Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT-TSC-UMTA-78-18		

4. Title and Subtitle	5. Report Date
PARATRANSIT INTEGRATION WORKSHOP PROCEEDINGS October 12, 13, 1977	August 1978 6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
D. Krechmer, J. Strawbridge, P. Wenger, S. Zavatsky	DOT-TSC-UMTA-78-16

9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Systems Architects, Inc.* Transportation Systems Division Thomas Patton Drive Randolph MA 02368	UM828/R8701 11. Contract or Grant No. DOT-TSC-1369

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
U.S. Department of Transportation Urban Mass Transportation Administration Office of Technology Development & Deployment Office of Bus and Paratransit Technology Washington DC 20590	Proceedings October 12, 13, 1977 14. Sponsoring Agency Code

15. Supplementary Notes

*Under contract to: U.S. Department of Transportation
Research and Special Programs Administration
Transportation Systems Center
Cambridge MA 02142

16. Abstract

The purpose of the Paratransit Integration Workshop was to have experts in the field of demand responsive transportation provide direction for the development of a handbook describing the planning, design, and implementation of integrated paratransit services. This format was used to ensure the usefulness of the handbook to those who must design and implement paratransit systems. The workshop consisted of seven sessions relating to the problems encountered in developing a paratransit program: 1) Planning and Institutional Constraints, 2) Involvement of the Private Operator, 3) Estimation Techniques, 4) System Design for Non-Automated Systems, 5) System Design for Automated Systems, 6) Implementation and Operation, and 7) Paratransit Integration Needs and Priorities.

The workshop concluded that the most important issues to be addressed in the Paratransit Integration Handbook are as follows: 1) the handbook should provide guidance to the planning community by supplying reference material as to how to include paratransit concepts into the existing institutional structure; 2) the manual should educate the planning community as to the potential of private operators to provide service; 3) the handbook should illustrate strategies which will foster the intended results of the proposed UMTA paratransit regulations; 4) the handbook should include strategies for involving the private operator in the planning process; and 5) the manual should include examples and strategies for the developing of the brokerage concept.

17. Key Words	18. Distribution Statement
Paratransit, Paratransit Integration, AWDRT, Dial-A-Ride, Transit Integration	DOCUMENT IS AVAILABLE TO THE U.S. PUBLIC THROUGH THE NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VIRGINIA 22161

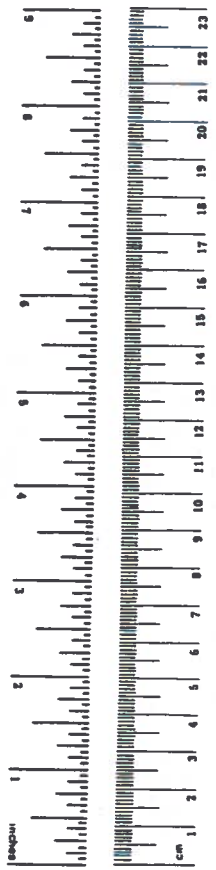
19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	100	

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

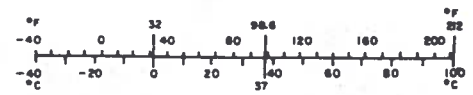


TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

TABLE OF CONTENTS (cont'd)

INTRODUCTION

PURPOSE

The Paratransit Integration Workshop was held October 12-13, 1977, at the Department of Transportation, Transportation Systems Center (TSC) in Cambridge, MA. The primary purpose of the workshop was to have experts in the field of paratransit provide direction in the development of a handbook for integrated paratransit services. This process was utilized to ensure the usefulness of the handbook to those who must design and implement paratransit systems. The Paratransit Integration Handbook will facilitate the planning, design, implementation, operation, and evaluation of paratransit systems.

The concept of paratransit service has been endorsed by the Urban Mass Transportation Administration (UMTA) as a means to supply transportation services for transit dependent population groups and low demand density areas in an urban or suburban community. The development of paratransit was in response to a recognized need to expand transportation services beyond conventional fixed-route service. The service concept encompasses a coordinated and integrated network of transportation modes.

The Paratransit Integration service concept integrates flexibly-routed paratransit services with fixed-route services resulting in an increased level of transportation service. This service concept encompasses a wide spectrum of transit services, i.e., elderly and handicapped service, shared-ride taxi, demand-responsive transit, carpools , which can be used to expand the quality of transit service within a community. UMTA recognizes that demand-responsive transportation is an appropriate mode for serving the following five transportation demands: (1) service in low density areas; (2) specialized transportation services in high density areas; (3) special journey-to-work service; (4) service for the elderly and handicapped; and (5) feeder service to line haul transit.

The purpose of the Paratransit Integration Handbook is to develop

a planning process which responds to those transportation demands and identifies the key elements a community should consider when developing a paratransit system. The intent of the workshop was to generate input relating to major problem areas, topics that should be included in the handbook, and specific experiences of the participants as related to the handbook topics.

PARTICIPANTS

The Paratransit Integration Workshop was attended by 50 experts in demand-responsive transportation. They included representatives from local, state, regional and federal governments, transit and taxi industries, universities, and consulting organizations. A complete list of participants is found in Appendix A.

Many of the participants had contributed to the development of paratransit systems throughout the U.S., Canada, and Europe. The workshop format enabled them to relate their experiences and disucss recent developments in the paratransit field.

THE PARATRANSIT INTEGRATION PLANNING MANUAL OUTLINE

In order to stimulate and focus discussion during the workshop sessions, a sample outline of the contents for a paratransit planning handbook was provided to each participant prior to the workshop. This outline described a handbook which would act as a guide for local, regional, and state planners in the design and implementation of paratransit systems. The completed handbook would present a detailed planning process for a paratransit system from the conceptual stage through system operation to evaluation.

A general planning process structure was presented in the first section of the handbook outline. The first five chapters of the second section of the planning manual outline were devoted to the five major demand-responsive transportation service concepts: Low Density Service, High Density Service, Journey-to-Work Service, Elderly and Handicapped Service, and Feeder Service. The sixth chapter, System Integration, outlined the considerations necessary to achieve successful integration and coordination of paratransit systems with each other and with any existing transit service.

The final five chapters of the planning manual outline dealt with: Demand/Supply/Cost Estimation Techniques; Vehicles and Maintenance; Automation Techniques; Involvement of the Private Operator; and Labor Considerations. Unlike the special planning considerations pointed out for each of the five service types, the issues explored in these chapters vary with system size and complexity rather than service type. These issues have also been the focus of substantial research and development, government regulation, and litigation.

Responsible officials face many controversial decision points in the planning and operation of paratransit systems. These areas were identified in the outline and used as catalysts for discussion in the workshop sessions. For each workshop session, discussion guides were developed which integrated the problem areas identified in the handbook outline into the workshop structure.

ORGANIZATION OF THE WORKSHOP

The Paratransit Integration Workshop consisted of seven sessions relating to the problems encountered in establishing a paratransit program:

IA.	Planning and Institutional Constraints
IB.	Involvement of the Private Operator
II.	Estimation Techniques
IIIA.	System Design for Non-Automated Systems
IIIB.	System Design for Automated Systems
IV.	Implementation and Operations
V.	Paratransit Integration Needs and Priorities.

Each workshop participant was assigned to sessions depending upon his/her areas of expertise; consideration was also given to ensuring balanced discussions. Following each workshop session, there were two simultaneous plenary sessions at which synopses of the conclusions reached during the sessions were presented. This structure encouraged the participants to discuss the conclusions developed in all workshop sessions. In Session V, the participants assigned priorities to the issues discussed during the workshop sessions.

SESSION IA:

PLANNING AND INSTITUTIONAL CONSTRAINTS

INTRODUCTION

Session IA, Planning and Institutional Constraints, focused on the constraints imposed on the implementation of paratransit service by the mandated planning process. The discussion focused on the audience for the Paratransit Integration Handbook and the planning process which should be included in the manual. Many useful suggestions were made as to the format and content of the handbook. This synopsis will be organized around the following subject areas which formed the basis for discussion during the session: (1) The Audience for the Planning Manual, (2) Institutionalized Planning Structures, (3) The Brokerage Concept, and (4) The Coordination of Transportation for Human Services Programs.

The participants in Session IA were:

Mr. Ronald Kirby - Chairman	Ms. Carolyn Fratessa
Mr. Charles E. Barb	Ms. Benita Gray
Mr. John Beeson	Mr. Karl Guenther
Mr. Bernard Blood	Ms. Susan Richardson
Mr. Francis E. K. Britton	Mr. David Rubin
Ms. Suanne Brooks	Ms. Jill Strawbridge
Mr. Thomas Carberry	Ms. Ling Suen.

THE AUDIENCE

It was the consensus of the workshop participants that the proposed Paratransit Integration Handbook should provide detailed information on the definition and potential of paratransit for those people who are responsible for planning and obtaining funding for transportation services. In general, it was felt that there was a pronounced lack of understanding of all aspects of paratransit service provision at the regional or MPO planning level; although, there was a need to educate planners at all government levels -- local, regional, state -- as to the potential of paratransit.

Karl Guenther of the Ann Arbor Transit Authority described the problem as follows:

> ....the regional planning agency is in the middle. They are being pushed from the bottom by social agencies, by advocacy groups, by private providers who are saying, 'You can't force me out of business. Here it says in the regulations you can't force me out of business'. They are under pressure from the top (UMTA) and the bottom (the community). These are the people that need help... At the point in our planning process where things are supposed to come together on a regional level, there is a void. These are the people who do not know how to handle paratransit.

The federal government mandates the transportation planning process (3C process) with which all interested parties must comply in order to receive DOT funding. Generally, the Metropolitan Planning Organization (MPO) and/or the 3C agency is responsible for meeting these regulations. DOT/UMTA is taking an increasingly active interest in the potential paratransit has for serving a variety of identified, urban transportation needs. This interest is being reflected in both existing and proposed regulations. The MPO is being placed in the position of having to respond to these mandates in order to ensure continued funding without sufficient guidance as to how this type of service can be made to fit into the existing regulatory and planning structure.

It was felt by the workshop participants that the proposed handbook should provide sufficient information to enable the public planner to respond to local initiatives for paratransit service and, if need be, to serve as a catalyst in developing service concepts. The handbook should address all publicly regulated and/or funded services. It is equally as important to advise planners on how they should regulate taxis and other services which are operating without public subsidy.

Thomas Carberry of TSC described the objective of the handbook in this way: "The objective of this document should be to assist planners in implementing programs that will not fail ultimately because of something they haven't considered, and to maximize the probability for successful systems."

The actual sources for new project ideas and paratransit services will be various organizations -- i.e., human services agencies, advocacy groups, private providers, etc. It was felt that there was a need for separate but complementary planning handbooks which would explain to these organizations how to design a service, the federal transportation planning process and its ramifications for funding, and funding sources for which the organization may qualify. It was felt that one role of this proposed paratransit planning manual would be to make public planning agencies more able to assist local organizations with their transportation problems.

Ronald Kirby, the Chairman of the session, summarized the need for a planning manual:

> I don't think the goal of the manual is to set up a very formal, rigid structure that will make everyone march to the federal government's tune. The idea is to be helpful to all kinds of people. We are at a stage where these kinds of services have bubbled up through guerilla tactics or other means, and there is evidence that they have an important role to play.
>
> Paratransit services are important because they are responding to changing priorities in transportation policy, moving away from heavy investments in new facilities towards greater use of existing facilities. There is a much stronger interest in human service activities, and this change in emphasis is creating greater interest in paratransit as opposed to other options. That is part of the reason why there is a need to provide information to people concerned with transportation services in this handbook. There is currently not much information available to explain the important planning issues.

INSTITUTIONALIZED PLANNING STRUCTURES

In order to understand the complexity involved in planning paratransit services, several different planning structures were analyzed in terms of how paratransit service was planned and implemented. It was discovered that each structure had very different implications for the planning process.

Ronald Kirby described the problem this way:

> The institutional structure for planning and operating transportation services is something that has evolved over a period of years and reflects the planning and operating needs of conventional transportation services rather than the needs of paratransit services, particularly those applications for human service purposes. One of the difficulties that people have in designing, planning, funding, and implementing paratransit services is that they are working within a planning structure that often is not well adapted for paratransit implementation.

In order to assess the problems imposed on the planning of paratransit services by the institutionalized planning process, the session participants analyzed three "typical" structures. Valuable insight into the problems confronted by planners in these situations was provided by the participants' personal experiences. Figures 1, 2, and 3 show the structures which were considered.

Figure 1 represents the first planning structure considered. This structure predominates in large urban areas. The unique aspect of this structure is that the Regional Transit Commission has both planning and operating responsibilities. It owns and operates the metropolitan transit system, and it is the recipient of funds to support these services. One of the great difficulties inherent in this structure is that the funds which go to the RTC are earmarked for the transit services it operates. It is often difficult for the RTC to contract with private operators to provide certain services because of agreements with labor unions. It is in the RTC's interest to provide new services itself.

This situation was not envisioned when the transit commissions were organized. There is a growing feeling, however, that there are limitations on the type of paratransit services which can be provided when the recipient of UMTA funds is also the transit operator. In this situation, difficult questions also arise as to which agency - the MPO or RTC - is responsible for planning transit services.

Historically, the Metropolitan Planning Organization (MPO) has been responsible for long-range, highway and transit planning.

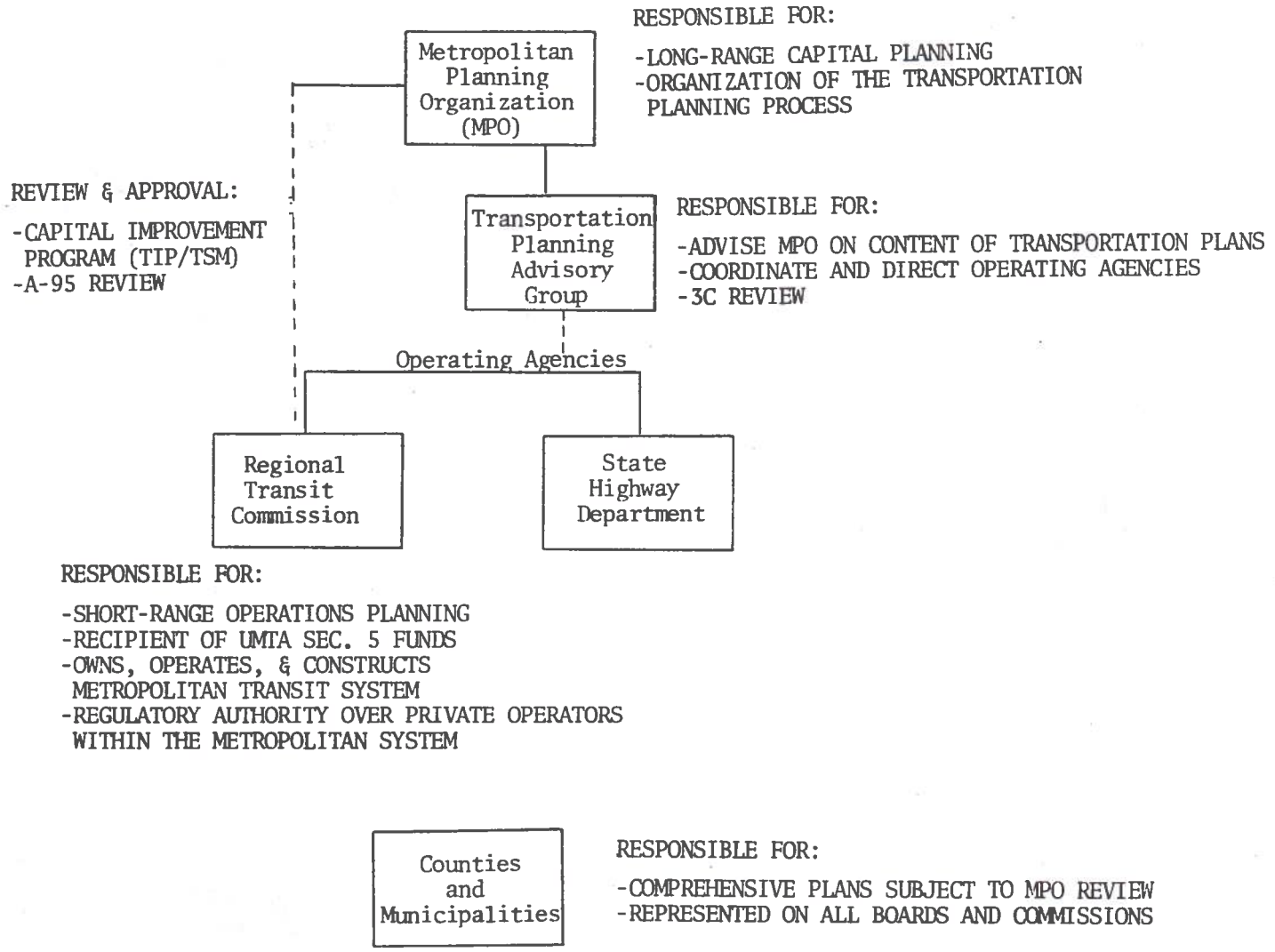


FIGURE 1. INSTITUTIONALIZED PLANNING STRUCTURE - REGIONAL TRANSIT COMMISSION

They have had only limited involvement in the short-range, operations-type planning done by the operating agency. The emphasis today, however, at the federal policy level is on short-range, incremental planning. The question which faces many metropolitan areas is whether the MPO should become involved in this type of planning and, if it does, at what point does short-range planning become operations and infringe on the responsibility of the operating agency. The design of paratransit services, because of its relatively short planning time frame and because of the RTC's inability to provide these services, has been the focal point for this controversy.

The session participants felt that there was a great possibility for cooperative planning between the involved agencies if they resolved to work together. There were few formal mechanisms which could be used to bring about this cooperation, however, if the agencies were unwilling. The Massachusetts Bay Transportation Authority's planning arrangements with the 3C agency (CTPS), and the A-95 review agency (MAPC) were given as examples of cooperative planning. The situation in Minneapolis/St. Paul between the Metropolitan Council and the Metropolitan Transit Commission was given as an example of where cooperative arrangements have not been achieved.

Figure 2 represents a second institutionalized planning structure under which transit services are planned and implemented. This structure is not as prevalent as the one represented in Figure 1. In Figure 2, the Regional Transit Authority is the recipient of Federal and state transit funds, can contract with private operators to provide service, can own capital equipment and lease it to private providers, and has regulatory authority over operators within its transit district. Because of this, the RTA is in a position to contract and coordinate individual operators to provide desired services. The RTA is a recipient and disburser of funds and equipment. The RTA can impose conditions as to the type and quality of service on the recipients of its support.

Figure 3 represents the planning structure which can be used by a local community to develop service. This structure bypasses the

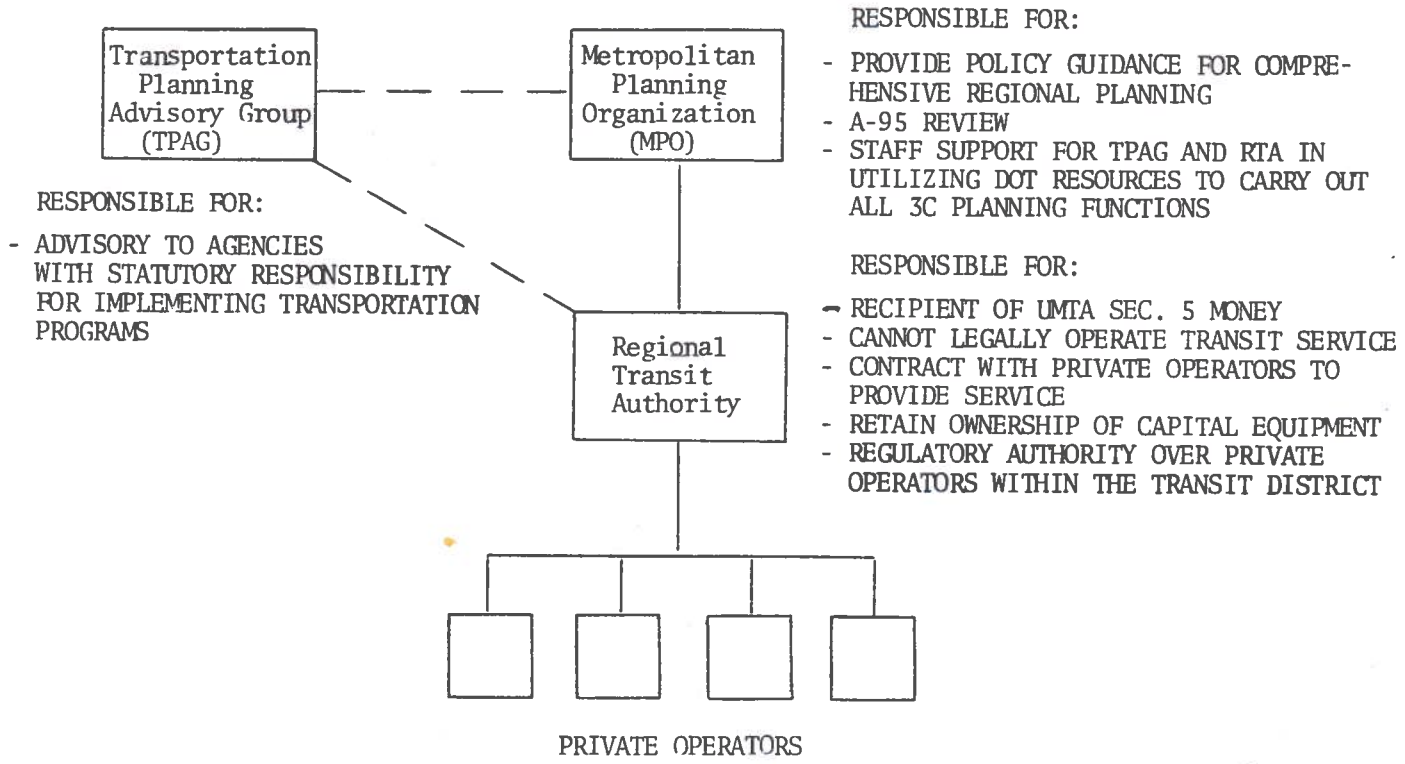


FIGURE 2. INSTITUTIONALIZED PLANNING STRUCTURE - REGIONAL TRANSIT AUTHORITY

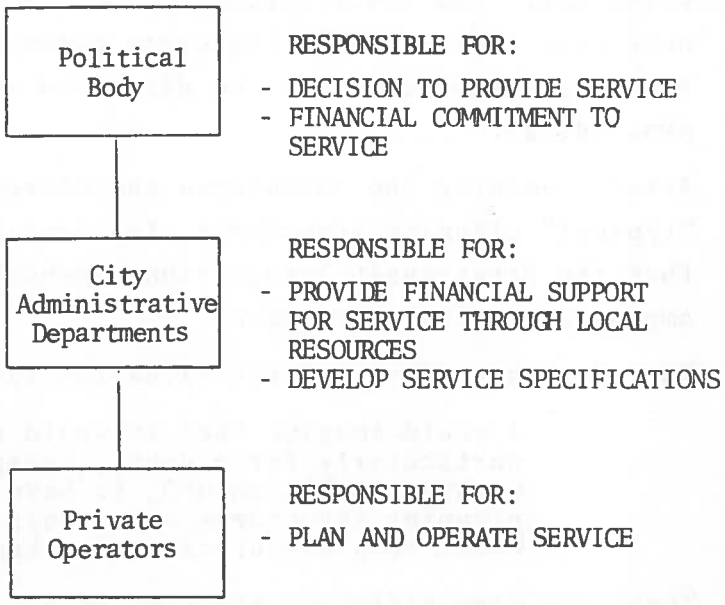


FIGURE 3. INSTITUTIONALIZED PLANNING STRUCTURE - CITY DEPARTMENT

federal transportation planning process, so any service developed in this way does not qualify for DOT support. There are a variety of federal funding programs which provide money directly to local governments which can be used to support transit service, i.e., revenue sharing funds, community development block grants. In many instances, the community will levy a special tax to support service. This structure can also be used to implement service while the federal transportation planning process requirements are being met. The institutional structure used in Knoxville, Tennessee, to implement the brokerage concept is similar to this. The Knoxville experience will be discussed in detail later in these proceedings.

After examining the advantages and disadvantages of the three "typical" planning structures, the session participants recommended that the Paratransit Integration Handbook include models and examples of typical situations.

Karl Guenther described the situation this way:

> I would imagine that it would be very useful, particularly for a young, inexperienced planner working within an MPO, to have these three planning structures and others. To me that would be a useful part of a handbook.

There are many different agencies at all government levels involved in financing transportation programs. They all have different mandates, regulations, and requirements; and they are not all coordinated at the regional level. One of the goals of the handbook should be to advise planners where they are located in the process by giving them some way of determining their agency's characteristics, what other agencies are involved in their area of interest, and how they interact with each other.

The handbook should be organized in such a way so as to emphasize guidelines to the planner for assessing the local situation. This can be done by providing checklists and charts of agency characteristics and transportation programs and their relationships to each other. Models of legislated structures and examples of community planning processes should also be provided. Ronald

Kirby felt that the evolving role of the planner is to understand all of these programs and their relationship to each other.

It was felt that the people who will be using the planning manual will be directed to it through interest and motivation, through a superior's directive, or through a regulatory mandate. There was, therefore, no need to provide a philosophical orientation to paratransit. In addition, the user will also have a background in transportation planning; the handbook, therefore, should not be elementary.

The participants also felt that it would be very beneficial to produce the manual through an interactive process. A draft of the manual would be developed quickly and distributed to various planning agencies for them to use when developing paratransit service. Based on their experiences and comments, the manual would be revised and distributed to different agencies for their review and comment. Francis Britton described the process this way:

> Get it out (in draft form), get the reaction of a selection of key people and users around the country, then refine and improve it in stages. In short, do the manual as you do paratransit: by providing the service, watching very closely what it does and does not accomplish, and then modifying and strengthening it as appropriate.

THE BROKERAGE CONCEPT

The discussion of the brokerage concept began with John Beeson making a brief presentation about the Knoxville, Tennessee, demonstration project. The City of Knoxville has received an UMTA demonstration grant to implement the brokerage concept. The city subcontracted with the University of Tennessee's Transportation Center in 1974 to administer the program. This contract was for two years. If the program was successful, the city was to take over the administration. The city created the Department of Public Transportation Services to participate in administering the program as well as to develop new services. They received an UMTA demonstration grant in January, 1976, to continue work on the concept.

The Knoxville program is oriented around a marketing/management approach. The initial program effort focused on developing alternatives for the work trip which was unserved by conventional transit. A successful vanpool program was implemented. From this, the program has expanded into coordinating and providing all types of service with a wide variety of vehicles and operators. Mr. Beeson stressed the need for the initial services to be successful in order to develop local credibility and support; "We had to have a success, and we had to gain one success after another. It builds upon itself..."

Currently, the Knoxville program is functioning completely as a coordinator. The staff will assess an agency's transportation needs and costs, design the service specifications, and put it out to be bid on by private operators. The department acts as a catalyst in bringing users and providers together.

The session participants attempted to determine whether the Knoxville program should be used as a model for implementing the brokerage concept. No consensus was reached on this or other specific issues relating to the definition of the broker, what type of agency should take on this function, or how it should be implemented. Some directions relating to these issues were agreed upon, however.

Defining the broker posed the greatest difficulty. John Beeson defined the broker not as a service provider, but rather as an entity which can bring users and providers together in some combination that results in the greatest utilization of vehicles and cost savings. It was felt that given the complex situation that was described earlier in the session with multiple agencies with different planning mandates and requirements that the importance of the brokerage function should be emphasized.

It was felt that the Paratransit Integration Handbook should encourage traditional planning agencies to become brokerage-type organizations and to be sensitive to the need for service within their community. The brokerage concept should be introduced early in the handbook when agency characteristics are delineated. The

type of characteristics which are required for an agency to become a broker should also be outlined.

Ronald Kirby spoke for the session participants when he defined the brokerage concept this way:

> I think it is important that we recognize brokerage as a function that we want someone to perform. Very often it is presented as a new body, some new kind of bureaucracy designed to take over virtually everything to do with transportation. It is very important to make this distinction. There is a function here, an activity that needs to be carried out, but just how and where it fits into different institutional structures is open to debate.

There was no agreement on whether the broker agency should receive and administer funds. Some participants were concerned that if an agency became a recipient for funds, then it would become an advocate for specific services or providers. Other participants were concerned that without funding authority, brokering would become strictly an "activity planning function."

The participants felt that the broker function should be placed in the existing institutional structure and that, if necessary, changes should be made in the existing agencies rather than creating a new level of bureaucracy. The Metropolitan Planning Organization or, in smaller communities, the city planning department can perform this function. The problem arises in trying to determine which agency is going to implement the coordinated services identified by the MPO. Francis E. K. Britton characterized the problem as follows:

> The local planning agency can make considerable headway in brokering services - if by that we mean providing a better and more explicit picture of specific classes or nodes of demand on the one hand, while simultaneously clarifying that there may be a multiplicity of <u>potential</u> matched suppliers (in both the public and the private sector) - without going so far as to actually do the active brokering itself. We must distinguish between <u>passive</u> and <u>active</u> brokerage.

The participants stressed the need for people and agencies to explore the ramifications of implementing the brokerage concept

in their local context. Local agencies must work to change the existing structure and processes themselves rather than wait for change to come from the federal level. Suanne Brooks characterized the problem this way; "Many times there exists a fear of the System all the way from the local level to Washington. So much of the problem, though, is the inexperience and lack of knowledge of federal bureaucrats. People at the local level are a hundred times smarter than the feds."

The participants agreed that transportation brokering was an important function. The session concluded that if possible the brokerage function should be included within the existing institutional structure, but that institutional arrangements also vary enormously from community to community. It is important that the manual not attempt to steamroll local institutions into a single "best" brokerage structure; but rather, it should recognize that permutations and combinations of brokerage arrangements will be necessary to respond to a local situation.

THE COORDINATION OF TRANSPORTATION FOR HUMAN SERVICES PROGRAMS

There is a directive throughout DOT legislation that transportation programs must support social policy. There is, however, no guidance as to how this is to be achieved. At the community/regional level, there is also no human services planning process which can be used to implement this directive which is comparable to the transportation planning process.

In addition to this lack of policy guidance, there is a myriad of human services programs which can authorize transportation services. Suanne Brooks of HEW describes the problem this way:

> We have at this point in time a regulatory mandate to provide services, supportive and otherwise, to all individuals with mobility impairments. It is my contention that any program that serves an elderly or handicapped person is considered a program for the elderly and handicapped. The GAO reports that there are 114 of these.

There are three broad problem areas that must be dealt with when developing a coordinated human services transportation program.

First, the various providers of human services transportation must be converted to and coordinated with the public transit services. Second, the problems in terms of bookkeeping, service accountability, etc., inherent in categorical programs for various groups, must be solved. Third, a negotiation process must be undertaken to convince local social service agencies that transportation providers can provide reliable, high quality service sensitively to their clients, and that this service will be cost effective.

Transportation also performs an advocacy function for the human service program. It extends and personalizes the primary service - i.e., health care, nutrition, recreation, etc. - in the minds of the client. It is more than a service; it is an advertisement.

The primary issue is service accountability versus system accountability. Human service organizations consider service accountability to be of the greatest importance. It is more important to ensure that the client receives the service; the characteristics of the system which bring him the service are secondary. In addition, they are not convinced that the system accountability issues have been adequately documented. The question of efficiency and cost-effectiveness has not been thoroughly researched and quantified. The development of mechanisms to coordinate services is hindered because much of the problem is imposed by state regulations, state planning, and state policy which vary depending on location.

It was felt that the Paratransit Integration Handbook should define the basic problems involved in human services coordination at the various hierarchical levels - the statutory level, the regulatory level, the policy level, the subfederal policy level, and the service delivery level. Examples should be used to illustrate these problems. It is important for the manual to stress, however, that solutions to the problems depend on the local situation. As Ronald Kirby stated, "What you have to do is encourage agencies to look for the potential where it exists, not imply that there are some particular techniques of coordination which every agency ought to implement."

No conclusions were reached about ways in which the brokerage

concept can be applied to the coordination of transportation in human services programs. The participants felt, however, that if the objective was only to coordinate human service programs, then serious consideration should be given to having a private, non-profit agency or a private operator perform the broker function. Many instances can be documented where these types of organizations have voluntarily taken on this function. "They are the provider going to the users. That is the market operating without the broker having to facilitate."

SUMMARY

The session participants recognized that there is a trend within the transportation planning profession away from long-range master plans toward short-range, implementation or service delivery plans. The planning and implementation of paratransit services falls into this short-range category. It is low-risk, low-capital transportation that can be implemented quickly.

It was also recognized that communities desire control over the transportation services provided. They are determining ways to use the process to achieve their goals. The Paratransit Integration Handbook must be written in such a way so as to recognize these trends. The planners who control the funding process must be educated as to the potential of paratransit and the advantages of involving the community and private operators in the planning process.

As Karl Guenther explains the general orientation of the planning manual should be:

> This is in your language. It explains to you what we are talking about down here at the grass roots level..., and it relates to the federal things that we know are your job.

SESSION IB:

INVOLVEMENT OF THE PRIVATE OPERATOR

INTRODUCTION

Session IB, Involvement of the Private Operator, discussed the process for involving the private operator in the planning and operation of a paratransit system and the implications of this involvement. The discussion began with a synopsis of UMTA's Paratransit Policy and its ramifications for the existing planning process. The ensuing dialog dealt with the impacts of the policy statement on both private and public operators.

The participants in Session IB were:

Mr. W. Donald Kendall - Chairman	Mr. Gorman Gilbert
Mr. W. G. Atkinson	Mr. Richard Gundersen
Mr. Dwight Baumann	Mr. John Hall
Mr. M. Douglas Birnie	Mr. L. L. McDonald
Mr. B. Paul Bushueff, Jr.	Mr. A. U. Simpson
Mr. Larry Coleman	Mr. Paul Wenger
Mr. Richard Gallagher	Mr. Stanley Zavatsky.

This summary will reflect the five major subject areas discussed during the session. The five areas are: (1) The UMTA Paratransit Policy, (2) Funding Mechanisms/the Brokerage Concept, (3) Transportation Ordinances/Regulatory Considerations, (4) Labor-Management Regulations, and (5) Insurance Protection.

UMTA PARATRANSIT POLICY

UMTA is presently preparing to release a policy statement on paratransit. This policy statement will emphasize the need for involving the private operator in the planning process for paratransit services. Doug Birnie of UMTA described the policy in the following manner:

> ....private operators need to be consulted in the development of the TSM (Transportation System Management Element) ....early in the process and, likewise, ... they have to be given an opportunity to recommend their own services for inclusion in the TSM plan and the elderly and handicapped element.

The policy is being promulgated in the belief that to be successful, private operators must be involved in the planning of paratransit systems. The policy also encourages the private operator's involvement early in the planning process primarily because the essence of his business has been in providing such services. However, the UMTA policy statement does not specify how this involvement is to be achieved. This responsibility will rest with the local agency subject to UMTA concurrence.

Since the UMTA policy was not released prior to this workshop, there was discussion concerning the wording of the statement. The consensus was that the policy should state clearly that private operators should be included within its scope. Additionally, all private operators including those that currently provide shared-ride service should be eligible to participate in the TSM process.

Although the policy will be general in nature, it will require complete private operator involvement; thereby avoiding any situation where the private operator is approached only for a TSM sign-off in the final stages of the process. Tony Simpson expressed the concern of private operators that even with the new regulations their involvement will be minimal:

> ....usually the individuals responsible for preparing the TSM's are very busy and do not want to undertake more meetings. Therefore, involvement of the taxi industry must be mandatory.

Usually the Metropolitan Planning Organization (MPO) is responsible for preparing the TSM and Transportation Improvement Program (TIP). To date, the involvement of private operators in this program has been minimal. This is due to the lack of staff and capital on the part of private operators to fully participate in all planning meetings and activities. There is a need for a liaison between the private operators and the MPO planning activities. The participants recommended that as part of the planning process, private operators be notified of all planning proposals and activities and be invited to submit comments.

A unique solution for ensuring private operator participation in the planning process was offered by Dwight Baumann. His solution would be to provide the private operator (management) with a

Section 13(c)-type leverage. Such leverage would allow the private operator to halt all projects in which he had not participated during the design stages. The concept as presented by Dwight Baumann:

> It is not my intent to defend the concept of 13(c). However, 13(c) does provide a mechanism whereby labor can show their approval during the planning process. If it is fair for the union to have such a leverage, then the private operator should have the same capability for approval or disapproval.

When discussing the TSM process, the consensus was that the handbook should present guidelines on the TSM process and utilize the case study approach which would cite specific examples. UMTA and the International Taxicab Association (ITA) are developing a document directed toward the private operator "explaining the process and what UMTA regulations are, and how he can get involved in the planning process...." (Doug Birnie).

In summary, the forthcoming UMTA Paratransit Policy Statement will have an impact upon the relationship between the public and private sector. Public agencies responsible for preparation of the TIP and TSM will be required to identify techniques to involve the private operator in the planning process. In relation to the handbook, the participants identified a need to explain the TIP/TSM process and techniques which can be used to implement the policy statement when it is released.

FUNDING MECHANISMS/THE BROKERAGE CONCEPT

Funds for transportation services are available from a variety of federal, state and local sources. There exists at this time, however, no institutionalized method of coordinating these funding sources. The consensus of the session was that if paratransit services operated by the private sector were to be successful, a way must be found to coordinate and integrate these funding sources to ensure adequate financial support.

Tony Simpson addressed the issue in the following manner:

> ....I think there is a need to encourage the use of non-operating transit commissions or brokers, which channel the money through to the transit

districts. This gives the transit commission the authority to direct and allocate funds to transit and paratransit services as appropriate.

The use of a broker would also insure more efficient use of UMTA Section 5 funds. There is an upper limit to available Section 5 funds, and it will be rapidly attained if more effective and efficient spending procedures are not utilized.

The contracting of paratransit services to private operators can result in operating efficiencies. It is less expensive to contract the services than "to set up all the structures and to operate a public transit system" (Wally Atkinson). Such a system, however, cannot be expected to materialize so long as the transit authority takes the lead role in the planning process. As Gorman Gilbert pointed out, "you wouldn't expect the transit operator to bring in his competitor for this new service." Doug Birnie, however, offered a possible solution, "...the transit authority must become a broker."

Difficulties will be encountered in attempting to establish a transportation broker. Public transit authorities are well established in the area of public mass transit, i.e., rail, subway, bus, and they possess the right of local taxation to fund transit. The fact that the transit authority controls the funding is seen to be the biggest barrier to a coordinated system.

The discussion also focused on the true costs of providing transit services. The ability to identify the costs of providing service can be an asset in the local decision-making process. "California has considered introduction of legislation at the state level whereby transit operators must pay 30 to 40 percent of the total costs of operations out of the fare box" (Tony Simpson).

The myriad of transportation funding programs disguise the true costs of operating transportation systems. There is a substantial pool of funds for transportation projects outside of the Department of Transportation in the Departments of Housing and Urban Development (HUD) and Health, Education and Welfare (HEW). These non-DOT funding sources are not subject to UMTA regulations and, therefore, are a source of competition for the private operator.

Richard Gallagher perhaps sums up the situation best:

> Most of our (the private operators) problems today are stemming from other agencies: HEW, HUD, Department of Labor and various other agencies; and yet these agencies are not written into this (transportation planning) process in any manner or in any form. For example, there are no HEW regulations governing transportation, and no recognition of the tremendous amount of money that is spent on transportation services. ....There is a considerable amount of money available other than from UMTA.

The utilization of non-DOT funds for transportation programs tends to disguise the true cost of providing that program. In Arkansas, Community Development Block Grant money used to support transportation services has resulted in a decrease in the number of operating cabs. In other communities funds from the Comprehensive Employment Training Act (CETA) Program are being used to provide the labor for transportation programs.

In addressing this issue, Richard Gallagher stated:

> In many cases to accomplish goals efficiently at the state level, federal guidelines are being bypassed. However, the result is the delivery of cheap transportation services that would otherwise not be cost effective.

Integrating services provided under contract by a private operator can result in cost efficiencies for a transit authority. These efficiencies may be as a result of flexibility which exists in the private operators' work rules, i.e., ability to use part-time drivers or lower wage scales. Another reason for involving the private operators in the providing of services was identified by Tony Simpson:

> One of the questions is why would one get the private operator involved. The primary reason is costs, but there are some other benefits in terms of the private operator's dedication because this is his/her livelihood--failure can mean financial disaster. In general, the private operators, especially the taxi companies, are very committed to the service.

With transit authorities relying more and more on local funding for continuation of transit services, more consideration must be

given to the type and quality of service provided to the local community. With increasing costs, transit authorities are going to have to provide the service they do best -- fixed-route, line haul service -- and control their losses. However, if the transit authority is to depend more and more on subsidy money from suburban areas, it will have to respond to these areas' transportation needs. The development of community circulation systems under the umbrella of a transit authority offers potential for private operator involvement.

In discussing the implementation of the brokerage concept, the consensus was that the broker must have control over available funds in order to direct the use of these funds. Within the existing structure, the broker, to be effective, must be on a higher level than the transit authority.

The discussion identified several obstacles which are restricting the institution of the brokerage concept. One obstacle is the desire of each social service agency to control the allocation of its own resources. As Dwight Baumann recounted from an experience with a social service agency, "the resource which they would give up last is deciding whether Mrs. Smith or Mrs. Jones gets the first trip in the morning." Dwight Baumann further explained:

> There was a resource allocation question that caused the social service agencies to be developed. They felt somewhat disadvantaged, and that is the last thing they would give up, ...that is the reason that we have got the problem right now....little groups are formed and apply for whatever funding they can.

A second obstacle is the fear that funding paratransit services will reduce monies available for conventional transit systems. However, the money in question is in DOT funding programs and a large part of the monies for paratransit service comes from departments other than the Department of Transportation. As Richard Gallagher stated:

> There is more money for paratransit outside of the Department of Transportation than there is in the Department of Transportation. We are not going to take vast transit dollars away. There is going to be very little impact.

In summary, the concept of a transportation broker is one which receives much support. To date, however, there have been only limited attempts at implementing brokerage programs, and these have met with various degrees of success. If implemented successfully, the brokerage concept may result in cost efficiencies and an increased level of service. The participants suggested that the handbook identify various types of brokerage concepts and the pros and cons of each.

TRANSPORTATION ORDINANCES/REGULATORY CONSIDERATIONS

Local transportation ordinances are often restrictive when dealing with taxi services and as a result create operating difficulties for the private operator. Local ordinances have developed over a period of time, and therefore, in many instances are out of date. A study conducted by the ITA investigated what should be contained in a model taxi ordinance. In reviewing over 600 ordinances, it was concluded that most of the ordinances were unenforceable because the local community does not have the funds. The study also revealed that, in most cities if something was not explicitly allowed in an ordinance, it was prohibited. This resulted in service restrictions on the options available to the local operator.

Taxi ordinances especially restrict the taxi driver. In order to qualify for a license, the candidate must have a blood test and police check and undergo an eight-day waiting period prior to issuance of a license. These requirements are not required for bus drivers.

Making changes in the ordinances is not an easy task. Typically, when city leaders are approached concerning "a problem in the cab business, the first thing they want to do is rewrite the city ordinance " (Richard Gallagher). This process entails requesting similar ordinances from other cities. However, since these ordinances are often outdated, the process is self-defeating. New ordinances have to be drafted that recognize problem areas such as driver licensing. In assessing the necessary contents of an ordinance, John Hall stated:

> Ordinances should protect the public and the cab driver; not inhibit the cab driver in the performance of his job.

John Hall also offered the following synopsis of the existing situation:

> I have never felt that the government wants to put us (taxi operators) out of business....I think it is strictly through ignorance and misunderstanding. I do think we need to educate them (city leaders).

In relating this discussion to the content of the handbook, the session arrived at the following recommendations. The planner in developing a system must be cognizant of the regulatory process, and this recognition should be made a part of the planning process. As part of the TSM process, consideration should be given to studying and updating local taxi ordinances.

LABOR-MANAGEMENT RELATIONS

The introduction of paratransit services will impact traditional labor-management relations of private operators. Due to the unique operating characteristics of paratransit systems, changes are also necessary in the traditional staffing approach of mass transit systems.

A major efficiency in paratransit operations results from having a different union representing drivers and dispatchers. This solves the serious problem created by "a firm agreement between members of most unions -- sometimes involving a fine or other penalty -- so that nobody can tattle to management on any other member of the union" (Tony Simpson). If drivers and dispatchers were members of the same union, irresponsible drivers could park their buses during their work shifts and management would not be informed. Also, special arrangements could be made between drivers and dispatchers for extra or extended coffee breaks. This is not a serious problem in most fixed-route services, because the buses can be easily monitored.

There are several possible alternatives to rectify this situation. The most obvious solution is to have dispatchers and drivers be members of different unions. In some cases, dispatchers are considered part of management. A third alternative is to establish the paratransit system as a zone system. Under a zone system the driver's time is controlled by his checking in at the zone

transfer point.

The seniority clause in transit union contracts could, with the growth of paratransit, impact the wage level of private operators. The paratransit vehicles will be more attractive to operate and will, therefore, attract the senior bus drivers. With a greater number of drivers shifting into paratransit vehicles, the taxi drivers will identify more and more with conventional transit drivers and request similar benefits.

In a related labor-management issue, the difficulties taxis have in providing service to the elderly and handicapped was discussed. Taxi operators were identified as not understanding the problems of the elderly and handicapped. The transporting of a handicapped person, however, results in the taxi operator subsidizing the patron at a rate of 50 percent for the extra service which must be provided. There are many possible explanations for this situation, one of which is that the taxi vehicle is not designed for transporting the handicapped. Under traditional operating circumstances the system of tips reimburses the operator for any inconvenience; however, the handicapped or elderly person is usually not in a financial position to tip.

A possible situation to increase the incentive of the taxi operator to provide service to the elderly and handicapped is to provide the driver with a coupon redeemable in cash for the extra cost of the extra service. Wally Atkinson reported that:

> This is being done quite extensively in Canada. The average tariff to handle a handicapped person is $7.00 and is often billed to the Welfare Agency.

INSURANCE PROTECTION

Obtaining adequate insurance as required by local ordinances is also a problem for taxi operators. Insurance costs were identified as the "biggest growth area in the transportation field." As Dwight Baumann commented:

> The insurance that the taxi operator has is a one hundred percent markup in the difference of what he pays and what he gets back. That is one of the areas for some concern, and I think if one is going

to subsidize something, one might look at the possibility of subsidizing insurance.

Traditionally, taxi operators carry less insurance than conventional public transit authorities. The actual degree of insurance coverage that an operator is required to carry is set by regulations and likewise, premiums are usually regulated by the state. In cases where taxi operators are contracted by public agencies to provide services, the public agency will usually provide the additional coverage that the carrier should have.

Two reasons were identified in the discussion for carrying insurance. The first reason is to protect the public so they have recourse, and the second was to protect the owner of the system in case he is sued. It was also reported that there are "almost 58 major carriers that provide this type of insurance" (Richard Gallagher).

The recommendations of the session pertaining to insurance were the following. The first suggestion was that statistics be developed as to the cost per passenger mile of insurance. A second suggestion was to involve the government in a process of spreading the cost of insurance through some form of no-fault system. The final suggestion was to have the public body provide vehicles and insurance coverage under contract to the private operator who would provide the service.

SESSION II:

ESTIMATION TECHNIQUES

INTRODUCTION

The session covered a number of topics and centered more on development of improved estimation techniques rather than dissemination of existing techniques. Although most of the participants did not dwell on the Paratransit Integration Handbook itself, useful suggestions for the handbook did emerge. The chairman initiated the discussion by asking what should be included in the handbook and what gaps in knowledge would provide fruitful areas for further research. Ideas concerning the state-of-the-art and how it may change in the future were considered important. Another consideration for the handbook is the diversity of its users. Designers of small systems will not be interested in complex demand/supply models. The major question of the session was: What does the handbook user need to know about estimation and the process of starting a system?

The participants in Session II were:

Mr. Roy Lave - Chairman

Mr. John Billheimer	Mr. Gabriel Roth
Mr. Thomas Brigham	Mr. Veit Rothermel
Mr. Rinaldo Favout	Mr. David Rubin
Mr. Martin Flusberg	Mr. Samuel Schiff
Mr. Daniel Krechmer	Mr. Gordon Schultz
Mr. Steven R. Lerman	Mr. Howard Slavin
Mr. David Levinsohn	Mr. Richard Wilmuth
Ms. Ann Muzyka	Mr. Nigel Wilson
Mr. Basil Potter	Mr. Eldon Ziegler.

For the purpose of this summary, the session content will be divided into three general categories: (1) Pitfalls and Problems with Estimation, (2) Data Needs and Important Variables in Estimation, and (3) Items to be Included in the Handbook.

PITFALLS AND PROBLEMS WITH ESTIMATION TECHNIQUES

Questionnaires returned by the participants cited several major pitfalls in estimation: (1) overpopularity of the system resulting in its inability to function, i.e., Santa Clara, (2) poor ridership estimation, (3) overselling the system, and (4) inaccurate cost projections.

The increased acceptance of dial-a-ride systems has made it more important that this option be objectively evaluated. It is no longer necessary for the planner to serve as an advocate for a new concept. A more critical alternatives analysis is required in order to avoid repeating past failures. Biases favoring dial-a-ride have been built into estimation techniques in the past.

It was generally agreed that estimation techniques should give the provider of paratransit service an idea of what costs to expect. The increasing interest in using private operators adds another dimension to the estimation problem; that of profitability and driver income. Most of the techniques discussed in this section are concerned only with publicly-operated, dial-a-ride systems.

Participants discussed the use of sketch planning techniques and generally agreed that they were appropriate in initial mode selection and possibly in the early stages of system design. Paratransit can be implemented incrementally, due to the flexibility available in operations. With this approach, adjustments can be made on the basis of actual ridership and system performance, making initial estimates of demand less crucial. Sketch planning techniques can be applied in the initial implementation decision when little information is available. Steve Lerman stated that "When planning, one doesn't have a previous system at this scale on which estimates can be based. Detailed model systems that are very complex to apply are inappropriate because they are not likely to be more accurate than sketch planning." It was noted that current techniques are rarely successful in moving from project goals and objectives to the macro-design stage.

Goals and objectives need to be more clearly defined by those planning services. Projects can be designed to increase mobility for all groups or selected "target" groups. This type of decision will determine what estimation techniques are applied.

Another key problem is communication of information to decision-makers. Most participants agreed that plus or minus thirty percent is usually a reasonable level of accuracy for initial estimates of paratransit ridership. Problems are encountered, however, in communicating the significance to decision-makers of the extent and range of estimate bounds. It is essential that decision-makers recognize the limitations of estimation and the fact that ridership may vary significantly from day to day. With limited capital equipment needs, 25-30 percent error was considered acceptable. Even if the system is overdesigned, other uses can be found for the equipment. It was pointed out that a 25 percent error in staffing, however, could cause serious problems. The incremental approach to implementation was cited as a protection against errors in estimation.

The relative accuracy of sketch planning and more detailed modeling techniques was discussed. Howard Slavin felt that sketch planning techniques could not detect subtle differences between service areas; "we need at least some simulation results on how much variation there will be in level of service as demand patterns vary, perhaps from day to day, but more importantly simply in space." It was then suggested that more research be done to determine which models are applicable in different situations. John Billheimer defined sketch planning as "using the tools at hand....population, maybe some socioeconomic disaggregation and whatever you can pull from the census and whatever additional information is built from existing simulations and past experience." Roy Lave said that the spatial factor is needed "in selection of alternative service configurations," and that ways are needed to "look at data that's generally available and generate need patterns."

Concern was expressed that rules of thumb can be simplistic and may cause planners to exclude paratransit as an alternative in

areas where it would work successfully. Sketch planning tools are needed to help the planner narrow the alternatives before the detailed design stage. The large number of available choices makes it necessary to eliminate unrealistic alternatives in the early stages. Participants did agree that despite the inadequacies of sketch planning techniques, many local planners and operators must rely on them. Tom Brigham felt "it would be very difficult to try to persuade a local planner/operator to adopt a very detailed and complex modeling approach when it seems much simpler to put the buses out, see where people want to go and add on that basis."

Planners must be made aware of the problems involved in the use of sketch planning techniques. These techniques will be improved with input from more detailed models and simulations, as well as expanded data on operating systems.

DEVELOPMENTS IN MODELING TECHNIQUES

Roy Lave indicated that the session should focus primarily on the "micro" aspects of estimation such as the relationship between demand, supply and level of service. However, Basil Potter cited some important "macro" considerations which he felt should be discussed first: (1) the involvement of the private operator and resultant problems with subsidy, profitability and driver income, (2) the parameter which is known as "uncertainty" and involves promised time of pickup, and (3) long-range impacts of demand due to such factors as gas prices and government incentive programs.

Eldon Ziegler stated that estimation is not a single problem but a whole series of problems which should be considered separately. Different service types and geographical areas require different estimation procedures. It was mentioned again that better sketch planning techniques are needed to deal with these types of problems, and that a better data base is needed.

Discussion focused on methods for obtaining information on particular market segments targeted for service. There is a need to determine the demand patterns which are characteristic of

those market segments.

Areas receiving new paratransit service often have no service at all. Thus, a major issue is geographic transferability; can models calibrated in one city be applied to another? Steve Lerman suggested that "side-by-side comparison of model methods" is needed. Eldon Ziegler asked, "how do you decide what locality you use as your base case?" According to Gordon Schultz, "transferability was better once you entered in all these different market segments and socio-economic variables." Level of disaggregation can be brought down to the household, which is an appropriate level for dial-a-ride. The short trip lengths, specific market segments and generated trips characteristic of dial-a-ride are difficult to deal with at an aggregate level.

Steve Lerman discussed a research study conducted by Cambridge Systematics, Inc. and Multisystems, Inc., "Method for Estimating Patronage of Demand-Responsive Systems." He emphasized that it is not a final planning tool and needs improvement. It is a sophisticated, computer based model which, "develops a sample of households and is capable of forecasting the demands for each household individually as a representative sample." The three major classifications were auto ownership, age (under 16 and over 65), and the availability of driver's licenses. Although further segmentation is desirable, there is the question of whether data is available to support that segmentation. The model also predicts level of service given a configuration. Service variables include vehicle fleet, size of vehicles, speed of vehicles, pick-up and drop-off time and some crude measures of dispatching policy. Performance is predicted in terms of wait times, ride times and demand levels by market segments. The model is for on-demand service only. There currently is no model which can distinguish between reservation and non-reservation systems.

Martin Flusberg emphasized that in a demand-responsive system supply characteristics are much more dependent on demand than in fixed-route transit. This model has a procedure which iterates between supply and demand. Additional supply models that are external to

the particular software package have been incorporated to allow modeling of slightly different system variations.

User perceptions of different variations in service were considered a major area where further research is needed. Nigel Wilson stated that better understanding of these perceptions is needed in modeling both demand and supply. Reliability is a very important factor which needs to be included. According to Wilson, "reliability is very important to use and that's the Achilles heel of DRT, generally the many-to-many cases which we may be able to overcome by supplying some type of structure to the service." Basil Potter also emphasized the importance of uncertainty based on "the little history we can get from small dial-a-rides on the West Coast."

Another question discussed was whether research into paratransit estimation should focus on modal split techniques or service-specific techniques. Steve Lerman cited a major drawback to modal split as the need to describe alternative modes.

A question was raised concerning the need to develop detailed models when 25-30 percent accuracy is considered sufficient and can be achieved with sketch planning techniques. Both Howard Slavin and Basil Potter pointed out that detailed modeling efforts have uncovered relationships which are not apparent in sketching planning techniques.

To summarize, there were several opinions concerning the future direction of research into paratransit estimation techniques. Efforts to develop more sophisticated models will continue. Levels of accuracy in the 25-30 percent range have been achieved and this may be sufficient. Techniques need to be developed that are geographically transferable and that can account for the impact of service reliability on demand. It was agreed that easy-to-apply sketch planning techniques are needed for designers of smaller systems. It must be recognized, however, that these techniques are useful only in generating estimates of overall paratransit demands, and are most appropriate in initial mode selection. It was felt that as computer-based models and simulation studies are

further developed, sketch planning techniques will also be improved.

SUGGESTIONS FOR THE HANDBOOK

The diversity of the potential handbook audience makes the presentation very important. Designers of small systems will not be interested in more complex modeling techniques, but will need to generate ridership estimates. The pitfalls encountered in past experiences will clearly be of use to system planners. This is especially true where political considerations create pressure for unrealistic operating policies. The planner may need documentation of past experiences in order to advocate a workable system. Nigel Wilson warned against overselling the system, stating that more critical evaluations of demand-responsive systems should be made.

Other suggestions included:

1) The need to address the process of local goal selection and its implications. Local planners and operators often attempt to implement systems without setting goals or evaluating alternatives in terms of goals.

2) The need to communicate the limitations of estimation to decision-makers.

3) The appropriate uses and limitations of sketch planning techniques.

4) Use of easily-available data (census, local travel surveys) to generate estimates. Ways to use available data.

5) Guidance concerning the costs and benefits of data collection. At what point is it more cost-effective to simply experiment with a small system?

6) Methods of narrowing the wide range of alternatives available.

7) Tabulation of data from existing systems for use in

(a) determining empirical rules of thumb, (b) building data base for future research.

8) List of important variables.

SESSION IIIA:

SYSTEM DESIGN FOR NON-AUTOMATED SYSTEMS

INTRODUCTION

Session IIIA, System Design for Non-automated Systems, focused on the considerations necessary to design a non-automated paratransit system. A non-automated system is defined as one which is manually dispatched and controlled. The session was designed to emphasize the fact that simple, manually dispatched, low capital intensive paratransit systems can be implemented successfully and can form the base on which to build more complex service.

When considering non-automated paratransit systems, it is necessary to divide them into two categories: (1) paratransit service integrated with regular transit service, and (2) paratransit in a small community with no existing service. The system design process will depend upon the service type. It was felt that when a small community designs a paratransit system, it is important for them to understand the potential contributions of the private operators and to seek their involvement in the design process.

This synopsis will be organized around the following subject areas which formed the basis for discussion during the session: (1) Involving the Community and Private Transportation Operators, (2) System Design Considerations, (3) Integration, (4) Vehicles and Equipment.

The participants in Session IIIA were:

Mr. A. U. Simpson - Chairman
Mr. James Bautz
Mr. John Beeson
Mr. John Billheimer
Mr. Ronald Kirby
Ms. Benita Gray
Mr. Martin Flusberg
Mr. Michael Markowski
Ms. Ann Muzyka
Mr. Gordon Schultz
Ms. Jill Strawbridge.

INVOLVING THE COMMUNITY AND PRIVATE TRANSPORTATION OPERATORS

The session addressed ways in which the community and the private operator can be involved in the system design process, the types

of expertise which the private operator can provide the design process, and whether the private operator can design the system himself. It was generally agreed that the private operator has much to offer the planning process in terms of his/her extensive knowledge of local operating conditions and of the transportation needs of the community. It was also conceded that the private operator is not involved more heavily in the design of transportation systems because of lack of knowledge of the planning process.

Transportation planners as well need to be educated as to the potential use and expertise of the private operator. The planner will then be able to seek the involvement of private providers in those areas where they are able to provide valuable insight. It is important for planners to develop solid working relationships with the private operators in their community. As John Beeson stated:

> ...until you can establish some rapport and confidence between the industry and government, you haven't got anything...whatever it takes to establish that rapport I think you have to do before you can start to plan anything....

The role that the private operator and the local community will be able to play in designing a system is determined by the structure of the local planning process. Martin Flusberg described the problem well:

> You have to take a step back and look at what the overall planning process is in a given area...this has a tremendous impact on the way the local community and private operator will be involved... States, in some cases, have planned it (paratransit systems) entirely from the outside without any community involvement. Continuing along the spectrum, some states have provided input to a local community action group to develop service. In some cases, the private operator has developed service on his own.

It was felt that the Paratransit Integration Handbook should recommend to the party responsible for designing the system that in order to ensure wide public and political support he should seek involvement in the design process from as wide a spectrum of community groups as possible. By stating the recommendation in this

way, it was thought that the need to describe problems which arise in relation to specific planning structures could be eliminated from the handbook. Several participants felt that the handbook should include lists of community groups to be contacted and examples of community participation processes.

The session participants felt that there was a need for two separate, complementary planning manuals. One manual is to outline the planning process for the private operator and identify ways in which the private operator can participate. As Tony Simpson states, "The private operators could do more if they had more technical and political awareness. They know how to run things, but often do not have the training to present their case properly to technical planners and elected representatives."

The second manual is to be written from the planner's perspective. Martin Flusberg described the focus of this manual.

> The other study is aimed directly at identifying ways for the private operator to get involved in the planning process. This handbook is aimed at 1) planners and 2) a much wider range of issues than just the planning process. (The handbook) should be identifying ways in which private operators have been involved in paratransit and ways in which private operators may be asked to become involved in both planning and operations.

The session participants agreed that the proposed Paratransit Integration Handbook should be written for the planning community. It should stress the importance of involving the community and private operators in the initial stages of the planning process. This will result in a system with wide public support.

SYSTEM DESIGN CONSIDERATIONS

The session discussion focused initially on the structure of the planning process in smaller communities. It was generally agreed that the controlling factor in determining service characteristics is the initial political decision that something should be done for Group X and that this is the amount of money to be spent.

The city council or another political body will make the decision to sponsor transportation service in response to the following

factors: (1) citizens demanding a certain type of service, (2) UMTA's requirement that special efforts be made to provide service to the elderly and handicapped, and (3) the planning staff suggesting service in response to identified needs. Once the decision to sponsor service is made, then the transportation planning community will delineate various service alternatives in response to documented demand patterns and which meet the guidelines laid out in the political mandate. Ronald Kirby described the role of the planner as follows:

> ...the planners have to understand what the options are and present them to the community representatives and say, "Here is what we can do, A, B, C, or D; what do you think?" There can be some discussion back and forth, but the community groups are not going to be able to come up with all of the alternatives; they don't have the expertise to do that.

It was generally agreed by the session participants that the handbook should outline this type of planning process as the most realistic and effective for smaller communities.

After the initial budget decision is made, there are three factors which determine the type of service which will be implemented: (1) the user payment or fare, (2)the level of service which will be provided, and (3) the number of trips users will be allowed to make. At this point, consultations with community groups are necessary to determine the trade-offs the public will support and the characteristics of the service. The session participants felt that it was important for the community to be involved at this point in the process. If there was not a formal process for community participation, then informal procedures should be developed.

The session turned briefly to the issue of demand estimation. It was felt that there is a need for simple, inexpensive estimation techniques. The low capital investment required and the flexibility of paratransit services means that sophisticated demand models are not needed. Ronald Kirby described the situation as follows:

> ...the planning community out there right now is unfamiliar with the latest modelling, and

> we have to have simple techniques (rules of thumb) that they can use right away.

There was a lengthy discussion of the implications of changing modes of operation in response to daily variations in travel demand. It was agreed that operationally there is no problem adopting this strategy. Problems arise, however, because the various market segments that exist and their service needs are not recognized by those responsible for designing service. James Bautz described the problem in terms of the orientation of the planning community:

> I think the major problem from the planning point of view is to get the planners and operators to recognize the various markets that exist and stop thinking of aggregate demands.

The session participants felt that it was important, especially in smaller communities, to develop personalized service; service which makes the users feel that it was designed to meet their needs. This can be achieved through operating policies such as the variety of service types offered, driver assignments, etc., and marketing programs. The extent that the service can be marketed will depend upon the primary mode of operation. For example, if a shared-ride taxi service is being offered, extensive promotion can result in greater demand, especially during peak periods, than the vehicle capacity can serve. These constraints must be considered early in the system design process. The marketing program must be designed in conjunction with the system configuration.

A corollary to the issue of developing a variety of services in response to daily variations in demand is the issue of substituting one service for another when demand is great enough. For example, how does one substitute fixed-route service for dial-a-ride service when there is sufficient demand to support the fixed-route service. The attempts at this service change -- i.e., Rochester, N.Y., Orange Co., CA -- have so far been unsuccessful.

The session participants felt that the planning handbook should emphasize the need for those planning the system to develop precise

objectives which respond to the basic political mandate. The service change should then be implemented smoothly and in stages. The dial-a-ride system should not be completely eliminated by fixed-route service, but rather only in those corridors where there is sufficient demand to support the scheduled service. It was felt that fare differentials and other incentives are needed to encourage people to use the desired service.

James Bautz felt that the handbook should address ways to use differential pricing to influence the market to move in a certain direction which will make the system more efficient without significantly inconveniencing the users. He said, "I don't think a lot of people, particularly in designing small systems, recognize the importance of pricing the service to get the type of response they want to see."

The final area discussed in relation to system design considerations was service area delineation. The question was how does the planner make the decision as to which areas within the political jurisdiction of the sponsoring authority will receive service. It was felt that above all the service area must reflect the political objectives and budget constraints of the sponsoring authority.

After the political considerations, the service area chosen will be dependent upon the type of paratransit service to be offered. Three major applications for paratransit service were outlined: (1) to serve areas where there is no regular transit, (2) to serve specific market segments which cannot use regular transit, and (3) to integrate with regular transit service. A service area based on zones is appropriate for a service where the spatial area served is a more important criterion than the market segment served. Tony Simpson described when a zonal service area would be appropriate:

> A zonal system, which is relatively easy to synchronize for transfer to other transit, would be oriented towards an integrated operation; whereas, for a target group or a situation where there is no inter-modal transfer, then a many-to-many (non-zonal) system is often more appropriate.

The service area should be based on actual trip patterns. It

should be structured in such a way so that the majority of origins and destinations occur within the zone. The size and shape of the service area should be designed so that light demand in one area of the zone will not degrade service for the rest of the zone. According to James Bautz, "The zone must be structured to cover the trip demands of the people living within it and to accommodate the greatest number of trips."

In conclusion, there was a consensus that the system design process should begin with a realistic assessment of the political and financial constraints facing the proposed service. This will also determine the size of the service area. Three factors will then influence the type of service which will be provided: (1) the user payment, (2) the level of service, and (3) the number of allowable trips. Community groups must be involved at this point to determine the trade-offs between these factors. It was also agreed that various market segments and their needs must be identified, and service designed to meet these needs. This type of analysis will ensure a smooth transition from one service type to another.

INTEGRATION

The session participants discussed the integration of demand responsive systems in pulse-type operations. A pulse system is one in which all vehicles are on similar schedules and are synchronized to meet at one common point. This makes transferring very easy with little or no wait time. A similar type of system is the timed transfer system where there are a number of coordinated transfer points throughout an area which allows a person to make a 2 or 3 transfer trip with no waiting time. This system has been implemented successfully in Canada.

The participants emphasized that developing coordinated, on-time service is no accident. The coordination strategy must be carefully thought out and built into the system design. Many-to-many, dial-a-ride service is especially difficult to coordinate.

It was also felt that it was essential that the transfer points be convenient, clean, sheltered, and safe. Minor services,

communications systems, and transit information should also be provided. The signing of the transfer point so that people can find their way easily and quickly is crucial. It was felt that the handbook should provide examples and specific references to communities which have developed successful signing strategies.

A good, convenient service is easy to market. The handbook should recommend strategies for disseminating public information, the things to be considered when developing these strategies -- i.e., signs, station design, etc. -- and where in the planning process these things should be initiated. The participants felt that the public should be provided with as much information about the transit system as possible. As John Hall stated, "...the easiest thing in the world is to call a taxicab, but the hardest thing is to figure out the schedule of the buses - a lot of people are confused by it...."

An integrated, dial-a-ride and fixed-route transit system frequently poses problems with personnel. Tony Simpson describes one problem as follows:

> In an integrated system the possibility exists of having the fixed-route drivers in one union and the demand-responsive drivers in another union or non-union. This can create union-jurisdictional problems.

Ronald Kirby added another dimension to the problem:

> This is one of the things that we haven't yet done institutionally in the U.S....establish formal coordination transfers between privately operated taxi services and conventional public transit services.

The participants agreed that many of the personnel problems posed by service integration stem from the uncertainty surrounding the application of Section 13(c) of the UMTAct. James Bautz described the problem this way:

> The first thing that has to be done in this whole area of labor is to clear up the misunderstandings, determine exactly who is covered and to what extent they are covered, and what is required by law versus what is required by administrative ruling.

The Department of Labor and the courts will be responsible for clarifying Section 13(c). The Paratransit Integration Handbook should describe the current state of the Section 13(c) regulations in as much detail as possible including any future implications. In the meantime, the participants recommended that only selected personnel from each system component -- i.e., dispatchers -- be allowed to communicate directly with each other. Separate communication systems should be used as much as possible.

It was felt that the handbook should describe successful integrated systems. It should also describe ways to overcome the institutional barriers to integrating demand-responsive and fixed route transit systems. The components which are essential to a successful, integrated service must also be described in depth -- i.e., on-time service, convenient transfer points, marketing.

VEHICLES AND EQUIPMENT

The key issues which should be addressed in the Paratransit Integration Handbook in relation to vehicles and equipment are: (1) descriptions of the range of equipment available and the needs it will service, and (2) procedures to control the quality of equipment. The session participants emphasized that a mix of equipment to serve various travel needs is desirable. For example, to provide community service, a heavy-duty sedan may be the most appropriate vehicle; to provide service to groups of the elderly or the handicapped, however, a specially-equipped van may be necessary. John Hall described this concept as follows:

> I'm talking about two vehicles for two different types of service. For a fast paratransit service with up to three stops you need a heavy-duty sedan...Now, if you get into the delayed type of service, the nutrition programs and going to the doctor's office, then we transport more with vans.

The session emphasized the need for government and industry to develop a reasonably priced, comfortable, and efficient small bus.

SUMMARY

Gordon Schultz outlined the philosophy that should be presented in the planning manual in relation to designing a non-automated paratransit system:

> You have to know what you really want to do with your system; you have to know your objectives, and then you can design your system.

SESSION IIIB:

SYSTEM DESIGN FOR AUTOMATED SYSTEMS

INTRODUCTION

Discussion in this session centered on the state-of-the-art of computer technology in paratransit systems. Participants generally agreed that automation could perform a number of useful functions for both public and private paratransit operators. It was agreed that the Paratransit Integration Handbook should be more concerned with applications of computer technology than its development. The handbook user will be looking at the computer as a black box, and will be interested in inputs and outputs rather than the contents of the box itself.

The user, however, should be made aware that if she/he does not understand the assumptions and operations in the black box, significant error in interpreting the results could, and probably will, result. Most of the participants, however, were involved in the development of automation technology and as a result, much of the discussion concerned current research and development efforts. The participants know that the technology is advancing very rapidly. Current techniques will be obsolete before they can be widely disseminated through the handbook. For this reason, it was agreed that the handbook should not contain a step-by-step procedure for implementing an automated system. Focus should be on discussion of the advantages and disadvantages of automating and the various functions for which automation is appropriate. It was suggested that descriptions of automated systems and the techniques used to implement them would be more useful than a cookbook approach. In this session review, discussion topics will be categorized under three headings: (1) Threshold Level for Automation, (2) Experiences with Automation, and (3) Developments in Automation Technology.

The participants in Session IIIB were:

Mr. Thomas Brigham - Chairman
Mr. Dwight Baumann
Mr. B. Paul Bushueff, Jr.
Mr. Dennis Goeddel
Mr. Dan Krechmer

Mr. Andrew Canfield
Mr. Thomas Carberry
Mr. Larry Coleman
Mr. Neal Colvin
Mr. Paul Connolly
Mr. Rinaldo Favout
Mr. Gorman Gilbert
Mr. Basil Potter
Mr. Veit Rothermel
Mr. David Rubin
Mr. Richard Wilmuth
Dr. Nigel Wilson
Mr. Eldon Ziegler.

THRESHOLD LEVEL FOR AUTOMATION

Chairman Tom Brigham cited several levels of automation, increasing in sophistication from automation of customer booking to dispatching algorithms employed on a batch system basis to a system consisting of fully automated customer booking, passenger scheduling and vehicle dispatching functions. The first level is the type used in the Ann Arbor dial-a-ride system while Rochester is using the fully automated system.

Basil Potter stated that the threshold of automation for shared-ride taxi service appears to be 20-25 cabs. He also felt that the levels of automation described above are not important in determining the threshold: "I have more trouble distinguishing between the Ann Arbor and Rochester systems than most people do. I lump all on-line computer systems into a single class of cost generators which can provide services based on need and where we are in the art at a given time." Paul Bushueff, however, said that a collection-distribution service such as Ann Arbor would have a higher threshold level of automation than a "more many-to-many environment." Basil Potter agreed that "when you get into an environment you have to address each environment on its own merits."

According to Richard Wilmuth, the question of threshold is tied more to advances in state-of-the-art and relative costs:

> If we could solve the software problem where there was a good algorithm, a good dispatching, recordkeeping and management procedure that could be microcoded and put on a couple of discs or passed out...free of charge from TSC, could we be putting in a lot of systems at a very low price?

Dwight Baumann felt that local operators would be more interested in automating bookkeeping functions than in automating dispatching. It was agreed that even if dispatching could not be automated, use of the technology for back-up functions such as bookkeeping and record-keeping should be encouraged. Basil Potter emphasized the benefits and cost savings that can result from automation, even in a relatively small system.

> The cost effectiveness of a machine, particularly when you consider the background programming like driver referrals and records, inventory lists or maintenance,parts-certainly telling when your vehicles should be in for inspection- and a host of other routines that can be put on the machine...even including inflation and five-year cost projections, a fairly expensive machine may be a lot cheaper than the cost of resisting automation.

Tom Brigham mentioned the problems in Rochester, indicating that the number of vehicles in operation at a given time has been too low to result in productivity increases from automated dispatching. According to Nigel Wilson, increased productivity from automation "depends on the institutional aspects...can you in fact really reduce the number of vehicles and drivers out there... even if you have level of service improvement, and if not, can you increase demand by improving level of service? There is no evidence on either point that I find persuasive."

System complexity is another consideration in determining whether or not to automate. It has been suggested that systems of the same size will have different automation needs, depending on the variations of service being run. Tom Brigham asked for comments on "the service integration issue, that is, in fixed routes with demand-responsive systems and whether in fact automated systems allow that to be done more effectively." Nigel Wilson replied that:

> The key there is the service approach that you take and I think one of the things we learned in Rochester was that with an unscheduled taxi route service it's very difficult to do that, whether it's manually controlled or automated.

> The Ann Arbor or any of the Canadian approaches with a zonal system operating on schedule basis seems to me to be far superior if a lot of your traffic is going to be from fixed-route to flexible-route service.

Nigel Wilson added that some type of zonal configuration is necessary if the volume of transfers is high. The Ann Arbor experience shows that a zonal system can be effectively used to organize transfer points. Basil Potter reiterated that Ann Arbor could not be run manually in its present configuration and that the question concerning automation is not if it should be done, but how it should be done. Dwight Baumann pointed out that there are a number of services using shared-ride principles (school services, deliveries) which have functioned effectively without automation for a long time. Richard Wilmuth cited the fact that a dynamic shared-ride system is different and has a more complex nature:

> "He (the driver) doesn't start with 10 trips, he starts with one trip and then other pickups and dropoffs get added to it and the schedule changes. That's a vast difference. You have all 10 and you are trying to look at a map and put the dots on a map - there is a major difference in complexity."

Paul Bushueff asked if 20 vehicles was a reasonable threshold level for automation in a zonal-type operation. Nigel Wilson replied that the question is still open:

> I certainly don't agree with the fact that we know 20-25 vehicles is the switchover point for the Ann Arbor type system and I certainly wouldn't like to make a similar statement for many-to-many systems. I don't know what the figure is. We haven't seen the benefits.
>
> There are ancillary benefits which you can't clearly identify which tend to be the first thing taxi operators go to; automation of the payroll, accounting, etc. If you are looking at justifying it on the basis of dispatching improvements I don't see the breakpoint as being defined for any of these services yet. I don't think we have reached the state-of-the-art where we can't define everything. I think this handbook should be designed for the vast set of systems which are going to be implemented with 20 vehicles and below per module and I think we

> can't really say very much about higher systems because we have little experience.

Gorman Gilbert agreed that the handbook "should not be prescriptive...but have some examples and description of how it should be done and important parameters about cost and other things." Dwight Baumann emphasized that the handbook should recognize that most people think their particular situation is unique. It should avoid being "paternalistic" or "over-bearing." Basil Potter felt strongly that people who are involved in automating a system must consider what is necessary for the particular area and what perception people in the area have of what the system must do.

The consensus of the session was that a threshold level for automation cannot be defined in terms of either system size or complexity. Even operators of very small systems can benefit from automated bookkeeping and record-keeping. The benefits of automated dispatching and scheduling are not as obvious. The technology must be further developed before costs and benefits can be fully analyzed and threshold levels determined.

EXPERIENCES WITH AUTOMATION

Eldon Ziegler briefly reviewed some of the automated systems in North America. Los Angeles Yellow Cab has a basic information system which has not been expanded. Ann Arbor has added digital communications control and the People's Cab Co. in Pittsburgh has added fare calculation capabilities while Mississauga, Ontario, has combined vehicle location and digital communication. These were all basically information systems without decision-making capabilities. Several operations have adopted simple decision-making systems using queueing techniques. Ziegler went on to describe more sophisticated decision-making systems.

> Beyond that, Rochester, Santa Clara County and the Diamond Cab System in Montreal were the three that actually have had or attempted to do the full scheduling where there is some basically non-interrupted process between the time the information is entered and the time it gets out to the driver.

Tom Brigham acknowledged that hardware costs are dropping rapidly but brought up the point that the software is not in distributable form. Eldon Ziegler did not think the software was even close to being in distributable form. Also, in regard to computer costs for dial-a-ride, he observed:

> Just the cost of it (the hardware) is a major difference in contrast to...our $10,000 - $20,000 little system for Knoxville for an information system...we are looking at something around $250,000 - $500,000 for that kind of system; an order of magnitude difference. It's basically in the developmental state at this point.

Basil Potter, who developed the Ann Arbor system, felt that it was assured of functioning on a relatively inexpensive machine. Ann Arbor had the advantage of a coordinated fixed-route/dial-a-ride system; an institutional structure that exists in only a few places. Potter felt that his ability to coordinate was very important in the success of the system:

> If you want to use the zonal configuration and avoid an incredible number of transfers you would have to integrate it with a fixed-route system. You will have to be able to coordinate, to advance, to actually control the headway of your fixed-route system.

David Rubin said that improved service provided to users through automation should be considered a real productivity, even if demand does not significantly increase; "the question is at whatever demand level is operating did the machine do better than the human." Paul Bushueff stated that the justification for automating shared-ride taxi was not necessarily an immediate increase in demand but a reduction in the fleet size and the consequent savings. Eldon Ziegler pointed out that the cost/benefit rationalization depends on where the improvements from automation are found:

> If you could show a productivity improvement you can justify a lot of money being spent on the control system because there is a lot of money spent on operation. Whereas if you are showing an improvement in the dispatch center itself there isn't a lot of money spent there

> so you can't justify as much money for the control system.

Tom Brigham felt that the vehicle reliability problem in Rochester has prevented fleet size from reaching a level where productivity increases will occur. Nigel Wilson questioned whether it is realistic to expect a reduction in the number of vehicles and drivers. Basil Potter cited Ann Arbor as an example of a system where a consistently high level of service has resulted in gradually increasing productivity. A realistic measurement takes several years.

Questions were raised concerning increases in productivity and/or demand resulting from automation. Supply models indicate that a 25% increase in demand is necessary in order to improve productivity by 10%. This is a significant demand increase which has not been experienced despite improved levels of service. Nigel Wilson underlined this problem in his discussion of the Rochester experience:

> The most dramatic improvement is in terms of reliability...of pick-up times and service times... but that has not been transferable into improvement in demand so we haven't seen that feedback which conceptually should be there...we haven't been able to improve productivity.

Basil Potter emphasized that operators are primarily interested in short-term cost savings, with long-run increases in demand and productivity secondary considerations. Dwight Baumann felt the automated fare system being used in Pittsburgh will pay for itself by reducing a driver theft rate which goes as high as 50% in some operations.

Dwight Baumann pointed out the marketing benefits of automated fare collection.

> The computer aid...makes it clear there is a top limit and if you think about it, the taxi industry is really the only transportation industry where you don't know before the trip starts what it's going to cost.

Basil Potter mentioned the importance of increased accuracy which resulted from digital communications in Ann Arbor. Elimination

of transcribing errors has benefited both riders and drivers. Neal Colvin added that in Rochester digital communications reduced radio congestion, improved accuracy and significantly reduced the amount of time the driver had to wait for information.

The participants in this workshop clearly favored further development and dissemination of automation technology. Although several participants admitted a bias in favor of automation technology, a number of benefits were clearly established. Major increases in productivity and demand have not been realized, but it was felt that these benefits need a longer time frame to become significant. Cost reductions and service improvements have been established in other areas, however, such as maintenance, bookkeeping and automated fare collection. There was general agreement that further development of automated dispatching and scheduling will eventually bring similar benefits in these areas.

DEVELOPMENTS IN AUTOMATION TECHNOLOGY

Basil Potter felt that the more fully-automated, Rochester-type systems "will come into vogue as opposed to an Ann Arbor approach, even in Ann Arbor-type environments." Additional steps should be automated but "with great care and step-by-step evolution."

The participants agreed that the decreasing hardware costs will soon make this a relatively minor consideration. Basil Potter stated that the major consideration with the software is "how much across the spectrum can you use, as a manufacturer, one set of software?...It would be very inexpensive if you could find enough users for the package. If you can't, it's prohibitive."

Dennis Goeddel brought up the question of whether systems can be built from a base of core elements:

> Are there basic building blocks or modules that can be identified for such a system that would be compatible for a number of different users or operating environments. If so, then these modules can be packaged together and marketed.

Basil Potter said that at least 50% of a typical system's needs could be serviced by a general package -- including the MIT

scheduling algorithm. The system is modularized very easily. Dwight Baumann, however, felt that borrowing software is not the common practice; most people prefer to develop their own. Basil Potter agreed but said that the situation is changing and use of software modules will become more common. Richard Wilmuth mentioned a number of basic modules which could be mass produced and sold, including street name files, correctors and processing and visual communication. According to Neal Colvin, some of the Rochester software may be distributed independently in modular form including,"Go file, called street name, spelling corrector and network maintenance system." He expressed confidence that the applicability of modules will be more widely shown and will gain greater acceptance. Richard Wilmuth felt that the software will have to be standardized due to increasing expense:

> Software has traditionally been so expensive for people who developed it...and the problem is much more compounded on mini-computers than it is on large computers because the ratio of cost of software to hardware is so different.

Paul Bushueff asked how the handbook should treat the subject of the scheduling algorithm:

> Is the...consensus here that the algorithm as it stands is pretty much set? Should we be looking toward the development of front-end filters to reduce the processing costs? Where do we stand with respect to the algorithm and what needs to be done and how should it be addressed in the handbook?

In order to allow relatively inexpensive machines to automatically book trips and tours, Basil Potter said that (based upon observations of manually scheduled system) "pre-filtering" before processing by the MIT algorithm will work but is not yet a proven concept. He feels it is a few years away for smaller machines. Eldon Ziegler described three parts in the development of automated scheduling for demand-responsive systems: (1) A procedure for evaluating alternative potential assignments. This capability should be transferable. (2) How do you compute the elements that go into travel time estimates? (3) Search techniques for how you efficiently go through and decide which

alternative assignments to evaluate.

Nigel Wilson felt that a different structure of decision-making is being formulated:

> We are investigating looking at deferring most decisions--until later on to reduce the amount of reassignment that we might have to be considering. That is something which is being tested right now in simulation model. I am fairly optimistic because that might be a much better structure in decision-making and I think we formulated it fairly efficiently as well...that it might be a big step forward.

It was agreed that development of this process is continuing and is not ready for distribution. Andy Canfield summarized this feeling:

> The whole area of automated dispatching is experimental at the moment. Each system is kind of unique and set up to try new things. I don't think it's to the stage yet where we want to be sending it out through the handbook unless we want the handbook to be replaced every two months.

SESSION IV:

IMPLEMENTATION AND OPERATIONS

INTRODUCTION

In Session IV, Implementation and Operations, the discussion focused on issues relevant to the operation of a paratransit system from a management perspective. The management of a paratransit system demands an awareness of the differences between that system and a conventional transit system. Paratransit systems implemented to date and operated as part of a larger transit system have not met with the level of success attributed to strict paratransit operations.

In the beginning of this session, the participants discussed the impacts that management strategies have on the successful implementation and operation of a paratransit system. This discussion also expanded into specific aspects of system operations. Among these topics were meeting the specialized needs of the elderly and handicapped, labor-management relations, vehicles and marketing programs.

The participants in Session IV were:

Mr. Bernard Blood - Chairman	Mr. Richard Gundersen
Mr. W. G. Atkinson	Mr. W. Donald Kendall
Mr. Charles E. Barb	Mr. Roy Lave
Mr. M. Douglas Birnie	Mr. L. L. McDonald
Mr. Francis E. K. Britton	Mr. Gabriel Roth
Ms. Suanne Brooks	Mr. David Spiller
Mr. Richard Gallagher	Ms. Ling Suen
Mr. Karl Guenther	Mr. Paul Wenger.

The following synopsis of Session IV will reflect the main subject areas which were discussed: (1) Management Aspects, (2) The Needs of the Elderly and Handicapped, (3) Training Programs, (4) Labor-Management Relations, (5) Marketing, and (6) Vehicles and Maintenance.

MANAGEMENT ASPECTS

Transit system middle management is traditionally caught between implementing the ideas of planners and the restrictions imposed by union work rules. It was within this level of the transit operations hierarchical structure where constraints to implementing and operating a successful paratransit system were identified. Wally Atkinson supported this contention in the following manner:

> The institutional constraints to implementing a new system rests with the operations managers. Unless they believe the system will work and are confident in the design of the system, they won't support it.

Karl Guenther supported this philosophy by stating "that the middle management is the real target for the institutional constraint or the reservation in establishing a paratransit system."

Further analysis of the middle management question provided additional insights into the roots of the problem. Two underlying principles which were identified in the discussion were; (1) middle management's skepticism of paratransit systems, and (2) a second class stigma attached to paratransit systems by middle managers.

Paratransit systems are usually initiated by planners at the request of suburban or small communities; rarely is a system initiated by an operator. Systems are also initiated in some cities in response to the elderly and handicapped question especially in light of UMTA requirements. As Doug Birnie stated:

> Even when they (the transit operators) are providing paratransit services, they generally do so becasue of E&H guidelines and requirements. The line haul business, however, is really what they are interested in and what they know how to do.

Wally Atkinson defended the operator: "The transit operator is very suspicious in that something has been planned without input from him on the fiscal side."

Karl Guenther suggested that if people truly wanted to initiate paratransit systems, they should provide some form of incentive to the operator. Although no specific incentives were suggested, it was noted that they do not have to be monetary or a threat of withdrawal of Federal funds. "Naturally, there is going to be resistance unless there is some reason why transit operators should embrace this idea and do it" (Karl Guenther).

Management, although not through a conscious effort, can give a system's paratransit operations a second class status. This attitude filters down through the organizational ranks to the drivers. Among the subconscious things that management can do which would result in a second class status are locating the system dispatching facilities in separate quarters out of the mainstream, parking paratransit vehicles outside while other vehicles are garaged, or having low seniority mechanics work on small buses only when they have spare time. Karl Guenther offered the following encouragement:

> If it (a paratransit element of a transit system) is organized in such a way that it is obvious to everybody who works there that this is important and it is part of our bus system and let's all do it together, then, I think it will be much more successful.

In established systems, management is discovering that veteran drivers are bidding the paratransit jobs. Speaking on the Canadian experience, Wally Atkinson reported, "It is the middle year drivers from six years to twenty years' seniority that pick this kind of service." Len McDonald of A.C. Transit, Oakland, stated:

> I think this has been our success that the veteran drivers were interested, and they had a certain amount of dedication and put forth a lot of effort to make it work.

Resistance to paratransit system implementation may exist in several other areas. Among these areas are: the local planning agency, taxi operators, social or human services agencies, and local industry. In these areas, resistance is the result of lack of familiarity with the paratransit concept, its operating techniques and its benefits.

However, the discussion recognized that transit and taxi unions were not a constraint to the implementation of paratransit systems. Richard Gallagher expressed the following opinion:

> ...the unions, as far as the taxicab industry is concerned, have been very flexible in allowing us to do things. I think the transit union is open to some innovation...the most important thing is management's attitude towards the type of service that is being planned...I cannot see the union problem as an issue.

The question of increasing system productivity was also discussed in this workshop session. In attempting to increase productivity, a distinction may have to be made in the quantitative formulas of measurement used so that they reflect the type of service provided. Techniques to increase productivity will not always be the same for systems serving the elderly and handicapped as those for conventional systems.

Among the techniques to increase productivity, Karl Guenther offered the following:

> There can be incentive programs to indicate to a manager of an areawide, demand responsive or paratransit system that his objective is to increase productivity, and this can be easily done in the way contracts are written so there is some kind of payoff for increasing ridership or increasing productivity beyond a certain base threshold.

Examples of where such a scheme was utilized are Detroit, MI, Orange County, CA, and Westport, CT.

However, when dealing with the elderly and handicapped according to Charles Barb: "It is not the number of bodies moved, but the sensitivity of the driver to provide assistance to a person." Richard Gallagher reports that the taxi cab industry recognizes this fact and considers it a serious problem.

> As a result, the driver who specializes in the elderly and handicapped rider is usually paid at an hourly rate because you can't measure productivity in that area the same way you do with ordinary taxi drivers who are on a commission rate.

However, Karl Guenther warns: "One cannot ignore productivity just because one is providing a human service." The attitude in

public service agencies that they all need their own vehicle is a source of lost productivity. In any community the first and most logical step in increasing productivity is aggregating demand and reducing the number of vans operated by human service organizations.

Approaching productivity from a different perspective, Charles Barb introduced "the question of energy consumption." The interest here was the impact that federal energy standards would have on transit systems, specifically what impacts they will have on system coordination and fleet size reductions.

In summary, the attitudes of management can be very influential in determining the success of a paratransit service. It is essential that management express confidence in the system design and treat the service as an integral part of the overall transit system. The attitudes of transit middle management were identified by the participants as the most essential factor in establishing a paratransit system.

THE NEEDS OF THE ELDERLY AND HANDICAPPED

From the operator's perspective, the providing of services to the elderly and handicapped demands special considerations. Besides the special transportation needs of the elderly and handicapped, the social service agencies presently serving various segments of this population group are reluctant to coordinate their services. There are special transportation needs of the handicapped besides those related to physical mobility handicaps according to Suanne Brooks:

> The ability of a retarded individual to articulate where he or she wants to go is a very serious problem. It is as serious a problem in routing of public transportation buses as it is to a paratransit operator.

This form of handicap is an area which is presently not receiving the attention it warrants. There is a great need for a specialized training program for transit personnel to deal with this type of handicap.

Various operational experiences were offered as to how these

special needs have been met. In Ann Arbor, MI, the transit union has developed a "special elite corps" of members who are especially receptive to dealing with the needs of the elderly and handicapped. In the taxi industry, there is a 50/50 split "of companies that will handle this type of business and others that just will not touch it partly because they just don't understand it" (Richard Gallagher).

TRAINING PROGRAMS

The need for training techniques and materials for driver instructional programs was identified as an area where the handbook could provide assistance in the system implementation and operational phases. The need for training programs for drivers providing services to the elderly and handicapped was identified as an area of special needs. The handbook was envisioned as a reference guide listing existing training programs, documents, audio-visual material, and other sources of instructional material.

General Motors has produced a number of training films for regular fixed-route services. However, Wally Atkinson stated: "The area where there are deficiencies is in the development of some of the new systems in communities that are starting from scratch and have to really dig around to find help." A reference guide to materials would be an asset to these communities. An additional source of training for the small system would be to obtain on-site instruction at an operating transit system. The handbook could identify those systems which would be willing to participate in such a cooperative training program.

The training of drivers and other system operations personnel to work with the elderly and handicapped requires a more specialized training program. Personnel working on these services must be sensitive to the needs of the patrons, i.e., mobility, communication, and emotional handicaps. Potential sources for obtaining this base-level specialized training were identified. Among the possible sources were the national vocational rehabilitation network, transit unions, human service groups and school district special education programs. The majority of these sources would provide their services without a fee.

As Francis Britton summed up the situation:

> ...the job of the institution or individual who is concerned with paratransit is to assess, understand, and work with not only the narrow base of problems and resources that have traditionally been associated with transit, but to be prepared to take a step back in order to consider the needs and the potential of the resource and institutional base of the community as a whole. Paratransit requires bringing together many parts of our communities to work out their access problems in a new sort of (relationship).

LABOR-MANAGEMENT RELATIONS

The issue of labor in paratransit is important due to paratransit's labor intensive nature and relative newness to the labor-management picture. The nature of demand responsive operations also impacts the type of manpower scheduling used to staff the system. As Wally Atkinson noted:

> Dial-a-Bus tends to spread the demand out resulting in a flatter demand curve; giving better work shifts, more straight time and less split shifts. These factors have an interesting effect on labor.

This impact on the traditional labor-management work agreement is not always met with union rejection. Richard Gallagher noted that unions "are more flexible than most people realize." In terms of handbook preparation, Richard Gallagher stated "that a positive approach to the union problem should be included" and that the unions should be consulted to identify their attitudes and position towards paratransit.

Several other items were also identified which should be included in the handbook. Doug Birnie suggested that the handbook should:

> ...identify the kinds of concerns that transit labor has so that planners or operators who want to implement systems become sensitized very early to potential issues when introducing a paratransit system.

The handbook should also "try to clear away some of the myths about 13(c)" (Doug Birnie). It was also suggested that the

handbook include a discussion of experiences gained in implementing systems, both successes and failures.

Section 13(c) of the Urban Mass Transportation Act has proved to be a stumbling block to many dealing with system implementation. In many cases there is a misconception of the power given to a union through Section 13(c) and therefore management is afraid of a strike or that the union will hinder other negotiations. However, as Doug Birnie points out:

> The Department of Labor is ultimately responsible for developing the protection agreement (13(c) agreement), and I know of no case where the Department of Labor has ever guaranteed under 13(c) that any union has the inherent right to provide new services.

Therefore, the handbook should explain what Section 13(c) is and the powers granted to the unions.

The upcoming UMTA paratransit policy statement is increasing the complexity of the 13(c) dilemma. The policy statement addresses the concept of paratransit service being provided by private operators who are also providing exclusive ride services. The conflict arises when you must determine whether or not Section 13(c) protection should be provided to the employees of a company providing both shared-ride taxi and exclusive-ride taxi services.

The Department of Labor, unfortunately, has not provided a great deal of assistance in this area with its recent Akron decision. In this decision the Department of Labor stated, (paraphrased by Doug Birnie) "that taxi employees who are only tangentially involved in the provision of mass transportation services will not be covered by Section 13(c)." However, no definition was offered for tangential involvement. "In Akron no taxi employee was involved more than five percent of his time in a mass transportation service " (Doug Birnie).

In concluding, the issue of labor-management relations is an area of uncertainty demanding answers to unresolved issues. Section 13(c) and its impacts on paratransit remain an issue to be resolved through the courts and the Departments of Labor and Transportation. With reference to the Paratransit Integration

Handbook, the consensus was to include the text of Section 13(c) as an appendix. In addition, an explanatory text should accompany the law and a timeframe outlining the various stages in the reaching of a Section 13(c) agreement.

MARKETING

In discussing marketing programs, the participants agreed that marketing programs do tend to over-advertise system capabilities before all the bugs are worked out. The most important part of a system's marketing program is the quality of service provided. Simply stated by Karl Guenther:

> ....The most important part of your marketing program is to provide quality service. If you do, then you do not have to worry about anything except publicizing your telephone number and the hours you are open.

In speaking about the Ann Arbor, MI, system, Karl Guenther reported that: "In our community, the image of our system is the social image as conveyed through the social structure, and it has nothing at all to do with what we say in our advertising."

Phased implementation of the system can also become part of the marketing program. By phasing in a system, the operational bugs can be worked out and the positive benefit of encouraging consumer interest in the system can be developed. In so doing, any negative lasting effects of promoting a not properly functioning system can be avoided.

When dealing with marketing, a common problem is that it is too often equated solely with advertising. Marketing, however, has many more facets such as user information, market research, and adaptation of the service to target group needs. Another important aspect of the marketing program is the "outreach" facet in which the services offered are presented to the potential market on a one-to-one basis. Such a program would be designed to reach shut-ins and explain more than just the transit system but also available social services. Again speaking about the Ann Arbor system, Karl Guenther stated:

> ...I know that many of our drivers have become consultants to the community, very informed consultants about where do you go to get something or where do you go to enroll in a social service program....if you are really organizing the information available to your work force, you have 200 ambassadors out in the community that can provide a valuable service.

The taxi industry is also starting to market their services to the community. Most of the larger taxi companies now have staffs whose responsibilities are to call on customers and explain the services provided by the taxi companies.

Another aspect of marketing referred to by Francis Britton was "a micromarketing approach" which involves the development of mechanisms to identify very specific transportation demands of the neighborhood, route, or node levels with a view toward trying to match them with the available transportation resources of the community. Again, some of the work of the University of Tennessee demonstration project in Knoxville is particularly instructive in this regard.

In summary, the proceedings indicated that a marketing program is an essential element in the design of a paratransit system. Caution must be exercised, however, to insure that the system is properly functioning before extensive ridership stimulation campaigns are undertaken. Recognizing the importance of the marketing program, the handbook was envisioned by the participants as a reference source for suggestions and ideas for developing a marketing program.

VEHICLES AND MAINTENANCE

Vehicle selection is a process which is not fully understood by the planner. Since each type of vehicle has its inherent problems, these problems as well as the techniques for dealing with these problems should be identified.

The underlying principle in vehicle selection is not to mix different types of vehicles in the same fleet. When vehicle fleets are mixed, the problem arises of maintaining an adequate

inventory of parts to service all vehicles. Likewise, if a system purchases modified vans, it should establish a reliable parts supply source.

As there exists a large variety of paratransit vehicles, there also exists a variety of a special equipment features for facilitating the needs of patrons. Planners should, therefore, choose the vehicle extra features which meet the needs of the particular community. As an example, in areas with narrow streets, a side loading lift vehicle may not be appropriate.

The handbook, when addressing the subject of vehicles, should warn planners about some of the problems which might occur during the vehicle's life. The handbook needs "to very realistically present the fact that small bus technology has a lot of problems" (Wally Atkinson). Therefore, when maintenance budgets are prepared for paratransit vehicles, it is necessary to include extra funds, maintain a larger parts inventory and purchase additional spare vehicles.

MISCELLANEOUS

During the Session IV discussions, several other topics relating to the session topic were touched upon in considerably less detail than those previously documented. In the following narrative, these short and often unrelated ideas are documented.

Integration as a concept can cause problems when a planner or operator desires to implement a system. Exactly how are integrated systems conceived and then implemented successfully? In the discussion, innovative systems often centered around system designs that integrate various existing systems. In the words of Wally Atkinson: "The key (to a successfully integrated paratransit system) is the integration of the operating experience with the planning function."

Local taxi ordinances can be a problem in establishing a paratransit system because in most cities, the ordinances must be changed before shared-ride taxi service can be implemented. In discussing local ordinances and the process to change them, Richard Gallagher stated:

> There is a tremendous resistance by the Government agencies that control ordinances to change them. In the taxicab industry the accepted philosophy is if it is not in the ordinance, then you cannot do it. This is usually the way that they are enforced.

The workshop also identified several other aspects of the session topic which should be addressed in the handbook. Among the items were the benefits of scheduling flexibility that can be derived from employing, if feasible, part-time labor. In addition the planner should be made aware that a private, not-for-profit agency or a private company may possess the flexibility in work rules to allow them to provide the service at a low cost. "The reader or the user of the handbook has to be aware of the relatively profound impact that work rules can have on productivity" (Karl Guenther).

In developing the handbook, Francis Britton warned that

> ...the manual should not attempt to impose its ideas for some sort of 'ideal' institutional structure either for providing a given service or for organizing the planning and implementation effort as a whole. The handbook should encourage planners and operators to develop systems and institutional arrangements which are varied, dynamic and specifically responsive to the unique requirements of their community.

In a similar vein, the consensus was that a useful procedure would be to route the Paratransit Integration Handbook through several planners and operators for comments. This process would assist in identifying the level of coverage needed for each topic to ensure the handbook's usefulness and completeness.

SESSION V:

PARATRANSIT INTEGRATION NEEDS AND PRIORITIES

INTRODUCTION

Session V was the concluding session of the Paratransit Integration Workshop. The intent of this session was to review the major issues of discussion during the workshop and to discuss the format of the Paratransit Integration Handbook. The workshop participants met together for this session.

QUESTIONNAIRE

In order to identify the most significant issues hindering paratransit development, a survey was conducted among the workshop participants. The issues delineated in the survey were a composite of the findings of each workshop session. Each participant was to indicate the priority attached to the resolution of that issue based upon the degree she/he perceived it was impeding paratransit development. In addition, the questionnaire requested an indication of who, i.e., federal government, private industry, federally-supported private research, should assume the lead role in resolving the issue. The second part of the survey requested participants to identify pertinent issues which were not discussed and/or adequately treated in the handbook outline. A copy of the questionnaire has been included as Figure 4.

The responses to Part 1 of the questionnaire are tabulated and presented in Table 1. The five most important issues which must be addressed in the Paratransit Integration Handbook are as follows:

> Issue 1: The handbook should provide guidance to the planning community. The workshop participants felt that the handbook should serve the planning community by supplying needed reference material as to how to include paratransit service concepts into the existing institutional structure.
>
> Issue 2: The manual should educate the planning com-

PART I

Issue - Planning Process IA	High Priority	Priority	Low Priority	Not an Issue	Who Should Take The Lead Role
1. Provide guidance to the planning community	☐	☐	☐	☐	
2. Help the planner determine his place in the existing structure	☐	☐	☐	☐	
3. Field test handbook	☐	☐	☐	☐	
4. What type of agency should a broker be, and how much power should he have	☐	☐	☐	☐	
5. Hiring planners to act as advocates for private transportation operators in the planning process.	☐	☐	☐	☐	
Issue - Private Operator IB 1. Impact of UMTA regulations on utilizing the private operator in planning and operating paratransit services	☐	☐	☐	☐	
2. Strategies for involving the private operator in the planning process	☐	☐	☐	☐	
3. Local legal and institutional problems impeding the operation and integration of private sector paratransit services	☐	☐	☐	☐	
Issue - Demand Estimation II 1. Determining appropriate level of sophistication of estimation technique	☐	☐	☐	☐	

FIGURE 4. SESSION V QUESTIONNAIRE

Issue - Demand Estimation II (cont'd)	High Priority	Priority	Low Priority	Not an Issue	Who Should Take The Lead Role
2. There is a need for geographically transferable models	☐	☐	☐	☐	
3. The impact of system reliability should be incorporated into both demand and supply models	☐	☐	☐	☐	
4. There is a need for more detailed treatment of service parameters	☐	☐	☐	☐	
Issue - System Design for Non-Automated Systems IIIA 1. The manual should educate the planning community as to the potential of private operators to provide service and the private operating environment	☐	☐	☐	☐	
2. The system design phase of the planning process should begin with a definition of the policy issues and budgetary constraints.	☐	☐	☐	☐	
3. Service area configuration is defined by budget constraints, policy objectives, and citizen input rather than minor geographical barriers.	☐	☐	☐	☐	
4. It is important to implement service changes smoothly with adequate advance information in order to limit the impacts on ridership.	☐	☐	☐	☐	

FIGURE 4. SESSION V QUESTIONNAIRE (cont'd)

Issue - System Design IIIA (cont'd)	High Priority	Priority	Low Priority	Not an Issue	Who Should Take The Lead Role
5. Marketing strategies must be delineated early in the planning process.	☐	☐	☐	☐	
6. The impacts of Sec. 13(c) are unknown, and its implications must be discussed in detail in the planning handbook	☐	☐	☐	☐	
7. Differential pricing strategies can be used to create travel patterns which yield the most efficient utilization of resources.	☐	☐	☐	☐	
Issue - System Design for Automated Systems IIIB 1. Can automated dispatching and scheduling be cost-effective and improve system productivity?	☐	☐	☐	☐	
2. Can level of system size and complexity be correlated to the appropriate degree of automation?	☐	☐	☐	☐	
3. There is need to indicate the proven benefits and limitations of automation.	☐	☐	☐	☐	
4. Future development should address means of modifying the cost of automation.	☐	☐	☐	☐	
5. The handbook should address peripheral components to automation, ie, AVM.	☐	☐	☐	☐	

FIGURE 4. SESSION V QUESTIONNAIRE (cont'd)

Issue - Implementation & Operation IV	High Priority	Priority	Low Priority	Not an Issue	Who Should Take The Lead Role
1. Middle management can be a problem in setting up a Paratransit system	☐	☐	☐	☐	
2. The handbook should be a guide to literature	☐	☐	☐	☐	
3. There is a lack of training for personnel working with the E&H	☐	☐	☐	☐	
4. Local and national unions should be involved in the planning process	☐	☐	☐	☐	
5. The planner needs a guide to vehicle and maintenance costs.	☐	☐	☐	☐	

FIGURE 4. SESSION V QUESTIONNAIRE (cont'd)

PART 2

PERTINENT ISSUES NOT DISCUSSED

MOST CRITICAL ISSUES

COMMENTS:

FIGURE 4. SESSION V QUESTIONNAIRE (cont'd)

munity as to the potential of private operators to provide service and the private operating environment.

Issue 3: The impacts of the proposed UMTA regulations on involving the private operator in planning and operating paratransit services are not yet fully understood. The workshop felt that the handbook should illustrate strategies that will foster the intended results of the regulations.

Issue 4: Strategies for involving the private operator in the planning process should be included in the handbook. There was general consensus that the private operator should be brought into the planning process at the earliest possible stage. It was also recommended that the planning agency provide staff support to inform the private operators of their function in the process, what expertise and input they can provide, and how they can best present their capabilities.

Issue 5: There are local, legal and institutional problems impeding the operation and integration of private sector paratransit services. It is this environment which has prompted the recent evolution of the transportation broker, but even this concept requires the proper regulatory climate to be effective. The manual should include strategies for developing the brokerage concept in a local situation and examples of successful transportation brokers.

In response to the question concerning issues not included in the workbook (Part II of the survey), the participants identified two principle concerns. These concerns dealt with (1) the identification of non-governmental funding sources, i.e., fares, and (2) the role of the private automobile, van pools and subscription bus in paratransit programs. The results of the question dealing with the "most critical issues" in paratransit development closely paralleled those identified in Part I of the questionnaire.

TABLE 1. SUMMARY OF SURVEY TABULATIONS

	High Priority %	Priority %	Low Priority %	Not an Issue %	Who Should Take the Lead Role
Issue - Planning Process IA					
Provide guidance to the planning community	76.7	23.3	0.0	0.0	Government
Help the planner determine his place in the existing structure	42.9	28.6	21.4	7.2	Government
Field test handbook	29.6	51.9	11.1	7.4	Government
What type of agency should a broker be, and how much power should he have	24.1	24.1	34.5	17.2	Government
Hiring planners to act as advocates for private transportation operators in the planning process	17.9	21.4	35.7	25.0	Local Operator
Issue - Private Operator IB					
Impact of UMTA regulations on utilizing the private operator in planning and operating paratransit services	55.6	40.7	0.0	3.7	Government
Strategies for involving the private operator in the planning process	69.0	20.7	10.3	0.0	Local Level Planning
Local legal and institutional problems impeding the operation and integration of private sector para-transit services	67.9	21.4	7.1	3.6	--

TABLE 1. SUMMARY OF SURVEY TABULATIONS (cont'd)

	High Priority %	Priority %	Low Priority %	Not An Issue %	Who Should Take the Lead Role
Issue - Demand Estimation II					
Determining appropriate level of sophistication of estimation technique	14.8	48.1	25.9	11.1	--
There is a need for geographically transferable models	18.5	48.1	33.3	0.0	Government
The impact of system reliability should be incorporated into both demand and supply models	31.3	40.7	37.0	3.7	--
There is a need for more detailed treatment of service parameters	3.8	50.0	42.3	3.8	--
Issue - System Design for Non-Automated Systems IIIA					
The manual should educate the planning community as to the potential of private operators to provide service and the private operating environment	59.3	40.7	0.0	0.0	Government
The system design phase of the planning process should begin with a definition of the policy issues and budgetary constraints	37.5	50.0	8.3	12.5	Local Level Planners
Service area configuration is defined by budget constraints, policy objectives, and citizen input rather than minor geographical barriers	26.1	26.1	21.7	26.1	Local Level Planners

TABLE 1. SUMMARY OF SURVEY TABULATIONS (cont'd)

	High Priority %	Priority %	Low Priority %	Not An Issue %	Who Should Take the Lead Role
It is important to implement service changes smoothly with adequate advance information in order to limit the impacts on ridership	34.6	38.5	19.2	7.7	Local Level Planners
Marketing strategies must be delineated early in the planning process	22.2	37.0	2.59	14.8	--
The impacts of Sec. 13(c) are unknown, and its implications must be discussed in detail in the planning process	32.0	44.0	20.0	4.0	Government
Differential pricing strategies can be used to create travel patterns which yield the most efficient utilization of resources	25.9	37.0	33.3	3.7	--
Issue - System Design for Automated Systems IIIB Can automated dispatching and scheduling be cost-effective and improve system productivity?	25.9	37.0	33.3	3.7	Government
Can level of system size and complexity be correlated to the appropriate degree of automation?	29.6	29.6	37.0	3.7	Government
There is need to indicate the proven benefits and limitations of automation.	30.8	50.0	15.4	3.8	Government
Future development should address means of modifying the cost of automation.	17.9	46.4	25.0	10.7	Government

TABLE 1. SUMMARY OF SURVEY TABULATIONS (cont'd)

	High Priority %	Priority %	Low Priority %	Not An Issue %	Who Should Take the Lead Role
The handbook should address peripheral components to automation, ie, AVM.	14.8	18.5	55.6	11.1	--
Issue - Implementation & Operation IV					
Middle management can be a problem in setting up a paratransit system	11.5	46.2	30.8	11.5	--
The handbook should be a guide to literature	21.4	46.4	21.4	10.7	--
There is a lack of training for personnel working with the E&H	11.5	50.0	34.6	3.8	Government
Local and national unions should be involved in the planning process	17.2	31.0	31.0	20.7	--
The planner needs a guide to vehicles and maintenance costs.	20.7	51.7	24.1	3.4	Government

HANDBOOK FORMAT

The workshop participants spent the remainder of Session V discussing the format of the Paratransit Integration Handbook. Two proposed handbook outlines were presented to the assembly to spur discussion. The outlines are included in Figures 5 and 6. Initiating the discussions, Paul Bushueff outlined the considerations which should direct the development of the handbook.

> The major considerations should be to limit the duplication of material and to make it as easy as possible for people to use.

The participants agreed that an essential element of the Paratransit Integration Handbook would be a dictionary of paratransit terminology. It was also agreed that the handbook should begin with a discussion of the overall planning process. In developing the outline for the materials to be included in the handbook, Tony Simpson suggested that "it would be helpful to review all the existing AWDRT systems and verify that the outline incorporates all relevant elements of their development."

The discussion also pursued how closely the handbook should resemble a cook book for paratransit development.

Basil Potter summarized the attitude of the participants:

> ...you have got to direct the handbook to the competent user. Use of a step-by-step guide will rarely fit any realistic set of circumstances. Use of illustrative examples will allow the user to address a mixture of many circumstances.

In discussing the Canadian experience in developing a paratransit planning handbook, Ling Suen stated:

> ...we went through the same sort of exercises to identify what should be the handbook's level of detail...and finally we had to settle on a general guideline type format and leave the intelligent reader to take out whatever is appropriate for his situation.

In response to discussion as to the handbook development process, Paul Bushueff outlined the Paratransit Integration Program's anticipated schedule. The first step is the outline of the hand-

PARATRANSIT INTEGRATION WORKBOOK

I. PRELIMINARY PLANNING

1. ASSESSMENT OF TRANSIT NEEDS AND OBJECTIVES
2. DETERMINATION OF BASIC SYSTEM CONFIGURATIONS AND ASSOCIATED SERVICE OPTIONS
3. ROUGH ESTIMATION OF DEMAND AND FLEET SIZE FOR AWDRT SYSTEMS
4. DEVELOPMENT OF GENERAL SITE SELECTION PROCESS
5. IDENTIFICATION OF INSTITUTIONAL IMPACTS AFFECTING AWDRT
6. ROUGH COST ESTIMATIONS OF SEVERAL PROPOSED AWDRT SYSTEMS

II. DETAILED DESIGN

1. DETAILED ALTERNATIVES ANALYSIS
2. DEVELOPMENT OF DETAILED SITE SELECTION PROCESS
3. DETAILED ESTIMATIONS OF DEMAND AND FLEET SIZE REQUIREMENTS
4. SPECIFICATIONS OF DESIGN REQUIREMENTS FOR EQUIPMENT AND FACILITIES FOR AWDRT SERVICE
5. SPECIFICATION OF REQUIREMENTS FOR OPERATIONAL AND MANAGERIAL PLANS

III. IMPLEMENTATION

1. SELECTION OF STAFF FOR AWDRT SERVICE
2. OBTAINING REQUIRED SYSTEM RESOURCES
3. IMPLEMENTATION OF REQUIRED AWDRT OPERATIONAL AND MANAGERIAL PLANS

IV. OPERATION

1. INITIATION OF FIRST STAGES OF SERVICE
2. IMPLEMENTATION OF SERVICE AREA EXPANSION STRATEGY
3. IMPLEMENTATION OF SYSTEM OPERATIONAL PLANS
4. IMPLEMENTATION AND OPERATION OF AN AUTOMATED SCHEDULING/DISPATCHING SYSTEM
5. POSSIBLE MODIFICATIONS TO THE AWDRT SYSTEM AFTER FULLY IMPLEMENTED

V. EVALUATION

1. EVALUATION PLAN PROCEDURES
2. EVALUATION PLANS AND MEASUREMENT INSTRUMENTS
3. MAJOR INNOVATIONS TO BE EVALUATED
4. RESULTS AND CONCLUSIONS OF EVALUATION PROCESS

FIGURE 5. HANDBOOK FORMAT OUTLINE

PARATRANSIT INTEGRATION WORKBOOK

I. THE PLANNING PROCESS

II. SPECIAL CONSIDERATIONS IN THE PLANNING PROCESS FOR:

1. LOW DENSITY AWDRT SERVICE
2. HIGH DENSITY AWDRT SERVICE
3. JOURNEY-TO-WORK AWDRT SERVICE
4. ELDERLY AND HANDICAPPED AWDRT SERVICE
5. FEEDER AWDRT SERVICE
6. SYSTEM INTEGRATION

III. STATE-OF-THE-ART CONSIDERATIONS

7. VEHICLES AND MAINTENANCE
8. AUTOMATION
9. INVOLVING THE PRIVATE OPERATOR
10. LABOR CONSIDERATIONS
11. DEMAND/SUPPLY/COST ESTIMATION TECHNIQUES

FIGURE 6. HANDBOOK FORMAT OUTLINE

book contents. The second phase is to develop pilot guidelines for system implementation. The final phase will be the development of the handbook. The participants, however, felt that as part of the process, there should be a mechanism for collecting input from planners and operators who review and/or test the handbook.

APPENDIX A

WORKSHOP PARTICIPANTS

Mr. W. G. Atkinson
Manager
Transportation Division
N.D. Lea & Associates LTD
Vancouver, BC, Canada V6G 2T5

Mr. Charles E. Barb, Jr.
University of Oklahoma
Norman, OK 73019

Mr. Dwight Baumann
Carnegie-Mellon University
Pittsburg, PA 15213

Mr. James Bautz
Office of Service & Methods
Demonstrations
DOT/UMTA
Washington, DC 20590

Mr. John Beeson
Department of Public Transportation
Services
Knoxville, TN 37902

Mr. John Billheimer
Systan, Inc.
Los Altos, CA 94022

Mr. Doug Birnie
Office of Policy Development
DOT/UMTA
Washington, DC 20590

Mr. Bernard Blood
Chief
Traffic Management Branch
Office of Ground Systems
Transportation Systems Center
Cambridge, MA 02142

Mr. Thomas Brigham
Research Engineer
Massachusetts Institute of Technology
Cambridge, MA 02139

Mr. Francis E.K. Britton
Ecoplan International
75006 Paris, France

Ms. Suanne Brooks
Planning & Evaluation Specialist
Office of the Principle Regional Official
Department of HEW
Atlanta, GA 30323

Mr. B. Paul Bushueff Jr.
Workshop Coordinator
Traffic Management Branch
Office of Ground Systems
Transportation Systems Center
Cambridge, MA 02142

Mr. Andy Canfield
Systan, Inc.
Los Altos, CA 94022

Mr. Thomas Carberry
DOT/TSC
Cambridge, MA 02142

Mr. Larry Coleman
Transportation Planner
Transportation System Division
Systems Architects, Inc.
Randolph, MA 02368

Mr. Neal Colvin
Technical Design Laboratories
Cambridge, MA 02139

Mr. Paul Connolly
Systems Analyst
DOT/TSC
Cambridge, MA 02142

Mr. John L. Crain
Transportation Consultant
Crain & Associates
Menlo Park, CA 94025

Mr. Ron Favout
Office of Advanced Systems
Transportation Systems Center
Cambridge, MA 02142

Mr. Martin Flusberg
MultiSystems, Inc.
Senior Transportation Analyst
Cambridge, MA 02138

Ms. Carolyn Fratessa
Systan, Inc.
Los Altos, CA 94022

Mr. Richard Gallagher
Vice-President
International Taxicab Association
Rockville, MD 20852

Mr. Gorman Gilbert
Dept. of City and Regional
Planning
University of North Carolina
Chapel Hill, NC 27514

Mr. Dennis Goeddel
DOT/TSC
Cambridge, MA 02142

Mr. George Gray
Deputy Director
Mass Transit
California Department of Transportation
Sacramento, CA

Mr. Karl Guenther
Executive Director
Ann Arbor Transportation Authority
Ypsilanti, MI 48104

Mr. Richard Gundersen
Transportation Legal Analyst
DOT/TSC
Cambridge, MA 02142

Mr. John N. Hall
President
Black & White Cab Co.
Little Rock, AR 72201

Ms. Eleanor Johnson
DOT/TSC
Cambridge, MA 02142

Mr. Donald Kendall
Operations Research Analyst
DOT/TSC
Cambridge, MA 02142

Mr. Ronald Kirby
The Urban Institute
Washington, DC 20037

Mr. Dan Krechmer
Transportation Planner
Transportation System Division
Systems Architects, Inc.
Randolph, MA 02368

Mr. Roy Lave
Chairman of the Board
Systan Inc.
Los Altos, CA 94022

Mr. Steven Lerman
Senior Associate
Cambridge Systemmatics
Cambridge, MA 02142

Mr. Edward Lieberman
KLD Associates
Huntington Station, NY 11748

Mr. Michael Markowski
Operational Technology Development Program
DOT/UMTA
Washington, DC 20590

Mr. L. L. McDonald
A.C. Transit
Oakland, CA 94612

Ms. Ann Muzyka
Project Manager
Paratransit Integration Program
Traffic Management Branch
Office of Ground Systems
Transportation Systems Center
Cambridge, MA 02142

Mr. Basil Potter
DAVE Systems
Anaheim, CA 92801

Ms. Susan Richardson
Manager, Service Planning
MBTA
Community Affairs & Marketing
Department
Boston, MA 02110

Mr. Daniel Roos
Director, MultiSystems Inc.
Cambridge, MA 02138

Gabriel Roth
World Bank
Washington, DC

Hr Veit Rothermel
SNV Studiengesellschaft Nahverkehr MBH
West Germany

Mr. David Rubin
Chief - Urban and Regional Research
Division
Transportation Systems Center
Cambridge, MA 02142

Mr. Gordon Schultz - Associate
R.H. Pratt Associates
Washington, DC 20006

Mr. A. U. Simpson
President
DAVE Systems, Inc.
Anaheim, CA 92801

Mr. Howard L. Slavin
Acting Chief
Evaluation Branch
Office of Systems Research &
Analysis
Transportation Systems Center
Cambridge, MA 02142

Mr. David Spiller
DOT/TSC
Cambridge, MA.

Ms. Jill Strawbridge
Transportation Planner
Transportation System Division
Systems Architects, Inc.
Randolph, MA 02368

Mrs. Ling Suen
Chief Systems Studies Division
Ministry of Transportation
Transport Canada
R&D Centre
Montreal, Quebec, Canada H3A 2R3

Mr. Donald Ward
Chief
Urban Planning Research Branch
Office of Systems Research & Analysis
Transportation Systems Center
Cambridge, MA 02142

Mr. Paul Wenger
Transportation Planner
Transportation System Division
Systems Architects, Inc.
Randolph, MA 02368

Mr. Richard Wilmuth
Systan, Inc.
Los Altos, CA 94022

Dr. Nigel Wilson
Palo Alto, CA 94306

Mr. Stanley J. Zavatsky
Vice-President
Systems Architects, Inc.
Randolph, MA 02368

Mr. Eldon Ziegler - Chief
Operational Technology Development Program
DOT/UMTA
Washington, DC 20590

APPENDIX B

PARATRANSIT INTEGRATION

Areawide Demand Responsive Transportation

A Workshop

October 12,13, 1977

AGENDA

October 12, 1977

9:00 AM	Workshop Overview	
10:30 AM	COFFEE	
11:00 AM*	Session IA:	Planning and Institutional Constraints
	Session IB:	Involving the Private Operator
	Session II:	Estimation Techniques
1:00 PM	LUNCH	
2:00 PM*	Session IA and IB:	Synopsis
	Session IA and IB:	Synopsis
3:30 PM	COFFEE	
4:00 PM*	Session II:	Synopsis
	Session II:	Synopsis

October 13, 1977

9:00 AM*	Session IIIA:	System Design for Non-Automated Systems
	Session IIIB:	System Design for Automated Systems
	Session IV:	Implementation and Operation
11:00 AM	COFFEE	
11:30 AM*	Session IIIA and IIIB:	Synopsis
	Session IIIA and IIIB:	Synopsis
12:45 PM	LUNCH	
1:30 PM*	Session IV:	Synopsis
	Session IV:	Synopsis
2:30 PM	COFFEE	
3:00 PM	Session V:	Paratransit Integration Needs and Priorities

*sessions run concurrently

250 copies