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16. Abstract

This is a compilation of material that was presented at the Third UMTA R&D Priorities Conference Workshop on Urban Transportation Planning. It includes discussions of the needs and problems of the transit operating industry in planning for urban transportation and research in transportation planning methods. This volume contains three 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 a workshop session 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:

Urban Transportation Planning Workshop

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
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When ordering copies of these reports from NTIS, please refer to the list of report 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.

URBAN TRANSPORTATION PLANNING

Chairperson: *Garrison Smith*, Deputy Director of Transportation, North Central Texas Council of Governments

RESEARCH NEEDS FROM THE METROPOLITAN PLANNING ORGANIZATION'S PERSPECTIVE: *Mr. Smith*

RESEARCH NEEDS FROM A TRANSIT MANAGEMENT PERSPECTIVE: *Philip J. Ringo*, President, ATE Management and Service Company, Inc.

DEVELOPMENT AND INSTITUTIONALIZATION OF IMPROVED TRANSPORTATION PLANNING METHODS: *Robert B. Dial*, Director, Office of Planning Methods and Support, UMTA, and *Richard Steinmann*, Community Planner, Office of Planning Assistance, UMTA

Panel: *Thomas Hillegass*, Office of Planning Methods and Support, UMTA
Granville Paules, Chief, Technology Transfer Division, UMTA

Reporter: *Robert Waksman*, Evaluation Branch, Transportation Systems Center

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URBAN TRANSPORTATION PLANNING

GARRISON SMITH
DEPUTY DIRECTOR OF TRANSPORTATION
NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS

I did a little statistical review last night of the people who had signed up for the session. If my calculations are correct, there should be throughout the session approximately seventy percent consultants, federal representatives, universities and researchers. I guess those are the ones that provide the money and seek the money. We have about thirty percent transit authority, local, state and regional people which, I guess, are the people that are the predominant users of the products of the research and development. So we would hope to provide an interchange between the panel and with each of you.

We are, as a part of the panel, supposed to provide a presentation. What I'd like to do is to raise questions through a few opening remarks. I suggest that perhaps you might wish to take some notes on these questions; not that they are that provocative, but that as you look at them on paper, maybe you can begin to generate some response and ideas that you'll offer back to us in response to those questions.

From the MPO perspective, one of the things I wanted to do was to try to be sure and define the MPO. The MPO is the elected officials in an area that make decisions with respect to transportation investment. There is an MPO staff and sometimes the MPO staff confuses themselves with the MPO and I hope that by that definition, the elected officials are the boss and the staff works for that group of elected officials.

In our area we have a very strong definition of who our client is. It's the local traffic and transportation engineers. It's the transit operators and it's the local elected officials that serve on the MPO board. We work very hard for those elected officials through their professional staff and I hope that it's the same way in your area as well.

With respect to urban transportation planning research and development needs, I just wanted to comment on a few issues that we face at the MPO level. Air quality, I'm very scared of. I spent a couple of days in the first part of this week working with the Environmental Protection Agency on how they intend to enforce the Clean Air Act Amendments of 1977. And I think it's a little bit scary for transportation planners and MPO-type activities.

One of our important activities is to help make project priority and funding decisions and to provide analysis for that effort. We are also involved in elderly and handicapped planning, alternatives analysis, and environmental impact statement type activities. Many of us are trying to integrate transportation decisions with water and sewer, housing and other land use type issues. Many of us are faced with civil rights analysis with respect to the equity of the distribution of transportation services and there's not a great deal that is known in this regard. And we also must analyze transportation related impacts including finance planning, economics, economic development of land use.

Generally an MPO is involved in a wide variety of activities: data mangement, analysis and trying to keep up with the state of the art. Perhaps, there's an information overload. Synthesis

of travel forecasting and impact analysis techniques, how to delineate alternatives for evaluation may be a priority. Just trying to maintain a computer system and manage it and operate it takes a tremendous resource. And there's the understanding of people and of politics and reality of group decision making.

With those ideas thrown out, I have listed several questions that you may wish to consider, based on your own experience, and then offer questions to the panel. These ideas are not in any particular order.

Some of the questions might be: At what level of detail should the planning process operate? I get a lot of sense from local governments that they want the process to operate in tremendous detail at the operational level. Is this true in your area?

Does your MPO serve your needs? I suspect in a lot of areas they don't and I'd like to hear in which areas they don't, why they don't and what you think can be done about it. It may be a technology gap on their part or maybe a lack of understanding, of your needs. So any ideas you may have in that regard would be welcomed.

You may feel that there is already too much planning technology available and, therefore, more is meaningless. I'd be interested if you agree with that. You might articulate, as I tried to do, some of the problems that you face that you do not feel you have adequate information or planning procedures to use to deal with it.

What does dissemination of transportation planning techniques

mean to you? Is it receiving a report or would you like to have some sort of "traveling helper" that would come by and spend a week in your shop and help you do your thing? That's a request we've had from our local governments. Perhaps you could set up dial-a-problem, no pun intended with one of our panelists.

Do you have some non-technical support needs such as in the areas of community involvement and graphic techniques? Perhaps you'd like some training manuals to give to your support staff to help train them in their job better. Perhaps you would like some help in the area of policy development. Guide books could perhaps be developed through an organization like Transportation Research Board.

Do you feel like the planning process is well managed? I've made the statement a couple of times that it's a 160 million dollar a year unmanaged business. There's no opportunity that I know of where MPO's get together to try to improve the basic techniques they use to get their job done. It somehow overwhelms me.

How helpful do you find case studies, the manual methods, the training courses that you have an opportunity to attend?

Do you feel that practitioners should play a stronger role in implementing new research and development?

These are just a few suggestions of the types of questions and issues that I'd like for you to pick up on and then expand in your own way. I'm not really asking for the horror stories that you might have with relation to each of these, but just to summarize the kind of research and development that you'd like

to have the Urban Mass Transportation Administration try to undertake to help you solve them. To be blunt, they have at least 5.4 million dollars available in research money that, with your direction, can flow into the kinds of activities that you'd like to have that money utilized for.

One particular suggestion that I have is that perhaps a visit to several MPO's to look at the total job that an MPO staff does from a management perspective, might be a useful activity and approach. The development of technology from a total management type of perspective -- that was an idea I picked up a minute ago in the Transit Management session.

I'd like to close with a little story that I heard a transit operator say to me once in a significant meeting and I'm not sure I can get the story correct but basically we were very proud of some new technology we had developed and we asked the audience if they thought that would help them manage their transit system better. The transit operator looked at me and said, well, it reminds me of the story of the Texas farmer that was speaking to this young agricultural agent who was trying to get him to improve the productivity of his farming techniques and get more crop for the money that he spent. The old farmer kind of looked at him and said, well, I don't farm now as good as I know how and I don't need your ideas. It floored me. It may be the truth of the matter that we're way ahead of what people want even though we're not as far along as we might feel we ought to be. If you agree with that, that would be interesting.

PHILIP J. RINGO
PRESIDENT
ATE MANAGEMENT AND SERVICE COMPANY, INC.

My background and basis is that our company runs a large number of transit systems, thirty-seven, in twenty-six states around the country. They're big, medium, small, but primarily bus systems. My experience is that the problems that are faced by transit operations are fairly common, regardless of size. The problems in particular that are faced by transit management tend to come down to needing more information to manage better. To answer the questions "What if we do this?" "What if we do that?" And I think there is clearly an important role that the planner in R & D can play and should play in providing answers to those questions and accordingly in helping the manager manage better.

Garry asked a question--"Should the practitioners play a stronger role in R & D?" I think clearly they should. To me planning and its related function , research and development is a corporate support function. It exists to provide assistance to the line management function of operations. R & D doesn't drive management and operations but it plays a major role in the success of any operation.

So what I'm going to try to do quickly is to talk about how I perceive the link up between planning and operations and then try to identify what, from my personal perspective, are some of the needs that should be addressed in terms of making the planning process more durable and more practical to the transit operator.

First, in terms of an environment of working together, I think we've come a long way in terms of being able to sit down as managers and as planners and talk to each other. Five or six years ago there was very little communication between these two groups. This has changed dramatically, and I think there's a lot more interplay that is due to a lot of the people at this table and similar people who helped make this thing come together. I think it's very healthy.

In terms of what is happening in the planning process, it seems to me from a Transit Manager's perspective, some of the positive changes are, that a lot more of the Section 9 money is flowing through so that it can be used for operating, planning and management objectives. Not so much is being spent on long range, blue sky plans that really haven't done us a whole lot of good. The pass-through of Section 9 money hasn't been without some pain. I think in some cases the MPO has suffered a little bit and felt that we've taken away some of their latitude and I also will admit that from a transit operator's standpoint, I think we've misused some of that Section 9 money, but in the long run I think the trend is healthy.

Among other things that are happening, the next one is in the not so good category. I'm not sure why it's happened, but let me describe it from my perspective. About three years ago we really were, it seems to me as an industry and as operators and boards, on top of the TDP process. We felt we understood what it was. We put together what we thought were pretty good transit development plans. Then all of a sudden the ground rules changed, and we had to deal not with TDP's but the TSM process. Again, I clearly understand why the TSM process is important, and why it is necessary to link up transit elements and highway or road element. However, I think that the change has left people very confused with the TSM process. No one has been able to show me a real good TSM plan, and I think we've lost substantial ground in that way and I'm not sure what to do about it. Maybe some of you all have reactions in that regard.

Another thing that is happening that I think impacts on planning and the operator, is that transit management is finally beginning to realize that data processing is something that can be of tangible value. Frankly, most of the transit industry is still in the early 50's in terms of our use of data processing, and even recently many of the data processing activities that we should have taken up a long time ago have been, in effect, forced upon us, and I think, healthily so, by the research and development activity. For example, RUCUS is superb. However, RUCUS

almost failed in some ways, I think, because transit wasn't totally ready for it. Thankfully, it's in place and now we're talking about extensions of RUCUS and other activities which I think are very helpful. So in that regard you all did a good job and kept beating on us until we changed.

Let me switch now and tell you where I think the emphasis ought to be placed in terms of planning and research and development. I see the following four categories:

The first one is service design and measurement of effectiveness of service.

The second one is training and manpower utilization, people utilization.

The third is market consumer research.

And the fourth is the whole area of data assimilation and interpretation.

When I look at how our company spends our research and support money--we have a support staff of technical people--inevitably about thirty-five to forty percent of our efforts are always spent on the design of the product; on the route structure, on schedule cutting, run cutting, on making sure that the service that's put on the street is effective. I think that's appropriate. If you put service out and it's not used, you have no ability to recover, you can't go back and do it all over again. And, in terms of where I see emphasis being needed, it is in that entire area of service design.

I would urge that it be done at a very specific, concrete level, on the street, since that's where you make service design changes. You need very detailed, very specific information. I am not a believer in "map jobs" and sitting back and making general changes in transit systems. You can't generally run transit. You have to do it very specifically because you're dealing with individual desires and individual needs for mobility.

In that regard--let me give you an example of a development which is working and is doubly pleasing because private enterprise developed it. I refer to the General Motors urban systems laboratory in Cincinnati. General Motors invested a considerable amount of their own money to work with very specific problems along a corridor in Cincinnati, the Reading Road corridor. They've come up with some information that is just gold for us in terms of being able to make decisions in terms of route changes. That kind of thing, I think, is very healthy and very productive. I hope that kind of activity, where private enterprise gets involved will be encouraged by the whole federal establishment. I have no brief for or against GM, but I think what they've done is interesting and should be pursued. It's that kind of activity, as well as other activities that UMTA is involved in that I think are important.

There are other things we can talk about; the need for guidelines; the need for standards in an industry that very often hides behind the lack of standards--and I think

that's the fault of management, not a fault of the research community; a very strong need for a continued look at ways to better frame and utilize manpower. Again, it's trite, but transit is 75-80% labor intensive and I think all too often we focus our research efforts on activities that are only going to have marginal improvements. And what we need to really focus on areways to better utilize our existing resources of manpower.

We were all scolded yesterday, and I think rightly so, by the woman from New York regarding our lack of sensitivity to the consumer in transit. I think that is a very pertinent comment. Mass transit's a terrible name, because you're not dealing with masses of people. You're dealing with individuals. In this regard we do need more consumer research.

I guess that's about it. From the transit operators perspective--to be a little critical--I think sometimes there's a tendency to overkill in the whole area of research. One of my people, likens it to the need for a transit system (or for an individual) to have an annual physical. Sometimes it seems to transit operators that some of the research in this regard goes too far. It's as if someone had a mole on their arm and instead of leaving the mole alone or taking the mole off, the cure is to amputate the arm. I do agree that research and planning can help us in identifying problems and, if a serious problem exists, to promote a detailed cure.

ROBERT B. DIAL
DIRECTOR, OFFICE OF PLANNING METHODS AND SUPPORT
URBAN MASS TRANSPORTATION ADMINISTRATION

I believe research and planning should cover a large, wide spectrum of activities from short range planning to long range planning. It should have overriding concern for multimodality. It should have a concern for costs and operations, and for tying in the strategic planning down to the tactical operational efforts of transit operations and traffic engineers.

But I'd like not to just lip all those platitudes this time and try to just be specific on commenting on some of the questions that have been raised. In particular, Dan Brand's question and the other one from the gentlemen from Boston regarding the TDP disappearance, has been a very sad event. And the lack, I think, of a specific guidance on what constitutes TSM planning is sad to me as well. I must, however, at this point hide under bureaucratic turf. I'm in research in transportation planning methods and I don't have anything to do with promulgation of policy.

Gary asked about methods available; are there already too many; are we served by all the methods we've got? And God knows, maybe we should just stop building them and get on with our planning work. We already know what we ought to be doing and just don't have time to do it well. I don't know why, it just flashed in mind, I was sitting with a girl I used to love an awful lot and she was leafing through a catalog for a junior college in northern Virginia and she got to the math section.

She saw there were three pages of math courses and she said, "Oh my God, why in the world would anyone want to know all this math and what in the world could you possibly do with so much math. They certainly teach too much math; we're overwhelmed with all the mathematics we have." And it was quite true in her case, but perhaps I for one believe the more tools the better. But, of course, that's a somewhat selfserving remark.

I, too, have always really been turned off by the term "Mass Transit". Then I rode it awhile and maybe "mass", when I took physics, you see, they measured mass in slugs -- maybe it's the right word after all - in terms of performance and sometimes in terms of the kind of services provided. Anyhow, it should certainly be called public transportation, and it needs to be improved in quality of service and other things. It is an awful choice of words,

The next topic that Garry raised was on TSM and as we heard earlier, we have got to keep up with the slogans in all aspects of professional life. Whether you're trying to get reelected, justify programs or write proposals, you've got to keep up with the slogans. The slogan TSM is the current one that's important to be understood and kept up with. My understanding of TSM is basically that it is a short range planning exercise with a great deal of implementation detail. And it's perhaps a lot more than that, but I'd like to use that as a working definition.

The thing that we're trying to do is to hook in short range planning activities with long range decisions. This means hooking together data bases, both those gathered to the detailed

level of TSM planning required and those used for more abstract analytical processes. I feel that the analytical techniques which originated in the long-range planning context have been potential for TSM.

Unfortunately, there is a kind of pig-headed assumption around that computers are only good for long range planning, because that's what they were used for in transportation planning initially. It's something like saying that typewriters are only good for typing novels but not technical manuals. However, it's clear to me this is a bias -- that the short range planning activities are more complex than the long range planning activities, and that more detailed decisions have to be made, and you have to get the plan "out on the street". To be able to operationalize something requires a great deal of detailed, down-to-earth, precise information, not just the glowing generalities that the long range plans would yield. So the output of any short range planning activity would have to be much more detailed, and, therefore, place a much greater demand on one's data gathering, data organization, analytical capability than with long range planning. All this seems to cry out for a computer's help. I'd say that both the traffic engineer and the transportation operator can, therefore, benefit, a great deal from the systematic analysis that long range planners are used to performing in terms of network analysis and data base management. We're now trying to prove that hypothesis.

Right now we're working on the transit side. We're also trying to intergrate our efforts with FHWA's research team on

the highway side. On the transit side, what we're trying to do is build tools that let the planner move smoothly, virtually automatically, from crude, coarse, long range descriptions of transit service applicable to either sketch planning or mezzo level planning activities for medium to long range planning, into a format which provides more detailed estimates of the characteristics of the operation with respect to vehicle schedules, manpower requirements, all the way down into a format directly consumable by the RUCUS package. That means that one can begin with route planning at a sketchy level and refine it down to a point where it becomes a file of, to use the jargon, "trips" which can be put in directly to RUCUS or it can be put into a vehicle schedule that's also a part of UTPS. That vehicle schedule will come out with, again, the jargon term, "blocks", which can then be input directly to RUCUS's run cutter which would give a manpower schedule. Given a vehicle schedule and a manpower schedule for a day and then being able to hook together a lot of those over a week and then, to do some manpower leveling over the week, one could get an extremely precise estimate of cost of operating a system plus a very detailed picture how one would, indeed, implement the idea that was planned.

We have made great progress in pulling this off, I think. We're beginning an agreement with Seattle's Metro and Portland's Tri-Met to serve as a place, a proving ground as it were, for a prototypical system which would make use of what we're building.

The concern that drove us into that detailed planning thing

was, principally, the cost estimation. It's obvious that transit planners are more cost conscious than anybody, I mean, in the transit operations people. They have really been beat over the head about cost for the last thirty-odd years and so they know a lot about cost estimation and have a lot of concerns about costs.

On the other hand, we long range transportation planners, coming from the highway side, haven't been greatly concerned about such things as operating costs, and it's a different kind of animal, of course, over on the highway side. So, we found that in order to get decent cost estimates for a proposed transit system, a large scale regional service, you have to make a lot of assumptions about how that service is going to be implemented and operated. And that means you need models to do some scheduling of vehicles and manpower because you can't be writing vehicle schedules and manpower schedules by hand for every idea you have. This has led us to get into more automated techniques for vehicles and manpower scheduling and estimation techniques. There have been some very promising results.

On the highway side, there is a TSM based R&D activity going on at FHWA. It's a bottom up kind of thing where they are dealing with some detailed simulation models of vehicular flow on a street system. We would hope that the outputs of that model and its inputs, indeed, would be in a format compatible with other software that we have in the UTPS package. So that one can create networks at a coarse, TPS level, and refine it down so it's acceptable to the detailed simulation models, and the outputs of these simulation models, the time spent on links and the delays

due to turning and the congestion here and signal settings there, could then be synthesized and brought back up into planning evaluation criteria. We're just getting underway on that and it's a difficult coordinating effort. This leads to another point that Gary brought up and that's the data management thing.

From my particular biased point of view of the world, I think most problems are data management problems or information problems. I found that even certain very, very difficult institutional problems seem to be largely surmounted once the data management problem is solved. And people seem to communicate and coordinate their activities very well if they share a data base. We'd like to have long range planners, short range planners, and operators using the same data base. If they do, then the results, the outputs, of one would be inputs to the other and vice versa. We're working hard on data management tools and concerns. It's a very large problem and hard in the sense of building and buying data management systems, making it cheap and easy to collect data, making it easy to convert data from other sources into format amenable to UTPS processes.

Another point Garry raised had to do with information dissemination. I've been in the federal government for seven years. There's been many things that have astounded me. However, the one thing that has astounded me the most is the huge amount of information that's funneled into federal agencies. A typical bureaucrat has going over his desk everyday scores of documents that someone in the field would give a right arm to see any one of. The bureaucrat doesn't have time to look at maybe two of

them much less digest them all. There's got to be some way of letting the world know that all these documents exist and being able to spread around what's known in Washington to the citizens of the country. We are trying some things in that regard.

I would hope that, indeed, an important mission of the entire UMTA program is to increase transit patronage. I view addressing that goal as a planning activity. Service and methods, of course, are another means of addressing it. How successful we are is another thing entirely. I don't mean to sweep that under the rug. It's just that it is the big issue and, as was said in the last session, we're talking about trees here more than we are about the forest.

The comment having to do with guidelines for standards for the industry, particularly in productivity measures for transit, has been an interesting point. The difficulty that has been experienced in trying to gather even a list of productivity indicators over the years shows how much hassle people are having with the idea of it. It has been argued that it isn't even possible to make such things because they would tend to encourage comparison between properties, that surely would be unfair, etc. There are a whole lot of reasons why you can't list productivity measures, and, perhaps, they're all correct and right.

So, the fault, then, was, I feel, mostly laid on transit management. It was not considered an R&D problem. Here I would tend to agree and disagree. Indeed, it's a management problem; however, I think that R&D can do something about it which management might not be able to do. Again, hiding under its turf, as

it were, an R&D organization can publish things like suggested productivity measures and not offend anyone, provided it's published as R&D results or an R&D project and not as implied policy. We did it with cost measures. We put out a booklet called "Characteristic Urban Transportation Systems." And included in it were the cost of things for a number of transportation systems. Believe me, the only thing hotter than productivity measures may be the cost estimates. Nobody wanted to publish list guidelines, because there was so much controversy regarding the cost of, particularly, fixed rail facilities and higher technology. Yet, since we are in R&D operation we can put out such information and put a big disclaimer on the front saying these are R&D results and they could be wrong. So write us a letter and we'll address your disagreements. Whereas if a policy office put out such a thing, all hell could break loose. I think that, therefore, an R&D priority, should be productivity measures, a list of such lists, again under the auspices of an R&D agency and not a policy agency.

The other point, whatever it's worth, has to do with the agriculture comment. I think one of the great successes in American history has been the interaction between the federal government and agriculture in this country. The R&D effort that went on and the conjunction of R&D with farming caused such tremendous increase in productivity in farming in the United States. Our country became number one in agriculture in the world. It would be nice to emulate the success or to try to do the same thing with transportation. However, as we look at it, we see that the model that we're using presently is nothing like the

agricultural model. The agricultural model would be a highly regionalized activity in which universities played a very, very large role. A lot of the taxpayer's money was given to the universities to perform research on a regional basis on specific topics. This research was roughly knitted together. It was not a big, super coordinated effort, because super coordinated efforts tend to kill the child. Maybe UMTA's research is too centralized for this model. A highly decentralized R&D activity, maybe regionalized, working closely with locals, the kind of paradigm that everybody's been talking about and hoping for, isn't the one that's really been achieved. I just wonder -- I'm asking a question and I wonder if you're asking the question -- what would have to be done in order to achieve that kind of operating mode in UMTA R&D and whether it would be beneficial or not.

The other point, the last one, is that one of the things that the products of R&D seem to focus on is tools and particularly on computerized tools. And that's quite true. I guess there's a lot of reasons for it. Some of them are bad; maybe some of them are good. I'd like to say that the program that I'm representing here is one that's not restricted to computerized tools at all. We deal a lot with manual methods and more on the soft sides of things, we make a big effort at that because we realize not everybody, not yet, has a computer. In a few years everybody will have a computer; however, that is not the point. Indeed, every problem doesn't require a computer. One can learn a lot and do without a computer, and maybe do it a lot better without a computer. So, I'd just like to try to dispel what I