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*A. Vanstegen*  
Evanston Oct. 71

# PROCEEDINGS — —

## Twelfth Annual Meeting

“Changing Times and Keeping Up”

October 18-19-20, 1971

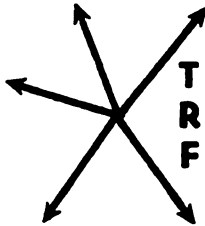
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**TRANSPORTATION RESEARCH FORUM**

# Transportation Research

by Paul W. Cherington\*

I WOULD LIKE to talk with you today about what I believe is a coming crisis in transportation research and in its ability to meet serious short-run needs for program decisions which are already upon us. What I have to say will undoubtedly sound critical to many of you. In fact my remarks are not meant to be critical as such but are rather an attempt to present you with the point of view of someone in the program decision stream who has been active in looking at and considering various research projects and proposals. I am hopeful that if some of you who are active in research have a better grasp of some of our immediate and pressing problems, the gap—which unfortunately I believe is a growing gap between the research point of view and the program point of view—can be substantially narrowed instead of widened.

There are, of course, various levels of planning and planning research in the transportation field. A few years ago planning consisted of someone sitting down with a map and a set of pencils and drawing out preferred routes for a road or a railroad or an airline on a map. If the pencils were of different colors, that was one level up in the order of sophistication. I think we would all be surprised at how many of our roads, rails and airline routes were laid out in approximately this way. The results were not always economic and frequently had unfortunate social and environmental impacts; but planning of this sort did get a lot of transportation facilities built, particularly in the intercity area.

Later we began to improve on the colored pencil approach by the addition of existing traffic flow data—cordon counts, tonnages over the line, various kinds of data used to measure potential public convenience and necessity on the airlines, and so forth. There is no doubt that the addition of this information made the planning process for transportation routes and facilities much more precise. Unfortunately the traffic data and the essentially linear projections made from that traffic data were largely static in nature. They took very little account of the impact of future changes in the transportation system on demand, and even more rarely did they take into account the trade-offs between one and another mode and between costs and benefits and the intermodal effects of improvements. Nevertheless, it is probably accurate to say that 99 percent of our transportation facilities—passengers and freight, intercity and intracity—have been built on the basis of this fairly simplistic planning process.

More recently, and it is hard to date the start of this approach but it is no more than ten or a dozen years old, we have entered the era of transportation planning by models or systems analysis. It is in this area where, in my view, the moment of truth is at hand. Many of you in the audience have had a major role to play in this development.

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The underlying concept of doing transportation planning by means of systems analysis is fairly straightforward and highly appealing. The rationale runs that systems analysis, which is a means of looking at complex problems and trade-offs on an overall basis via various mathematical formulations, is a useful tool in looking at transportation systems. Indeed the proponents of systems analysis claim that it is the *only* useful approach, given the complexities of the transportation systems problem. The argument continues that through the construction of mathematical models and their exercise we get far better answers on probable demand for transport, the impact of new transport facilities on that demand, the question of modal split, and reliable guidelines to preferred investment paths as between modes. And in terms of overall transportation capacity, I do not quarrel essentially with any of the general claims for a systems analysis approach to transportation problems. On the other hand, consider, if you will, some of the difficulties which the program and policy decision makers face and the help which can realistically be furnished to them via systems analysis at the present time.

We are told, and we are painfully aware that it is a fact, that there is a data problem. The old saying in systems analysis, "Garbage in, garbage out," is nowhere more applicable than in the transportation field. Yet we know or should know that a great deal of the required data of both a physical and economic nature is simply not available. Indeed, one early large effort in this field foundered essentially because it called out a large number of items of data which were not available and which could not be generated in any reasonable period of time or at any reasonable cost. Second, there is the problem of the model itself. It is extraordinarily hard for the nonexpert to follow the arguments between the model makers. Since we are constantly confronted by the argument that the other fellow's model is really quite unsophisticated, inaccurate, or simply no good, the nonmathematician has very few guidelines in picking between the models. Third, and perhaps most important, the design and implementation of a transportation system inevitably involves a large measure of politics—not party politics, but politics all the same. In short there are a good many items of transportation irrationality in the process. I am not sure that these problems can ever be handled within the framework of systems analysis, but I am sure that they rarely are. Yet at times these political questions bulk so large in the decision making process as to far outweigh some of the niceties of intermodal choice. In any event political questions, ranging from the impact of land-taking to plain vanilla lobbying must be taken into account by the decision maker. It is not particularly helpful to him to have the systems analyst say, "Of course the model and design which we have produced leaves all consideration of politics out of account." Rather to be useful, the systems analyst must be able to come forward with the optimum program and then, given certain political facts of life, a suboptimum program.

Finally the decision maker is confronted with the question of timing. Program decisions are being made all the time. A new highway is being put through, a subway dug, and this process simply cannot and probably should not be stopped while the various models are prettied up, made more sophisticated and fully tested. It does the program decision maker very little good to be told that in two years a systems analyst will have a finished model and

will be able to give him an answer. He must have some sort of answer today. If it is not the ideal answer, then hopefully it is an answer that is better than several others that he might receive; for his job is to make a decision and proceed as best he can. Too often the systems analyst before he is willing to give *any* answers pleads for more time, more testing, more debugging. Thus while he tends to bemoan the fact that decisions are not made on the basis of the best possible analysis, he is all too frequently unwilling to provide *any* interim help. Essentially, therefore, what he is pleading for is a stop to all decision making and implementation until he can come forward with his analysis. In the real world that approach simply is not acceptable.

Now why is it that I feel we are coming to a point of crisis in systems analysis as applied to transportation problems? It is simply because in several areas we are coming to the watershed of some major program decisions. As you know the administration has on the Hill two major transportation programs: one is the airport/airways bill; the other is the urban public transit bill. The airport/airways bill is moving very rapidly and I have no doubt that it will be passed some time this fall, in a form very similar to that submitted by Secretary Volpe and President Nixon. The urban public transit bill was submitted somewhat behind airport/airways, and it is perhaps too early to appraise precisely its chances. Nevertheless, they appear to be good and to be brightening. I would venture to forecast that sometime in the early months of 1970, that program too will be passed. And when it is, if it is passed in the form supported by the Administration, there will be almost immediately available for commitment, fairly large sums of money: something over \$3 billion of Federal funds, which means somewhere in the order of \$5 billion of total funds. That money is going to be committed over the next year or so to various urban public transit programs in a variety of cities, ranging all the way from new subway systems down to the support of a variety of bus systems. Secretary Volpe and the UMTA Administrator, Carlos Villarreal, are going to have to make decisions on the commitment of that money. They are going to want to make those decisions on the best possible basis they can. But to say that they must wait for the completion and complete testing of a variety of mathematical models as to how they should do their job is being hopelessly unrealistic. They would be fired if they took this line; and furthermore, they would be greatly delaying the provision of absolutely essential urban public transit facilities.

It may be that, absent the help of highly sophisticated systems analysis, some wrong decisions will be made, but this is an area where some wrong decisions are probably preferable than no decisions at all.

Looming behind these two programs, which are of significant size, is the probable course which the highway program will take in the post-Interstate period, beginning about 1972. I happen to be one of those who believes that the Interstate program, started in the mid-50's and now nearing completion, is a spectacular and highly beneficial achievement. There are undoubtedly places where the road builders bulldozed through communities, tore up scenic or historic spots and the like; but viewed as a whole, the 42,000 miles of Interstate, when completed, will provide a superb transportation system. There

is no doubt that we are going to have to pay more attention to the environmental impact problems in the future and, indeed, under Secretary Volpe's leadership, ways and means have already been found to iron out some of these problems.

But anyone who thinks that road building will come to an end with the completion of the Interstate System is simply not familiar with the facts of life. There is going to be some sort of post-Interstate program and the only question is, what is it going to involve and how big is it going to be? There are a number of possibilities here and, at least in concept and in terms of preliminary planning, there are already a good many ideas about this. If systems analysis cannot provide some *immediate* inputs to the decisions and plans which will be made over the next two or three years—starting as of yesterday—it will miss out on probably the most important single set of transportation decisions that will ever have been made in the United States.

It is the immediacy of these program decisions that constitutes the real challenge for systems analysis. The time is now, and models completed and perfected in 1972 will have missed the bus. Their impact will have to be postponed essentially for another generation and another round of fundamental decision making, about 1990.

Having thus far sounded impatient with system analysis and its approach, let me suggest some positive things that, in my view, could be done to improve the situation.

In the first instance, it strikes me that there is considerable over-reaching in this field, perhaps wider and bigger claims than the state of the art can in fact deliver. I think that as a matter of professionalism this is something that has got to be guarded against. For example, there are a good many late contracts, a good many overrun contracts and a good many contracts which end up with little more than junk. The situation is not yet fatal to the further willingness of the government including DOT to support efforts in this area, but it easily could get to that point; and to be frank, we are not very sophisticated in selecting between the good guys and the charlatans. Extensive over-reaching by anyone is apt to damage the entire transportation systems analysis community.

Second, I would urge you to give some attention to the utility and use of the models and studies which you are developing and somewhat less to the advanced methodologies and mathematical niceties of the models. I know that this advice sounds anti-intellectual and that many of you are primarily interested in the methodological problems. Nevertheless, if you want your products to be used and if you want to be supported so that you can do a certain amount of methodological research, I think you must pay more attention, than has been true in the past, to the utility of your work in the planning process.

This leads me to three other areas where it seems to me some real improvements are needed. One is the question of data. Every systems analysis team in the transportation field should have at least one person on it who is intimately familiar with the data that are available. As I have already men-

tioned, there is no point in designing a highly sophisticated transportation model if the data on which it operates are not available or can not be readily obtained. And data on the transportation business takes years to develop and is extremely costly. We have a program in this area which we are proposing to the Congress but it will be some years before much of a start on the implementation of this program can be undertaken. Thus it is critical that the model be operable on what is available, off-the-shelf data. In some cases this will impose severe constraints upon your studies and to a few, I suppose, it will be absolutely fatal. Nevertheless it is a fact of life that I think you must take into account.

A second area is that as you work forward on a two or three year project, you inevitably are going to be asked for some interim advice. If you cannot furnish such advice, you will be faced with an unhappy client or perhaps worse. I would urge you, therefore, to so schedule and program your study so that at least portions of the problem can be resolved and some answers which are better than the existing answers can be given. We do not, of course, expect a three year study to be completed in a year and one-half. On the other hand, we at the program level are all a little startled when after two years and eleven months of work, there are absolutely no answers. And we are told that until things are debugged, the effort and money put into the study has yielded no results whatsoever.

This leads to my final point that, whereas we are certainly interested in the overall transportation system, whether it be in the nation, a region or in a city, we are also interested in developing some better answers on small pieces of the overall transport problem. And again if some of these can be drawn off during a major study, so much the better. This is especially true given the political constraints which, as I mentioned above, tend to afflict any overall transportation system proposal. It may very well be that the overall result of a systems study is virtually meaningless in terms of reality. Thus the value of the study, if any, must come in what we learn about various subsegments of the study.

In closing, let me say that if I have sounded like a harsh critic of systems analysis in transportation, it is not because I do not believe in it but rather because I want to be sure that it is in a position to rise to the challenge which will confront it in the very near future (if not right now). There is a real danger that if the profession cannot rise to this challenge, its growth and activity over the next decade will be greatly curtailed. That would be a most unfortunate state of affairs in my opinion and one which I am sure will not occur. The systems analysis approach to transportation planning is not only the best hope we have, it is probably the only one. I am confident that you will see to it that that hope can be realized.

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