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16. Abstract

This is a compilation of material that was presented at the Third UMTA R&D Priorities Conference Workshops on Rail and Construction Technology. Part I deals with railcars and equipment, and includes discussions of the rail technology R&D program, the rail system studies of the Congressional Office of Technology Assessment, and the problems connected with technology deployment. Part II, construction technologies, includes discussions of construction technologies and costs and the transit industry's views of UMTA's R&D program in this area. This volume contains five resource papers which can be found summarized in Volume I of this report along with summaries of other workshop sessions. Volume I also includes the proceedings of the general sessions and a listing of conference participants.

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PREFACE

This report contains proceedings of workshop sessions of the Third Urban Mass Transportation Administration R&D Priorities Conference which was held at the U. S. Department of Transportation's Transportation Systems Center in Cambridge, Massachusetts, November 16 and 17, 1978. This volume contains the following:

Special Programs Workshops

Part I: Safety, Qualification, and Life-Cycle Costing
Part II: Consumer Inquiry Technology, NCTRP, Technology Sharing

These conferences are sponsored periodically by UMTA to enable them to communicate directly with those who represent the views of transit users, operators of public transportation systems, suppliers of equipment and services, the research community, and governments at the State, local, and Federal levels. The purpose of the Third Conference was to provide a current review of UMTA's research and development plans and to solicit recommendations for improving the direction and effectiveness of its program. The conference included general sessions on research and development policy and a total of fifteen half-day workshops on research, development, and demonstrations in urban transportation systems, technologies, planning, management, and services.

The volume containing proceedings of the general sessions and summarized reports of the workshops has been published by the Urban Mass Transportation Administration. However, because of the volume of papers, presentations, and discussions, detailed proceedings of the workshops have been compiled into separate reports by subject area. All of these documents are available from:

National Technical Information Service
U. S. Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161

When ordering copies of these reports from NTIS, please refer to the list of reports numbers and titles which follows.

1. Third UMTA R&D Priorities Conference, November 1978, Volume I: Proceedings of General Sessions and Summarized Reports of Workshops, DC-06-0157-79-1.

2. Third UMTA R&D Priorities Conference, November 1978, Volume II: Proceedings of Bus and Paratransit Technology Workshops, DC-06-0157-79-2.

   Part I : Paratransit Integration
   Part II: Bus Technology, Paratransit Vehicle Development, Flywheel Energy Storage System

3. Third UMTA R&D Priorities Conference, November 1978, Volume III: Proceedings of AGT and Advanced Systems Workshops, DC-06-0157-79-3.

   Part I : AGT Socio-Economic Research and AGT Applications
   Part II: AGT and Advanced Systems and Technologies

4. Third UMTA R&D Priorities Conference, November 1978, Volume IV: Proceedings of Service and Methods Demonstrations Workshops, DC-06-0157-79-4.

   Part I : Pricing Policy Innovations
   Part II: Conventional Transit and Paratransit Service Innovations

5. Third UMTA R&D Priorities Conference, November 1978, Volume V: Proceedings of UMTA Special Technology Programs Workshops, DC-06-0157-79-5.

   Part I : Safety, Qualification, and Life-Cycle Costing
   Part II: Consumer Inquiry Technology, National Cooperative Transit R&D Program, and Technology Sharing

6. Third UMTA R&D Priorities Conference, November 1978, Volume VI: Proceedings of Rail and Construction Technology Workshops, DC-06-0157-79-6.

   Part I : Railcars and Equipment
   Part II: Construction Technologies

7. Third UMTA R&D Priorities Conference, November 1978, Volume VII: Proceedings of Transit Management Workshops, DC-06-0157-79-7.

   Part I : Management Systems Developments
   Part II: Human Resources Development

8. Third UMTA R&D Priorities Conference, November 1978, Volume VIII: Proceedings of the Access for Elderly and Handicapped Persons Workshops, DC-06-0157-79-8.

   Part I : Planning and Regulation
   Part II: Demonstrations and Hardware

9. Third UMTA R&D Priorities Conference, November 1978, Volume IX: Proceedings of the Urban Transportation Planning Workshop, DC-06-0157-79-9.

SPECIAL PROGRAMS I

Chairperson: *Cline W. Frasier*, Deputy Director, Office of Ground Systems, Transportation Systems Center.

UMTA'S SAFETY PROGRAM: *William J. Rhine*, Director, Office of Safety and Product Qualification, UMTA

PRODUCT QUALIFICATION AND NEW PRODUCT INTRODUCTION: *Mr. Rhine*

LIFE CYCLE COSTING IN UMTA PROCUREMENT: *Patricia Simpich*, Office of Socio-Economic and Special Projects, UMTA

PANEL: *Rod A. Johnson*, Vice President-Transit Sales, Chance Manufacturing Company Inc.

Donald Raskin, New York Metropolitan Transportation Authority

Deborah Roberts, Science and Technology Policy Study, Syracuse Research Corporation

Emerson Harris, Chief, Special Studies Branch, National Transportation Safety Board

REPORTER: *Richard H. Robichaud*, Transit Systems Branch, Transportation Systems Center

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SPECIAL PROGRAMS I

WILLIAM J. RHINE
DIRECTOR, OFFICE OF SAFETY AND PRODUCT QUALIFICATION
URBAN MASS TRANSPORTATION ADMINISTRATION

This afternoon I'm going to talk primarily about UMTA's activities regarding Rail Transit Safety, but I don't want to leave the impression that we're not concerned with the other modes of transportation. There are several reasons, probably none of which are valid or strong enough, why we've concentrated on Rail Transit Safety.

First, and foremost, is the usual Federal reason, we don't have enough resources. We had in the past only two people in the office until I joined as the head of the office several years ago; but a very recent decision on the part of the Secretary's office regarding giving us Rail Transit Safety responsibilities has changed the outlook for resources. I will describe the Rail Safety Program plan and what our issues are with that program. A follow-up to that activity will be a comparable effort in the bus area and past that, but not very far behind it, will be activities regarding DPM System Safety and in the far off or near future, will be the more advanced automated guideway systems. I might also say that in developing the Rail Safety Program plan we worked with elements of the Secretary's Office that will make the final decision on giving the resources. I was frightened of that at first, but I welcomed it when I got through the experience. They're very supportive of the real need inside the department, as long as you have an objective and a reasonable justification. The outlook is that we will receive

the resources that we've asked for.

A little bit of background on how we got to where we are today. (Figure 1) Starting last year, the Secretary's office was charged with conducting a study on Rail Rapid Transit (RRT) Safety, because there appeared to be some confusion within the department about exactly who was in charge of this safety area. At that time, the FRA had been designated as having the responsibility. I might point out, no administration had specific responsibility for Light Rail Transit Safety.

In February of this year, after a lot of work on this study which I feel was very good work, the recommendation was made that UMTA was to be given a responsibility for Rail Rapid Transit Safety, and that we form a task force to set down a finite plan for the type of resources we would need to carry out the program. A very high priority item was to develop a new Rail Rapid Transit Accident/Incident Reporting System, which is to replace that currently used by the FRA. The FRA system is not adequate or appropriate for an RRT Accident/Incident Reporting System. The referred-to study clearly cites this and I think all parties agree to that. It's not a criticism of the FRA system itself, nor the FRA's point of view. Their system was designed for railroad and is not the correct system for RRT reporting.

We have prepared the plans, including definitions of the systems that it covers: Rail Rapid Transit and Light Rail Transit. (Figure 2) We have excluded Commuter Rail which will remain the jurisdiction of the Federal Railroad Administration. We do not address buses or DPM Systems in this plan at this time.

We have previously established authority for investigation and correction of unsafe conditions, the so-called Section 107 of the UMTA Act of 1974. We hope that this newly delegated responsibility will mean that Section 107 will be infrequently involved.

Part of our program plan is to come up with UMTA internal procedures and disseminate information on these procedures for public knowledge of what we would do in the cause of an unsafe investigation. This does not usurp the position or the prerogative of the National Transportation Safety Board, which has the authority to investigate any significant accidents. This just means that UMTA has its own requirements in protecting the funding investment while making the properties responsible in terms of safety actions.

We've broken the plan into three major elements (Figure 3) and from my point of view any future safety activities of UMTA, regarding bus or DPM's, will probably be structured in the same way. The first element we've identified is safety information. I've already mentioned that we're developing a new Accident/ Incident Reporting System. Another information activity is accident or unsafe condition investigation. We are developing procedures and methodologies for such investigations and a very important point is that we will make these procedures known to the transit industry, the people who would be involved in any such investigations, should they be necessary.

The systems safety activities, are those general activities concerned with on-site visits to the properties. In the past,

we held a number of what we called Safety and Systems Assurance Reviews. (Figure 4) These covered a rather wide gambit of information regarding systems during their construction phases.

We've also had a series of courses at Transportation Safety Institute in Oklahoma City on Transit Safety and Security. (Figure 5) I'll talk more about the future of both of those activities in a minute.

The final category in Research and Development is the crux of the whole safety issue.

First of all, this activity will make use of the information coming out of the Accident/Incident Reporting System or any other source of information on safety problems. Secondly, it will help us decide what we should undertake in the way of safety activities on the part of the Federal Government.

Today I want to discuss some of UMTA's primary safety concerns - not necessarily covering all the industry-wide efforts to maintaining the good safety record of public safety.

One of our major activities in the past has been the Safety and Systems Assurance Reviews. As we come into the future, with the concentration on safety, we will be cutting back on the breadth of topics covered in these reviews and will concentrate more on safety. We also contemplate safety reviews of both existing properties (Light Rail and Rapid Rail) and new properties under construction. In the past, we've only been dealing with new properties in the construction phases and the initial operational stages.

Another activity that has taken place on a voluntary basis

which has been a very satisfactory operation, is the development of safety program plans by the various Rail Rapid Transit Systems. We have not said that these will be approved by the government; we don't contemplate that. We've been a partner to development of these plans and have partially funded their preparation. We think that these safety program plans will represent one of the means whereby we will maintain visibility on the safety of the properties in the future.

Because of our changing responsibility and enlargment of responsibility, and the fact that we think we have saturated the market in some of these courses pertaining to rail transit, we are holding the TSI classes on safety in abeyance, probably for all of fiscal 1979. In 1979, we will, however, go ahead with several courses on Transit Security. In 1980, we will possibly reinstate some of the safety courses. We are trying to take into account the fact that our responsbilities have changed, and working with APTA and the help of TSC, we will be adding to or changing the curriculum that we've had out there in the past.

In both the presentations I am going to make today, Safety and Product Qualification, I'm going to throw at you some of the issues that we see from our point of view. Since we had this Safety program structured in three elements, I've derived issues in each of these areas. (Figure 6) The first one may not even seem a sensible question. I think we can develop such a system. A more meaningful question is, that of getting the industry to cooperate and furnish inputs for this data system. I must say to date they've been very cooperative. Until our system is in

place, we were directed to ask the rail transit properties to continue to report to the Federal Railroad System. They are doing so, but UMTA will be responsible for all reporting and use of their data.

In calendar 1979, our first safety related activity in this area will be to prepare the annual Accident/Incident Report on rail transit. The FRA recently published this report for 1977 which will be the last such report by them. TSC has been asked to undertake the publishing of the 1978 and subsequent reports as part of their work in developing the Accident/Incident System.

We also must set up these procedures for carrying out the unsafe condition investigations and make industry not only aware, but a partner to developing these procedures, since they will be an active part of the activity in carrying out any safety investigations.

Figure seven indicates issues on systems safety. I said earlier we are going to overhaul the TSC safety course structure. Again we're looking for industry participation. Today I particularly missed Tom Boyle from CTA, who is the head of the APTA Safety Committee. He always faithfully comes through and tells UMTA what we should be doing or not doing.

The Safety and Systems Assurance Reviews will be restructured to concentrate on Safety. We plan periodic reviews with all Rapid and Light Rail Systems, frequency not yet determined. We will establish the format and the content of the reviews and make this known to the people to be reviewed. The real question which is the basis of these reviews, is what is the significant

information that we should be looking for. As I said earlier, we think that an improved Accident/Incident System and information regarding accidents and incidents will be a prime source of information in our safety activities.

Figure eight cites issues relevant to safety research. In Safety Research, as with any other type of research, you started out knowing you have limited resources. How do you set the criticality and rank problems? How do you assess the pay-offs and the benefits? What are the industry concerns? What are their priorities?

One of our stands has been that the prime responsibility for safety remains with the managers of the system. Having taken that position, we must honor and recognize that the people that are operating the systems have a voice in establishing what needs to be improved in the way of safety.

Another important question to us, is what is the best form or method for using our research results, standards, guidelines, regulations and carrying out the planning activity. The plan describes activities or projects for developing standards as one possible result of our research. There was a great note of concern expressed by the members of the Secretary's staff, who participated in the plan preparation, that it may be presumptuous to talk about standards at this time. We have a caveat in the plan that says we do not say that there should be Federal standards, that they could be those that the industry could use voluntarily. However, the mere mention of standards these days alarms people, and I am one of those that gets alarmed also.

We will not set out deliberately to regulate the industry. On the other hand, if we are going to carry out research, I think safety so often has a result, a form of standards. I don't think we'll develop any particular hardware. I don't think we'll tell people how to operate the systems, and I don't think we'll set down rules and regulations. So the best descriptive term I could think of was standards, and I stand to that and the plan that will go forward shortly (and I will give Deane Aboudara a copy of it) will maintain the posture that the best way of describing the anticipated output of the large effort, will be something called standards.

SAFETY - FIGURE 1

BACKGROUND

"RAIL RAPID TRANSIT SAFETY REVIEW"

DEPARTMENT OF TRANSPORTATION
FEBRUARY 1978

- UMTA RESPONSIBILITY FOR RRT SAFETY
- FORM TASK FORCE TO ESTABLISH PLAN
- DEVELOP RRT ACCIDENT/INCIDENT REPORTING SYSTEM

SAFETY - FIGURE 2

PLAN CONSIDERS:

- SYSTEMS RRT - PUBLICLY OWNED, ELECTRIC SELF-PROPELLED RAILCARS, EXCLUSIVE RIGHT-OF-WAY, DOOR LEVEL PLATFORMS, NOT DIRECTLY CONNECTED WITH GENERAL RAILROAD SYSTEM.

  LRT - PANTOGRAPH POWER PICK-UP (USUALLY), RESERVED RIGHTS-OF-WAY (USUALLY), VARIETY OF PLATFORM LEVELS, ELECTRICALLY PROPELLED RAILCARS (SINGLE OR TRAINS).

- EXCLUDES - COMMUTER RAIL
  - DPM

- AUTHORITY - SECTION 107

SAFETY - FIGURE 3

RECOMMENDED RAIL TRANSIT SAFETY PROGRAM ELEMENTS

- INFORMATION
  - ACCIDENT/INCIDENT REPORTING SYSTEM
  - ACCIDENT/UNSAFE CONDITION INVESTIGATION
- SYSTEM SAFETY ACTIVITIES
  - ESTABLISHING/MONITORING SYSTEM SAFETY PROGRAMS
  - SYSTEM SAFETY TRAINING
- RESEARCH AND DEVELOPMENT
  - STANDARDS
  - HUMAN FACTORS
  - SLIPS/FALLS OF RAIL TRANSIT PASSENGERS

SAFETY - FIGURE 4

SAFETY AND SYSTEMS ASSURANCE

REVIEWS

- WMATA (JUNE-JULY 1976, JANUARY 1977)
- MARTA (MAR. 1975, NOV. 1975, MAY 1977, APRIL 1978)
- BALTIMORE (APRIL 1977, NOV. 1977)
- BUFFALO (JULY 1978)
- MIAMI (MARCH 1978)
- PITTSBURGH (PLANNING MEETING, MARCH 1978)

SAFETY PROGRAM PLANS

- PREPARED (VOLUNTARILY) BY ALL U.S. RAPID RAIL TRANSIT SYSTEMS

SAFETY - FIGURE 5

UMTA COURSES

- INTRODUCTION TO S & S A
- S & S A - SYSTEM SAFETY
- S & S A - QUALITY ASSURANCE
- TRANSPORTATION SECURITY
- RMAD
- SPECIAL SEMINARS/PRESENTATIONS

SAFETY - FIGURE 6

UMTA SAFETY ISSUES

A. SAFETY INFORMATION

- CAN UMTA DEVELOP AN ACCIDENT/INCIDENT SYSTEM USEFUL FOR INDUSTRY AS WELL AS UMTA?

- FORMAL PROCEDURES MUST BE DEVELOPED BY UMTA FOR CARRYING UNSAFE CONDITION INVESTIGATIONS (SECTION 107).

  - INDUSTRY MUST BE MADE AWARE OF SUCH PROCEDURES.

SAFETY - FIGURE 7
UMTA SAFETY ISSUES

B. SYSTEM SAFETY ACTIVITIES

- COURSE STRUCTURE AT TSI NEEDS OVERHAUL - INDUSTRY PARTICIPATION IS VITAL TO SUCCESS.

- SAFETY AND SYSTEMS ASSURANCE REVIEWS

  - RESTRUCTURE TO CONCENTRATE ON SAFETY.

  - PERIODIC REVIEWS WITH ALL RAPID AND LIGHT RAIL SYSTEMS.

  - FORMAT AND CONTENT OF REVIEWS TO BE DEVELOPED AND MADE KNOWN TO INDUSTRY.

  - WHAT IS SIGNIFICANT INFORMATION TO BE EXAMINED AT SUCH REVIEWS? (I.E., ACCIDENT/INCIDENT HISTORY).

SAFETY - FIGURE 8

UMTA SAFETY ISSUES

C. SAFETY RESEARCH

- HOW SHOULD LIMITED SAFETY RESEARCH RESOURCES BE ALLOCATED?
  - CRITICALITY/RANK
  - PAYOFF/BENEFIT
  - INDUSTRY CONCERNS AND PRIORITIES
- WHAT IS BEST FORM FOR UTILIZING FEDERAL RESEARCH RESULTS?
  - STANDARDS
  - GUIDELINES
  - REGULATIONS

The next area that's on the program is called Product Qualification. (Figure 1) I've described this as a program to help insure the acquisition of satisfactory equipment by the transit community. I've tried to indicate some of the key elements we think are "satisfactory". It's not my program. It's not my Office's program. It's more than even all of George Pastor's programs, because it goes over into the capital grants or transit assistance area, as well as almost anywhere in and out of UMTA that's devoting time and efforts toward this problem. This is an all encompassing and accordingly, a frequently overwhelming problem.

We look on our efforts in this area as a bridge to aid in delivering both government and industry improvements and advancements. I've also described it in my mind as a drawbridge, to prevent losing ground in systems equipment performance. There are a lot of people today that are very much convinced that we have lost ground in the last few years in transit systems equipment performance.

Some examples of some particular projects that are underway are given in Figure 2. Again they're not all mine. I won't go through them all in detail; I will discuss one or two of them.

Rail Car Standardization is a project, which I'll just generalize it as a baseline rail car specification. It's not a vehicle spec per se and is not for just one vehicle.

TRIP is a transit reliability information program to establish a national data bank on critical hardware for transit systems. Rail car terms and conditions establish guidelines

for rail car contracts for terms and conditions which are more equitable than were used in the past.

Recently UMTA dictated joint buys among several United States cities for rail cars, which we think will have benefits towards solving some of the problems on the previous view graph. We have directed the properties to test all new cars at Pueblo. We think this may take on the air of force feeding; but we think it's a valuable and useful test facility, which can compliment the testing ordinarily done to new vehicles on properties.

We have had a standard light rail vehicle specification, which has been subject to a lot of question in the past. We are trying to learn from the problems of using that spec as originally written and are in the process of upgrading it for future light rail vehicle buys.

The Transit Bus Quality Program is something that was in formulation for a long time and I'm going to get into the bureaucratic problems that we have internally at UMTA and DOT.

The 16(b)(2) Vehicle Reliability Program furnished technical information to the many users of special-purpose transit vehicles funded by UMTA and used to transport the elderly and handicapped.

TSC has done an outstanding job in preparing this information which has become of national interest to the various state DOTs that are the purchasers of the vehicles.

We've been involved in a program that is one of APTA's favorites, on FMVSS 121, the bus anti-lock system. We are supporting an evaluation of such systems by NHTSA.

We're undertaking an evaluation of the chopper propulsion

system on the CTA cars. There are several cars in the last buy there that have a new chopper system. We're interested in performance, reliability and maintainability of these systems (along with our general interest in all hardware performance).

The last topic indicates the sort of help we get in setting up our various projects. Because of a GAO criticism of CTA and UMTA regarding an earlier buy of bus communication equipment, we are carrying out a rather rigorous evaluation of a current bus communication system procurement by CTA.

Rail Car Standardization will be covered in another session by Steve Teel, although I said earlier I was covering more than the projects in my own office. I have the pleasure in George's organization of controlling money among several offices due to my rather broad charter, but in general the work represented by this money is done in the other offices. I just become the technical godfather to some of these projects. I should give credit to these other offices for their work, part of which I have mentioned today.

The Transit Reliability Information Program is interesting from several points. (Figure 3)

In 1975, at a public hearing on all of the problems with rail car procurement, the establishment of such a data system was proposed by the rail car industry. It has utility for buyers, suppliers, and of course, for UMTA. In particular, UMTA has talked about research on component improvement, but has little actual data on which to measure achievements. For buyers, the data bank should enable the preparation of better specifications

and the acquisition of better equipment. Sellers and suppliers will better be able to understand how their products are performing and where improvements are needed.

As an example of how long it takes to get such a project going, we started serious effort on TRIP in 1976. The kickoff meeting for the program took place last month. When talking about R&D priorities, one should recognize the time involved in just getting a new project started. The sensitivity of the timing of some projects could be a factor in the scope of such projects or even in deciding whether to undertake the project.

Initially, we'll only cover rail transit cars in the TRIP data bank and then only the more critical subsystems in terms of the operating problems we're most worried about. The data system will be expandable and will cover buses in the near future. We have a paralleled effort in bus information gathering in the meantime to meld into this program as soon as we can. We will also expand into other pertinent or appropriate transit operating equipments.

Someone was saying at the panel this morning that the job of transportation is to carry people back and forth. All I have talked about today is to help us pursue research on the Federal part to give information to buyers, and operators and suppliers to get the equipment or to improve the equipment that's needed to do one basic job: carry people back and forth, safely, reliably and as economically as possible.

As I did before, I would like to present some of the UMTA issues and concerns regarding product Qualification (Figure 4).

My favorite line is limited financial resources in the R&D budget, and staff limitations. That's a good thing because it makes us examine everything. Everything competes, competes for dollars, competes for people and priority.

When you talk about qualification, how reliable should things be, the data bank will help that problem, but it's not the end-all. What are the real service needs in the operational environment? Where do we get the data and the information to quantify these needs? Engineers want to put things down in hard numbers, numbers you can prove, numbers you can measure. Many of these characteristics we're talking about for improving or maintaining the reliability of transit equipment are best exemplified by numbers, but we don't have the data. A number of people I know, acquaintances in various fields in the aerospace world, know what it means to try to gather such data. We don't have the money that was available in the aerospace world.

A final important issue for product qualification of products, as with anything else, is setting priorities among themselves and against the other general priorities of R&D.

Let me turn now to the other half of this presentation, new Product Introduction (Figure 5). I consider this a subset of the product qualification area. At the same time, we are setting standards, criteria for qualification and grant suitability. We are also setting thresholds against which new technology must measure.

We have a policy on new technology introduction that was in large established by George Pastor. I think he is one of the

first people that recognize that we ought to have something. It came out first as a joint agreement between him and the Associate Administrator of Transit Assistance and was enacted as a formal DOT policy earlier this year (Figure 6). It cites two categories of improvement: the ongoing improvements for incremental new developments and modifications; and the major renovations that are significant new technology, service improvement or software, recognizing that again technology and hardware are not the only needed areas of improvement.

I talked to you earlier about standardization and setting reliability numbers and so forth. We certainly don't want to stifle or limit any progress by built-in bureaucratic policies or subjective resistance. There is a lot of feeling that taking a chance on improvements is dangerous to a lot of us. The procedure I am describing gives an orderly method for controlling the introduction of new or improved technology on a rational basis rather than for the sake of new technology.

Both categories of improvements are required to meet appropriate acceptance criteria to be able to be funded with UMTA transit assistance money (Figure 6). In the second category under the responsibility for testing primarily with suppliers, UMTA may provide financial assistance for field trials and operation evaluations. This is of particular concern to those very costly, larger but promising new products. It takes a lot of money to deploy these products, and deployment must include suitable evaluation before you go into production and full scale operation.

Our issues here start with (Figure 7) how to categorize new products. That's an over-simplication, but you have to divide these things from the smallest little piece of hardware all the way up to the whole new car or new propulsion system, even a major new service improvement method. There's a world of things out there that might give benefit, but where do they fit? How do they fit into the operation of the system? How do they fit in the reliability picture or the safety picture? How do you set requirements and acceptance criteria for equipment or systems which may have never been used before?

Again, we have a lack of data or information on existing products to compare and show acceptability or to show cost benefits. We're all thinking that in the end we must show the benefits, but not everything is going to have a positive benefit cost ratio. We must be able to assess these new things against the competing ones that exist today.

Certainly, we lack enough money for all the new worthwhile products looking for market entry, and I don't mean a commercial market entry, I mean in transit operation and utility.

UMTA doesn't have an organized method and that's a mea cupa statement because part of my job is to establish the methods, the overall methodology and plans whereby this policy is to be carried out. I'll tell you frankly, because of the diverse nature of the things that are potential candidates, I'm not sure there is a generalized methodology.

We do have TSC carrying out some of these types of new product evaluations. They're new system evaluations and I've

asked them to consider one of the evaluations as a guinea pig for developing a methodology, which either the government or a supplier could use to receive grant acceptance. That is, what should we really do with something that's new, never been tried out before, and consists of hardware and software. If the system does not qualify for a grant, at least the person or organizations that have it, want to market it, know what we think should be done to make it suitable.

Closing with the bright star on our horizon, the new transportation bill specifically allows use of transit assistance funds for new product introduction. This has been something that I give George Pastor credit for. He's fought for it long and hard. We weren't able to get a finite amount of money assigned to it, but looking at the total size of transit assistance funds, any part of it would be more than we have today. Thank you very much.

FIGURE 1

PRODUCT QUALIFICATION - WHAT'S IT ALL ABOUT?

- A PROGRAM TO HELP INSURE THE ACQUISITION OF SATISFACTORY EQUIPMENT BY THE TRANSIT COMMUNITY
- "SATISFACTORY" INCLUDES
  - RELIABILITY
  - MAINTAINABILITY
  - SAFETY
  - OPERATIONAL AND SERVICE SUITABILITY
  - EFFICIENT
  - COST

FIGURE 2

PRODUCT QUALIFICATION (CON.)

EXAMPLES OF SPECIFIC UMTA P/Q PROJECTS

- RAIL CAR STANDARDIZATION
- TRIP
- RAIL CAR TERMS AND CONDITIONS
- TRANSIT BUS QUALITY PROGRAM
- 16 (B)(2) VEHICLE RELIABILITY AND QUALITY SUPPORT (FOR UTA)
- FMVSS - 121 ANTI-LOCK DEVICE EVALUATION (JOINTLY WITH NHTSA)
- CTA CHOPPER EVALUATION
- CTA BUS COMMUNICATION EVALUATION (GAO INSPIRED)

FIGURE 3

TSC

TRANSIT RELIABILITY INFORMATION PROGRAM

TRIP

A GOVERNMENT - INITIATED RESPONSE TO THE ACKNOWLEDGED NEED FOR TRANSIT RELIABILITY INFORMATION

OBJECTIVE

- COORDINATE RELIABILITY EFFORTS
- UNIFORMLY COLLECT AND ANALYZE FAILURE DATA
- DISSEMINATE RESULTS
- PROVIDE SUBSTANTIVE DATA FOR NEW PROCUREMENTS

BENEFITS

- ASCERTAIN CRITICAL RELIABILITY AREAS
- EVALUATE IMPROVEMENTS
- UPGRADE MAINTENANCE
- IMPROVED EQUIPMENT SPECIFICATIONS

FIGURE 4
PRODUCT QUALIFICATION (CON.)

- ISSUES
  - .. WHAT ROLE SHOULD UMTA PLAY IN THIS AREA?
    - ... LIMITED FINANCIAL RESOURCES FROM R&D BUDGET
    - ... LIMITED IN-HOUSE STAFF
  - .. WHAT CONSTITUTES QUALIFICATION?
    - ... HOW RELIABLE?
    - ... WHAT ARE REAL SERVICE NEEDS (AND OPERATIONAL ENVIRONMENT)?
  - .. HOW CAN UMTA SET PRIORITIES FOR P/Q PROJECTS?

FIGURE 5

NEW PRODUCT INTRODUCTION -

A SUBSET OF THE PRODUCT QUALIFICATION AREA

- UMTA POLICY ON NEW PRODUCT INTRODUCTION - ORDER 1120.1, JANUARY 1978
  - TWO CATEGORIES OF IMPROVEMENT
    - ON-GOING PRODUCT IMPROVEMENTS - INCREMENTAL NEW DEVELOPMENTS AND MODIFICATIONS
    - MAJOR INNOVATIONS - SIGNIFICANT NEW TECHNOLOGY, SERVICE IMPROVEMENT OR SOFTWARE

FIGURE 6

NEW PRODUCT INTRODUCTION (CON.)

- UMTA POLICY
  - .. REQUIRES BOTH CATEGORIES TO MEET APPROPRIATE ACCEPTANCE CRITERIA TO GET UMTA FUNDING
    - ... CRITERIA TO INCLUDE SOME OPERATIONAL EVALUATION.
    - ... MAJOR INNOVATIONS REQUIRE FIELD DEMONSTRATION AND A FULL OPERATIONAL TEST OF A LIMITED NUMBER OF UNITS BEFORE ACCEPTANCE OF PRODUCTION RUN.
  - .. RESPONSIBILITY FOR TESTING PRIMARILY WITH SUPPLIERS
    - ... BUYERS TO ESTABLISH TEST REQUIREMENTS AND ACCEPTANCE CRITERIA.
    - ... UMTA MAY PROVIDE FINANCIAL ASSISTANCE FOR FIELD TRIALS AND OPERATIONAL EVALUATIONS.

FIGURE 7

NEW PRODUCT INTRODUCTION (CON.)

- ISSUES
  - HOW TO ACCURATELY CATEGORIZE NEW PRODUCTS.
  - HOW TO SET REQUIREMENTS AND ACCEPTANCE CRITERIA FOR EQUIPMENT OR SYSTEMS WHICH MAY HAVE NEVER BEEN USED BEFORE.
  - LACK OF DATA/INFORMATION ON EXISTING PRODUCTS TO COMPARE AND SHOW ACCEPTABILITY (AND TO SHOW COST/BENEFIT IF NEW PRODUCT MORE EXPENSIVE).
  - LACK OF SUFFICIENT FUNDS TO SUPPORT ALL POTENTIALLY WORTHWHILE NEW PRODUCT LOOKING FOR MARKET ENTRY.
  - NO ORGANIZED METHOD FOR NEW PRODUCTS TO BE SUBMITTED FOR CONSIDERATION OF ACCEPTANCE AND FOR UMTA TO EVALUATE.
- BRIGHT STAR ON THE HORIZON - NEW TRANSPORTATION BILL SPECIFICALLY ALLOWS USE OF TRANSIT ASSISTANCE FUNDS FOR NEW PRODUCT INTRODUCTION.

PATRICIA SIMPICH
OFFICE OF SOCIOECONOMIC AND SPECIAL PROJECTS
URBAN MASS TRANSPORTATION ADMINISTRATION

We have two life cycle costing projects in the Office of Technology Development and Deployment. By life cycle costing, we mean the selection between products and the purchase of equipment that is the least costly to own over its service life.

I'm the project manager for one of the two projects. The result of that project to date is a methodology for the procurement of small buses using life cycle costing. Chuck Daniels is the project manager for the other project. That project involves the applying of life cycle costing principles to the standard large bus.

The contractor for the small bus project is Dudley Gill and Associates. Reed Winslow, a consultant to Dudley Gill, is in the audience today.

The contractor for the standard bus project is Advanced Management Systems of McLean, Virginia.

SMALL BUS TRIP CYCLE COSTING PROJECT

The methodology for the small bus project goes like this. A transit authority interested in buying small buses will develop a site-specific performance spec, go through negotiated procurement with a manufacturer to pick up three buses from each manufacturer whose vehicle meets the performance spec, and will test those buses over 18 months, gathering operating and maintenance costs data for that 18-month period. At the end of that period the property will ask for a bid for a larger buy

and will take the cost that it has collected over the 18 months, project those costs over six years, (the expected life of the vehicle), and then select the vehicle with the lowest expected life cycle cost. The authority will also continue to run the test buses for the life of the vehicles until they know all they need to know or until the information is no longer of interest.

With this project, we have a set of small bus guidelines produced by Dudley Gill and we expect to start, during fiscal year 1979, a pilot experiment trying out these guidelines. Our aim is (a) to prove that you can buy on a life cycle basis, (b) to set up a consistent data format with common definitions, and (c) to prove or disprove that there is a difference between the life cycle costs of small buses carrying out the same performance.

STANDARD BUS LIFE CYCLE COSTING PROJECT

The other project, Chuck Daniels' project, goes like this. A property interested in buying standard buses gathers its cost experience from the past 24 months on its "New Look" bus. The property publishes this cost experience and requests bids. Bidding manufacturers are asked to come in making savings claims against these costs. There are about 60 items on which the property will establish its cost experience, categorized under: Body, Chassis, Roadcalls, Preventive Maintenance, and Operating Costs such as fuel, oil, and tires.

The manufacturer makes his savings claims about items whose follow-on costs he can affect by design improvements. The manufacturer must justify his claims and there are guidelines

developed for him to do this. For example, there are functional tests to demonstrate that the components have a longer life or that they perform multiple functions, and there are time demonstrations to show that a decrease in repair time is needed.

The property evaluates the value of these claims, of these design improvements to the user, and corrects the bid. That is, the property rejects some claims because they aren't well justified, accepts some, and accepts portions of others. The property then corrects the bid price of the manufacturer according to the claims accepted, and then applies a formula to calculate the life cycle costs.

$$LCC = BP + 500{,}000 \quad \frac{(O + F + M + T = S)}{100}$$

where:

BP = Bid Price

O = Oil

F = Fuel Costs

M = Maintenance Costs

T = Tire Costs

S = Savings Claims Accepted (-)

= Higher costs beyond the costs of the properties records as a result of the Design improvement (+)

The plan for this methodology is that we will also undertake an experiment to try it out. We will undertake a <u>simulated</u>, parallel procurement in three properties that are going to buy on a lowest-bid basis. That is, the simulation will parallel, but not interfere in, a planned lowest-bid buy. This is going to take place in Chicago, Phoenix, and in Nassau County, Long Island,

all sites where good historical data exists on the cost of owning the "New Look" bus.

WHY TWO APPROACHES TO LCC?

There are those who have asked why do we have two life cycle costing projects? Our response is that there are two methodologies developed to respond to two very different situations. Take for example, the small-bus method with its 18-month testing approach. There is very little cost data on the small bus compared to the years of cost experience with the "New Look" bus. Hence, a method that obtained this data was needed. Also, there is no standard specification on the small bus compared to the advanced design bus with its UMTA-developed, UMTA-approved specification. So, the lack of standard specifications offered a challenge as well.

There are at least three generic types of small buses and there are at least three different types of performance required (fixed-route, feeder service, and demand-responsive service). The small bus ranges in price from about $19,000.00 to $87,000.00, a tremendous price spread. We hear from transit properties that the small bus is very costly to maintain, but there are those in the industry who attribute these high costs, not so much to the quality of equipment, as to a mismatch between the design of the vehicle and the performance required of it at the local level. Hence, a method had to be devised to allow us to associate cost, not just with the vehicle, but with a combination of vehicle and the performance required of the vehicle locally. To meet this need, the methodology calls for a property to develop its

site-specific performance spec, identifying the type of service expected of the bus.

To date, the small bus appears to have a six-year life. This relatively short life span permits the 18 months of testing; that is to say, a data collection period of about one-third of the life of the bus, as we know the life of that bus today, doesn't seem unreasonable in view of the fact that you're working with a 400 per cent spread in bid price. This approach wouldn't make sense for the standard bus with its 15-year life and a smaller difference in acquisition price.

The life cycle costing methodology for the standard bus on the other hand, takes advantage, with its savings claims approach, of the fact that there is a lot of data out there. It also recognizes that there are but a handful of manufacturers, so that a property won't need an inordinate amount of time to evaluate the savings claim of the few bidders. Eventually, it may be appropriate to have one methodology, if for example, data is available on the small bus, then a property might be able to use a savings claims approach. Or, if we wanted to test components on the large bus, say air conditioners, there may be procedures for testing developed in the small bus pilot experiment that we can apply to testing components in the large bus.

As we learn more about the two procedures, we may modify them or we may develop other approaches. Right now we're interested in learning if the two methodologies we have are acceptable and if they can be carried out in a fair way that assures us there can be a fair life-cycle-cost competition for the large <u>or</u> small transit bus. Thank you.

SPECIAL PROGRAMS II

Chairperson: *Henry Nejako*, Executive Assistant, Office of Technology Development, UMTA

CONSUMER INQUIRY TECHNOLOGY: *John S. Durham*, Office of Socio-Economic and Special Projects, UMTA

NATIONAL COOPERATIVE TRANSIT R&D PROGRAM: *Mr. Nejako*

TECHNOLOGY SHARING AND COMMUNICATION: *James R. Dunke*, Technology Sharing Office, Transportation Systems Center

Panel: *Deane N. Aboudara*, Director, Department of Technical and Research Services, American Public Transit Association.

Alinda C. Burke, Vice President, Public Technology, Inc.

Deborah S. Rudolph, Program Analyst, Technology Sharing Division, Office of the Secretary of Transportation.

Michael L. Noonchester, Washington, D. C., Metropolitan Area Transit Authority

Reporter: *Patricia M. Rudman*, Technology Sharing Office, Transportation Systems Center.

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SPECIAL PROGRAMS II

By John Durham
Operations Research Analyst
Office of Technology Development and Deployment
Urban Mass Transportation Administration

Transit consumers' need for information on transit availability usually results in their first real contact with transit activities. The result of that contact can leave a lasting impression; if the need isn't satisfied the consumer may not be back. This is particularly true in trying to change potential consumers into first-time users; however, it also applies in trying to change first-time users and occasional users into frequent users, as well as in trying to maintain frequent users in that category.

The UMTA Office of Technology Development and Deployment (UTD) is looking at ways technology can enhance communication with consumers and/or reduce the cost of providing such service. Possible technological improvements can occur in a broad range of communication formats, these being:

A. Maps and Charts
B. Signs
C. Telephone Information
D. Interactive Systems

It is readily seen that the degree of technology increases from areas A to D, which parallels the interest of UTD in these areas. Most of UMTA's work in maps and charts as communication aids has been sponsored by the Office of Transit Planning and Management (UPM). That office is also planning a workshop on considerations in preparing maps and charts,

to be held in the next few months. Regarding signs, transit operators are expressing a growing interest in rider displays and flap-type signs such as used in airport terminals.

UTD is primarily concerned with ways of improving telephone information service and with service improvements offered by interactive systems which use computers, such as the trip planning Kiosk in Portland, Oregon's new transit mall and the remote terminal developed in Germany by MBB for dial-a-bus operations. Currently, emphasis in UTD on consumer inquiry technology focuses on a closely related group of projects directed at improving telephone information service to consumers who call for information on transit service availability.

These projects collectively form a program called Automated Transit Information Systems (ATIS), which is briefly diagrammed in Figure I. 1/ This program was, until several years ago, referred to as Point-to-Point-Trip Management (PTPTM), if you are familiar with that earlier acronym. Most recently, we have pluralized the "Systems" of the ATIS acronym to more clearly show our increased awareness that ATIS is really several technologies that can form the basis of an interrelated group of applications.

1/ See Chart on Next Page

UMTA

OFFICE OF TECHNOLOGY DEVELOPMENT AND DEPLOYMENT

AUTOMATED TRANSIT INFORMATION SYSTEMS (ATIS) PROGRAM

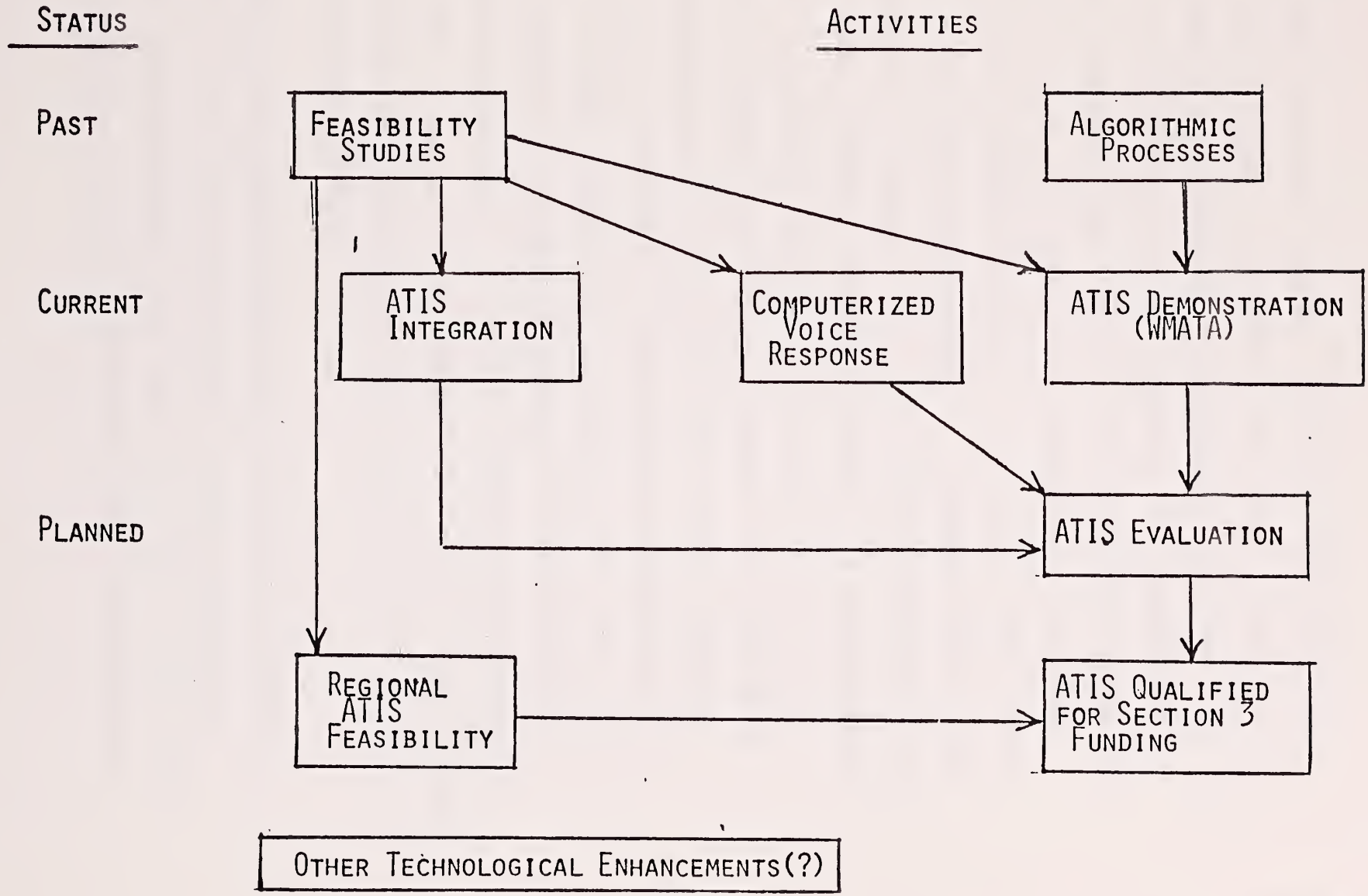

FIGURE I

Figure I shows the earlier work done primarily by MITRE Corporation and the National Bureau of Standards on the technical, operational and economic feasibility of ATIS and on the algorithmic processes which are needed for determining the best path (quickest, best transfers, least cost, etc.), through a transit network. These feasibility studies have indicated that using the computer for searching for and retrieving information in a telephone information center may be a viable activity, at least in the largest transit properties. Therefore, UTD is funding a demonstration of a prototype ATIS at the Washington Metropolitan Area Transit Authority (WMATA) to determine more fully the costs and benefits of such a technological enhancement. This demonstration forms the cornerstone of present UTD activity on consumer inquiry technology. It is supported by projects in computer voice response technology (to determine the feasibility of using computer synthesized voice to respond to callers' requests), and in integrating ATIS with other related systems (RUCUS, AVM, computerized production of transit schedules, and non-transit use in cities) as a means of reducing costs of implementing ATIS. Again, as can be seen from Figure I, the intent of the ATIS program is to evaluate these applications so that viable ones can be qualified for transit assistance funding.

In conclusion, you should be aware that UTD and UPM are coordinating activities in these areas and are jointly planning a workshop on consumer inquiry technology, to be held in late summer or early fall of 1979. Furthermore, please note that UMTA's latest authorization now

explicitly allows for discretionary Capital Assistance (Section 3) funding of such innovations which improve transit service.

We welcome your thoughts on new approaches or projects in this area.

The objectives of the National Cooperative Transit R&D Program (NCTRP) are described in Figure 1.

With regard to the first objective, we have selected a particular mechanism that would involve UMTA's constituency in doing this prioritization and identification of problems. The NCTRP will provide an opportunity for transit operators and local governments to participate in identifying these problems and participate in, if not the development of solutions, at least the development of a statement of work or the statement of the problems in such a way that someobdy else can go to work and see if they can get closer to a solution.

An underlying objective is to improve communication and technical information exchange on both transit R&D results and what is going on currently, and to provide a means of addressing particular technical problems in transit without requiring UMTA to appoint a project manager and go through the procurement process and expend a lot of staff effort in managing each of these projects.

One question some people might have is why there are only transit operators and local governments that are going to be participating. In answer, I would say, initially, these happen to be two representative constituent groups with whom we were able to agree on terms and proceed toward organizing the program. I don't think this is meant to be exclusive for all time, particularly if the Surface Transportation Administration comes into being. There is already a National Highway Cooperative Research Program (NHCRP), I expect that eventually the constituency that participates in the prioritizing and the objective setting will be expanded. Maybe the range of problems that would be looked at will be expanded also.

NATIONAL COOPERATIVE TRANSIT R&D PROGRAM

Objectives:

- Identify and Prioritize Transit Problems in Need of R&D Investigation
- Provide Opportunity for Transit Operators and Local Governments to Identify Problems and Participate in Developing Solutions
- Improve Communication and Technical Exchange of Transit R&D Results and Ongoing Work
- Provide Means of Addressing Problems Without Extensive Federal Involvement in Each One, With "Grass-Roots" Participation

Figure 1

Initially, the NCTRP is conceived of as primarily oriented toward technology-related problems.

How do we plan to do this? We have a scheme (Figure 2) modeled after the Federal Highway Administration's NCHRP. They have what is called AASHTO, the American Association of State Highway and Transportation Officials. In the highway program they have a certain amount of money allocated for use in research and planning and for no other purpose. The state governments set aside voluntarily a certain portion of that money, which is channeled into as a central pot and used to fund the National Cooperative Highway Research Program.

UMTA doesn't have quite that funding scheme. We don't have a certain amount of money that would be voluntarily channeled into the NCTRP. Our OMB examiner keeps asking why the operators and MPO's and so on, don't voluntarily take some of their Section 5 money and allocate it to this program. You can read George Pastor's detailed answer in the Senate and House hearings of this year. Basically, I think he says that it is too soon for that. We haven't started yet and we haven't shown that it can produce something useful, so we can't expect our constituents to provide the funding. I think if the NCTRP is successful, we can expect some OMB pressure in the direction of contributions from the transit industry.

It also occurs to me that maybe we should hold our hats out to the large oil companies, saying that contributing to the NCTRP is a way you can get some good public relations and help us with our transit problems. I doubt that, as a government official, I am at liberty to solicit in that way.

NATIONAL COOPERATIVE TRANSIT R&D PROGRAM

PROPOSED NCTRP PROGRAM ORGANIZATION

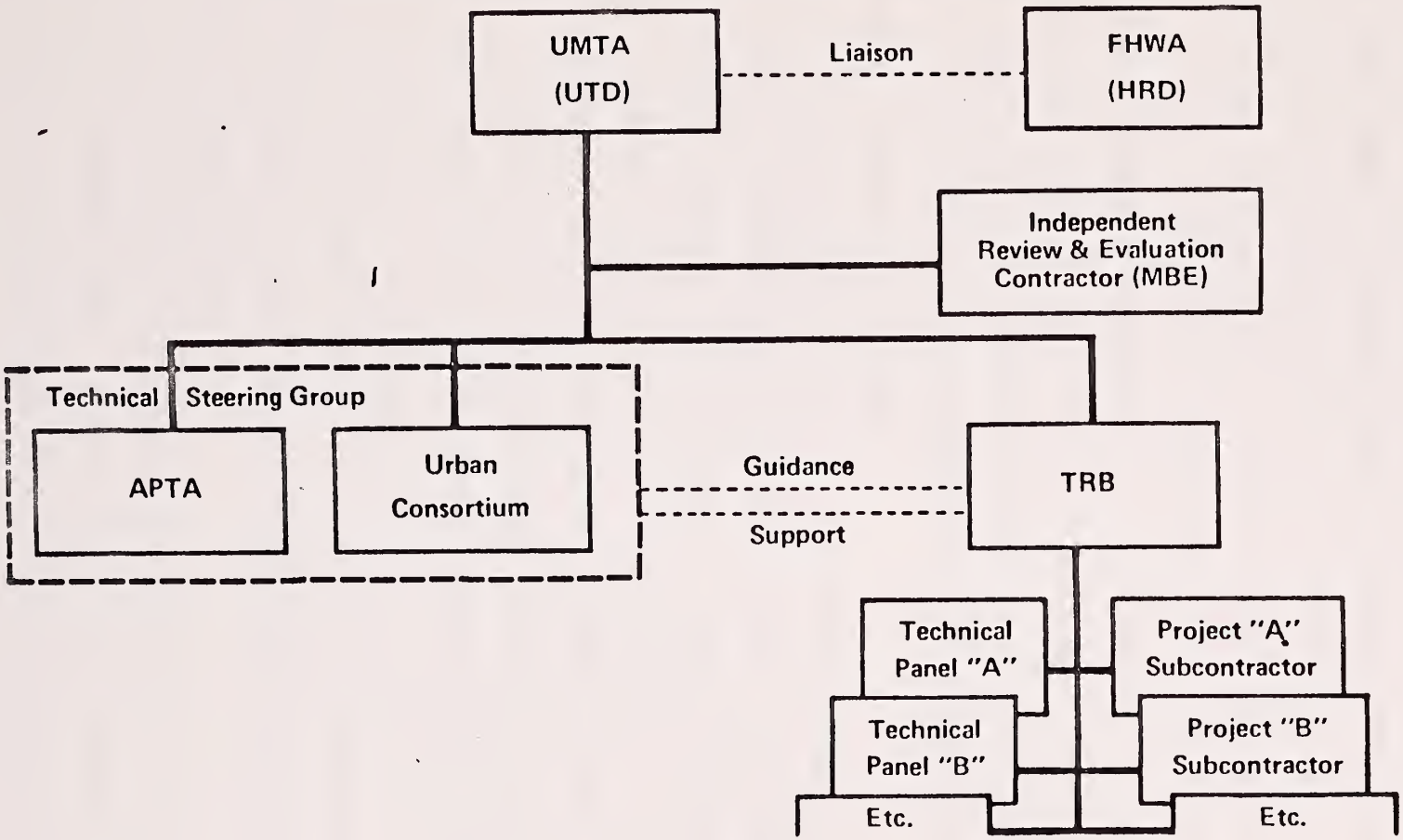

Figure 2

We have identified a technical steering group, which consists of eighteen members of the American Public Transit Association, selected on a regional basis, three of them from each of six APTA regions, and three representatives from the Urban Consortium for Technology Initiatives, represented here by Alinda Burke. These people will meet, review and prioritize in much the way that you have been hearing other people talk about prioritizing. Their range of interest has to be focused somewhat narrowly, however, because they know that we only have, at the moment, about one million dollars a year for this total effort. It wouldn't make much sense, therefore, for them to identify a five million dollar project unless it is possible to do some exploratory feasibility work on such a project in one particular year.

We will be working with the Transportation Research Board of the National Academy of Sciences/National Research Council. The technical steering group will identify a menu of what they think are the most significant problems. They will do this with the benefit of technical support from TRB, who, like UMTA, will be telling them that so-and-so is already working on this or has been working on this for five years, or that we have already tried this and have learned so much to date. Now, if the steering group still wants to pursue it and we know of nobody who is exploring the problem, TRB will also help us to frame how large an effort it is going to require to make a meaningful contribution toward solving some of these problems.

For each problem that is selected for implementation, we expect TRB to set up a technical panel. Perhaps some people in this room will be asked to serve on these technical panels. The technical panels'

responsibilities will be to dig in and write the project statement of work. What is going to be done? How will we select the particular subcontractor to do this work? How are we going to keep up with what is going on and the progress that is made and whether we are achieving our objectives?

For each of these projects that is funded, there will be a subcontract awarded by TRB. We presume that they will then range from a year to two or three years to try and make a contribution toward solving each problem. I have illustrated that perhaps three to five problems would be addressed in any given year. As the programs get rolling, there will be several active projects, some just begun, some in midstream, and some just concluding.

Finally, we have put into our program structure an independent review and evaluation contractor, a minority firm called the Onyx Corporation. They will be working directly with me on how UMTA can tell whether this whole process that we have described is going to achieve its stated objectives. Onyx will also look at some of the individual projects. After we have identified the problem and conducted the project, did the results make a difference in terms of the problem that was stated?

Now, just so that you won't think that these are going to be very esoteric problems, I would like to give some examples to show you that they are fairly mundane concerns (Figure 3). I am not prejudging what is going to be in the first year's menu, but these problems have all been mentioned as typical of the problems that might be suited to the NCTRP, at the outset. They involve things like materials, mechanisms, manuals, procedures, and equipment, mostly having some tangible product or piece

NATIONAL COOPERATIVE TRANSIT R&D PROGRAM

Examples of Near-Term Problems Which Might Be Addressed:

- Safer Stairs and Escalators
- Fail-Safe Design Manual for Rail Transit Signal and Control Equipment
- Better Fire Detection and Extinguisher Equipment
- Improved Destination Signs
- Improved Window Materials
- More Efficient Cleaning Equipment and Procedures

Figure 3

of hardware or technology associated with them. I think if the whole process turns out to be successful, there is no reason why the funding, ~~and the~~ constituency representation, and the range of programs can't be expanded later. The National Highway Cooperative Research Program includes software, procedures, methods and policy problems as well as hardware, construction and materials problems.

JAMES R. DUMKE
TECHNOLOGY SHARING OFFICE, TRANSPORTATION SYSTEMS CENTER

For the purpose of eliciting comments and suggestions, I have divided up the universe of communication activities for UMTA's research, development, and demonstrations into three categories (Figure 1). I intend to make only a few comments of my own on each category, and then to provide a reminder of the many resources which are working in the field.

Project Information Dissemination: This activity consists of the generally accepted methods for building a usable knowledge base of scientific and technical information. The methods follow well-established patterns which include standards for report formats, technical papers, specifications, handbooks, etc. These are well understood by the research community and industry. Research papers in social, economic and management fields also adhere closely to technical report conventions.

The important thing to remember about this area is that the bulk of information is organized by project. In other words, most documents and other forms of communications are limited in content to the results of the work that was commissioned. In total, however, the knowledge base contains a reservoir of retrievable detailed technical data which can be used for further research and for additional applications.

Information Services: A second category of communications activities consists of the services which help people to find technical and program information. In looking broadly across industries, both general awareness devices and systems which provide easy access to relevant information seem to be related to

the outlook for total R&D activity in the field. For example, I can access data on aircraft landing gear more easily than on rail suspension systems. The information services in intense technological fields reflect a higher quality of services as well as a larger data base.

Figure 2 illustrates how transit-related information is beginning to accumulate. It is based on numbers furnished by Marina Drancsak on the quantity of UMTA-funded technical reports which have been submitted to the NTIS each year by UMTA's Transit Research Information Center. The curve is obviously accelerating - with reports coming out at the rates of 200, 300, and 400 per year for the last three years. If we consider that R&D for transit was only substantially initiated in the 1969-1970 era, we may expect what will appear to be an explosion of information (600 to 1,000 UMTA reports per year) in the near future. There doesn't appear to be a good way of estimating when the rate of growth will level off.

User-Oriented Activities: Although growth of the traditionally organized technical knowledge base may be accelerating, conventions and systems are available for dealing with it. This is not necessarily true of the category of communications activities which is concerned with user-oriented information. Thus far, we have found one formula which has been successful. It consists of a series of workshops which brings researchers together with potential R&D users to exchange practical experience and develop an understanding of user information needs. Then the staff produces a draft which can be aimed at the right

questions and can include an appropriate level of technical detail. Utility of the information is validated through a user's review workshop.

This kind of process is alien to the entire world of technical reporting, and I believe it will have to receive a much heavier emphasis in the next three or four years if we are to realize the full benefits of government-sponsored R&D. We need other formulas and to find them, we should carefully examine how research in other fields has been applied successfully, and which methods are the most efficient. Within our programs we need to understand the downstream decision-making process and design communication strategies which will help useful innovations to see the light of day.

Resources: As shown in Figure 3, a wide variety of resources are already at work supporting the communications system we have today. I believe we should first ask ourselves whether these resources are being used to best advantage. Can they be combined in clever ways? For example, can the government make better use of existing trade and professional association publications?

Near-Term Goals: During the coming year, the principal goals for the Technology Sharing Office are to support UMTA's Technology Development and Deployment by 1) formalizing user/sponsor communications, 2) increasing user-oriented reports and services, and 3) improving dissemination time.

From our technology sharing experiences over the past few years, it is becoming apparent that we should establish some permanent linkages

between sponsors and potential users of research, development, and demonstrations in transit. Our office has commissioned studies on information and training needs and on State and local infrastructures, but we find that both the needs and the infrastructures are in a constant state of change. Four years ago, for example, there was considerably less interest in improving accessibility for elderly and handicapped riders. Now there seems to be a need for a clearing house to handle what may be a peak workload of communication needs.

Existing associations of State and local governments, planning agencies, transit providers, and the construction and equipment industries could provide a valuable resource for continually updating our understanding of information needs. APTA, the Urban Consortium, TRB, and the community of UTPS users are examples of networks which provide two-way communications on R&D needs. The same networks, and others still to be investigated, could also provide inputs on information needs and priorities. The National Cooperative Transit Research Program is an example of still another opportunity for closed-loop communications.

Finally, I expect that by working through these associations, we can develop new and more effective user-oriented products, and find ways to streamline the dissemination of technical results.

UMTA RD&D

COMMUNICATIONS ACTIVITIES

PROJECT INFORMATION DISSEMINATION

- Technical Data, Technical Reports
- Bulletins, Summaries, Announcements
- Conferences, Seminars, Workshops
- Implementation Handbooks
- Training Programs
- Information Networks

INFORMATION SERVICES

- Directory of RD&D
- UMTA Abstracts - Bi-Monthly and Annual
- Search Services
- Libraries and Repositories
- Direct Mailings
- Communications Coordination and Support

USER-ORIENTED ACTIVITIES

- Manuals, Handbooks, Guides, Calendars
- Assessment Reports
- State-of-the-Art Summaries, Primers
- Subject Bibliographies

Figure 1

UMTA TECHNICAL REPORTS

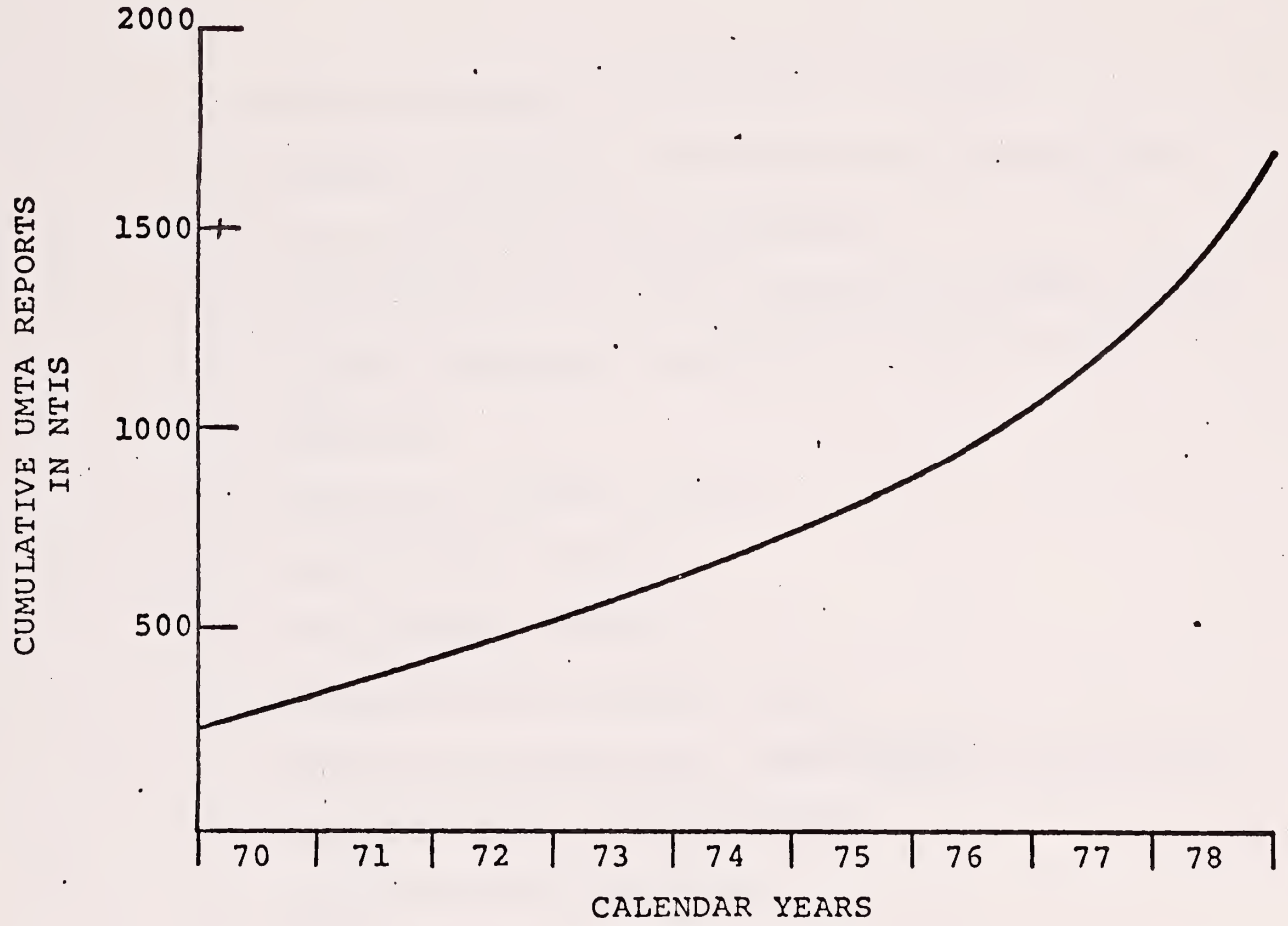

Figure 2

COMMUNICATIONS RESOURCES

- PROJECT MANAGERS, CONTRACTORS, INDUSTRY
- RESEARCH, ACADEMIC AND CONSULTING INSTITUTIONS
- PUBLIC AFFAIRS OFFICES CHANNELS
- TRANSPORTATION RESEARCH INFORMATION CENTER (TRIC)
- NATIONAL TECHNICAL INFORMATION SERVICE (NTIS)
- LIBRARIES
- TECHNOLOGY SHARING OFFICES
- TRIS/TRISNET SERVICES
- UMTA REGIONAL OFFICES
- TRANSPORTATION RESEARCH BOARD
- ASSOCIATION COMMITTEES, CONFERENCES, AND NETWORKS
- ENGINEERING AND TRADE JOURNALS
- TRANSPORTATION NEWS MEDIA

Figure 3

FY 79 TECHNOLOGY DEVELOPMENT
COMMUNICATIONS GOALS

- FORMALIZE USER COMMUNICATIONS
- INCREASE USER-ORIENTED REPORTS AND SERVICES
- IMPROVE DISSEMINATION TIME

APTA, basically, has struggled for this kind of a program. The title of the program, National Cooperative Transit Research Program is not by accident. I underline the word "Transit." There were times when people were talking about "urban transportation" and "transportation" and we made the point that we wanted the word transit very explicitly, because we wanted our turn at bat, so to speak, to attack these self-help programs, or as we classify in the DOT terminology, the independent R&D endeavors.

They are important to us. They may not necessarily be in accordance with policy of UMTA in their working with Congress in the big picture, but they are responsive to the public and the transit operators' charge in their understanding of the Mass Transit Act of 1964. Simply stated which is, to serve the riding public and discharge a responsibility in the matter of safety, attractive service, reliable service, and operationally viable.

So, the American Public Transit Association, working with the Urban Consortium for Technical Incentives, Transportation Research Board and UMTA, has forged a mechanism to achieve such an objective. APTA itself has reorganized as of about two years ago, with the introduction of a Vice President of Development and Technology in addition to the other vice presidents of finance, marketing, rail transit, bus operations, government affairs, human resources, to name a few.

In the NCTRP, a Technical Steering Group is provided who will determine the annual program content. The Chairman of the

TSG is the Vice President of Development and Technology of APTA and presently is Mr. Leonard Ronis, General Manager of the Greater Cleveland Regional Transit Authority.

APTA has six regions, from which is obtained a consensus of various issues. We use these regions and structured representation which would encompass small operators, large operators, bus only operators, bus and rail operators, to get a flavor of the needs that they perceive in discharging their responsibility to the public. This numerically comes to 18 members.

In addition to that UCTI will provide three members. UMTA will be in an ex-officio capacity.

Looking at Region I representation, for example, is Mr. John deRoos, who is Chief Executive Officer of the New York City Transit Authority; Robert Kiley, who is the Chairman of the MBTA, whom you heard earlier today and Joseph Silien, who is the Executive Director of the Rochester-Genesee RTA. That is one region. You can see from there that it is a pretty good representation.

In Region II, getting into the New Jersey area, and Virginia and so on, we have a Mr. Henry Church of the Greater Richmond Transit Company, a small operator, but an important ingredient; Robert Johnston, who is General Manager of the Port Authority Transit Corporation in Camden and John F. Hoban, who is the Director of the Rail Planning Division of the Port Authority of New York & New Jersey.

Region III, Mr. John Williams, General Manager of the

Transit Authority of Northern Kentucky; Mr. Alan Kiepper, General Manager of MARTA; and Ernest Gerlach, Director of Operations in the Metropolitan Dade County Transportation Administration.

Region IV, which moves into the Ohio, midwest area we have James Reading, Central Ohio Transit Authority; Metropolitan Transit Commission who will confirm an individual, and the Chicago Transit Authority, probably to be represented by Mr. George Krambles, Executive Director.

Region V, moving westerly will be comprised of Paul Ballard representative of a bus management group, the American Transportation Corporation; John Simpson, Executive Director of the Denver RTD and Mr. Lawrence Heil, who is with Houston City Transportation Operation, a small bus operation.

Getting out in the far west we have Peter Cass of the Tri-Met or Oregon; Gerald Haugh, at Long Beach Transportation Company; and we have yet to have a confirmation from Mr. Peterson of Seattle Metro, but he indicates that he doesn't think he will have any problem serving on this Technical Steering Group.

So, we have a good balance. They are in support of this kind of a program. It is something that we have been striving for at least five years, because that is when I started this assignment for the expressed purpose of implementing practical near-term developmental and application type effort.

Henry mentioned some programs in his introduction. As mentioned before, if those are not the programs to be chosen, we have a few more in our inventory. There are 168 programs

that have been identified by the operators as to their needs. One of them which was not mentioned today probably because of the spelling and too long a title is, "Psychological and Phsiological Factors Involving Panic with Passengers in Subway Stations."

This is a very interesting area. It is a serious area. It is one of which we should step up to and address, but it is a problem that maybe doesn't interest too many people. We think it has a high priority.

There is just a pluthora of programs. From the standpoint of funding, Henry Nejako mentioned a million dollars, and we are not slighting that. We think that's great, because the point has been won. And I have to say, "won" because it has been a fight. UMTA and APTA joined forces. We had sessions with representatives of Congress and the logic finally prevailed of what we were trying to do. This is a wonderful example of a good opportunity with the Urban Consortium, with UMTA, with APTA, TRB. We are paralleling some TRB activity and I see nothing wrong with emulating success. That is the best way to get things done and probably the most cost effective.

The advertising people have a stereotype -- probably technical people have a stereotype too -- advertising people are the people who brought you the "Pepsi Generation," or "Pop, Pop, Fizz, Fizz." Well, advertising in the transit industry is quite a different commodity. I think you need to know how we marketing people view public transportation before you can understand why we are doing so much work in information systems.

When you go into a store, Crest toothpaste is the same on any shelf you go to. You can advertise it nationally or within a region. You might have variations in the tubes of toothpaste, but it is all the same product. Scope is the same wherever you go, the same kind of mouthwash.

Public transportation is a unique product or commodity to every potential user. It is not the same. It is a service. Generally, you know, that no two people are going between the same points. Every once in awhile you might get a husband and wife, but very seldom. People are going between completely different points. Suppose you leave this building; some people go to Braintree, some people go up to Newton, and some people head out to Revere. You have almost an infinite number of potential trips that can be made. You can go downtown and leave from Copley Square, and it becomes almost infinite again.

Public transportation, thus, becomes a very complex product to market, to advertise, to sell the people, because each trip is different. Giving that much information in a media campaign is a very difficult task. Consequently, information becomes critical to any marketing or advertising program we can put together. Recognizing this, we looked at our information elements. As John Durham pointed out, there are a number of them, including printed information, point of purchase information or, as they call them, static displays, and telephone information.

We started in 1973 looking at our telephone information. It was quite a problem to us, because we were getting a lot more telephone calls than we could possibly handle. Then we started looking at the need. Where do we go from here? We had some obvious problems that were confronting us.

First of all, in Washington we had an extremely complex transit system, six to seven hundred different bus routes with an addition of a rail system now. We also have a constantly changing bus system; we change every other month, reconfiguring all the route structures. That becomes a problem for us.

We also have a multiplicity of jurisdictions. This becomes a problem, too. Two different states and the District of Columbia and none of them get along with each other. This presents a problem with the constant change. Our information operators are all entry level people, presenting constant turnover and constant retraining problems. Again, this is setting the stage for our needs.

Consequently, in 1973 we decided we had to automate this when WMATA took over the private bus companies in the area. We put in a grant to request capital assistance and we got funding for it. We went out and brought in a company that did feasibility work and listed the technical specification for us. Then we moved along and we got the feasibility work done. We checked it over and found problems that took quite awhile to resolve. A couple of years later we were still working on it. In the meantime we had tried several other approaches to improving the telephone information function. We doubled our staff. That didn't help because what we were doing was raising the level of expectation among the consumers. People couldn't get in through the phone switchboards before so they didn't

call. We doubled the number of operators and calls quadrupled. People thought that they could get in and they were calling up. More and more calls flooded in. We could probably double our operators again and the calls would again double. The responsiveness of telephone information service is directly related to successful promotion of our system, because our ridership started to increase.

We then looked at a microfilm system. It had some inherent problems for us. One is that we had such a changing system that updating and refilming pages of material became quite a headache and we were always running behind. The other thing it did not do was compute the route itineraries. It couldn't tell a person how to get from point A to B. The operator had to know that. So, all it did was store information, and we were running behind in getting it stored, so we ceased that demonstration. Some other transit properties are using it, such as Chicago, and it seems to be working for them, but they have a less complex system and a more nearly static system. It is not changing to the extent that ours is.

Then we looked at improving our manual materials and that helped us significantly. Arranging better maps and materials for the operator's access helped considerably. We found also the Hawthorne effect was setting in. The more we were trying to make improvements, the more our operators noted it, the more productivity improved and consequently, we were getting a lot more work out of those people.

Then we looked at training.

We improved training, and found that helped quite a bit. Then UMTA R&D contacted us because they were doing some work in the area. We pooled our efforts, MITRE joined us, NBS joined us and we developed a specification, advertised, and now have a company on board. They are

developing a system for us that will meet all the very complex criteria. That is, it has to be able to handle a constantly changing information base. It has to be able to handle a massive data base, including both a geographic data base and a schedule data base. Technical people would call it a data base management system problem. They are working on it, and have overcome the algorithm problems. We had a successful prototype demonstration. We have introduced it to our information operators who are very enthusiastic about it. What remains for us to determine is, knowing that we can put it in and they can try it, will the ultimate effect be a good one or a bad one in essence? That is, it may help the operators and may give good information. It may slow down the operators, but what are the costs and benefits. It may improve accuracy of information. More itineraries are provided, better itineraries, but it may actually slow down response. We don't know. It takes a long time for an operator to type in information, and the human mind has remarkable facility to store vast amounts of this type of information and process it.

Some of our senior operators can handle over 50 percent of the inquiries they get, just straight from the knowledge they have in their head. Thus, we have the human mind pitted against the computer, and we have to see who is going to win on a cost effective basis.