wi.us
Web: www.dot.state.wi.us

Section 5311, RTAP
Mr. Donald M. Chatfield
Wisconsin Dept. of Transportation
Bureau of Transit and Local Roads
P.O. Box 7913
Madison, WI 53707-7913
Tel: 608.266.3973
Fax: 608.266.0658
E-mail: donald.chatfield@dot.state.wi.us
Web: www.dot.state.wi.us

WYOMING

Section 5307, 5309, 5310, 5311, RTAP
Mr. John Black
Wyoming Dept. of Transportation
5300 Bishop Boulevard
Planning Building, Suite 215
Cheyenne, WY 82009-3340
Tel: 307.777.4181
Fax: 307.777.4759
E-mail: jblack@state.wy.us

4.2 Other State Contacts

Contact information for other state level program administrators may be found in the telephone book's government listings, on the state web sites, in transit directories, or the CTAA "Resource Guide 2000". Additional state level contacts that may be helpful are:

Public Transit Associations
Governor 's Office
County, Regional or District Council
Community Development
Community Services
Economic Affairs
Disabilities Planning Council
Medical Assistance
Rehabilitation Agency
School Transportation
Social Services
Temporary Assistance to Needy Families
State Unit on Aging
USDA Rural Development Office
Welfare Reform

5 GLOSSARY

Like other industries, community transit has a language of its own, one that is often thick with acronyms and terms that are not easily understood. This summary provides clear, concise definitions for these words to help you understand what each term means and how it relates to community transit.

American Public Transportation Association (APTA): A national professional association of those involved in the transit industry.

Access to Jobs: Federal funding for programs to increase work-related transportation available to low-income individuals, authorized in TEA-21. Nonprofit organizations and municipalities can apply to FTA for funding.

Accessibility: The extent to which facilities, including transit vehicles, are barrier-free and can be used by people who have disabilities, including wheelchair users.

Accounting Software: Electronically processes, stores, tracks, and reports standard accounting data and processes

Americans with Disabilities Act (ADA): Passed by the Congress in 1990, this act mandates equal opportunities for persons with disabilities in the areas of employment, transportation, communications and public accommodations. Under the ADA, most transportation providers are obliged to purchase lift-equipped vehicles for their fixed-route services, and must assure system-wide accessibility of their demand-responsive services to persons with disabilities. Public transit providers also must supplement their fixed-route services with complimentary paratransit services for those persons unable to use fixed-route service because of their disability.

Automatic Passenger Counters: Collects data on passenger boarding and alighting by time and location. This information can be used to increase overall operating efficiency through better service planning.

Automatic Vehicle Location Systems (AVL): Measure real-time positions of vehicles using onboard computers and a positioning system (such as global positioning system, signpost, or dead reckoning) and relay the information to a central location.

Brokerage: A method of transportation service delivery that matches passengers with appropriate transportation providers through a central trip request and administrative facility. The transportation broker may centralize vehicle dispatch, record keeping, vehicle maintenance and other functions under contractual arrangements with agencies, municipalities and other organizations. Actual trips are provided by a number of different vendors.

Capital Costs: Refers to the costs of long-term assets of a public transit system such as property, buildings and vehicles. Under TEA-21, FTA has broadened its definition of capital costs to include bus overhauls, preventive maintenance, and even a portion of ADA paratransit expenses.

Central Processing Unit (CPU): The microprocessor that does the computing and controls the flow of information in the computer.

Communications: Provides voice and/or digital communication among vehicles and base stations. Both radio and cell systems are available.

Community Transportation: Transportation services that address the transit needs of an entire community — including the needs of both the general public and special populations — in a cost effective, flexible and efficient manner.

Complementary Paratransit: Paratransit service that is required as part of the Americans with Disabilities Act (ADA) which complements, or is in addition to, already available fixed-route transit service. ADA complementary paratransit services must meet a series of criteria designed to ensure they are indeed complementary.

Computer Upgrade: Purchase of new computer software or hardware components to enhance existing computer capabilities and functionality such as memory, storage, data transmission, or graphics speed.

Computerized Dispatching: Procedure for assigning demand-responsive transit customers to vehicles. Computer makes recommendations, in either real-time or batch processing mode, on which vehicle run to place a requested trip. May use Geographic Information Systems to map source and destination address for making recommendations.

Coordination: A cooperative arrangement between transportation providers and organizations needing transportation services. Coordination models can range in scope from shared use of facilities, training or maintenance to integrated brokerages or consolidated transportation service providers.

Community Transportation Association of America (CTAA): A national professional association of those involved in community transportation, including operators, vendors, consultants and federal, state and local officials.

Community Transportation Assistance Project (CTAP): This program of the U.S. Department of Health and Human Services offers training materials, technical assistance and other support services for community transportation providers across the country. CTAP services are delivered by CTAA through the National Transit Resource Center.

Customized Spreadsheet and Databases: A computer software application that performs calculations on a table of numbers as specified by the user. Transit operators can use specifically customized databases and spreadsheets to prepare schedules, record dispatching, perform general record keeping, and prepare management information reports.

Database: A collection of information, organized for easy analysis and retrieval. Consists of individual data elements, each of which is called a field. A collection of fields related to one entity, such as a passenger, is called a record. A collection of records is called a file.

Demand Responsive Transit (DRT) Software: Generic term for a range of public transportation services characterized by the flexible routing and scheduling of relatively small vehicles to provide shared-occupancy, personalized, door-to-door, curb-to-curb, or point-to- point transportation at the user's demand; implies existence of a coordinated dispatching service.

Demand-Response Service: The type of transit service where individual passengers can request transportation from a specific location to another specific location at a certain time. Transit vehicles providing demand-response service do not follow a fixed route, but travel throughout the community transporting passengers according to their specific requests. Can also be called "dial-a-ride." These services usually, but not always, require advance reservations.

Deviated Fixed Route: This type of transit is a hybrid of fixed-route and demand-response services. While a bus or van passes along fixed stops and keeps to a timetable, the bus or van can deviate its course between two stops to go to a specific location on demand. Deviation is typically used to accommodate a passenger with a disability who cannot access the fixed route stop.

Digital Data Communications: A regime for communicating digital data (0s and 1s) that can communicate voice data as well by translation to digital data at both the sending and receiving ends.

Disabled: Any person who by reason of illness, injury, age, congenital malfunction or other permanent or temporary incapacity or disability is unable, without special facilities, to use local transit facilities and services as effectively as persons who are not so affected.

Dispatching: The process of relaying or providing service instructions to vehicle drivers or vehicle operators. Includes assigning customers to vehicles, notifying drivers of assignments, and monitoring the operation of drivers.

Door-to-Door Service: A form of paratransit service that includes passenger assistance between the vehicle and the door of the passenger's home or other destination. A higher level of service than curb-to-curb, yet not as specialized as "door-through-door" service (where the driver actually provides assistance into and out of the home or destination).

DOT: Department of Transportation.

Driver Log: A record of vehicle trip information, such as passenger names, trip origins and trip mileage, maintained by the driver of each vehicle.

Economic Development: The improvement of an area's employment, production or industrial well being. The availability of public transit can play an important role in economic development.

Electronic Fare Media: Electronic technologies for collecting fares and identifying passengers; magnetic strip cards, magnetic/contactless cards and smart cards.

Electronic Payment Systems: Automated fare payment systems that allow passengers to pay for transportation services using electronic media such as magnetic stripe cards, credit cards, debit cards, or smart cards (card with embedded microchip). Farebox or other device reads cards and performs payment entries.

Employment Transportation: Transportation specifically designed to take passengers to and from work or work-related activities.

Fare Box Revenue: The monies or tickets collected as payments for rides. Can be cash, tickets, tokens, transfers and pass receipts. Fare box revenues rarely cover even half of a transit system's operating expenses.

Federal Highway Administration (FHWA): A component of the U.S. Department of Transportation that provides funding to state and local governments for highway construction and improvements, including funds that must be transferred to transit. FHWA also regulates the safety of commercial motor vehicle operations (vehicles which require a CDL to drive). FWHA is the lead agency in federal intelligent transportation activities and regulated interstate transportation.

Fixed-route: Transit services where vehicles run on regular, pre-designated, pre-scheduled routes, with no deviation. Typically, fixed-route service is characterized by printed schedules or timetables, designated bus stops where passengers board and alight and the use of larger transit vehicles.

Federal Transit Administration (FTA): Federal Transit Administration (before 1991, Urban Mass Transportation Administration). A component of the U.S. Department of Transportation that regulates and helps fund all public transportation. FTA provides financial assistance for capital and operating costs and also sponsors research, training, technical assistance and demonstration programs. FTA was created by the passage of the Urban Mass Transportation Act of 1964.

Generic Software: Programs that can be used as multipurpose tools, rather than having specific applications. Word processors, spreadsheets, and database managers are the most common examples.

Geocoded: coding of spatial information, such as a street address, with geographic coordinate information that unambiguously defines the location in a system to allow determination of distances among points.

Geographic Information Systems (GIS): GIS uses an electronic map and relational database to display and analyze the spatial relationship between different data. In transit, GIS displays and analyzes vehicle routes, trip pick-up and drop off points, bus stops, streets and landmarks, and it is often integrated with DRT software and AVL systems to provide advanced system capabilities.

Grant: The award of government funds to an entity. Federal funds are typically awarded either as formula (or "block") grants, where a pre-determined legislative process establishes the level of funding available to an entity, or discretionary grants, where the funding agency is free to determine how much (if any) funding an entity will be given based on the relative merits of the proposal. Private foundations also give grants based on much the same criteria.

Graphical User Interface: Operating system that uses small pictures or images called icons to represent documents, programs, or commands; a mouse clicks on the icon initiates the action represented by the icon.

Hardware: The physical components of the computer, as opposed to the programs of software.

Head Start: A program of comprehensive services for economically disadvantaged preschool-age children. Services, including transportation, are provided by local Head Start agencies and are funded by the Administration for Children and Families, part of DHHS.

Human Services Transportation: Transportation related to the provision of human or social services. Includes transportation for the elderly and people with disabilities when the transportation is provided by an arrangement other than the public service available to all.

Intelligent Transportation Systems (ITS): the use of recent advances in information and electronics technology to improve the development, building, and management of the transportation infrastructures and vehicles.

Intercity Transportation: Transportation service between two urban areas. Under FTA's Section 5311 (f), intercity transportation service must receive no less than 15 percent of each state's total Section 5311 funding, unless a state's governor certifies that intercity transit needs are already being met.

Internet: System of hardware, software, and telecommunications protocol that allows users to easily connect to other computer systems from all over the world to exchange or display information.

Internet Service Providers (ISP) : Entity that provides Internet access to computer users through telephone dial-up, cable television, and other telecommunication services, usually for a fee. AOL (America Online), AT&T, and GTE are noted ISPs.

Internet Web site: Allows personal computer users to easily exchange or display transit service information such as trip requests, route schedules and maps.

Local Area Network (LAN): See Network

Maintenance Software: A computer program for electronically processing, storing, tracking, and reporting detailed vehicle maintenance and repair data, including parts and supplies inventory.

Match: State or local funds required by the federal government to complement federal funds for a project. A match may also be required by states in funding projects that are joint state/local efforts. Some funding sources allow services, such as the work of volunteers, to be counted as an in-kind funding match. Federal programs normally require that match funds come from other than Federal sources.

Mayday System/Silent Alarm System: An in-vehicle system that transmits an emergency "help" and vehicle location signal through either a satellite or cellular communication system to an emergency response system.

Medicaid: Also known as Medical Assistance, this is a health care program for low-income and other "medically needy" persons. It is jointly funded by state and federal governments. The Medicaid program pays for transportation to non-emergency medical appointments if the recipient has no other means to travel to the appointment.

Memory: See Random Access Memory

Mobile Data Terminals (MDT) : Small computer terminals in vehicles that allow drivers to receive and send text and numerical data by radio signals to the operations center.

Metropolitan Planning Organization (MPO): MPOs are the primary transit planning organization in urban areas. These local bodies select projects in urban areas to be funded by TEA-21.

National Transit Database Reports: Annual reports formerly known as Section 15, based on financial and operating data, required of almost all recipients of transportation funds under Section 5307.

National Transit Resource Center: CTAP and RTAP funded service housed at CTAA. Provides technical assistance, information, and support to the community transportation industry. Most services and materials are available at no charge.

Network: A set of conjoined computers that can share storage devices, peripherals and applications. Network may be connected directly by cable, or indirectly by telephone lines and/ or cable, or satellites, and can be part of an office system (LAN- local area network), campus system (WAN – wide area network), or a global web (numerous other networks).

Off-the-Shelf (OTS) Software: Commercial software widely available form retail stores and software vendors that does not require additional effort to customize for the customer's needs.

Operating Costs: Non-capital costs associated with operating and maintaining a transit system, including labor, fuel, administration and maintenance.

Operating Systems: A master software program that allows the computer to run software applications; controls the flow of commands and data within the computer, and between the computer, software applications and its peripherals. Examples are Windows, DOS, UNIX, Mac OS, and Linux.

Package: A group of programs distributed as one product.

Palmtop Electronic Manifest Device: Electronically stores and updates vehicle schedules (e.g., driver manifests) and provides capabilities similar to mobile data terminals.

Paratransit: Passenger transportation that, on a regular basis, provides a more flexible service than fixed-route service but is more structured than the use of private automobiles. Paratransit includes demand-responsive and subscription service, taxis, limousines, carpools, vanpools, and jitney services.

Personal Computer (PC): Originated as a nickname for the IBM personal computer but is commonly used to refer to single-user, desktop computers. Sometimes called microcomputers.

Personnel Management Software: Processes, stores, tracks, and reports detailed payroll benefits, hours worked, and personnel information.

Platform: Another name for a computer system including both hardware and software.

Pre-Trip Traveler Information: Travel information that is provided to potential users at home, work, malls, public building, or tourist attractions prior to making their trip.

Program: A collection of commands to the computer to be executed as a group.

Random Access Memory (RAM): A chip containing the operating memory of a computer holding the programs and data that are currently involved in operations and can be changed dynamically (uploaded or downloaded).

Request for Proposal (RFP): The document that specifies a purchaser's need for a product or service and asks vendors to propose providing the product or service.

Reservation Function: In DRT systems, process of taking trip request details and varying eligibility; recorded onto form or computer screen.

Risk Management: An element of a transit system's safety management program. Includes identification and evaluation of potential safety hazards for employees, passengers and the public.

Routing: In DRT systems, providing the precise street path to a driver or vehicle.

Rural Transit Assistance Program (RTAP): This project of the FTA offers training materials, technical assistance and other support services for rural transit systems across the country. RTAP funds help to support the National Transit Resource Center.

Scheduling: Giving an estimated pick-up time for a requested trip, and assigning a trip to a vehicle.

Section 5307: The section of the Federal Transit Act that authorizes grants to public transit systems in all urban areas. Funds authorized through Section 5307 are awarded to states to provide capital and operating assistance to transit systems in urban areas with populations between 50,000 and 200,000. Transit systems in urban areas with populations greater than 200,000 receive their funds directly from FTA.

Section 5309: The section of the Federal Transit Act that authorizes discretionary grants to public transit agencies for capital projects such as buses, bus facilities and rail projects.

Section 5310: The section of the Federal Transit Act that authorizes capital assistance to states for transportation programs that serve the elderly and people with disabilities. States distribute Section 5310 funds to local operators in both rural and urban settings, who are either nonprofit organizations or the lead agencies in coordinated transportation programs.

Section 5311: The section of the Federal Transit Act that authorizes capital and operating assistance grants to public transit systems in rural areas with populations of less than 50,000.

Signal Priority: Holds a traffic signal at green so that a particular vehicle may pass through the intersection more quickly.

Smart Card: Electronic fare media that uses plastic cards, similar to credit cards, with an embedded microchip for storing and processing information. Used on electronic systems, such as farebox, to pay fares.

Software: Programs and languages used to communicate to computer hardware the tasks to be performed.

Spreadsheet: A program used to set up, manipulate, and perform computation on the numbers in large table tables (matrices) of numeric and alphabetic information.

Storage: Computer device to store data such as hard disk drive, diskette, CD-ROM, and zip drive.

Temporary Aid to Needy Families (TANF): Created by the 1996 welfare reform law, TANF is a program of block grants to states to help them meet the needs of families with no income or resources. It replaces AFDC, JOBS, Emergency Assistance and some other preceding federal welfare programs. Because of TANF-imposed time limits, states are trying to place recipients in jobs as quickly as possible, often using program funds to pay for transportation, childcare and other barriers to workforce participation.

Transportation Equity Act for the Twenty-First Century (TEA-21): This 1998 legislation authorizes approximately $217 billion for highways, highway safety and mass transportation until Fiscal Year 2003.

Transit Operations Software: Automates, streamlines, and integrates many transit functions and modes, including computer-aided scheduling and dispatching, service monitoring, route planning, supervisory control and data acquisition.

Traveler Information Systems: When applied to rural transit, traveler information can take many forms, including pre-trip information, in-vehicle information, and in-terminal/wayside information. Examples are automated trip itineraries, in-vehicle annunciators, variable message signs and monitors, and interactive information kiosks.

Trip: A one-way movement of a person or vehicle between two points. Many transit statistics are based on "unlinked passenger trips," which refer to individual one-way trips made by individual riders in individual vehicles. A person who leaves home on one vehicle, transfers to a second vehicle to arrive at a destination, leaves the destination and has to transfer to yet another vehicle to complete the journey home has made four unlinked passenger trips.

U.S. Department of Agriculture (USDA): Among its many other functions, USDA is the federal government's primary agency for rural economic and community development.

U.S. Department of Health and Human Services (DHHS): Funds a variety of human services transportation through ADA, Head Start, etc.

Variable Message Signs: Displays information and messages that can be changed on-site or remotely via traffic management systems.

Work Station: A single-user minicomputer.

APTA	American Public Transportation Association
APTS	Advanced Public Transportation Systems
ADA	Americans with Disabilities Act
AVL	Automatic Vehicle Location Systems
CPU	Central Processing Unit
CTAA	Community Transportation Association of America
CTAP	Community Transportation Assistance Project
DRT	Demand Responsive Transit
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GIS	Geographic Information Systems
GPS	Global Positioning System
DHHS	U.S. Department of Health and Human Services
ITS	Intelligent Transportation Systems
ISP	Internet Service Providers
LAN	Local Area Network
DOT	Department of Transportation
MDT	Mobile Data Terminals
MPO	Metropolitan Planning Organization
NTD	National Transit Database
OTS	Off-the-Shelf
PC	Personal Computer
RAM	Random Access Memory
RFP	Request for Proposal
RTAP	Rural Transit Assistance Program
TANF	Temporary Aid to Needy Families
TEA-21	Transportation Equity Act for the Twenty-First Century
USDA	U.S. Department of Agriculture
WAN	Wide Area Network

To access an electronic version of this publication and other
ITS related publications visit the ITS Electronic Document Library
(EDL): www.its.dot.gov/welcome.htm
EDL Document Number 13601

Visit the ITS Joint Program
Web Site: www.its.dot.gov

Publication No:
FTA-MA-99-0356-01-1
FHWA-OP-02-028