Welcoming Remarks

Milton P. Criswell

I would like to explain briefly why FHWA sponsored this conference and what it expects to achieve by holding it. As you may be aware, the Office of Development is charged with major responsibilities for the FHWA technology-transfer function. Our job is to assure that potentially usable research results are translated into a form that accelerates their application in an operating environment. To accomplish this job successfully, technology transfer involves many factors. Three that I am going to highlight involve, first, informing the potential user community of the availability of the new technology; second, assuring that the technology has been translated into an acceptable user language; and, third, making adequate technical assistance available to help the user during initial trials.

This conference was conceived by FHWA to assess and address its experience to date on these factors in the traffic simulation area. FHWA asked TRB to organize this conference because of its well-known reputation for conducting successful transportation-related conferences.

In the past decade, a variety of traffic analysis tools has been produced from research programs in FHWA's Traffic Systems Division in the Office of Research. The TRAF family of traffic simulation models and, in particular, the NETSIM traffic network analysis model show significant real-world potential. Accordingly, the first objective of this conference is to inform you of FHWA's plans concerning these models. The second objective is to obtain feedback on FHWA's past work and planned future work with the NETSIM program so that the implementation process with the new TRAF models coming on-line, such as TRAFLO and FRESIM, can benefit. As part of this process, we should gain a better understanding of what users, such as you, assess as the most important needs and the best ways for FHWA to address these needs.

To gain a better understanding, it is important that the various user groups that utilize traffic models be involved in the process. These users include cities, states, universities, and consultants. Users can also be classified in terms of program managers, teachers, design engineers, planners, etc. The wide variety of users by both jurisdiction and functional specialty led to the by-invitation-only development of this conference so that the cross section of users could be controlled to reflect the actual user communities. To this end, the 75 participants registered at this conference represent the following groups: state and local government, 34 percent; consultants, 24 percent; academia, 22 percent; and federal (including other), 20 percent.

To get the proper balance between informing and obtaining feedback from you, we asked the conference steering committee to formulate an agenda balanced among papers on planned activities, user experience reports, and workshop discussions. The people who organized the conference have done this job. Now it's up to you to "milk it for all it's worth".

Most of you have extensive experience in the use of traffic simulation models. The opportunity is here to learn from others with equal experience; to meet the key individuals involved in a similar activity; to enhance user interchanges among people with similar experiences, needs, problems, solutions, and understanding; and to foster better communication, needs identification, and problem-solving activities. You are a nucleus of key experienced people in traffic simulation models and, I believe, have a major responsibility for making the technology go forward.

To make it happen, therefore, it is important for you to give of yourselves and share your knowledge. Questions are as important as answers. I expect that working relationships and friendships will be developed that go far beyond the limits of this conference.

In conclusion, the conference feedback will provide input into FHWA's planned program for implementation of a wide range of future traffic-simulation-model activities. I am confident that the conference will meet its objectives.

Role of Simulation in Traffic Engineering

(Thoughts on Accepting and Using New Analysis Techniques)

Donald E. Orne

This conference is aimed at advancing, perhaps even promoting, the use of simulation models as working tools in the field of traffic engineering. Because we are convinced that some models are ready for wider use, we want to bring about an expanded dialogue among traffic engineers to facilitate greater understanding of the practical value of simulation modeling and to accelerate efforts toward overcoming implementation barriers. We can improve our abilities to authoritatively and persuasively select and seek approval for traffic improvement programs if we help each other to gain additional technical capabilities both at this conference and in the profession at large.

This is a challenge. But your presence here demonstrates your commitment to this objective. Our conviction that several models are ready for wider application along with our collective action toward implementation can begin to bring about significant advancement in their use as traffic-engineering problem solvers.

I have a concern, however, that we may be somewhat presumptuous in thinking that our unsolicited help will be welcomed by the typical traffic engineer or transportation manager. This suggests to me that we need to spell out why these ultimate users will be interested in what we have to say. We must clearly identify the problem we are trying to solve.

Traffic operations improvement projects have characteristically been designed and carried out by a specialized group of engineers who have focused on pragmatic solutions to problems. These engineers, whose function evolved from street traffic enforcement, often have had only a limited theoretical background on which to base their decisions. The

technical explosion of the last two decades, in many respects, has increased the difficulty of the job. We have been catapulted from an environment where cause-and-effect relationships were unknown or uncertain to one in which we are overwhelmed by what appears to be an unmanageable set of variables, constantly changing analytic tools, and continued uncertainty about cause and effect.

We can demonstrate that simulation offers a better way to comparatively evaluate alternate solutions to one problem or competing solutions to several problems. We can also enhance our abilities, through increased objectivity, to devise and recommend acceptable improvement programs.

I contend, then, that we do have a legitimate role at this conference that will receive enthusiastic support from the user. This role is to reduce to practice a framework that provides badly needed, fast, accurate, and reliable analytic tools to either solve multivariate traffic operations problems or compare complex and costly alternatives before they are executed. We can provide a reliable means of predicting the outcome of several possible courses of action in situations that involve factors so large and complex that conventional analytic methods do not offer much assistance.

This may all appear obvious, and perhaps you are wondering why we need to meet since numerous very sophisticated computerized simulation models already exist and are in limited use. Why, then, are they not running right now on every government, consultant, and university computer in the land? A managerial perspective of the answer to this question is that resistance, both to change and to perceived complexity, is very real. However, although individual and institutional barriers may exist, it must also be recognized that the suggested program may not really be perfected. Thus, a user is reluctant to initiate it.

Some of these barriers are founded on unwarranted fears of the unknown, but others relate to very real skepticism about costly commitments to unknown or operationally difficult products. Consider for a moment that some of the basic tenets of classical physics continue to be challenged, even today. We are regularly learning more about their limitations and the costly consequences of misapplication--and most of these only have three or four variables. Yet, we presume to ask a director of transportation to expend sizable amounts of money for equipment and staff and then base multimillion-dollar decisions on results obtained with very complex models that involve hundreds of variables.

Something else to consider is that researchers and developers sometimes lose sight of the real decision makers and their sales resistance. Many of today's managers and administrators were practicing engineering before commercial television or commercial jet air travel were introduced. The technical breakthrough of their day was the transistor.

These same managers and administrators now control transportation improvement programs and the money needed to construct them. The technical world has moved very rapidly, and many still retain a built-in resistance to computer applications. This resistance arises from an aversion to expending substantial time and energy to learn about computers, and a fear that printouts may be only manipulated or unreliably simplistic conclusions produced through the use of complex mathematics. The result is that a good intuitive basis on which to judge simulation output validity sometimes does not exist.

This is beginning to sound very gloomy, and one may wonder if there is any hope for overcoming the barriers to implementation. I happen to believe there is considerable hope and that progress can indeed be made.

The cliche, "Nothing succeeds like success," is very applicable. Our conference program features a number of user experience reports. These factual statements about successful practical application should go a long way toward alleviating fears about the translation of mathematical models into everyday practice.

After all, it is common among staff professionals of state transportation departments, counties, and cities to seek out and listen to show-and-tell presentations. The word is spread at meetings, through correspondence, and by telephone. This search for positive problem-solving experiences leads to new opportunities and new ideas for improvement.

Word-of-mouth enthusiasm and endorsement within the professional community probably do more toward breaking down barriers to the acceptance of new techniques than the best 12-ft shelf of technical literature in existence.

Communication is the key to breaking down barriers. This conference has two communication objectives (and I suspect that we can improve our performance in both areas):

1. Inform the user community about model availability and planned future development so that understanding of adoption implications may be increased, and
2. Obtain from the user community a statement of needs in order that developers and researchers may improve and enhance the value of simulation models.

Without proposing specific recommendations, I do suggest that substantial effort should be expended to rethink and improve the dialogue between users and model developers. The 12-ft shelf is not bad, provided it is read, understood, and accepted. But, its limitation is its inherent one-direction communication. More desirable and practical bidirectional surrogates should be used. The first step can be to identify, or affirm, the intended audiences and open up wider discourse among them. All too often one receives the impression in the field that researchers and developers talk and write trade jargon to and for each other and lose sight of their ultimate customer--the field practitioner. Conversely, I am sure that field practitioners sometimes appear unsophisticated and unable to describe their problems precisely.

What, then, can we accomplish during this conference and in the weeks and months ahead? Obviously, a meeting has little point if experts only discuss their specialty among themselves and do not disseminate their conclusions to those less knowledgeable. Significant gain can best be made if your articulated thoughts are captured and the synergistic product of our discussions is made available to those who make the field changes. The practitioners, in turn, must continue to feed their experiences back to the researchers if the art is to be further refined.

Each of you is a catalyst who will return home with a renewed enthusiasm to enable you to overcome persuasively the barriers to the practical use of high-speed traffic problem analysis through simulation tools. I hope you will choose to become part of a nationwide communication network to inform others about this remarkable problem-solving tool.

So, my challenge to you is to think of simulation as a useful tool with a vital purpose to serve and not as a museum piece to be admired but not touched. Traffic simulation models fail to achieve their purpose until they serve usefully in that part of the world where traffic problems are real and immediate. Our task is to cause this to happen. Only then will our objectives be realized.