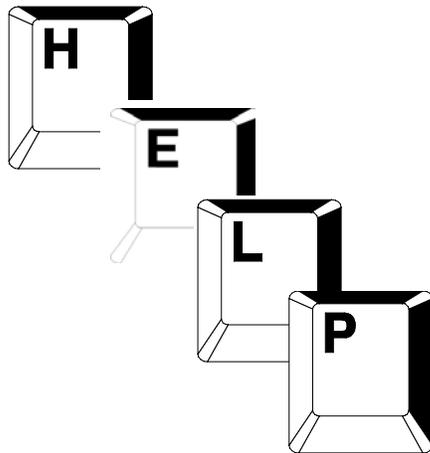
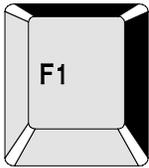


Guide for Acquiring Demand Responsive Transit Software and Technology





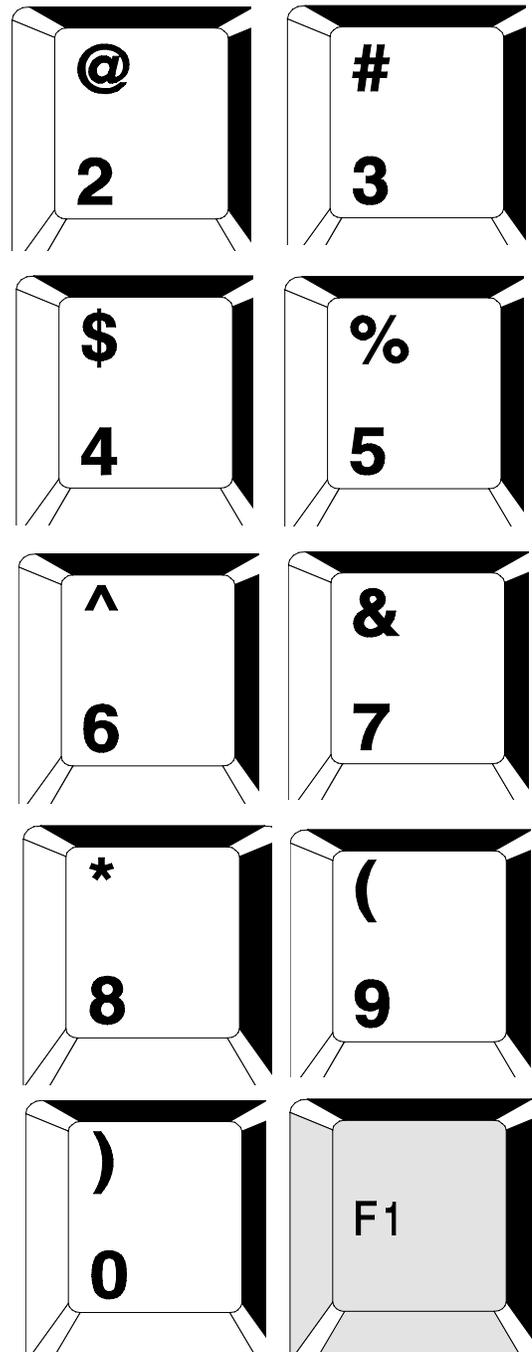
Introduction

Modern demand responsive transit (DRT) operations require the use of computer software for trip reservations, scheduling/dispatching, financial management and reporting. As a system grows, the demands for information also grow and become more complex. When this happens, existing software programs may become inadequate. In order to maintain the level of service and the timely submission of reports, system managers seek out solutions. One solution that is often considered is the purchase of new software to aid in system operation. The search for new software can be a time-consuming, sometimes confusing process.

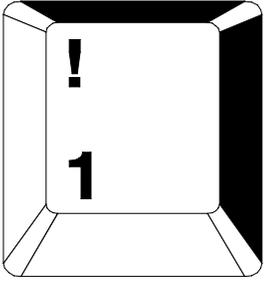
This brief guide is designed as an aid for systems that are in the market for new DRT software. The contents of this guide are based on two previous reports about acquiring DRT software and the experience gained at a one and a half-day software Expo held in Camp Hill, P.A. in the spring of 2001, sponsored by the Mid Atlantic RTAP.¹ The main purpose of the guide is to provide a blueprint for those individuals considering the purchase of new DRT software.

¹ Lave, Roy E., et. al., *A Handbook for Acquiring Demand-Responsive Transit Software*, Transit Cooperative Research Program, Report 18, National Academy Press, 1996. Thorough discussion of the use of software in paratransit operations and how to go about acquiring it. The reference material on vendors is dated. Many changes have occurred since 1996.

Institute for Transportation Research & Education., Transit Operations Group, *Transit*



Technology Guidebook: Procurement and Implementation, North Carolina State Univ. Prepared for Ohio Department of Transp., Office of Transit, 2000. Excellent general information source for vendors of software and other technologies for paratransit. Also discusses evaluating, acquiring and implementing different technologies, including software.



Assess Status of Current Demand Responsive System

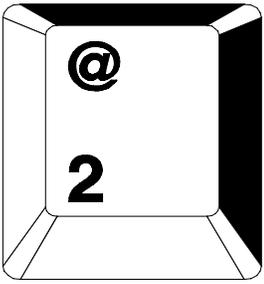
The first step is to determine whether or not you need new software/hardware or can the existing system handle needs for the next few years. To do this it is necessary to thoroughly assess the status of your current operation. The most effective approach is to assemble an assessment team. Membership on the assessment team will vary from system to system, but should, at a minimum, include members from operations and management. You may also want to get input from key customer agencies in the community and funding sources.

It is a good idea to evaluate scheduling and routing procedures and system performance periodically to identify changing needs. Changes in procedures may be all that is required to iron out problems with service delivery. Also, comparing your system with other similar systems may identify areas for improvement that are not obvious in an “internal-only” review. New technology is not always the answer. The box at right lists some illustrative samples of questions to ask.

If the assessment of the current status does not identify remedial actions that can be taken, attention then turns to a more detailed needs assessment outlined in step 2 on the next page.

Assess Status: Example Questions

- Is the current system meeting all expectations? This involves looking at software, hardware and procedures.
- Is demand for paratransit trips growing?
- Will the current system be able to meet our needs over the next two/three years?
- Is turnover high for scheduling/dispatching personnel?
- Is the system operation adequate with respect to on-time performance and productivity?
- Are we meeting our customers’ travel needs?
- How does the operation of our system compare with similar systems in other areas?



System Needs/Technology Assessment

If the initial review of existing system operation results in a need for newer technology, the assessment team will then have to identify the needs that, when filled, will result in better overall system performance. In order to do this it will be necessary to also conduct an initial assessment of the technology that may match the needs identified.

Systems Needs Assessment

The assessment of system needs should be broad, but practical with an eye to the next three to five years. Some capabilities would be nice to have, but may be difficult to justify in terms of cost and functionality. The assessment team should include personnel from management, operations, and maintenance as well as selected individuals representing community agencies and regular users. The table at left shows some sample system needs.

Initial Technology Assessment

Once the needs of your system are identified, your team will begin to search for information on the types of technology that will potentially address those needs. The team will have to learn about the technology available to match your needs, its cost and the experience others have had using it. There are many sources of information such as the the two reports mentioned previously, the internet, Community Transportation Association of America (CTAA), other transit systems that use technology solutions.

The importance of learning as much as possible about the potential technologies your system may implement cannot be overemphasized.

Sample System Needs

- Improved Reporting and Record Keeping
- More Productive Operations Staff
- Better On-time Performance
- More Effective Maintenance Tracking
- Improved Communications
- More Efficient Scheduling and Routing
- Faster Dispatching
- Reduced on-vehicle time
- More Efficient Reservations Processing
- Higher Overall Quality Service
- Greater Safety
- Accessible Customer Information
- More detailed and timely reports
- More detailed and timely billing

Lave, *et. al.*, identify four types of risk.

1. Knowledge risk,
2. Technology risk,
3. Vendor risk, and
4. Integration risk

Knowledge risk is related to your lack of knowledge about a particular technology, how it will fit into your system and how it will integrate with other technologies. This technology is often complex and expensive. Therefore, in situations where different technologies are to be integrated into a coherent system, it will benefit an organization to seek outside help from a knowledgeable third party source such as a system integrator.

System integrators are experts on the technology available and the challenges and problems associated with getting different technologies to work together. It is important to select a system integrator that has at least some experience in the transit field in order to avoid unnecessary costs and delays.

Technology risk refers to the possibility that the technology will not do what you expect it to do or it will not be a significant improvement over your old system. Reduce this risk by learning about the technology and the experience others have had using it. In addition, talk to your local network administrator to determine if your current computer resources are adequate.

Vendor risk is associated with the possibility that the vendor will not perform as expected or the vendor will go out of business. Lack of support and training services may cause problems for your operation. This risk may be overcome by understanding the vendor's capabilities with respect to your needs and by talking to other systems that have acquired technology from them.

Integration risk is the risk that may occur when two or more technologies are integrated into a system that operates below expectations. To reduce this risk you need to have expertise in how the components of the system are expected to operate. This knowledge can be based on your research about the experience of other DRT operations with integration or the use of a reliable technology integrator consultant.

Another risk worthy of note is *implementation risk*. Implementation risk has many sources, but one of the most important, at least for some systems, is the reaction of employees to the new technology. Some people may resist new or different ways of doing things. For this reason, it is important to keep employees informed about the various stages of acquiring and implementing technologies especially if they cannot be directly involved in the decision making process.

Table 1 illustrates how system needs might be matched to technology. It is also important to obtain an early estimate of cost in order to save time investigating software your system cannot afford. Using a matrix like Table 1 will help in the process of identifying those technologies that your team will investigate more thoroughly.

The checklist in Table 2 can be used when interviewing vendors about their software. This can be done during an in-person demonstration, by phone or at a transit expo. Software-only expos offer an excellent opportunity to spend more time with vendors and to observe the nuances of each product in an relaxed atmosphere. Transit professionals and vendors highly rated the Camp Hill, PA software expo because there was ample time to learn about the technology *and* the needs of transit operators.

Table 3 is a tool for collecting information on the technology selection and implementation experience of other transit systems. A transit provider should always talk to several systems before making a final decision. In selecting systems to interview, try to match the size and operating characteristics of their operation with yours.

Table 4 is a list of some of the more important capabilities of DRT software. Use this table to make a list of the features you think are either essential, desirable or not needed.

Table 5 is a reminder of the costs commonly overlooked in the process of acquiring and installing DRT technologies. Systems with recent experience indicate that the cost of additional staff time needed to get a technology up and running is almost always greater than originally estimated

Table 1

NEEDS/SOLUTIONS TABLE		
NEED (Ranked High to Low)	TECHNOLOGY SOLUTION	ESTIMATED COST
Improved Reporting/Record Keeping	Accounting Software	
	Customized Spreadsheets/Databases	
	Electronic Fare: Bar Codes, Smart Cards, Palmtop Electronic Manifest Device	
	Magnetic Stripe Cards	
	DRT-Computer-Assisted Software	
	DRT-Automated Software	
	MDTs	
	Farebox System (fixed-route only)	
Better Service/Mode Coordination	Communications System Upgrade -- Internet, Electronic GIS	
	Mail, Radio System, Cellular System	
	Magnetic Stripe Cards	
	Electronic Payment: Bar Codes, Smart Cards, Palmtop Electronic Manifest Device	
	DRT-Computer-Assisted Software	
	DRT-Automated Software	
	MDTs	
	AVL	
More Productive Operations Staff	GIS	
	Electronic Fare System: Bar Codes, Smart Cards, Magnetic Stripe Cards	
	Palmtop Electronic Manifest Device	
	DRT-Computer-Assisted Software	
	DRT-Automated Software	
	MDTs	
	AVL	
	Farebox System (fixed-route only)	
More Effective Maintenance Tracking	Maintenance Software	
	Customized Spreadsheets/Databases	
	DRT-Automated Software	
Improved Communications	Communications System Upgrade – Radio/Cellular System, Electronic Mail, Internet	
	Palmtop Electronic Manifest Device	
	DRT-Automated Software	
	MDTs	
	AVL	
More Efficient Scheduling/Routing	Customized Spreadsheets/Databases	
	DRT-Computer-Assisted Software	
	DRT-Automated Software	
	MDT	
	AVL	
Faster Dispatching	Customized Spreadsheets/Databases	
	Communications Systems Upgrade – Radio/ Cellular System (A)	

NEEDS/SOLUTIONS TABLE cont'd.		
NEED (Ranked High to Low)	TECHNOLOGY SOLUTION	ESTIMATED COST
Faster Dispatching (continued)	GIS	
	Palmtop Electronic Manifest Device	
	MDTs	
	AVL	
More Efficient, Reservations Processing	Customized Spreadsheets/Databases	
	GIS	
	DRT-Computer-Assisted Software	
	DRT-Automated Software	
	Advanced Telephone Sys. – Automated Call Routing, Messaging	
Higher Quality Service	Advanced Telephone Sys. – Automatic Call Routing, Messaging, and Interactive Voice Features	
	GIS	
	Palmtop Electronic Manifest Device	
	Electronic Fare System: Bar Codes, Smart Cards, DRT-Computer-Assisted Software	
	DRT-Automated Software	
	MDTs	
	AVL	
	Farebox System (fixed-route only)	
Greater Safety	Communications Systems Upgrade – Radio System, MDTs	
	AVL	
	Farebox System (fixed-route only)	
Accessible Customer Information	Advanced Telephone System – automatic call routing, messaging, interactive voice features	
	Communications Radio System and other wireless	
	GIS	
	Electronic Fare System: Bar Codes, Smart Cards, DRT Computer-Assisted Software	
	DRT Automated Software	
	AVL	

Needs/Solutions Table adapted from the NCSU study.

Table 2

Vendor Interview Checklist

During product demonstrations and discussions, be sure to give the vendor a good description of your system needs, and obtain the information on this checklist.

Basic Product Information

- General product description (version, capabilities, examples)
- Number of installations in public transportation systems (Total and in systems like yours)
- Product capability in terms of number of vehicles and trips, and service type (demand-response service, taxi cab, fixed-route, etc.)
- Description of how the product functions or integrates with other technologies, such as:

Personal Computers	Off-the-Shelf Software	Internet	Palmtops	Radio System	Fareboxes
DRT Software	Smart Cards	AVL	MDTs	Cellular Network	
- Use in different operating systems (DOS, Windows 2000, Windows NT, Novell)
- Data storage format and capability to import/export data
- How product is expected to evolve in next three years
- User-friendliness of the product.

Functionality

Description of how product will perform and improve the following functions in your transit system:

- Call-taking ability
- Customer eligibility and management (for ADA and multiple funding sources)
- Trip-by-trip eligibility
- Trip scheduling
- Vehicle routing
- Dispatching
- Fare collection/passenger ID
- Collection of trip data
- System performance evaluation and reports
- User-defined fields available
- Redundant reservation warning
- Personalized passenger needs
- Customer/agency billing/split billing
- Required federal operational, financial and program reporting
- Changes to computers and network that would be required
- Changes in your transit system radio, cellular, or other communication system that would be required
- Query capability of product
- Customized report generation by user
- Simulation training capability (does the product have tutorial capability?)

Other Product Information

- Type and amount of training required
- Provision of additional training
- Continuing product support
- Level of installation and implementation assistance provided
- Level of technical assistance provided
- Presence when system goes "live" (will vendor be there at this time?)

Costs for Following Components

- Base station software and hardware
- Additional work stations (or other additional hardware)
- Can components be purchased separately?
- On-board vehicle equipment
- Training per day (initial training and rate/hour or day for additional training)
- Software and hardware maintenance fee
- Upgrades/enhancement for software and hardware
- Additional hardware and software needed to integrate system components (e.g., cost of creating reporting forms)

References

- Systems that use product and are similar to your system
- Systems that use product and are within a three-hour drive of your location

Table 3

Transit System Interview Checklist

The best way to learn about some of the problems with procuring, installing, and using technology is to visit transit systems that have already implemented it. Such a visit can be extremely valuable. During your visit or discussions, use this checklist as a guide for requesting and recording information.

Service Background of Transit System

- Number and types of vehicles operated
- Transit services offered and number of trips
- Size and character of the service area (rural, urban, fast growth, etc.)
- Number and type of human service agency contracts
- Number and functions of different positions (drivers, dispatchers, reservationist, maintenance, bookkeeping/billing, etc.)

Technology Decision

- Description of the technologies that system implemented
- Expected benefits from technology

Procurement

- Description of procurement approach (get copy of RFP)
- Comparison of different bids and products
- Reason for choosing winning vendor and product
- Costs (software and hardware, training, installation, technical support, maintenance, and upgrades)

Installation

- Installation plan and preparation steps (obtain copy of installation plan)
- Problems encountered and actions to overcome these problems
- Impacts on personnel attitude, time and cost (e.g., extent of over-runs in time and cost of transferring data from old system)

Product Performance

- Satisfaction with product in terms of: ease-of-use; performance in call-taking, scheduling, routing, dispatching, billing, etc; integration with other technologies or products; and reliability
- Satisfaction with contractor responsiveness and technical support and training

Lessons Learned

- Benefits that can be attributed to the technology
- Obstacles to implementation
- Changes to the operations, service, administration, and other business practices to realize enhanced benefits from new technology
- Staff reaction to new technology and changes made to help staff adapt

Table 4

	CAPABILITIES OF TECHNOLOGY	ESSENTIAL	DESIRABLE	NOT NEEDED
1	Automatic retrieval of passenger data			
2	Tracks recent ride history			
3	Multi-user reservation process			
4	Automatic rider eligibility check			
5	Partial name/address entry			
6	Geocoded addresses			
7	Keyword search and sort capability			
8	Frequent destination list			
9	Manual over-ride of computer-generated schedule			
10	Name recognition of common places			
11	User-defined fields available			
12	User name and date stamping			
13	Performance data calculations			
14	On-line time (pick-up, etc.) estimates			
15	On-line address verification			
16	Trip eligibility check (for ADA)			
17	Redundant reservation warning			
18	Variable vehicle parameters (number, seats, etc.)			
19	Ad hoc report formats			
20	Batch scheduling/dispatching			
21	Multi-tiered security			
22	Choice of performance criteria (ride/wait times, etc.)			
23	Personalized passenger loading times			
24	Automatic fare calculation			
25	On-line help available			
26	Billing codes			
27	Problem passenger warning			
28	Pop-up menus/multiple windows			
29	Auto. vehicle selection for passenger needs			
30	Real-time reservations and scheduling			
31	Veh. speed as function of traffic, time, geography			
32	Remote terminal access			
33	Import/export ASCII files			
34	Fully computerized scheduling and dispatching			
35	Computerized vehicle route selection			
36	Automatic purge of inactive registrants			
37	Import/export to spreadsheet			
38	Validity checks on all inputs			
39	Import/export to word processor			
40	Group trips			
41	Trips displayed on layered maps			
42	Call-back list generated			
43	Flexible invoice formats			
44	Support for multiple operators			
45	Split billing			
46	Simulation training capability			
47	Allows "what if" questions			
48	Paratransit transfers			
49	Fixed route transfers			
50	Vehicle location on layered maps			
51	Automatic call-back confirmation/schedule change			
52	Automatic in-vehicle data capture			

Table 5

Costs Items Commonly Overlooked in Technology Planning

Transit System Staff

- Additional staff hours for procurement process, data entry, training, and running parallel systems (this cost can be considerable especially if data transfer problems occur)
- New staff hires with needed technology skills (e.g., may need to have additional computer network support)
- Temporary support staff (e.g., may need to hire temp help to enter data)

Software and Data

- Yearly maintenance and technical support fees for software (software support and upgrade costs are typical for almost all software in the DRT arena)
- Initial GIS base map of service area and periodic updates (e.g., you may need to digitize locations in your service area)

Computers and Other Hardware

- Computers or server upgrade (e.g., you may need to develop a new network or increase the size of existing one)
- Peripherals (e.g., specialized printers, oversized monitors, data backup)

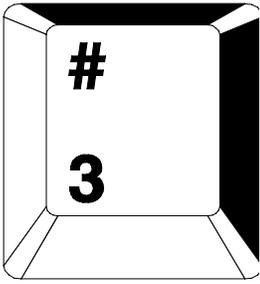
Communications

- Additional radio channel/frequency
- Dedicated or dial-up telecommunication line and service fee (e.g., T1 service)
- Telecommunication fee for vehicle/base station communication (e.g., cellular fee)
- Additional telephone equipment (e.g., caller ID box, key system, automatic trip confirmation system), lines and usage fees

Training and Support

- Consulting fees for conducting procurement (e.g., to advise on technology, write RFP, and to evaluate bids)
- Consulting fees for technical services (e.g., monitoring implementation)

Note: The North Carolina State University report also included a table on estimated costs of technologies. Due to the short half-life of cost information it is not included here.



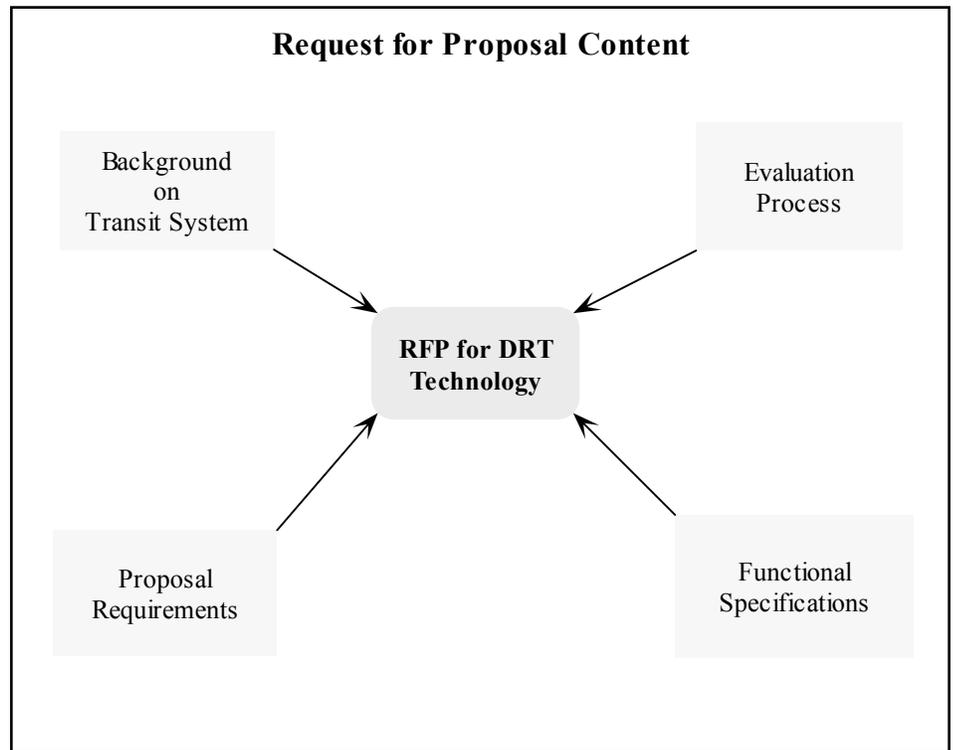
Procurement

The process of procurement involves identifying a vendor of DRT technology that is capable of providing a product that will meet your needs and then entering into a contract to procure that technology. Due to the complexity of the individual technologies, not to mention the even greater complexity of combinations of technologies, you may want to obtain professional assistance in developing the request for proposals (RFP) and selecting the technologies. You may also want to obtain examples of RFPs used by similar systems to acquire the type of DRT technology your system is considering. It will also be necessary to have a team review proposals.

The content of the RFP contains four major elements as shown in the diagram at the right.² The first major component is enough *background information* on the transit system to enable prospective bidders to submit proposals that respond to your system's needs. These items might include a description of the service area, the number and type of trips provided per time period, the number of vehicles, type of service provided, performance data, organization and staffing, reporting requirements, computer hardware and net-

work setup, current technologies used, etc.

Another element of the RFP is a specification of the *requirements* bidders must meet in order to have their proposals considered. This includes items such as vendor qualifications, certain budget itemizations, proposed timeline for



implementation, non-collusion affidavits, non-discrimination and other certifications, etc.

The RFP also needs to identify and explain the procedures and criteria to be used for *evaluation*. The criteria can be based on how well proposals respond to the functional specifications mentioned in the RFP, vendor qualifications, thoroughness of approach, etc. Develop a quan-

²If your state procures DRT software through centralized purchase or if you piggyback on the procurement of another system, the RFP used may differ from the model presented here.

tifiable procedure for ranking each criterion. Typically this is done by assigning points to each criterion to indicate its importance with respect to other criteria.

Finally, the RFP needs to contain *functional specifications* for the DRT technology. Specify what functions your system needs such as the ability to produce specific reports for funding agencies, calculation of fares, ability to track no-shows, compatibility with existing software and hardware, to mention a few. It is important to be clear about your needs and expectations so that vendors can prepare responsive proposals.

The following checklist is a good reminder of the kinds of items you may want to consider in preparing the RFP.

Table 5

Request for Proposals (RFP) Checklist

Introduction

- Brief statement of purpose (summary of why your system is soliciting proposals)
- General requirements (much of this is “boiler plate”)

Proposal Requirements

- Number of copies, due date, location of delivery
- Procurement agency
- Proposal format (what sections need to be included, e.g., itemized budget)
- Mandatory forms and documents (include a checklist of documents required)
- Pre-proposal conference (not mandatory/mandatory; place, date, time)
- RFP amendments
- Interviews and demonstrations
- Dispute resolution and protest process
- Software, hardware, and system acceptance testing
- Handling of confidential information assurances

Evaluation Process

- Review team (that there is one, not necessarily who is on it)
- Timeline for review
- Evaluation criteria (provide weight for each)
 - Ease of use
 - Compatibility with existing hardware/software
 - Responsiveness to meeting the required functional specifications
 - Level of current customer satisfaction with product and company

Transit System Background Information

- Service area profile and performance data (operational characteristics)
- Current technology systems
- Organization and staff
- Current operations and administration procedures
- Needs and problems
- Vision, goals, objectives, and planned changes to practices and procedures

Functional Specifications

- Performance requirements of each function
- Hardware requirements
- Software requirements

Other Requirements

- Installation and project management plan (vendor should take into consideration your proposed timeline from the RFP)
- Technical support (remote during installation, live at installation, etc.)

Request for Proposals (RFP) Checklist

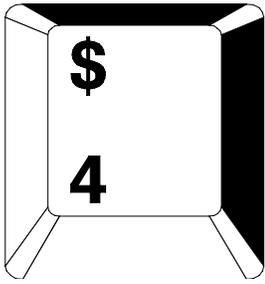
- Training (request two training sessions with time in between both to test system, request hourly rate for any additional follow-up training)
- Documentation (training manuals and on-line support)
- Maintenance (request annual maintenance costs)
- Warranty (a copy of software source code put into escrow. This offers an option to seek your own technical support should the vendor go bankrupt)
- Compatibility requirements (any new system needs to be compatible with existing hardware/software if these systems are not being replaced)
- Guaranties (require a phased payment plan with a retainage expectation for the customized transit products (e.g., DRT, MDTs)
- References (request a list of contacts for all current installations)
- Vendor capacity to do work, meet schedule; financial stability
- Cost forms

Contract Terms and Conditions

- Local and state terms and conditions
 - Consult with your local and state procurement agencies
- Federal contract terms and conditions (if federal funds are used)
 - Download the table of required federal clauses and the suggested clause language, and "paste" them into your RFP. See Appendix 1 of the FTA: Best Procurement Practices, available at <http://www.fta.dot.gov/ntl/index.html>
 - Federal required submittal forms (e.g., debarred contractors, non-collusion and lobbying restrictions)

Appendices

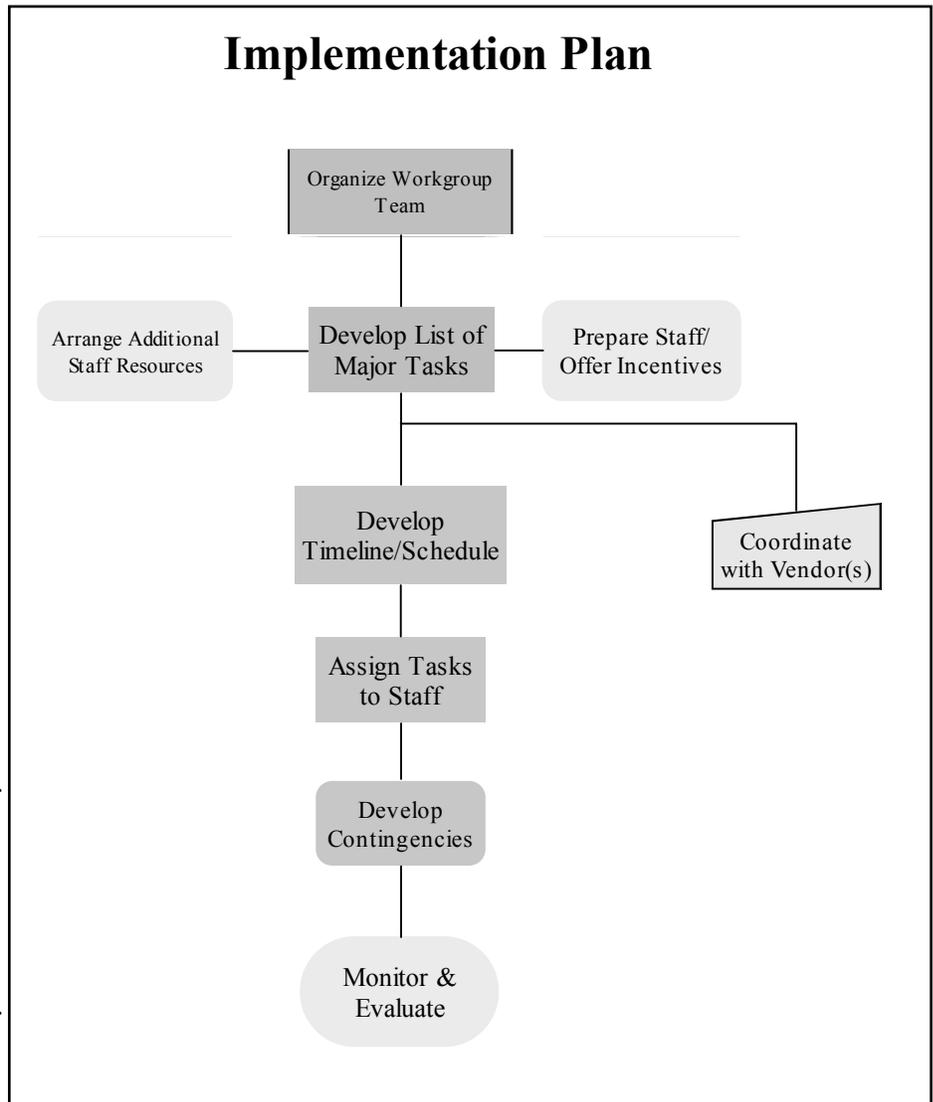
- Relevant transit system statistical information
- Organizational information
- Planning documents
- Network information: operating systems, network configuration, etc.
- Other references



Implementation

Planning for implementation of the DRT technology is essential. Without a cogent plan, costly mistakes can occur. The plan acts as a blueprint for getting the DRT technology in operation. Developing a preliminary implementation plan can occur in parallel with other tasks such as procurement and revised as necessary after procurement.

The flowchart to the right shows the major elements of an implementation plan. Start planning early in the process so that adjustments can be made along the way. The first item is to assemble a workgroup team made up of individuals who will be managing and using the new technology or be affected by it. This team might include management, dispatchers, reservationists, operations staff and any other relevant personnel.



The job of the workgroup is to develop a list of major tasks that will be necessary for successful implementation. If additional personnel will be needed, make arrangements early to avoid the last minute crunch, which often adds to the confusion of change. In addition, if the new technology is going to result in change substantially different from what your system does now, you may want to prepare employees for the change

by including them in the process at an early stage. It may also be appropriate to offer some form of incentive to employees for working on the project.

Implementation tasks might include items such as:

- reviewing policies and procedures related to demand responsive transit service

- evaluating the status of data files
- reviewing staff roles and how they are likely to change
- identifying possible service delivery policy changes
- staff training
- coordinating changeover to new hardware
- planning and staffing system start-up
- monitoring and evaluation

Another important task is to develop a timeline and schedule for the various tasks. Since the development of the implementation plan will roughly parallel the procurement process, it is important to coordinate implementation tasks with the vendor of the DRT software/hardware. A well designed, thought-out timeline will keep the project on track. The timeline is typically organized by task and can also show subtask duration.

The timeline can be used as a framework for assigning tasks to individual staff or teams. In task assignment it is important to establish deadlines for completion and milestones along the way.

An often overlooked component of a plan for implementation is the development of contingencies. Contingencies are plans that respond to breakdowns and unexpected events. If something unexpected occurs, the contingency plan provides the procedures to follow.

Finally, monitoring and evaluating the implementation and operation of the DRT technology will enable your system to make adjustments to operational procedures and other changes as necessary. Because of the investment in time and

money, you may want to do an analysis of the benefits and costs of the new technology. Baseline data from the “old” system will need to be gathered for this comparison to be made.

During the first few months of using the new technology system staff may learn new, more efficient ways of doing certain tasks. They may also learn to use the technology in ways that were not possible with the previous system. The new technology should produce benefits that were not foreseen when your system started its search. And, some of these benefits should translate into better service for your customers.

Note: For more detailed information about acquiring DRT technologies see Institute for Transportation Research & Education., Transit Operations Group, *Transit Technology Guidebook: Procurement and Implementation*, North Carolina State Univ. Prepared for Ohio Department of Transp., Office of Transit, 2000.