

- tion: An Analysis of Data for 1975. Mitre Corporation, McLean, VA; National Transportation Policy Study Commission, Washington, DC, 1978, p. 24.
10. R. McGillivray. Should the Intercity Bus Industry Be Subsidized? *Traffic Quarterly*, Jan. 1979, pp. 99-115.
 11. A. Levine. Intercity Passenger Transportation for Rural and Small Communities. Paper presented at the National Symposium on Transportation for Agriculture and Rural America, New Orleans, Nov. 15-17, 1976.
 12. Ex Parte 277: Adequacy of Intercity Rail Passenger Service. U.S. Interstate Commerce Commission, 1976.
 13. Quality of Amtrak Service Still Hampered by Inadequate Maintenance of Equipment. Office of the Comptroller General, U.S. General Accounting Office, 1976.
 14. Air Services to Small Communities. Federal Aviation Administration, U.S. Department of Transportation, 1974, NASW-2524, pp. 24-26.
 15. G. Douglas and J. C. Miller III. Economic Regulation of Domestic Air Transport: Theory and Policy. Brookings Institution, Washington, DC, 1974.
 16. W. Gregory. Airline Re-equipment Financing Studied. *Aviation Week and Space Technology*, July 11, 1977, p. 23.
 17. Aviation Forecasts—Fiscal Years 1978-1989. Federal Aviation Administration, U.S. Department of Transportation, 1977.
 18. Airport and Airways Cost Allocation Study. Federal Aviation Administration, U.S. Department of Transportation, 1973.
 19. P. Dygert. Pricing Airfield Services. In G. P. Howard, *Airport Economic Planning*, MIT Press, Cambridge, 1974.
 20. D. Smith, D. Maxfield, and S. Fromovitz. An Analysis of the Financial Impact of Non-Capital Planning Alternatives at the Large Hub Airports of the United States. Office of Systems Analysis and Information, U.S. Department of Transportation, 1977.
 21. J. A. Carlin and R. E. Park. Marginal Cost Pricing of Airport Runway Capacity. *American Economic Review*, Vol. 60, June 1970, pp. 310-319.
 22. J. Meyer, M. Kain, and M. J. Wohl. *The Urban Transportation Problem*. Harvard Univ. Press, Cambridge, MA, 1968.

Future of Statewide Transportation Planning: What Can the Professionals Deliver?

Marvin L. Manheim, Massachusetts Institute of Technology, Cambridge

Lance A. Neumann, Cambridge Systematics, Incorporated, Cambridge, Massachusetts

The fact that the committee planning this conference expressed concern with the role of the professional in statewide transportation planning and programming is indicative of a significant problem. As transportation professionals we have an image of what "transportation planning" should be about. This image is one acquired through the evolution of statewide transportation planning from its roots in urban transportation planning over the last 20 years.

In today's world, issues at the statewide level in transportation are increasingly complex and are presenting unique problems and challenges to the profession. Confronted with these issues, our old model of how statewide transportation planning should be done is brought seriously into question. Indeed, many of us are asking, What should our role be today and what can we as professionals deliver at the statewide level?

Although the challenge facing the profession and this conference is substantial, we believe that the roles and potential for transportation professionals in dealing with state-level issues and problems are more exciting today than ever before. These roles call for strengths and skills that are more diverse, more difficult, more challenging, and, ultimately, substantially more rewarding than those we have played in the past.

This paper, first, describes the nature of statewide transportation planning as we see it today and the challenge posed for planning professionals. Second, the paper examines the nature of possible professional roles in this activity and, finally, looks at the challenge we face as individuals and organizations in looking to the future.

STATE-LEVEL TRANSPORTATION PLANNING TODAY

As numerous recent studies have documented (1), there are many issues facing state transportation decision makers and agencies. Some of these issues are briefly described here:

1. Implications and changes in rail systems and service, including not only the historical evolution of rail passenger service abandonment, but also changes in branch-line and main-line freight service;
2. Potential implications of deregulation for both rail and trucking;
3. Increasing difficulty of financing adequate highway maintenance and surface and structural renewal, while also providing for some modest expansion of highway systems (similarly, bridge replacement and Interstate rehabilitation needs may curtail any substantial improvements on the rest of the system);
4. Implications of the changing nature of air transportation for state service to major and minor activity centers;
5. Implications of the continuing energy crisis for short-range contingency planning and for long-range strategic planning, including the implications of fuel efficiency standards or long-term motor vehicle tax revenues;
6. Changing nature of the U.S. economy and of society's concerns for the environment and for development as these impact on the magnitude, nature, and location of economic growth and development; and
7. Continually evolving nature of institutional and organizational relations at the state and substate levels, including the role of the state in financing and promoting urban area transit options, transportation system management options, and intercity transit.

To address these issues and make difficult policy choices, decision makers require a range of information and analysis which is organized in a manner that highlights the implications of different policy directions. These information requirements (2) generally include the need for the following processes.

1. A wide range of options, including not only traditional investment in infrastructure (highways, transit facilities, airports, and so forth) and maintenance, but also a wide variety of service strategies (routes and schedules for rail and air service, whether service is offered at all by some modes and particular markets) and pricing decisions, as well as organizational, institutional, and regulatory options should be available. In addition, transportation and nontransportation measures designed to minimize or avoid adverse social, economic, or environmental effects must be given due consideration.
2. Impacts on a wide range of interests must be evaluated. These include the direct costs and revenues incurred by both passenger and freight users and by operators, including private companies and public entities; concerns for mobility for a wide variety of potential user groups such as the elderly, the handicapped, the low-income, the non-car-owner, and other groups; and implications for urban and rural development, employment, preservation of open space and recreational areas, and such environmental effects as air quality, water quality, noise, disruption of neighborhoods, and energy consumption.
3. A commitment to an open planning process at each level of government in which multiple-interest groups, both public and private, and multiple agencies provide input throughout the decision-making process concerning

transportation actions. These actions may be major infrastructure changes, short-range policy-oriented actions, energy contingency plans, branch-line abandonments, or pricing policies.

4. Explicit recognition of the uncertainties that are inevitable in state-level transportation decisions. Realistic acceptance of uncertainty implies that any major decisions will need to be implemented in stages. The only firm decision is one from which implementation can begin immediately; everything else is always tentative and may be revised substantially as the issues change in future years.

In thinking about the requirements of state-level transportation decision making today, we can compare them to an image of transportation planning that has its roots in urban area transportation planning.

In the classical period of urban transportation planning, generally throughout the decade of the 1960s, the dominant image was characterized by the terms "coordinated" and "comprehensive" (3,4). In this era, the primary transportation planning activity revolved around the development and the analysis of alternative comprehensive schemes for land use and transportation for a time horizon of 20-30 years in the future. In this environment, although analysts did spend some time developing alternatives and predicting their effects, the vast majority of planning activities was dominated by the management of large-scale data-collection efforts and the development of large-scale and complicated models to be used for predicting the effects of various strategies.

This period was one in which there was a highly technocratic overtone to the nature of transportation planning activity. That is, planners were almost wholly oriented toward the abstract intellectual activity of developing and using large-scale models and related technical apparatus (for example, cost-benefit analysis). The predominant style of analysis carried with it an image of attempting to do a relatively objective and value-neutral assessment of the likely effects of alternative courses of action by using sophisticated technical methods. The implication was that transportation planning should be somewhat aloof from the political process, should be removed from the value issues of conflicting goals and objectives, and should stand apart from the emotionally expressed needs and desires of various interest groups.

Thus, transportation planners attempted to operate as objective professionals, that is, proceeding deliberately and supposedly unemotionally and objectively through the steps of a highly refined technical process that was widely accepted (at least among professionals). In this activity, the systems and models represented high standards of technical excellence, and the role of judgment—especially value judgment—in planning was minimized, at least in the rhetoric of planning. In short, the planner strove to be viewed as a technical expert. His or her major political role was to appear at meetings or public hearings as an expert who could talk in a neutral way about the likely effects of alternatives, and the reasons why a particular plan, evaluated in a value-neutral manner, appeared to be best for society as a whole.

Well, we all know what happened to this image in urban transportation planning. The freeway revolt of the 1960s, the environmental movement, fiscal restraints, all of the ramifications of recent federal and state legislation and policy changes, and changes in the nature of issues considered important by elected officials and the public have all significantly changed the nature of urban transportation planning. The same changes can be observed at the statewide level.

In the early periods of statewide planning, most professional activity revolved around trying to mimic the urban transportation process. Most planners involved with statewide transportation issues were primarily concerned with establishing formal procedures for predicting the effects of transportation plans and for programming investments in transportation systems. Substantial efforts have been devoted to trying to identify data-collection needs and to collect data in order to develop statewide systems of transportation planning models for use in predicting future demands for travel at the state level as well as related economic and other effects.

Furthermore, some substantial effort has been devoted to developing formal decision procedures for deciding on the desirable mix of capital projects from a statewide programming perspective. Similar to the situation at the urban transportation planning level, this technology transfer of the planning "image" has been seriously called into question in recent years.

The challenge is reflected in the changing context of state-level transportation described earlier. Today, long-range comprehensive planning at the state and urban levels is an image that is central to the redefinition of the planner's role; the real issue is not attempting to be comprehensive and to settle for all time a long-range plan for the region as a whole, but to respond to a variety of issues facing state transportation decision makers by providing professional insights into both the long-term and the short-term consequences of decisions. In short, there are multiple issues, oriented around different bundles of options, impacts, and interest groups, which must be addressed at the state level. There is a need for a variety of analysis styles, ranging from quick-response policy analysis within a few days or a few weeks, to midterm technical studies of three or six person-month efforts, to multiple-person-year in-depth planning and analysis activity.

Correspondingly, there is a need for a variety of analysis capabilities, including not only the traditional long-range comprehensive models, but also simplified procedures that can focus on specific near-term policy questions, including not only simplified computer models, but pocket calculator, manual worksheet, and judgmental methodologies as well. There must be a recognition that there will always be a wide variety of types of data relevant to a decision. Data will be located in various public agencies and private firms, and assembling these data will always be a major task. However, it should not dominate the analysis required.

Finally, there is a need for a variety of products from the planning process that reflect the variation in issues, analysis styles, and analysis methods. Although there will continue to be a role for detailed and comprehensive technical documentation, results of the planning process will have to be communicated by brief issue-and-decision memoranda and the budget and program implications of planning analysis will have to be explicitly explored.

To be effective in today's environment, statewide transportation planning must reflect the facts that (a) comprehensiveness is infeasible, (b) long-range planning often is unrealistic, (c) large data-collection activities and model development efforts will be relevant only to a small portion of the issues, and (d) the professional style of the past—analysis oriented, aloof from the complexity of the organization and political environment, technically objective and value neutral—will not be an effective role. Rather, today's environment calls for a new kind of professional role. Instead of seeing ourselves as statewide transportation planners who are aloof and concerned only with treating long-range issues comprehensively, we should look to becoming problem

solvers and issues analysts. This may appear to be merely a semantic change, but the point is that we must challenge traditional planning roles and methods to continue to be effective at the state level.

IS THERE A PROFESSIONAL ROLE IN ALL OF THIS?

A New Role

In our view, there is a rich and exciting challenge in what transportation professionals can do in the changing environment at the state level. In fact, many are already creating and accepting new roles. The key issue is, Are the challenges, responsibilities, and opportunities of the new roles recognized as being legitimate? For example, are we comfortable with these activities? Are we trying to get other members of our organization to accept and to excel in them? Are we training our junior colleagues who are entering our organizations or attending professional schools in these activities?

The role we are suggesting for state-level transportation planning in today's environment is to provide timely information for the decision-making process. Although decisions in some cases will be made about comprehensive strategies and long-range policy directions, more often decisions will focus on one or more well-defined issues. In some instances, one to two years may be available for response, but more often one to two weeks or months will be available for analysis. However, regardless of the scope and time frame of decisions, the basic format of the information required by decision makers is based on

1. The major alternatives open to them,
2. The major advantages and disadvantages of each alternative—with particular attention to the incidences of gains and losses, and
3. The viewpoints of all who are significantly interested in or affected by the decision.

This format applies whether we are talking about a statewide airport plan, decisions on state financial components of a rail system plan, or operating strategies for rural public transit for the next year. Only if these conditions are met can decision makers act with reasonable confidence that their decisions can be implemented. Furthermore, while we want to provide a basis of technical analysis that is useful to decision makers, they will make decisions whether or not the analysis results have been produced in a timely and relevant fashion. In other words, the environment of state-level transportation today requires that planners and analysts must operate as staff to decision makers and provide both formal and informal information to support decisions.

Various terms have been used to describe the kinds of activities in which various technical staff must participate—catalyst, coordinator, entrepreneur, for example. These terms all suggest styles of work that involve substantial interaction with individuals and interest groups, along with traditional technical analysis. Thus, in state-level transportation, planners and analysts need not only to operate from bases of technical information and to perform analyses of alternatives and their consequences that are useful to decision makers and the public, but also to interact with a wide variety of public and private individuals and organizations.

To see the implications of this situation for state-level transportation professionals, some specific topics (e.g., analysis methods, planning products, and participation) are examined here.

Analysis Methods

Does the image of planning we are posing mean that data collection, model development, and the use of models to analyze the consequences of alternatives should be abandoned? Our answer to this, of course, is no. Instead, there are a number of analysis methods that are potentially useful in different situations. Historically, lip service has been given to this premise through the notion of sketch-planning methods. However, little real effort has been devoted to seriously developing a variety of simplified, relevant, yet valid, analysis methods for use in a variety of different situations at the statewide level.

What is needed are analysis techniques with different data and time requirements for application and with different degrees of comprehensiveness in the scale of analysis, from a focus on a specific issue or strategy to a focus on more comprehensive regional or statewide issues.

For travel demand, for example, a variety of potential approaches have already been developed, largely at the urban level, but some at the statewide level as well. Recent innovations have assisted in stimulating the development of a variety of styles in which such methods are used for forecasting. Such styles can include the use of simple elasticities and nomographs, the transfer of policy results from other areas, quick manual calculations with structured worksheets, pocket-calculator-assisted methods, and special-purpose models in standard computer environments, as well as large-scale major model systems (5-13).

The implication is that, as a practical priority, there needs to be ongoing development of planning and analysis methods in each state organization and on a national level to produce a variety of analysis techniques and to continually update and revise those techniques as new transportation issues and problem situations arise. Professional staff in state and other agencies should be comfortable with a wide variety of analysis styles and should be comfortable with reasoning through what is the appropriate technique for a particular policy or planning issue and a particular set of time and resource constraints.

In other words, we should all be comfortable with the idea that state-level transportation analysis does not require a comprehensive statewide multimodal model. Rather, it is an appropriate professional activity with which to make a quick assessment of policy consequences by using judgments about elasticities. This approach is just as legitimate as the use of computer models or pocket calculators. In addition, although we have used the travel demand area to illustrate the need for, and increasing availability of, a range of analysis styles and methods, the same message is appropriate for all areas in which technical analysis and judgments are required. A recent report of the National Cooperative Highway Research Program surveyed statewide analysis techniques available in these areas (1): environmental, social, economic, travel, development, legal, administrative, institutional, financial, and plan and program evaluation. In each case, a variety of analysis approaches are available and others are under development.

Products of Planning

Another way of understanding the new style of professional work required is to examine the notion of what the products of planning should be. Historically, from the heritage of comprehensive urban planning, the key product of statewide planning was visualized as a comprehensive statewide long-range plan, predominantly

for the construction of fixed facilities such as highways or airports. The target date was 25-30 years in the future. An alternative image is indicated in the concept of a multiyear program plan. As illustrated in Figure 1, a multiyear plan contains actions staged over several periods into the future, beginning with near-term immediately implementable actions in the first year or period of the plan, additional actions tentatively planned for implementation in the short-range period (years 2-5), the midrange (years 5-15), and the long range (beyond year 15). The plan also contains actions consisting of studies, such as planning, design, data-collection or research activities, and changes in infrastructure through construction of new facilities or improvements of existing facilities, and a wide range of operating, policy, and pricing alternative actions.

Such a multiyear program plan would be updated annually or biennially, and the periodic updating process would move some projects scheduled for future years into the current year's implementable program. (Those familiar with current U.S. Department of Transportation urban transportation planning regulations will recognize that the transportation improvement program corresponds to that portion of the multiyear program plan dealing with years 1-5 and containing primarily the capital projects. The annual element of the transportation improvement plan is the first year of the multiyear program plan.)

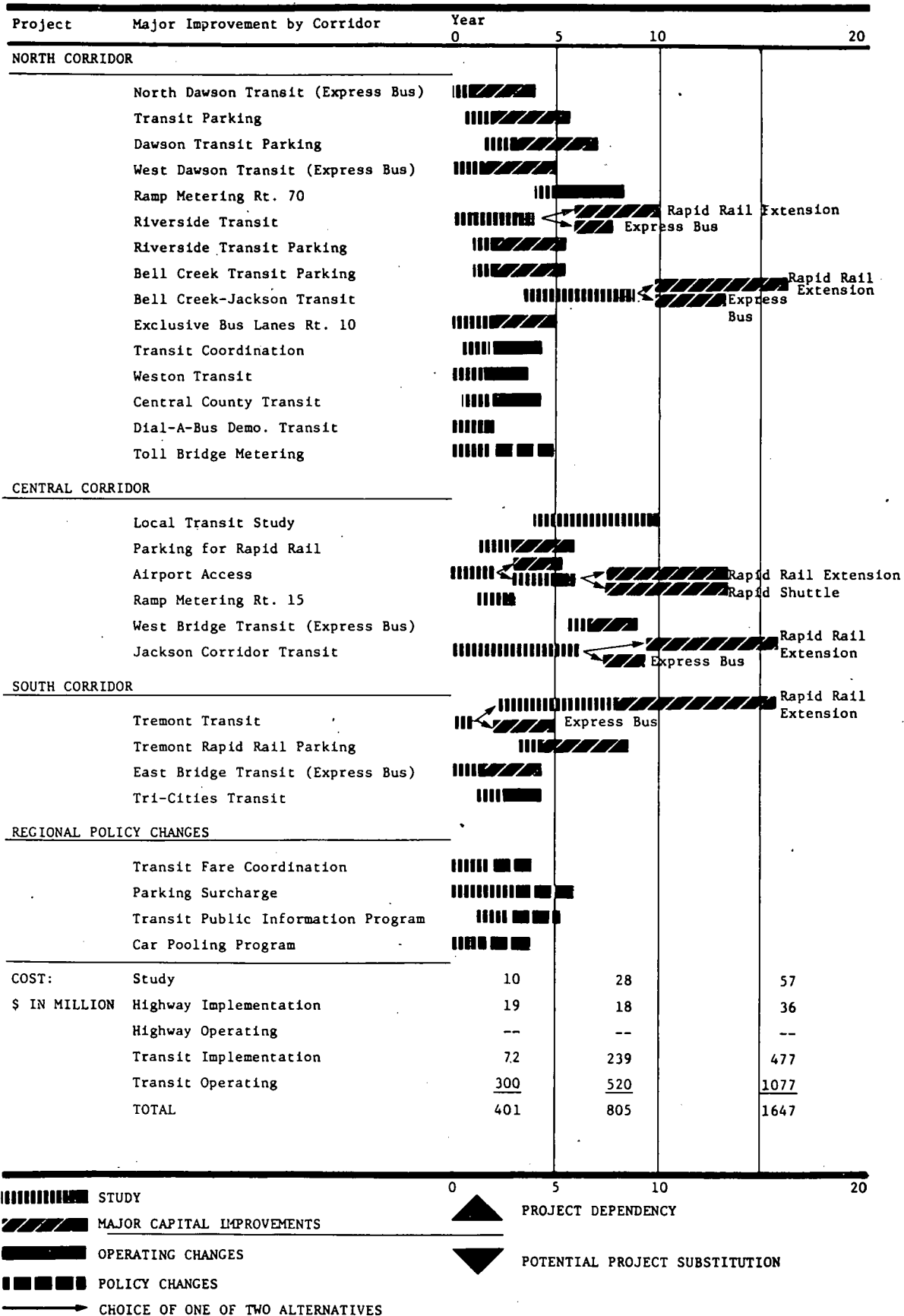
Thus, according to this concept, the primary product of the planning activity is reflected in the decisions that culminate in an annual cycle of updating and advancing the multiyear program plan. A wide variety of planning and analysis activities are required to accomplish this. In addition to such traditional planning activities as analyses of alternative long-range future systems, other planning studies can look at interim or short-range changes to existing systems. Other analyses can look at the potential implications of changes in pricing policies, regulation, or institutional arrangements. Still other planning activities can involve the design and implementation of data-collection activities. Alternatively, the planning activity could have as its focus the obtaining of an agreement among several private shippers or carriers to produce certain data in future years on a coordinated basis.

Thus, the multiyear program plan provides a concept for structuring a process of planning at the state level that involves a variety of professional activities. Many of these activities can take place primarily in state-level transportation organizations. Others can be cooperative activities involving state, metropolitan, rural regional agencies, and private carriers or shippers. Each activity can be organized and structured to produce appropriate outputs at some point in time for input to the decision process of updating and adopting an annual multiyear program plan.

The concept of a plan program document as a key product is not to suggest that we do away with long-range systems planning. Rather, we simply want to suggest that often the important information we as planners can bring to the decision-making process is the long-range implications of near-term budget and program decisions. By tying longer-range plans to near-term proposals via a program plan format, (a) long-range analyses can be more influential and (b) the need to focus analyses on a variety of issues will be more apparent.

We also do not mean to suggest that all planning activities and resources should be oriented toward the production of one product, whether long-range master plan or multiyear program plan. Many decisions will not wait for a regularly scheduled annual or periodic plan update cycle to be completed. In short, various forms of decision memoranda, issue papers, and so

Figure 1. Program plan concept.



forth, will have to become routine products of the planning process for our analyses to really be useful on an ongoing basis. Again, the message is that we must be flexible and respond to the information needs of decision makers at different levels in an organization. While we cannot simply become fire fighters for top management, neither can we afford to see well-intentioned and, by and large, high-quality, comprehensive studies and plans relegated to library shelves.

Participation

Another important area is that of participation. The image of participation from the early days of highway and urban transportation planning is that public involvement is a response to citizen opposition, and participation activities are primarily targeted toward neighborhoods within communities that are most likely to be affected. Environmentalists and other nonestablishment groups are also affected. Implicit in this orientation was the idea that we were trying primarily to respond to concerns raised by potentially opposing groups. Today, of course, in both statewide and metropolitan planning, the appropriate image of participation should be a much more balanced one.

At the statewide level, participants in the planning process include a wide variety of interests with various concerns, including industry, shippers, carriers, labor, environmentalists, growth as well as no-growth advocates, and so forth. There needs to be a carefully designed variety of participatory mechanisms to involve the appropriate affected interest groups constructively in each of the issues that concern them. This requires that participation of interest groups be viewed in a positive catalytic role as an asset and as support to various kinds of planning activities, rather than simply as a potential opponent. Of course, each type of planning activity, described earlier in this paper, will have a correspondingly appropriate constituency and mechanisms for involvement of affected interests. Involvement of affected interests should be seen as assisting problem solving. For example, in adjusting to rail abandonments and trying to find reasonably equitable strategies to replace the discontinued rail service, or to provide substitute jobs or industrial locations for those who are affected, various task forces could be created to provide a positive alternative rather than simply opposing any route rationalization. Although we can anticipate that there will still be confrontations from time to time, we should look for more opportunities to develop constructive partnerships with the various groups and interests involved in state-level transportation issues.

CONFERENCE CHALLENGE

A number of fruitful issues have already been articulated by the planners of this conference in designing the two sets of workshops and the specific transportation and implementation issues to be addressed by these workshops. Basically, our discussion boils down to a simple line of reasoning. In the past, we had a relatively simple image of state transportation planning. Our agencies, usually highway agencies, had essentially a single product—the design, construction, and maintenance of highways. To implement this product, they evolved over many years a well-defined and well-organized production process, in which there was a sequential flow from adoption of a statewide freeway or expressway system plan to corridor and route planning, facility design, production of plans, specifications and estimates, right-of-way acquisition, and construction. In this process, there were well-defined professional

roles and required skills, largely of a quantitative engineering nature together with closely related technical skills. Furthermore, the organizational structure of most state highway and transportation agencies was designed to implement this sequential production process in a very efficient way.

What we need to have today is a broad view of the nature of state-level transportation planning. A wide variety of potential roles and functions to be accomplished exists. We should ask ourselves (a) What are some of the specific functions and activities to be accomplished? (b) What organizational restructurings within an agency might be desirable for the organization to function more effectively in this new more varied environment? and (c) What do we need to do to enable our transportation personnel in a statewide organization to be more comfortable with and more equipped for roles in this new agency environment.

We still have largely the same personnel base and the same organizational structures that we inherited from our earlier and simpler period. Our personnel are good; they are highly qualified, but they do vary in their capabilities to adapt to new roles and new challenges. We need to think very carefully about what staff development is necessary or desirable to help our personnel equip themselves to perform a wider and richer variety of professional tasks than those they were originally trained or asked to perform.

Therefore, the real challenge at this conference is to ask (a) what kinds of planning activities should be undertaken across the broad spectrum outlined here, (b) what kinds of alternative organizational structures might be appropriate, and, most important, (c) how can we help the personnel we now have in our agencies to move into more satisfying roles, acquire new skills, enhance old skills, and develop a new entrepreneurial-coordinator-catalyst-communicator style of transportation planning at the state level? Our profession has evolved dramatically over 20 years and will evolve even more dramatically over the next 20. We look forward to your response to our ideas.

REFERENCES

1. S. Bellomo and others. Evaluating Options in State-wide Transportation Planning/Programming. NCHRP, Rept. 179, 1977.
2. M. Manheim. Fundamentals of Transportation System Analysis: Vol. 1—Basic Concepts. MIT Press, Cambridge, 1979.
3. D. Boyce and others. Metropolitan Plan Making. Regional Science Research Institute, Univ. of Pennsylvania, Philadelphia, Monograph Series No. 4, 1970.
4. W. M. Pecknold. Systems Planning and Programming Methodology—Passenger Travel: Workshop Resource Paper. TRB, Special Rept. 146, 1974, pp. 101-144.
5. D. Harmatuck. Review of Transportation Demand Elasticity Studies. Wisconsin Department of Transportation, Madison, Aug. 1978.
6. Y. Chan and others. Review and Compilation of Demand Forecasting Experiences: An Aggregation of Estimation Procedures. Pennsylvania Transportation Institute, Pennsylvania State Univ., University Park, June 1977.
7. Quick-Response Urban Travel Estimation Manual Techniques and Transferable Parameters: A Users' Guide. Comsis Corporation, Wheaton, MD, Nov. 1977, 604 pp.
8. A. M. Voorhees and Associates, Inc. TSM Planning. North Central Texas Council of Governments,

- Arlington, Vol. 2, Aug. 1977.
9. R. H. Pratt and others. Traveler Response to Transportation System Changes: A Handbook for Transportation Planners. U.S. Department of Transportation, Feb. 1977.
 10. How to Prepare the Transportation Portion of Your State Air Quality Implementation Plan. U.S. Department of Transportation; U.S. Environmental Protection Agency, 1978.
 11. Cambridge Systematics, Inc. State Energy Conservation Plans: Guidelines for Travel Demand Analyses of Program Measures to Promote Carpools, Vanpools, and Public Transportation. Federal Energy Administration, Nov. 1976.
 12. M. L. Manheim and others. Responsive Transportation Analyses: Pocket Calculator Methods. Department of Civil Engineering, Massachusetts Institute of Technology, Cambridge, Vols. 1-3, 1978.
 13. J. F. Murphy. The Fully Programmable Hand-Held Calculator: A Tool for Transportation Engineers. Transportation Engineering, Oct. 1977.