

# **Multimodal Transportation: Development of a Performance-Based Planning Process**

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# Table of Contents

<b>Summary of Findings</b> .....	ES-1
ES.1 Contents of this Report .....	ES-1
ES.2 Summary of Findings and Recommendations .....	ES-1
<b>1.0 Research Objectives and Work Plan</b> .....	1-1
1.1 Research Objectives.....	1-1
1.2 Research Plan .....	1-3
<b>2.0 Case Studies</b> .....	2-1
2.1 Metropolitan-Level Examples.....	2-1
2.2 State-Level Examples .....	2-6
2.3 Service Providers .....	2-11
<b>3.0 Workshops</b> .....	3-1
3.1 Summary of Findings.....	3-1
3.2 Montana (TRB Multimodal Planning Committee Summer Meeting).....	3-2
3.3 Boston (ITE International Meeting) .....	3-8
3.4 Saratoga Springs, NY (AMPO) .....	3-11
3.5 Washington, DC (1998 TRB Annual Meeting) .....	3-12
<b>4.0 Suggested Topics for Further Research and Product Development</b> .....	4-1
4.1 Analytical Tools .....	4-1
4.2 Data Collection and Maintenance .....	4-3
4.3 Information Sharing.....	4-4
<b>Appendix A</b>	
Case Studies	
<b>Appendix B</b>	
Phase I Draft Final Report	

# Summary of Findings

This is the draft Final Report for NCHRP Project 8-32(2), *Multimodal Transportation: Development of a Performance-Based Planning Process*. The purpose of this report is to document the research and findings resulting from this project. A separate *Performance-Based Planning Manual* has been produced which organizes the findings and recommendations of the project into a user-oriented guidebook format.

This project was conducted in two distinct phases, the first of which began in 1995 and concluded with delivery of a Draft Final Report in August 1996. The second and final phase of the project began in April 1997 and resulted in preparation of an Interim Report (February 1998) and a *Research Results Digest*, published by TRB in July 1998. Remaining products of the research project include this Final Report and the *Performance-Based Planning Manual*.

## ■ ES.1 Contents of this Report

This Final Report includes a discussion of the project objectives and work plan, (Section 1.0), a summary of the 10 case studies (Section 2.0), a summary of the four workshops conducted around the country (Section 3.0), and identification of further research or product development that are suggested by the results. Appendix A contains detailed documentation of the case studies conducted during Phase II of the project. Appendix B provides a copy of the Phase I Draft Final Report which was originally delivered in August 1996. Note that the *Performance-Based Planning Manual* has been prepared for publishing under separate cover, incorporating the *Performance Measures Library* as an appendix.

## ■ ES.2 Summary of Findings and Recommendations

NCHRP Project 8-32(2) involved several years of active research into the application of performance measurement to the multimodal transportation planning process. In two distinct phases, the project team conducted some 20 case studies and eight formal workshops to identify the extent to which public agencies and private transportation organizations have incorporated performance measurement into their planning decision-making. The team reviewed an extensive amount of written material, extending beyond the transportation sector and beyond the normal perspective of governmental agencies as well. The team also took part in many discussions with practitioners across the United States and Canada to identify their interests, needs, and implementation experiences with application of performance measurement to their planning missions.

Our findings are broad ranging, and different users of this research will undoubtedly find some findings and recommendations more useful and applicable to their situation than others. This is at least in part due to the fact that the term “performance-based planning” itself is quite broad, and means different things to different people. The field of performance-based planning, if such a thing can be said to exist, is expanding rapidly as interest grows and agencies initiate efforts to design and implement performance monitoring and reporting programs.

One of the most apparent results of the research is that even discussing performance-based planning with others requires that the parties to the discussion first agree on *what* exactly they are talking about. Workshops and entire conferences have been devoted to discussion of a range of distinct applications or contexts for performance measurement, from planning to management to budgeting. It has become clear that there is still much room for refinement of the terminology and greater clarity about the intended application and purpose of any given performance measurement undertaking.

That said, it is the purpose of this final project to report on the potential usefulness of performance measurement in the context of multimodal transportation system planning and decision-making, and to present that information in a user-friendly guidebook format. While that context can certainly be broadly construed to include budgeting, management, agency performance review, etc., we hope to focus our results on those fundamental activities and elements of the planning process that typically lead to identification and adoption of transportation policies, programs, and projects for a jurisdiction or authority.

## General Findings

- **Above all, integration of performance-based methods into the planning process remains a desirable and important objective.** Evidence from within and outside of transportation agencies points to the need for improved practices, and the value which can be expected in return. Today, there are more factors influencing transportation decisions than ever before, such as international trade and competition, deregulation and modal competition, environmental regulation, and the pluralistic nature of most transportation decision-making processes. We have a need to serve an increasingly diverse customer base with the transportation system, and many agencies have embarked upon new or different missions emphasizing preservation, management, and user-orientation. Performance-based planning remains an important strategy in addressing these changing demands, independent of the presence or absence of ISTEA management systems.
- **States and MPOs are looking for guidance rather than regulation.** Flexibility of the methodology, and a great degree of self-determination rank high among their needs. More specifically, the impact of the current funding environment on agency capabilities cannot be overestimated. Agencies are under pressure to do more with fewer resources, and will not react positively to new mandates or structured planning regulations. This has clear implications for the way in which performance-based planning is framed and deployed. It is important to demonstrate the value of performance measurement to the planning and decision-making processes.

- **Implementation of performance-based planning methodology in the transportation planning context is an evolutionary process.** Most agencies that have implemented a performance-based approach have made many changes along the way, including fundamental changes in the structure of their processes and in the way performance measures are used. The implication is that agencies that pursue performance-based planning must be prepared to stick with it for a considerable duration. Not only does it take multiple budget cycles to design and implement a program, but results and benefits also take some time to clearly materialize. Thus, agencies need to secure solid support from executive management to ensure continuation of the program.
- **In many instances, programs that started out comprehensive in nature have been refined to provide a smaller, more focused method of measuring system condition and performance.** The range of elements or dimensions that are monitored has, in many cases, been incrementally refined to focus on those over which the monitoring agency has the greatest interest and degree of control. This trend has implications for refinement of the typology for performance-based planning which was proposed and refined in the first phase of the study. While most agencies continue to be interested in tracking the contribution of their activities towards broad societal objectives such as economic development, livability, or environmental quality, they have become more realistic and pragmatic about how to monitor and report that contribution. Advances have been made, for example, in selecting performance measures to distinguish between those outcomes over which an agency does or does not exercise direct control; agencies continue to monitor outcome and performance in areas where they do not exercise sole control, but can use performance measures as diagnostic tools to promote better understanding of the underlying causes, and thereby, solutions to those problems.
- **Performance measures are being applied in a variety of contexts,** as noted above. These contexts include system planning, program prioritization, organizational accountability, budgeting, personnel management, etc. This research project focuses on application of performance monitoring and evaluation methods to improve the linkage between system goals, policies, and actions as embodied in the various system planning documents. The methods are intended to aid in the identification of programs, projects or services that most directly address those goals, and to monitor the actual outcome of plan implementation and thus provide feedback to the subsequent planning processes.
- **The research findings do not warrant any endorsement for using performance measures as a way of replacing the current transportation project prioritization and selection processes with purely analytical, quantitative methods.** Many participants in the case studies and workshops emphasized their viewpoint as practitioners that it is undesirable to attempt to replace an inherently complex, political process with one that is overly simplified or purely quantitative. While performance measurement can bring higher quality information to the decision process, it is most valuable as an input to the existing processes, and should not replace those more deliberative, qualitative processes.
- **In most transportation agency applications, performance-based approaches have not yet had a significant impact on the ultimate outcome of decisions.** In many states or regions there is a backlog of approved projects competing for selection and funding.

New projects that might rank highly under a performance-based approach compete poorly in current decision-making models against projects that have already received political consensus and/or broad support. The structure of policy-making has not changed substantially in most agency situations. This appears to be true even though the outreach to external stakeholders and customers in the planning process has improved dramatically in many locations due to the influence of ISTEA and other statewide and metropolitan planning rules and guidelines. We do not believe this is a sign that performance-based planning methods cannot have a significant impact on the decisions or the outcome of those decisions. Rather, there is likely a necessary passage of time during which the performance-based methods become institutionalized and gradually will exert more influence over decision-making. **At present, most practitioners seem to agree that the most they can expect to accomplish in the near term is to provide better-quality, more goal-relevant information to an inherently political decision-making process.** By educating and informing the public, in part through the use of customer-oriented outcome measures, we should also expect to see incremental changes in the decision-making models that favor more objective evaluation and debate.

The refined model for performance-based planning incorporates a number of these more recent findings, as well as some of the basic ideas that were tested in the first phase of the project. For example, it is widely agreed now that the system policies, goals and objectives are a critical starting point for development of a performance-based approach. It is most important for agencies to establish the “why” and “what” of the process before tackling the “how,” although this principle is not always followed in practice. The concepts of “outcome” measures and the important role of customer perception and satisfaction are now well established.

## Specific Implementation Issues

The *Performance-Based Planning Manual* contains implementation guidance based on the research. The following major findings are worth noting here:

- **There are inherent differences between freight and personal transportation, and between private-sector freight transportation activities and those administered or provided by the public sector.** One important difference is the timeframe for making decisions, and the duration of commitment to a selected decision or course of action. The freight industry, and the private sector in general, makes decisions which are more responsive to changing market conditions. They may also change strategy more frequently than is *perceived to be* desirable or feasible in the public sector. Thus, performance measures aimed at freight transportation should distinguish between those components of the system that are reasonably provided by the public sector, and those which should remain the domain of private industry. Public agencies focus on providing access to public facilities and on ensuring the dependability of those facilities, while the private sector focuses on more dynamic investments which permit them to achieve their business objectives in light of changing market realities. The methodology should observe this division of function where it is valid. As a further note, agencies should take a hard look at private industry’s willingness to make more frequent and rapid changes to their system of performance measurement. The common wisdom has

been that public agencies should not (or cannot) respond as quickly to changing external forces. Yet some of the research suggests that a more flexible approach and greater openness to modification of data collection, analysis, and reporting procedures might allow public planning agencies to evolve and respond more quickly to changing needs and expectations of their customers.

- **A performance-based planning process should include both performance measures which are broad enough to guide system planning, and more specific evaluation criteria which improve the ability of agencies to select and prioritize specific projects or programs.** The relationship between performance measures and evaluation criteria, and the linkage of both to broad goals, should be clear. The different time horizon of long-range plans and more near-term project planning activities makes it a challenge to achieve this linkage, however. Decision-makers, the public, and the system planners all have a different time horizon. This problem can be overcome in part by assuring that near-term evaluation criteria are directly related to longer-term measures and goals, and in part by using the process to periodically reevaluate and amend as necessary the long-range planning documents. Goals and performance measures need to be kept reasonably current with users' needs, and the planning process needs to be able to react more quickly to changing needs. Performance-based planning can be an important process for monitoring, evaluating, and modifying the implementation of long-range plans.
- **While the use of more focused measures does lend itself to better informed planning decisions at the project and program level, it raises the question of the importance of user-specific issues to those who are responsible for the entire transportation system.** Again, by looking to the states and metropolitan areas that have persevered through several cycles of performance-based measurement and planning, we can see that the level of disaggregation of information needs to be carefully linked to the type of decisions that are to be based on the information. Agencies have begun to develop and refine more structured approaches in which information of a certain type (e.g., safety-related data) can be collected in one format but reported at a variety of levels of aggregation, depending upon the decision-making context in which it is used. We are seeing a trend towards a structured, hierarchical framework that provides information aggregated to the proper level of the organization at which the information will be used. This finding provides guidance on the selection of measures, data sources, and analytical methods that are useful across a broad range of applications.
- **In order to be useful at a variety of levels of planning and decision-making, the approach needs to offer performance measures at the appropriate level of aggregation and with the appropriate information content.** For example, some agencies have designated a relatively small set of core measures for executive-level decision-making, supplemented by related but more specific and disaggregate secondary or tertiary measures intended to support decision-making at the program or service delivery levels. What is important is that these measures be related or aligned along some dimension that has strategic significance to the agency in terms of its goals and policies.
- **This hierarchical model recognizes that there are different information needs for different users and owners/operators of the system.** The over-arching policies and goals to which the agency's actions are dedicated are common to these different perspectives,

and therefore the performance measures, although different in construction and information content, need to align with a defined, limited set of strategic categories. The model recognizes that the frequency of data collection and reporting of measures may vary significantly depending upon the level at which the measure is used. And, the analytical models or data manipulation techniques used to refine data into performance measures will vary depending again upon the end user of the measure.

## Areas Where Further Improvement is Desirable

Continued opportunities for discussion and debate among practitioners will be valuable if for no other purpose than to force some clarity of intent and context. Beyond this, however, there are some specific areas where future research would prove useful to the development and implementation of performance-based planning methods. These are discussed in somewhat more detail in Section 4.0 of this report, and briefly summarized here.

- **Development and distribution of analytical tools:** Generation and analysis of system performance data remains a major obstacle to implementation of the outcome-based, user-oriented performance measures that are important to performance-based planning. Not only is there a continuing need to refine the analytical methods and tools, there is a need to see that once developed, these tools are made more readily accessible to a range of users.
- **Data collection:** Distinct from methods to synthesize, forecast, and analyze data, there are fundamental obstacles to the collection of data that will support performance measures beyond those traditionally collected by transportation system owners. Deployment of ITS technologies promises to eventually improve the quality and lower the cost of a broad range of transportation data, but work is required to determine how to best capture these data sources for planning and evaluation purposes. At the same time, there exists a potential for “data overload” if too much information becomes available and agencies are not able to identify that smallest amount of data that best addresses their information needs.
- **Dissemination of information:** The research conducted for this project points out the ease with which information can become dated in a rapidly expanding field. Performance-based planning is being explored and implemented by a rapidly growing number of transportation planning and operating agencies. A more rapid and streamlined means of collecting, organizing, and disseminating the experiences of these agencies, as well as their response to research results such as these, would facilitate more uniform and timely development of ideas. In Section 4.0 we recommend utilization of electronic media to support more timely two-way communication of between interested parties.

# 1.0 Research Objectives and Work Plan

## ■ 1.1 Research Objectives

NCHRP Research Project 8-32(2) was conceived to support a new era of transportation planning efforts at the federal, state and regional levels. There are several significant factors that have broadened the goals and objectives for transportation investment, and have expanded our awareness of the diverse set of customers that the transportation system serves. These factors include:

- The ISTEA legislation with its emphasis on multimodal solutions and its long-range planning, financial planning, management system, and flexible funding provisions;
- Heightened concern about the most effective use of scarce resources in an era where traditional transportation funding sources are not generating sufficient revenue to meet perceived needs, yet the public continues to be in a “tax revolt” mood;
- Increased awareness and concern about the role of transportation in supporting economic competitiveness, as changes in the national and global economies place new demands on the transportation system, especially for freight and goods movement, and international trade agreements open new markets;
- Environmental laws and regulations and particularly the Clean Air Act and Energy Efficiency Act;
- Social and equity concerns reflected in legislation such as the Americans with Disabilities Act;
- Growth management, congestion management, and transportation/land use laws and regulations; and
- A variety of new technologies offering a wider range of transportation solutions including Intelligent Transportation Systems (ITS), alternative fuel vehicles, high-speed rail, etc.

NCHRP 8-32(2) was conducted in two phases. The first phase focused on searching for applicable examples of performance-based planning in industries and sectors other than transportation planning. There was also a review of state and MPO plans and programs to determine the degree to which ISTEA had begun to impart any element of performance measurement. The objective of Phase I was to develop some common typology of goals and objectives, and to establish a framework for application of performance measures to the multimodal planning process. These objectives were accomplished through a detailed

literature review, through 10 case studies covering a broad range of transportation planning contexts and situations, and through several workshops at the regional and national level.

The second phase then focused in on identified cases of application of performance measurement, and identified examples of successful practices. A second round of case studies was conducted, this time of agencies selected specifically for their range of experience and recent application of performance measurement to their planning processes. Another round of workshops was held, this time in conjunction with professional meetings or conferences. These workshops served to present interim findings of the research and obtain feedback from planners, administrators, academics, and others.

This second phase of work helped to build on the Phase I findings, and to more clearly focus the objectives of the research. The following objectives were laid out as the project transitioned from Phase I to Phase II:

- More clearly establish the benefits to be gained from performance-based planning, beyond the law or other mandates. Why is this a better way to do business? Why should agencies find value in this approach as compared to what they do now?
- Concentrate on giving states and MPOs guidance in relation to performance-based planning, opting for a theme of helpfulness in contrast to a recent environment of regulatory mandates.
- Highlight the role of performance-based planning as an aid to improved decision-making, not as a replacement for existing processes.
- Make clear the need to derive performance measures from appropriate goals and objectives that have undergone public review and acceptance.
- Provide guidance in the identification and selection of specific performance measures, providing users with a menu of realistic candidate measures for each of several defined goals or areas of concern.
- Provide for differences in geographical and institutional coverage corresponding to the different needs of state, MPO or local levels of planning responsibility.
- Resolve concerns about the cost of data collection by incorporating existing data sources into the methodology and framework, tying specific performance measures to known data sources where possible.
- Identify next-generation data sources, analytical methods, and performance measures, demonstrating techniques for utilization of data collected through technology such as traffic surveillance and monitoring systems.
- Present solutions to process- or institutionally-oriented problems, not solely to the technically-oriented problems.

- Target specific information gaps identified in Phase I, such as freight-related measures and data, “user-friendly” analytical methods, existing data sources to meet immediate needs, and institutional obstacles.

## ■ 1.2 Research Plan

The following summarizes the research plans adopted for both Phases I and II.

### Phase I

- **Literature Review** – We conducted a thorough inventory of the basic elements which comprise the performance-based process, including example goals, objectives, and performance measures, and the decision-making and planning approaches driven by the measures. Examples were drawn from the public and private sectors, from transportation and non-transportation fields. Sources included published transportation plans, management information systems work plans, other research reports, and follow-up interviews with practitioners.
- **Case Studies** – The case studies were an important source of information in Phase I. A broad range of transportation situations was included in the case studies, from state-wide multimodal transportation planning efforts, to regional and facility-level implementation projects. We included multi-state undertakings, public-private partnerships and turnkey projects.
- **Typology of Goals and Objectives** – We developed and continuously refined a typology of goals and objectives, establishing relationships between the goals, objectives, and measurements of transportation system performance. The purpose of the typology is to clarify how the selection of appropriate performance measures is a function of the particular goals and objectives, and further, how the data needs are in turn driven by the goals, objectives, and measures. The linkages between these elements of the process, and the feedback loops integrated into the process, are the defining features of a performance-based planning process.
- **Analytical Methods and Data Sources** – In Phase I, this was limited to identification of analytical methods which could be used to facilitate a new generation of performance measures. These methods include data collection, storage, manipulation, and analysis procedures. A broad range of possible techniques, and potentially desirable methodological enhancements, were identified in order to accommodate a wide range of agency resources and needs.
- **Peer Review and Feedback** – We convened four advisory meetings to uncover examples of experience with performance-based planning techniques and to solicit feedback on the research at various points along the way. During Phase I, three regional advisory meetings were conducted, in Cincinnati, Portland (OR), and Atlanta. These meetings had a regional focus, involving participants from state DOTs, MPOs, transit

authorities, and private owners/operators. The final advisory meeting was held in Washington DC, in April 1996, and include numerous participants from agencies and organizations with a national perspective, as well as additional local, regional and state agency participants.

The findings of Phase I were presented in a Draft Final Report, which appears in Appendix B to this report.

## **Phase II**

The following work steps were conducted in Phase II:

- **Document Phase I Results** - The key findings of Phase I were summarized in a Research Results Digest, formally published and released by TRB in 1998.
- **Define the Scope and Content of the Performance-Based Planning Manual** - The research team defined the key product of the Phase II research, taking into consideration the Phase I results and Panel input. The manual outline was refined over the course of Phase II, incorporating further comments from the Panel as well as comments received at the Phase II workshops in 1997. The Manual draws upon examples to provide realism and context in illustrating how others have approached performance-based planning, obstacles they encountered, and how they overcame those obstacles.
- **Select Case Study Sites and Conduct Research** - The Panel confirmed the plan to build the final products around a series of focused investigations into current efforts of states, MPOs, and others in the application of performance-based planning processes. Case studies were completed of these 11 agencies/organizations:
  1. Florida Department of Transportation;
  2. Oregon Department of Transportation (focusing on the Intermodal Management System);
  3. Washington State DOT (focusing on the Eastern Washington Intermodal Transportation Study);
  4. Vermont Agency of Transportation;
  5. Capitol District Transportation Authority (Albany, NY MPO);
  6. Portland Metro (MPO);
  7. East-West Gateway Coordinating Council, (St. Louis, MO MPO);
  8. Metropolitan Council (Twin Cities, MN MPO);
  9. United Parcel Service;

10. Amtrak; and

11. Miami Valley Regional Transit Authority (Dayton, OH).

Summaries of the case studies are in Section 2.0 of this report, and the detailed case studies are in Appendix A.

- **Workshops** – In addition to the case studies, the research team conducted workshops at four points during the Phase II contract to discuss our findings and progress with a cross section of transportation planning professionals. These were organized as “breakout sessions” attached to regional and national conferences and meetings that attracted an appropriate audience. The main purpose of these meetings was to solicit feedback from the likely users of the research results. The research team conducted workshops at the following locations:
  - Essex, Montana, at the 1997 TRB Multimodal Planning Committee Summer Meeting
  - Boston, Massachusetts, at the 1997 Institute of Transportation Engineers International Meeting
  - Saratoga Springs, New York, at the 1997 Association of Metropolitan Planning Organizations (AMPO) National Meeting
  - Washington, DC, at the 1998 TRB Annual Meeting

Details of the workshops and their associated findings are presented in Section 3.0.

- **Prepare Performance Measures “Library.”** – An important component of the overall research products is the Performance Measures Library, a reference compendium on alternative performance measures. Its purpose is to offer practitioners a concise look-up guide of potential measures.
- **Prepare Interim Report** – An Interim Report was prepared approximately 10 months into the Phase II work to document the progress and findings of the research to date. This report was presented to the Panel at a March 1998 Panel meeting in Washington, DC.
- **Develop Performance-Based Planning Manual** – The research team developed a preliminary draft Performance-Based Planning Manual for Panel for review and comment. The final Manual will be bound separately from the final Project Report, and is intended for distribution to a wide range of potential users.
- **Prepare Final Project Report** – The Final Project Report documents the overall process that was followed in conducting the research and completing the manual. The objectives of the final report are to formally document the work done in the research effort, and to summarize any special problems that were encountered and solved or discoveries that were made. Whereas the Manual is intended to be more user-oriented, concise, and to the point, this Final Project Report includes more background about the case studies and the research project in general.

## 2.0 Case Studies

The case studies conducted for Phase II of this research project reflected public and private experiences with performance-based planning. The cases were chosen because of specific characteristics that allowed the project team to generalize from this experience to other contexts. These case studies included state departments of transportation, metropolitan planning organizations, transit and intercity rail passenger service providers, and a private firm specializing in goods transportation. In each case, field visits provided an in-depth review of the institutional and technical foundations for performance-based planning. The results of these case studies provide important insights into the challenges and opportunities associated with such planning, and lead directly to recommendations and guidelines incorporated into the *Performance-Based Planning Manual*.

The importance of each case study to this research project is described briefly in the following sections. The completed case studies are provided in Appendix A to this final report. It is important to note that these case studies were conducted during the period April 1997 through February 1998. Most of these agencies have continued to develop and refine their performance measurement and reporting methods and programs since that time, and these case study summaries do not reflect the changes and improvements that may have been made since early 1998.

### ■ 2.1 Metropolitan-Level Examples

Three case studies focused on performance-based planning at the metropolitan level. These case studies included: Albany (NY), St. Louis (MO), Portland (OR), and Minneapolis/St. Paul (MN).

#### **Albany, NY**

The Capital District Transportation Commission (CDTC) in Albany, NY was one of the earliest metropolitan planning organizations to use performance measures in a comprehensive way. As part of a comprehensive update to the long-range regional transportation plan, the CDTC adopted a set of “core performance measures” that reflected a total cost-accounting perspective on transportation system impacts. Importantly, this cost accounting as reflected in the performance measures includes not only those impacts that can be monetized, but also those that do not involve a pecuniary cost. For example, travel time for commercial and on-the-job travel is monetized, while all other travel time is quantified, but not transformed to monetary terms.

The approach used for developing a universe set of performance measures was an important characteristic of the success of the Albany effort. Nine task forces were

established to provide additional focus in key planning areas such as arterial management and transit futures. The task forces developed supplemental performance measures that could be used for tradeoff analysis of specific plan options. These supplemental measures had to be related directly to the core performance measures. This process was successful in linking broad system performance measures to criteria for evaluating cost-effective strategies in individual applications.

### ***Lessons Learned from Albany***

Although the conceptual approach toward performance-based planning in Albany is widely regarded as a national model, participants did not find that it had much influence on final decisions. Two of the task forces, however, those focused on Transit Futures and Expressway Management, felt that the performance-based approach was particularly well-suited to the types of options they considered.

The minimal impact on ultimate decisions is not surprising. Participants explained this by relating these decisions to the structure of policy making (i.e., who makes the decisions and who they represent). This is likely to be true for any transportation investment decision process where tradeoffs must be made. In addition, a backlog of TIP projects meant that new projects that surfaced from the performance-based planning approach would have to compete with projects which had already received political consensus. Again, this is something not likely to occur in any political process. The specific lessons learned from the Albany case study were:

- Adoption of performance-based planning for a planning process will be evolutionary, that is, there will be a period of time before the new approach begins to have an impact.
- Performance measures should be viewed as a way to assist decision-making, not guide it. One could argue this is the basic function of planning in general.
- Developing a set of core performance measures to which everyone agreed assured consistency among the many different groups as they proceeded toward recommended policy and strategies.
- Performance-based planning is perhaps more participatory than traditional models. This implies that great efforts need to be made to “open” the process to a broad range of participants. This also means that the process must be understandable to these participants.
- Long-term commitments for data collection and analysis are necessary for performance-based planning to work.

### **St. Louis, MO**

The East-West Gateway Coordinating Council, the MPO for St. Louis, has been exploring the use of performance measures in planning for at least the past four years. Importantly, the long-range transportation plan identified outcome-based performance measures that

related to the social, economic, and environmental vitality of the region. These measures were used in three planning initiatives with varying levels of success.

The first initiative was a major investment study (MIS) where the performance measures were used to compare and rank modal investments. Measures were identified as part of the evaluation process, but did not seem related to project-specific impacts nor the availability of data. A second effort in the MIS to incorporate performance measures resulted in 50 measures being identified.

The second initiative was to use performance measures in project prioritization for the TIP. Projects were ranked by their relation to regional goals (and hence performance measures) and their cost effectiveness.

The third initiative was incorporating performance measures into a regional freight planning study. A list of 28 performance measures was identified which related to regional freight objectives. Importantly, industry participants played an active role in defining these measures. These measures will be used on a periodic basis to produce a “report card” for freight mobility in the region.

### ***Lessons Learned from St. Louis***

The St. Louis case study provides an interesting example of the difficulties associated with performance-based planning if realistic constraints are not placed on the parameters at the outset. For example, many of the participants criticized the process because of the unwieldy number of performance measures that became part of the process. Not only does this represent an information “overload,” but the data collection effort can become unmanageable very quickly. With regard to the MIS, one of the areas of concern was the linkage between performance measures and likely project impacts. Because of the large number of measures as well as the lack of data to support them, the exercise was considered unsuccessful. Also, the performance measures were incorporated too late into the MIS process. This created difficulty in relating the measures to project concerns.

In the TIP prioritization case, the performance measures were not adequate for measuring progress toward overall goals. Another constraint was the very nature by which projects are selected. Some participants felt that the listing of specific prioritization criteria limited the number of projects that were submitted to the TIP process. This possibly resulted in a set of actions that did not best address all of the MPO’s priorities.

The freight planning annual “report card” provides the best successful experience in St. Louis with performance-based planning. The final set of recommended measures was chosen based on two criteria: ease of data collection and relationship to regional significance. By using these criteria, the performance measures reflected a strong level of implementation feasibility. A comparison with the original planning performance measures showed a relationship between the two, that is, the freight measures related closely to the regional measures.

The specific lessons learned from the St. Louis case study were:

- Although often difficult to gain consensus on which measures are “the best,” focusing on a few good performance measures provides more targeted information to decision-makers. Too large a number of measures can confuse the decision-making process as much as inform it.
- Monitoring system performance along the lines defined by the performance measures requires substantial, periodic data collection and analysis. Any set of performance measures that results in an overwhelming data collection requirement will be quickly abandoned.
- The freight “report card” illustrates the need for incorporating stakeholders and system users into measure definition. In some sense, this assures the relevance of the performance measures to the actual use of the transportation system.
- Technical in-house capacity to use performance measures is critical. This not only relates to the credibility of the process as seen from other actors in the process, but also translating the data collected into information that can be used in decision-making.

## **Portland, Oregon**

Metro is the MPO for Portland, Oregon. While Metro is involved in more than one application of performance-based approaches (they are a partner, with ODOT and the Port of Portland, in the Oregon Intermodal Management System, for example) this case study focused on Metro’s application of performance measurement to the regional transportation planning process.

Relative to many other MPOs, Metro has a higher degree of legislative and statutory strength behind its planning activities. Oregon’s administrative rule for transportation planning, the Transportation Planning Rule (TPR), requires the quantification of goals and objectives as part of the process. The Regional Transportation Plan (RTP) is framed by the more comprehensive “2040 Growth Concept,” which calls for emphasis on access to the central city, regional centers, intermodal facilities, and industrial areas. There is a secondary emphasis on access to other nodes such as town centers, communities surrounding transit stations, etc. As can be seen, the RTP has a very strong land use component built in, by virtue of the orientation towards access as opposed to mobility.

Metro has a relatively larger amount of resources dedicated to transportation analysis, and is known for their innovations in development and application of analytical models for multimodal planning and analysis. This capability sets Metro apart from many MPOs at present, and also tends to have a large influence on the performance measurement effort. In particular, Metro has developed measures of accessibility that are fairly advanced, and which are based upon a spatially-referenced data system and travel model. The advantages of their approach include providing a measures of access to opportunities that are relatively mode-neutral.

### ***Lessons Learned from Portland***

- Metro feels the decision-making process is better informed, more open, and as an indirect result, more lengthy. Planners should anticipate that implementation of performance-based approaches will draw out the time required to evaluate and reach decisions, not decrease it.
- A high degree of public involvement in the planning process has driven the user-based perspective. You cannot expect to have one without the other, i.e., you cannot accurately gauge what the public values if they are not heavily involved, and you cannot involve them without providing feedback on predicted system outcome in measures that are meaningful to the users and general public.
- Performance-based planning in a growth-management environment such as Portland's has helped integrate land use and transportation decisions. It has also reduced some of the conflicting objectives between land use and transportation plans. For many, this linkage is the "holy grail" of planning, and a performance-based approach that considers the land use impacts of different transportation investments will help achieve this objective.
- On the technical side, Metro has gone further than most agencies in devising and implementing quantitative measures of mobility and accessibility that are computationally complex, but the results of which are still relatively intuitive to the user. Metro cautions that many accessibility measures they have considered are simply not possible given the availability and status of data and analytical tools. In Portland, the accessibility measures are derived from model data that include non-work trips. This is possible because of the capabilities of Metro's analytical tools that are not widely prevalent in other MPOs. In many other regions, the ability to generate measures of mobility and accessibility is limited to the work-related trips, particularly when considering trips made by any mode other than the auto. Some planners argue that, given the growing percentage of daily person trips that are not work related, accessibility measures need to consider access to opportunities other than just employment, such as services, shopping, and recreation. Because of the different trip-making characteristics of different income level groups (number of trips, purpose, and mode) there are social equity issues implicit in measures of accessibility and mobility. It will be a challenge for most regions to develop the level of analytical capabilities needed to populate the performance measures in a way that addresses the equity aspects of mobility and accessibility.

### **Twin Cities**

The Minnesota State Legislature required the Metropolitan Council to perform an audit of the region's transportation system. The purpose of the audit was to look at the transportation system as a "system" instead of agency-defined modes and services. In addition, the audit was intended to provide public accountability for the amount of resources that were being allocated to the system. A review of recently completed policy statements and plans provided an overview of the regional goals and objectives guiding transportation investment. From these goals and objectives, several major themes became apparent including such things as ensuring economic growth and competitiveness, encouraging

growth management, preserving the condition and integrity of the existing infrastructure and minimizing the impacts on the environment.

The evaluation framework for the audit focused on three levels, starting first with transportation system performance, then leading to economic growth and competitiveness, then leading to quality of life. For audit purposes, performance measurement had to be related to some datum such as a benchmark, peer comparison, or performance standard. Each of these categories of assessment were used in the audit. Included in this assessment were the results of transportation system customer satisfaction both from households and businesses.

### *Lessons Learned from the Twin Cities*

The Twin Cities case study reflects a growing use of performance-based planning – providing accountability for public resources expended. The concept of an audit targets the relationship between these expenditures and system performance. Of great interest in the Twin Cities case was the broadening of the outcome measures to include economic growth/competitiveness and quality of life. The performance measures thus became directly linked to stated regional goals and objectives. Also, the emphasis on customer input into an assessment of performance satisfaction recognizes the need for including the ultimate user of the transportation system into the performance monitoring process. The specific lessons learned from the Twin Cities case include:

- The broadening of performance outcomes to include topics such as economic growth and quality of life is meaningful when the linkage to transportation system performance is made clear.
- Performance measurement over time is meaningful when related to changes that occur and that reflect some datum of reference. This datum can simply be the change from the last measurement cycle, peer comparison, use of performance standards, or benchmarks.
- Customer orientation is an important element of measuring system performance. Not only does this relate to the original definition of appropriate measures, but also to the actual determination of system performance relative to customer expectations.

## ■ 2.2 State-Level Examples

Although several states have been involved with program performance measurement for years, the first mandate for performance-based planning occurred with the ISTEA-required management systems. These management systems were supposed to monitor system performance (as defined through performance measures) and provide this information to decision-makers. Even though the development and use of management systems has been made voluntary, many states have continued with their development. These experiences provide the basis for two of the case studies that focused on state-level planning.

## Florida DOT

The Florida DOT has one of the longest histories with performance-based planning of any state DOT in the country. This is partly due to a focus in state government on increased accountability in the use of state dollars. The Florida Transportation Plan explicitly states that performance measures will be used in revising goals and objectives, and that indicators of progress will be used to measure progress toward long-range objectives. The Short-Range Component of the Plan is the basis for an annual performance report on the level of achievement of the 15 short-range objectives. In this case, key indicators are used to measure this achievement. In addition to these planning measures, much of the early work on measuring performance related to program productivity and the monitoring of agency output. The DOT has been very careful in defining a set of budget program measures that reflect agency actions. These measures are designed to link the expenditure of state dollars to program performance.

The Florida DOT was one of the first DOTs to develop a comprehensive intermodal management system (IMS), partly with support from a grant from the U.S. DOT. The original concept of the IMS was for the focus to be systemwide with emphasis given to the characteristics of flow within transfer facilities as well as quality of access to and from the facilities. As this effort evolved, the focus became a facility by facility review of the access characteristics to the state's highway network, with capacity and utilization of the facility being dropped from consideration. This new focus further evolved into a process whereby points were assigned to empirical observations that could be used to establish priorities for specific improvements. These priorities were to be established by the DOT district offices that were responsible for establishing capital programs.

Thus, instead of the original purpose of revealing system conditions to program managers, the new purpose of the IMS was to establish the comparative need among projects in the development of a capital program. After a two-year test period, an internal evaluation of the IMS concluded that no district had used the information for establishing priorities. However, there still seemed to be support for having an IMS in place that monitors a portion of the system that did not traditionally receive much attention.

### *Lessons Learned From Florida*

Because Florida was one of the first states to use performance-based planning concepts in program operation, the observations from this case study provide useful insights on the evolution of such concepts. A key conclusion of this case study is that participants very carefully *distinguish between performance measures and indicators of conditions*. Indicators provide information on what is happening to system characteristics that are deemed critical to program operation, but they do not necessarily relate directly to a causal linkage with agency action. Thus, performance measures per se become triggering devices which indicate when further study is warranted. They may not by themselves serve as good diagnostic measures.

The ability to track key characteristics of the system, even though the Florida DOT may not have direct control over the outcome, becomes a critical component of the agency's commitment to improve its actual performance. Florida DOT officials caution that

performance measures could oversimplify the phenomena that cause the outcomes being observed. The existence of a monitoring program that provides feedback to agency managers allows a certain amount of flexibility in responding to “problems.”

Another interesting observation from the Florida case study is the distinction being made between outputs and outcomes. There are several external pressures on the DOT to use output measures that provide some sense of program accountability. However, there is growing pressure from some constituencies to develop outcome measures that relate transportation system performance to quality of life issues and economic development. Although DOT officials recognize the importance of such measures, they are hesitant to adopt a process that establishes accountability for measures over which they have little influence.

Other specific observations that come from the Florida case study include:

- Establishing causality between program investment and performance measures becomes a critically important technical and political issue.
- The *process* of monitoring system performance was considered as important, if not more so, than the actual performance measures.
- The evolution of Florida DOT’s performance-based planning process into a prioritization scheme was unsuccessful. This was partly true because of the tendency to have the prioritization approach remain dominated by negotiation and bargaining.
- An important role for performance measures is as triggering devices for more detailed study and diagnoses. This is one way of integrating performance measures more closely with existing planning procedures.
- A concern was expressed about the danger of decision-makers “chasing” the performance measures. By this is meant that once it is known how “success” will be measured, basic human nature suggests that those projects which most quickly and easily achieve this success will be selected. This might occur even though the root cause of the problem being solved might demand different solutions.

## Oregon DOT

Along with Florida, Oregon was one of the earliest states to devote considerable resources to the development of a statewide intermodal management system (IMS). Similar to the experience in Florida, the Oregon IMS evolved from a global and comprehensive set of possible performance measures to a smaller and more focused set of working measures. The early phase of IMS development included the undertaking of an inventory of intermodal facilities, the definition of a set of general measures of performance, and the identification of the corresponding data requirements. Once the sheer scale of such an IMS became known, the IMS concept was refocused onto one concept – the quality of access into and out of major points of transfer.

This new focus of the IMS was developed based on extensive input from transportation system stakeholders who identified five critical dimensions of performance measures –

capacity, accessibility, connectivity, time delay and safety. Attention was given to establishing thresholds of acceptable performance and to using this information for prioritizing projects. Currently, the relationship between revealing needs (which one would argue is a purview of management systems) and the establishment of priorities is being debated. Of great concern is a perception that performance measures would supplant the decision process of establishing priorities.

### ***Lessons Learned from Oregon***

The evolution of the IMS in Oregon is strikingly similar to that found in Florida. The move away from a global management system to a focus on those elements of the transportation system under the control of the public agency, i.e., access links, was true in both cases. The trend toward using performance-based planning as a means of prioritizing projects, only to run into reluctance, was found in both. Specific observations that come from the Oregon case include:

- Performance measures were refined to reflect only those elements of the transportation system under control of the agency.
- Efforts to supplant (or at least perceptions of such efforts) the political process associated with prioritization were not well received.
- The Oregon IMS generally turned out to have a dual focus on freight-only movement and intermodal movements. This dual focus was considered by some as a useful addition to the planning process because of previous neglect of this sector, but was lamented by others due to the loss of a total “systems” perspective. This illustrates the important roles that such a planning approach can play.
- Over 1,000 stakeholders participated in the development of the IMS. This extensive involvement was generally considered to be a key to the successful definition of an IMS that would have an important role in the transportation planning process.
- There was great hesitation in further refining performance measures to ever finer quantification. The measures were viewed as input into planning, not as replacing the planning process itself. Thus, high levels of disaggregation were not necessary.

### **Washington State DOT**

The Washington State DOT along with key regional partners undertook the Eastern Washington Intermodal Transportation Study whose intent was to study the mobility needs of agricultural commodities. By developing a logistics chain database for important commodities, transportation officials can then understand the implications of alternative policies. The important difference in this study from others similar is that the focus was on the “trip” of a commodity from origin to destination, rather than on aggregate flows across a transportation network. So, for example, the study examined the timing of harvests, the demands for transportation, and the resulting impacts on the network.

It is interesting to note that although the perspective adopted in this study was very much oriented toward users of the transportation system, the performance measures were targeted at those system components under the control of the state DOT. As in Florida, Washington State is using the concept of indicators to represent phenomena that are not causally linked to agency action. And even where user-based measures can be identified, they need to be aggregated into an overall system measure given that the user is just one of many that utilize the transportation system.

A similar effort to the Eastern Washington study has been occurring in Seattle. The Puget Sound Regional Council (PSRC) has developed an analysis process for freight planning that is commodity-based, rather than the traditional reliance on land use characteristics. The PSRC has developed a monitoring program consisting of 26 critical segments of the region's road network, mainly measuring conditions experienced by trucks. Many of these segments are strategic locations between ports and major warehouses. Five major categories of performance measures have been identified for these segments - reliability, access, time and congestion, costs/benefits, and safety. At this point, these measures are to be used to report trends, but are viewed as the basis for a more systematic planning process aimed at freight movement in the region.

### *Lessons Learned from Washington State*

This case study focused on system performance as it related to freight movement. Experience with similar types of studies showed that when freight stakeholders are brought into the process, the resulting performance-based planning effort becomes quite meaningful. However, a freight focus also raises the question of how user-specific transportation issues that are important to a specific group can be generalized to the entire system. The specific observations that result from this case study include:

- Both system-based and user-based performance measures should be included in performance-based planning.
- The level of disaggregation of performance measures will be related directly to the type of information desired. Thus, for example whether user-based, commodity-based, or market group-based measures are defined depends ultimately on the types of decisions likely to be made based on this information.
- A market group focus for performance measures draws a strong linkage between economic productivity and the performance of the transportation system. This is one way of defining a performance measure that focuses on the "outcome" of economic productivity.
- As in other cases, the Washington State case shows the concern with having performance measures replace decision-making in establishing priorities. Such prioritization is considered the purview of the political process and should remain so. As noted by one participant, "the kinds of information needed will be revealed by actual political decisions you want to make."

## **Vermont Agency of Transportation**

The Vermont Agency of Transportation (AOT) has set in motion a program to monitor the performance of the programs aimed at improving the quality of transportation in the state. The program is based on both the commitment of the agency, and legislative mandate to undertake a program of monitoring and feedback in the planning process. The agency undertook a massive customer survey as part of the long-range planning effort in 1994, and is working on methods to continue meaningful communication with the customers of the agency.

Senior managers at the agency reported satisfaction with the development of a program to monitor the outputs of the agency's work, but are now wrestling with the transition to the use of outcomes. Managers feel that certain departments have made major strides in the reorientation of their work towards a program of performance-based evaluation. For example, high-level managers believe that the pavement program has evolved away from a list of projects, conceived as separate projects, to a system which can be described, evaluated and understood. This is described as a significant improvement over previous conditions, and a big step towards application of performance evaluation to strategic planning and management.

The biggest challenge of the managers at this time is the development of a meaningful program of monitoring in the maintenance department. As part of the process, the maintenance department is designing a new telephone log system to capture customer requests, a mechanism to annual survey district customers, and a numerical index to rate maintenance conditions for road sections. These examples show how the agency has augmented or modified their data collection and manipulation systems to better suit the information demands of the performance-based approach.

## ■ **2.3 Service Providers**

One of the traditional uses of performance measurement has been in those industries providing a service to customers who often have other options. Thus, knowing the key attributes of the service that are important to the customers and monitoring these system characteristics become critical elements of successful management. The following **three** cases illustrate performance-based planning concepts as they have been applied in passenger and freight transportation operations.

### **Amtrak**

As part of its strategy to attract customers, Amtrak management instituted a Customer Satisfaction Tracking System (CSTS) as input into operations and capital decisions. In 1994, Amtrak sponsored a survey of more than 10,000 customers to determine the most important factors for customer satisfaction. After these factors were identified (13 ranging from schedule adherence to bathroom odor), customers on each of Amtrak's product lines

were surveyed in a regular basis. A three-month rolling average was used to track customer satisfaction trends. A composite Customer Satisfaction Index (CSI) was developed which became the major indicator of customer satisfaction as reported to the Board of Directors. Because this index is presented to the Board, it becomes an important measure in the organization when investment decisions are being made.

There is some evidence to suggest that several managers are using the entire database to make decisions at their level as well. For example, customer dissatisfaction with the provision of information during train delays caused a manager to direct train operators to provide more frequent time information to passengers. Another manager has developed a regression model based on the raw data to isolate the most important characteristics that are used to prioritize service changes.

### ***Lessons Learned from Amtrak***

The understanding of customer satisfaction with the service being provided and the use of this information in decision-making is a good example of the use of performance measurement. The importance of the CSTS to Amtrak's customer-driven management system is widely accepted by agency managers. However, several managers question the usefulness of a performance-based day-to-day management planning tool that was primarily oriented to the Board of Directors. In order to motivate agency personnel and influence operations with customer satisfaction measures, there needs to be a "buy-in" from managers and employees. One way of doing this was repeatedly suggested by those interviewed – include managers in the process of developing relevant tools. Specific observations that come from the Amtrak case study include:

- Performance-based planning can provide important management decision support for those organizations providing customer service.
- Customer-oriented product delivery requires a good understanding of the desired service characteristics and of the status of those characteristics in actual service delivery.
- Surveys can be important means of gauging customer satisfaction especially when administered on a periodic basis. Surveys are most relevant to performance-based planning when they focus on those characteristics deemed most important to the customer.
- Including those officials who will be the ultimate users of performance-based planning in the process of defining key parameters is critical to successful implementation.

### **Miami Valley Regional Transit Authority (Dayton, OH)**

In the early 1990s, the Miami Valley Regional Transit Authority found itself in an ever worsening situation of being isolated from the community it was meant to serve. New agency leadership in 1991 decided that credibility with the community was the most crucial issue facing the Authority, and thus embarked upon a process of establishing this credibility. A committee was established of civic, business, and constituency leaders with a mandate to

develop a strategic direction for the agency. As part of this strategic direction, the Authority instituted a service standards process whereby service performance could be monitored and new service requests could be evaluated in terms understandable to the community. Four service standards were defined by the Authority: passengers per platform hour, vehicle load factors, on-time performance, and community-based service needs. The last standard is a qualitative assessment of how a service relates to fundamental community needs such as access to key employment, commercial or medical facilities. A wide-ranging data collection effort supports the monitoring of system performance.

In addition to the use of performance measures, organizational changes have occurred which further implement the system performance orientation of the Authority. The planning staff has been given responsibility for scheduling and is expected to field customer complaints twice per month. This provides a direct linkage between customer perceptions on service provision and actual provision of service. Future plans include the development of a core set of benchmarked performance measures that will become part of the service standards process. Customer-based, quality-focused performance measures will supplement operating statistics for Board use and community outreach. Baseline surveys will be conducted in 1998 to identify key parameters in customer-perceived quality of service provision, important issues associated with transit, and relative levels of importance attached to each.

### ***Lessons Learned from Dayton***

Specific observations that come from the Miami Valley Regional transit Authority case study include:

- The implementation of performance-based planning is an evolutionary process with important “developmental” phases along the way. In this case, community involvement and public perception that there is a vested interest in enhancing system performance was critical.
- Credibility in the process means that periodic system measurement provides a sense that customers and stakeholders are receiving benefits for their investment.
- Credibility in the process also means having the resources to deal with the problems that surface from the performance-based planning process. The Authority’s gain in community acceptance can be related to the attention being paid to deferred issues.

### **United Parcel Service**

United Parcel Service (UPS) is the largest parcel delivery company in the world and one of the largest express and overnight shippers. Today, UPS is an integrated information delivery company offering a range of expedited, standard ground, logistics support and information dissemination services across the world.

UPS’ measurement systems have traditionally focused on productivity, efficiency, and finance. An unofficial company philosophy was that there was a most efficient way to do

everything. Efficiency concerns were a factor in a consistent pattern of goals and objectives oriented to revenue and volume growth. Early performance measures in support of these goals included volume growth, revenue growth, time-in-transit and cost per package. Profit concerns were not as explicitly assessed in UPS' early systems. In recent years, profit has become a more explicit concern with realization that revenue and volume growth does not necessarily equate to profit growth.

Within the last five to 15 years, UPS managers have concluded that an exclusive focus on efficiency and finances, particularly volume growth, was creating long-term negative implications especially for fixed asset requirements. This conclusion was based in part on external factors such as industry deregulation and the rapid expansion of competition. For example, new service offerings brought about by competition could not be assessed (and serviced) in same way as traditional ground service. Also, with market forces providing greater leverage to the customer, old actions based on internal productivity concerns (such as package drop-off/pick-up at same time) could not be maintained.

All in all, many forces have come together to compel UPS to take a broader approach to performance measurement. However, the current approach did not develop from a clean adaptation of prior systems. There were many false starts and changes in plans. As recently as five years ago, the system was considered by some managers to be unwieldy, with 25 measures in use at top levels.

UPS' case study participants stated that a performance measurement should be applied in both top-bottom and bottom-up fashions. However, the system should be established solely top-down, with key corporate goals, rather than data availability, used as the driver and alignment mechanism for all measures. With the wealth of data and information available to management, there is a constant need at UPS to identify the most important decision-making needs at each level and focus on that information. Since most upper management at UPS started at lower levels and were promoted from within, they tended to develop an affinity for information availability at lower levels. Many individuals struggle with temptation to gather and review detailed information since it is readily available.

Given the concerns UPS has experienced with data ownership, the transportation planning field may want to begin exploring the issue. With the potential to automatically collect data using ITS, instrumented vehicles or advanced surveying techniques, planning information may become readily available from many different sources. Groups other than planners and traffic engineers could begin to be sources of valuable information for transportation planning.

### *Lessons Learned from UPS*

While UPS is different from most transportation planning agencies in fundamental ways, there are useful observations to be made.

- UPS has invested heavily in information systems over the last 10 years. They have underestimated the cost of maintaining this new infrastructure, and also did not fully anticipate the additional costs that are incurred just by virtue of having data available (e.g., customers now wanting information over the internet). An aggressive investment in IT and data collection undoubtedly creates a need for even more investment.

- The emphasis remains on providing the least amount of information that is needed to make an informed decision. The timeliness of information is more critical than quantity of information at all levels, particularly when there is a need to isolate the effect of new initiatives.
- UPS rapidly changes and adapts its management strategies and measurement systems based on decision-making needs and market forces. This willingness to change approaches is somewhat reflective of the flexibility and needs provided by a private sector environment. Yet the potential lesson for transportation planning agencies should not be overlooked; undue concerns about the long-term stability of measurement systems and specific measures may paralyze agencies and prevent them from responding to changing internal and external forces.
- Explicit linking of diagnostic indicators and strategic performance measures allows front-line managers to identify, evaluate and select actions with an eye to strategic objectives. That is, different kinds of measures may be needed to track performance with respect to strategic objectives, as opposed to measures that are better diagnostics of the problems and effective solutions.
- Performance measures become more useful when users understand what drives performance. UPS is using feedback and evaluation, particularly in terms of customer satisfaction, to help identify effective performance drivers.
- While financial measure are still important in the private sector, some companies such as UPS are trying to measure, interpret and predict financial performance in a broader context that incorporates customer- and employee-oriented measures
- Even in an environment where data collection is not a constraint, the selection, evaluation and interpretation of performance information is not simple. The availability of “unlimited” information creates new problems of putting it all together, or of “creating information out of data.”

## 3.0 Workshops

An important component of the Phase II research plan was the organization of several workshops to present incremental results to groups of interested potential end-users of the products. The primary purpose of these workshops was to solicit comments and suggestions on the proposed research plan and findings, and use the information to refine the research plan or methods if appropriate and guide development of the final products so as to improve their overall usefulness.

Four such workshops were held during Phase II (in addition to the four held during Phase I) over the period July 1997 to January 1998. The workshops were held in conjunction with the summer meeting of the TRB Committee on Statewide Multimodal Planning; the ITE Annual Meeting; the Association of Metropolitan Planning Organizations Annual Meeting, and the TRB Annual Meeting. These different meetings were used as organizing venues in order to attract participants representing a wide range of organizations and perspectives.

### ■ 3.1 Summary of Findings

The more detailed notes from each of the four workshops are included below. The following general observations can be made:

- Despite the lack of published information about this research project in particular and performance-based planning in general, there is widespread interest in both. More and more agencies are becoming aware of the application of performance measures to the planning process, and as they do so, the demand for information and guidance is growing. Although a number of transportation planning agencies have invested in the process, application of performance-based methods to the transportation planning process is still very much in a growth and discovery mode.
- There continues to be a healthy debate over the intended application of performance measures. State and local agencies are concerned that there is an agenda to use performance measures to score and rank agencies according to organizational performance criteria, perhaps using externally-determined criteria. The many representatives we have met from state DOTs, MPOs, transit agencies, and local government are relatively uniform in their desire to focus on measures of system performance rather than organizational performance. This does not ignore the fact that there is a related movement afoot in many public agencies to develop systems for measuring organizational performance and efficiency. Much of the impetus for this organizational performance measurement comes from legislative bodies interested in monitoring the cost-effectiveness of transportation agencies. But there is an audience for guidance and information sharing on performance-based planning methods that focuses on system performance and outcome of different investment strategies, apart from the organizational issues.

- The perspective of what is important does indeed vary across many dimensions: state versus MPO, urban versus rural, passenger versus freight, etc. This raises the question of how to provide guidance that is both specific enough to be useful to those who already are using a performance-based approach and at the same time broad and flexible enough to be valid across such a range of perspectives. For example, it is generally true that state DOTs are relatively more preoccupied with system maintenance and preservation, while MPOs find themselves dealing with less quantifiable issues such as community values, sustainability, etc. The more urban agencies tend of course to be quite interested in developing mode-neutral measures of system performance and outcome, often so as to minimize a perceived historical bias towards highway investments. Less urbanized states with large highway miles may have a more traditional perspective, or at least may have a dramatic range of perspectives from the urban districts to the rural ones.
- Agencies are concerned about their ability to effect improvement in an area of measurement. For example, safety is a key area of measurement for most DOTs and many other agencies as well. Yet, the overall outcome of safety, whether just the highway system or the entire surface transportation system, is the result of many factors, a number of them external to, and beyond the immediate control of, the agency doing the monitoring. Mobility, another primary area of interest for most DOTs and MPOs, is also impacted by external trends in in-migration, job formation, transportation costs, etc. Usually there are numerous agencies that contribute to overall mobility of an urban area or state. Agencies are concerned that while they may track numerous mobility-related measures, their positive achievements may be dwarfed by external factors resulting from trends or decisions made outside of their purview.
- There has been a very noticeable shift to practices which favor incorporation of the “customer” or user perspective in defining and evaluating performance of an agency. Attitudinal surveys, focus groups, and other methods have been employed to establish who the customer base really is, what segments it is made of, what is important to these customer market segments, and what constitute realistic expectations on the part of the customer. At the same time, agencies realize that there is a need for balance of perspective here. There are entire elements of the agency’s operation that are critical to the overall mission but practically invisible to the customer, such as certain system preservation and maintenance functions.

The following summaries present additional discussion and conclusions from the four workshops.

## ■ 3.2 Montana (TRB Multimodal Planning Committee Summer Meeting)

The first NCHRP 8-32(2) workshop of this phase of the project was held on July 28, 1997, in Essex, Montana in conjunction with the TRB Statewide Multimodal Planning Committee summer meeting. This workshop was attended by about 25 members,

including representatives of several state DOTs, FHWA/FTA staff, and a small number of other members including consultants. The workshop included the following segments:

- Overview of the workshop purpose and format;
- Summary of the purpose and findings to date of 8-32(2);
- Summary of Phase II objectives and work plan; and
- Discussion of several aspects of performance-based planning, including:
  - Barriers to implementing performance-based planning
  - Customer satisfaction and perception
  - Performance measures
  - Data-related issues
  - Federal/state and state/local issues
  - Proposed TRB Subcommittee on Performance Measures

## **Major Questions and Comments Raised During the Workshop**

### ***Comments Regarding the Phase II Research Plan***

Several DOT members commented that the workshops should include the perspective of elected decision-makers and legislative representatives. These members felt that the proposed workshops were focused on groups that exclusively represent “technical” agency staff, and that to be effective, the proposed methods need to be acceptable to groups such as MPO boards, transportation commissioners, etc. Suggested venues included the National Governors Association and the Conference of Legislators. A follow-up suggestion was made that the technical advisory committees to MPOs and transit agencies should be consulted during the workshop process. As a result of this suggestion, a workshop was added at the September 1997 Association of Metropolitan Planning Organizations conference.

The TRB Committee Chair and workshop host Neil Pederson asked whether the research project would focus on performance measurement in the context of programming or planning. We responded that although our research has looked at application of performance measurement to a variety of functions including planning, programming, budgeting, internal management, etc., the focus of this project is in the area of planning, and our products will be oriented primarily to that function.

Participants questioned whether the proposed selection of case study sites was skewed towards growth-management states, and whether that might limit the usefulness of findings for other states. Two committee members representing growth-management states replied that in their experience, the linkage between application of performance measurement methodologies and growth management was not a critical factor. We also noted that if in our research we identified instances where the presence of strong growth management controls was necessary to support certain performance-based approaches, we

would make that clear. We also pointed out that in Phase II we had intentionally selected states and MPOs with some track record in performance measurement, and that there may be some correlation between states with more aggressive land use/transportation planning linkages and performance-based planning and programming. The research team was asked to be aware of this potential linkage, particularly in the Washington, Oregon, Florida, and Portland Metro case studies.

### ***Barriers to Implementation***

In the discussion about the barriers that may exist to the implementation of performance measurement and performance-based planning concepts, the following questions and comments were made:

- **Term Limits:** The trend in some states towards legislative term limits was raised as a potential obstacle. A frequent change in policy makers leads to more frequent change of objectives, creating the potential need to change the system performance measurement too often. The group consensus was that it is probably too early to tell whether legislative term limits themselves represent a significant barrier. Some members felt that the opposite may be true, that is, with a shorter legislative “memory”, lawmakers and commissioners might find it necessary to rely more heavily on a consistent system of performance measurement. With a limited term, legislators might be more inclined to use the system they inherit upon taking office rather than try to reinvent it. There might be periodic efforts to change the standards or targets to be achieved, rather than the measures or areas of measurement themselves. Committee members commented that in fact a good system of performance measurement might help mitigate or dampen some of the agenda “swings” they might otherwise expect to result from term limits.
- **Lack of Clear Objectives:** Lack of a clear objective was cited several by members as a significant barrier to successful implementation. An agency needs to more clearly articulate *what* they are trying to accomplish by adopting a system of performance measurement, reporting, and monitoring. Comments suggested that it is still the case that agencies focus too quickly on *how* to use performance measures without clearly articulating what their objectives are, and gaining buy-in to that view. We asked whether the goal and objective statements from long- and short-range system plans were a good enough source from which to draw performance measures and standards. Members replied that plans often need to be more explicit and the linkage to performance measures more evident than is typically the case.
- **Resource Limitations:** Some of those present questioned whether simple resource issues might keep performance-based planning from being more broadly adopted, and suggested that the efforts may suffer the same fate as the ISTEA Management Systems. Others felt strongly that there are significant differences between independent performance-based planning efforts and the federally-mandated Management Systems. They noted that not all states *will* undertake comprehensive performance measurement efforts, but that many states will be able to draw guidance from the examples.

Other potential barriers to successful implementation suggested include:

- Unwillingness to put “bad news” on the table; those with experience suggested it is important to report accurately and objectively, even the bad news.
- Propensity to measure elements that are “flashy” but not critical to the agency’s mission.
- Unwillingness to measure performance of a system that the agency cannot directly or completely influence.

### *Federal/State and State/Local Relationships*

A unique aspect of this workshop, given the host Committee, was the perspective on how performance measurement may be used at one level of jurisdiction to evaluate the performance at another level. While the tension between state DOTs and the U.S. DOT on this particular issue is well acknowledged, we encouraged the members present to also consider whether there was a similar tension or conflict between their state agencies and regional or local transportation agencies.

*Agency Comparisons:* Members commented that where they have used performance measures to grade and compare, they have encountered resistance; where they have attempted instead to guide resource distribution, they have found less opposition. To the extent that the states ask locals to spend local dollars for data collection, however, they do encounter resistance.

*Partnerships:* Another state/local issue occurs where the state has an interest in routes of significance that are not on the state system (intermodal connectors such as port access roads being a good example.) In these cases, performance measurement can be used to establish the level of need and to encourage the development of partnerships (interjurisdictional as well as public-private) to address the need.

*Performance Measures as a Funding Mechanism.* Both at the state and local level there is concern about the possibility that performance measures may be used to directly determine funding allocation. There is an obvious potential problem if declining performance or condition results in reduced resources to an agency or program, as this tends to create a self-eroding or downward-spiraling situation. Transit operators may demand a “hold harmless” clause for funding based on performance, or a minimum funding floor. Intra-state and trunk highway systems may be adversely affected if the state sets policy without adequate regard to local needs. It is important in these cases to seek state/local agreement on specific objectives before these are translated into performance measures or standards.

### *Performance Measures*

Part of the discussion focused on the performance measures themselves, and there is obviously a great level of interest in the nuts and bolts of the process. While many of the issues raised have been raised before, they are worth noting and repeating:

- **Simplicity.** In a planning application in particular, measures need to be readily understood by decision-makers and the lay public. This supports the concept of a

hierarchy of measures, with the top-most levels being the most aggregate, composite system performance and condition indicators that provide decision-makers and the public with a summary of results (or predicted results.)

- **Structured Hierarchy of Measures.** A hierarchy of measures can be effective in allowing agencies – and their stakeholders or customers – to monitor both internal performance efficiency and external outcome. But it is easy to get consumed in the pursuit of the performance measures themselves, which is why some higher-level, strategic reporting is desirable, in addition to what may be useful at the program or project level.
- **Control over Outcome.** It is useful to identify *who* (i.e., which agencies or other parties) actually influence outcome on a particular measure. It is rarely the case that any one unit or agency controls the outcome in some broad area of measurement. The best example given of this was in the area of safety, where the state DOT tracks performance but actually controls only a limited number of factors. Contributing factors other than roadway design and condition, such as driver skill and condition, vehicles, etc., are often the domain of other agencies. The fact that the monitoring agency does not fully control the outcome *does not* suggest that they should not monitor that element, but rather, ensure that the system of measures is specific enough to provide some diagnostic capabilities. If the major underlying causes of accidents can be tracked with the system, for example, the agency is in a better position to define strategies involving other partners who also control the inputs (e.g., driver training, enforcement, etc.) and thus the outcome.
- **Transportation’s Real Contribution to Outcome.** This recognition that control over outcome is usually complex and multi-jurisdictional may be useful in dispelling some notions about what transportation’s real role and contribution to outcomes. This is particularly true the more broadly we define our areas of measurement. For example, identifying transportation’s actual contribution to overall changes in the environment (e.g., air quality or stream habitat) is more problematic than in a more focused area such as safety or mobility. Recognizing this, it appears that several agencies that have been using performance measures for several years have attempted to define a more concise universe of measurement areas, and to focus more specifically on their system’s contributions to outcome rather than on the total outcome.
- **Output versus Outcome Measures.** Since the completion of Phase I of this study, there has been more widespread discussion of the concept of “output” and “outcome” measures. The group consensus seems to be that:
  - Outcome measures have been historically under-represented in the typical DOT measurement and evaluation processes.
  - Extra effort needs to be made (as it has in certain states and MPOs) to develop a better sense of the customer and external stakeholder perceptions of performance and importance, and to represent these perceptions in the measurement system.
  - That notwithstanding, there is a need for balance between the two types of measures, not a wholesale replacement of useful output measures which have an important part in informing management and planning decisions.

- **Proxy Measures.** The notion of surrogate or proxy measures has been introduced through this research effort and other projects as well. This is in response to the data and analytical methods resource concerns. The idea is that while a plan goal or objective might suggest an ideal measure, real limitations on data collection and analysis may suggest or require that a less ideal measure be adopted in the interim, based upon more readily available data resources. In time, data collection and analytical capabilities (e.g., travel time information available through ITS deployment) will make the ideal measure more feasible.

### *Customer Perception and Satisfaction*

A final area of discussion at the Montana workshop centered on the value of incorporating the system users' (or "customers") perception of performance into any evaluation scheme. Some states such as Minnesota have taken this concept to new levels, and have greatly improved the state of the practice in determining what is important to the customer and how to use the information. The following guidance and opinions should be useful to other states and MPOs who want to incorporate the customer perspective:

- Take care to define who your customers are; some states include "internal stakeholders" as customers, others focus on the system users. It is important to include *anyone* with mobility needs, not just current users of the system, and this presents some challenges in terms of identifying and reaching out to these latent non-users.
- Define what is *important* to your customers, as well as what they expect in the way of performance relative to what the system currently provides.
- One agency which has employed market research specialists to assist in surveying customer perception advises "Don't ask questions unless you are willing to deal with the answer," or perhaps more completely, don't survey customers about aspects of system condition or performance that the agency does not intend to address through their investment programs.
- While the 8-32(2) products will not go into the details of survey methodology, a summary of general points and practices to be observed would be useful. The appropriate use of focus groups, for example, was described by some as to help with issue identification, survey design, and pretesting. But such focus groups, especially hand-selected "expert" focus groups as opposed to more randomly selected groups, might not be the best way to assess customer perception.
- Some members expressed the opinion that agencies should not rely too extensively on customer perception; their perspective may reflect too-short a timeframe, or may ignore the important longer-term maintenance and preservation functions of a DOT. Some of the preservation-oriented activities are not perceptible to the user, but are nonetheless critical to the agency's mission. In many states, the focus is shifting from modernization to maintenance and preservation, suggesting that operational and maintenance issues are more critical to the agency than some of the more visible, customer-oriented outcome measures. This suggests again the need for a balance of perspectives, rather than a radical swing to an outcome-based, customer-dominant perspective.

- Perhaps surprisingly, more than one DOT representative noted that customers, while more knowledgeable and demanding than in the past, are also somewhat more realistic than the system planners. They may have a more constrained view of what can actually be changed or improved.

## Summary

The Montana workshop, involving predominantly state DOT and FHWA/FTA representatives, was extremely useful in helping to focus in on areas of interest to the ultimate audience for the Performance-Based Planning Manual. Although not all of the suggestions can be accommodated in the research plan, there were many observations and examples that have helped to shape the end product and make it more useful.

### ■ 3.3 Boston (ITE International Meeting)

The study team conducted the second workshop at the ITE International Meeting in Boston on August 4, 1997. Led by Peter Zabierek and Matthew Coogan, the study team met with a group of about a dozen practitioners. About half the group were consultants, while the remainder included MPO staff, one state DOT representative, and two university researchers.

The two-hour session began with an introduction of participants and an identification of what each participant wanted from the meeting. In general, the group agreed that their intentions were to share experiences in performance-based planning, identify and apply concepts, and identify additional resources. There were some focused requests for applying concepts in both the long-range planning and the MIS processes.

#### Defining Performance-Based Planning

The consultant team opened by leading the group in a discussion of the definition of performance-based planning. In order to give the group something to react to, the following candidate definition was presented:

*Performance-based planning is the planning for system and facility improvements that lead to enhanced performance of the transportation system where desired system performance is explicitly stated at the outset and monitored over time.*

While the group found the exercise useful for orientation purposes, they had a number of criticisms, constructive and otherwise, of the definition. Among them:

- “‘Enhanced performance?’ Given the development and growth pressures we are dealing with, we’d be lucky to keep the status quo. We should replace the word ‘enhanced’ with something like ‘the best possible.’”

- “This definition brings up more questions than it answers. What do we mean by ‘performance of the transportation system?’ Do we mean from a total trip perspective, individual modes, or what?”
- “Does performance-based planning include monitoring? If so, they should include it in the title.”
- “I like the fact that it includes monitoring. Otherwise, what’s the use?”

## **Dimensions of Performance**

While most of the participants each had a wide variety of interests and experiences, this discussion focused on only the “application” dimensions of performance, i.e., how to apply the process to various planning processes (e.g., MIS, long-range plan).

One participant cautioned the group to be careful when using customer surveys to generate performance information at a corridor level. Oftentimes, in his experience, customer surveys are distributed only to those who live in that particular corridor, and do not consider others who use the corridor. This can lead to suboptimal solutions, he said, as system-level improvements like ramp metering may be eschewed because of their negative local impacts. In addition, while he touted the value of the public participation process, he expressed concern that customer satisfaction performance measures could drive project selection process, and rigorous technical analysis would be ignored.

A number of participants echoed words of caution on the use of customer surveys. One participant claimed that “...many of the surveys we do for transportation assume that the customer is homogenous. Of course, that’s not true. Take the elderly, for example. They do not work 9:00 a.m. to 5:00 p.m. jobs, they have a greater need for social services, and their modal options are usually few. If we’re going to use customer information, let’s appreciate the nuances of the market.”

The topic closed with discussion of how to develop performance measures for an MIS, and how that may be different than those used for a subarea. In general, the group agreed that the process starts with an identification of goals and objectives for the corridor, and continues with linking the performance measures to these goals and objectives. The group expressed a desire to move away from the ordinary LOS measure to broader definitions of system performance. Door-to-door travel times, VMT/person trip, and person-throughput measures were all discussed as possible options.

## **Current Issues in Performance-Based Planning**

As had been discussed in other workshops, the group opened a discussion of the most topical issues in performance-based planning. These issues were summarized as:

- Barriers to implementation;
- Customer satisfaction;

- Developing/selecting performance measures;
- Data; and
- Federal-state, state-local relationships.

While the participants agreed that all of these issues were important, the majority claimed that the data issues and the difficult process of selecting the “right” performance measures were their highest priority at the time.

As for the data issues, the study team provided some information from Phase I of the 8-32(2) project, which provided some resources for the efficient collection, storage, and dissemination of data. Many of these strategies included ITS technologies. In addition, some participants suggested other data sources that may not always get tapped, such as Census data, HERS and HPMS data, safety information submitted to state and police departments, and National Transit Database data. One participant from the Texas Transportation Institute described their work on the “congestion index,” how that data was collected and how it can be used to benchmark one metropolitan area versus another.

Developing performance measures, the other top concern amongst the group, began with a reminder of the “K.I.S.S” principle (“Keep it simple...”). One of the ITS-savvy participants made an analogy to the “few good measures” principle used in the ITS community. “Given that there will be only a few, how can you measure transportation’s contribution to broad outcomes?” asked one participant. One reply was that one needs to develop performance measures that answer a number of different questions. Another was “you’ll never be able to capture everything, so do the best you can with a few measures.” Finally, the project team shared the Albany, NY MPO experience, where the agency defined both “core” measures, which are used at a high decision-making level and secondary measures which are used by technical staff.

## **Summary of Findings**

- Developing a definition of performance-based planning is difficult yet instructive. While not absolutely necessary, an agency might find value in developing its own working definition of the concept so that stakeholders understand the scope of the process.
- Use care when using customer-oriented performance information. Balance this information with technical analysis and make sure that the customer information you generate is credible and has statistical integrity.
- Different applications of performance-based planning to various processes (long-range planning, MIS, etc.) require their own types of performance measures.
- One valuable approach to developing a manageable set of performance measures may lie in a two-tiered system, which would include “core” measures and secondary measures.

## ■ 3.4 Saratoga Springs, NY (AMPO)

The Association of Metropolitan Planning Organizations (AMPO) held their third annual conference in Saratoga Springs, September 3-6, 1997. It was the team's desire to devote one of the workshops specifically to MPO issues, and the AMPO conference provided that opportunity. Team member Sarah Campbell conducted the workshop on September 4.

### **General Comments**

The workshop facility was designed for 10 to 12 people; however, nearly 40 people arrived. One of the key reasons that the workshop proved popular was because there had been a provocative and confrontational presentation on the subject at a previous conference in June 1997. At that time the presenter told participants that performance measures were basic to the MPO business (i.e., everything they did could be quantified) and that, once selected, the measures would be used by the federal agencies to evaluate the MPOs. Partly as a result of this previous presentation, the audience's view of "hot issues" and "good measures" were different from what the research team heard from state DOT staff.

As the September workshop proceeded, it was clear that the group had some strong opinions about performance measurement. When an overhead slide depicting numerous "Dimensions of Performance" was presented, the group paused to discuss the issue of "environment and community values," and how this issue could be addressed in a performance-based planning process. This caused several MPO representatives to express the view that much of their work involved finding ways to incorporate these less-quantifiable issues into decision-making, and that they should be recognized as important even though less amenable to quantitative measurement.

### **Specific Topics and Views Expressed**

The AMPO workshop offered a wide-ranging discussion that elicited a number of strong opinions. The following general concerns were made clear:

- There is a need to recognize qualitative measures, and the fact that some important aspects of transportation and MPO business are not given to "hard measures."
- The emphasis should be on output for some activities and on outcomes related to goals for others.
- MPOs want a "tool kit" that allows users to understand what are effective measures for various activities; what it takes in time and resources to develop them; and how they have been used in various settings.
- MPOs do not want measures for organizational assessment. There is a concern that these will be used for comparisons between MPOs and with other sister transportation agencies such as city or state DOTs or public works planning agencies.

- The state-of-the-art of performance-based planning should be recognized as uneven across agencies and geography.
- There is a need to develop and apply measures that are mode neutral.
- We should recognize political nature of process of selection and concern that measures will be used “politically” for comparison between metro areas by federal agencies.
- Available data is often not what is needed for the desired performance measures. How much data gathering is worthwhile in terms of time and money?
- Many participants see performance measures as a potentially useful tool to explain to the public why transportation is important. They feel that national studies, such as NCHRP 8-32(2) should do this, and then worry about measures for individual MPOs or other transportation agencies later. Generally they see the need for help in getting buy-in from local officials for consistent investment.
- A good measure should be determined by local goals and priorities. That is, the measure should track progress toward local goals. These may not be the same place to place. Hence, not all performance measures fit all jurisdictions’ requirements.
- Recognize difference between tracking performance of transportation system in a region and assigning responsibility. Some good measures may reflect multiple agency efforts. (One of many reasons why they are against agency report cards.)
- Several participants found measures were useful in TIP decision-making, but all would like help on better measures for project scoring.
- The amount and nature of data required for the measure is an issue. How many performance measures are needed to help guide decisions or chart progress overtime? The group generally favored the “few good measures” approach.

### ■ 3.5 Washington, DC (1998 TRB Annual Meeting)

The fourth workshop held as part of Phase II of this project took place in Washington, DC on Sunday January 11, 1998. Participants from a wide variety of agencies and geographic locations were invited to attend. The workshop was intentionally not announced in the TRB Annual Meeting program in order to help limit attendance to a size that would permit direct and detailed interaction between the audience and the research team. A total of 16 participants attended, along with five members of the research team. Participants represented several state DOTs, several MPOs, the FHWA, and consultants to the public and private sector transportation industry. The workshop lasted approximately three hours, over half of which was dedicated to discussion among the participants.

## General Comments

One of the general comments expressed by several audience participants at the outset of the discussion period is that the kind of information being generated by NCHRP Project 8-32(2), as evidenced by the workshops and other presentations attended over the past months by research team members, is of great interest to transportation agencies. The information discussed thus far was described as “very germane” to what agencies are trying to accomplish, and that they would expect the products of the study to be quite useful. As in past workshops, audience participants inquired about the status of published results and exhorted the research team to do what they could to complete the work in a timely fashion, and equally importantly, see that the results are distributed without undue delay.

## Topics of Discussion

Research team members summarized the findings of the numerous case studies completed for the project, focusing on themes including the debate over the intended application of performance-based methods, the significance of outcome measures, the perspective of different levels of government (DOTs, MPOs, transit operators, etc.) and other key themes that have emerged from the research. Audience participants responded to these issues and introduced additional ideas and opinions, as summarized below.

### *Intended Application of Performance Measures*

- Monitoring of performance is widely supported, but the use of measures as standards for measuring success is not.
- The use of performance measures to prioritize programming decisions is also a subject of debate, with a good range of opinion. The application of performance measures in this context in some states was described as a failure, and it was noted that it is “not the job of management” to attempt to replace a political process with a technical one.
- Participants agreed that performance-based planning does not replace any process, but merely improves it. A better-informed, if still inherently political decision-making process, is all that might be expected. Results will vary from state to state!
- One way to effect more substantial change in the politics of decision-making is to use performance-based methods to better educate and inform the public, thus influencing their expectations and possibly driving further changes in the political process.
- In some states, performance measurement is being implemented specifically to provide a greater degree of local determination over planning.
- “Mission Overlap” needs to be understood by transportation agencies in their application of performance measures. For example, DOTs need to work more closely with economic development agencies to effect any real progress on “welfare to work” agendas. This federal example will have analogs at the state/local level.

- Representatives from DOTs and MPOs have stressed the point that they do not favor organizational performance measures; they are interested in system performance. (Of course, this view is not shared by all elected officials or decision-makers who have commented on the matter.)

### ***Outcome Measures***

- An “outcome” measure is that only if it measures something that the agency has a specific program, the intent of which is to influence that outcome.
- The ability to directly control outcome is not a prerequisite to measuring outcome. This echoes comments heard at the Montana workshop. A representative from a different state this time again used safety as a key example of how performance information can be used to diagnose problems and then devise actions and strategies to achieve policy objective by partnering with other agencies, e.g., highway patrol, DMV, the justice system, schools, etc.
- Some question whether public expectations of outcome are realistic. External trends (in-migration, shift to a service economy, etc.) need to be taken into consideration before establishing measures and standards.
- While an agency can monitor and track things which effect outcome but which they do not directly influence, they might not want to call them “performance measures.”

### ***Process Issues***

- There are significant regional differences, not only in the thresholds/standards that are set as targets, but in the measures themselves. At the state level, for example, congestion may be a noteworthy issue in only a few districts; and/or, the way in which congestion is defined and measured may be different. Using this example, it might be better to define mobility as the area of interest, and congestion as but one measure of mobility. In rural areas, measures other than congestion will be used to define relative progress towards improved mobility.

### ***The Scope of Performance-Based Planning***

One of the most significant topics discussed by participants in this workshop centered around the scope of performance-based planning. That is, to what extent should transportation agencies (or perhaps others) broaden the range of measures they employ, beyond measures of transportation system performance and outcome, to measures of success in attaining the overall future vision for a region or state. While the first phase of this research project talked about transportation’s contribution to broad societal objectives such as economic development, quality of life, and environmental protection, the model to date focuses on measuring the outcome *within the transportation system* as it relates to these more broad societal objectives. Some have argued that until the scope of measurement is broadened to include a more comprehensive look at these societal goals, they will not be achieved. The argument is that if only transportation system measures are used (e.g., what is the transportation system’s contribution to air emissions, not what is the overall

air quality) then any regional or state plan can be made to look successful. In reality, because of a variety of behavioral actions and decisions that are made outside of the small arena of public transportation planning and investment, the net effect of the system contribution will be quite small and probably overwhelmed by external factors.

This discussion points out the importance for an agency to determine early on what they are actually trying to accomplish through implementation of a performance-based methodology. The answer to this question will determine what an agency should measure and how the information should be used.

## 4.0 Suggested Topics for Further Research and Product Development

The research project turned up three general areas where additional research and development of products would have clear value. These are improved data collection methods, improved analytical tools, and better methods of information distribution and sharing.

### ■ 4.1 Analytical Tools

Although there are numerous performance-based planning processes now underway in the transportation sector, our research suggests that even today there is insufficient emphasis placed on objective measurement of the outcome or effectiveness of alternative system investments. The historical bias towards measures of system output and efficiency has been carried forward in part due to limitations in data and analytical models. Agencies have thus had difficulty developing and applying measures that are descriptive of system performance in terms that are more meaningful to users, such as travel time in specific corridors, predictability of trip duration, etc.

Many agencies have neither the staff resources nor the analytical tools to develop the new generation of outcome-based measures that would greatly add to the value of performance measurement. We have found numerous situations where an agency desires to adopt measures of accessibility and mobility, for example, but is ultimately constrained not only by the lack of current data but also by the inability to estimate values for important data under hypothetical future scenarios.

The problem is a result of at least two major factors: The absence of appropriate analytical tools among agencies, and the high initial and ongoing costs of applying and maintaining certain kinds of tools. The two causes are related, of course. The relative shortage of easy to use, widely distributed models and tools restricts access for many mid- and smaller-sized agencies. Because of this, human resources to apply the models are more scarce and more costly than would otherwise be the case.

It is true that a large number of cities, counties, MPOs and other special purpose local and regional agencies have (or have access to) a traditional travel demand forecasting model. The research confirms, however, that the majority of these models are limited in their ability to produce information that is useful in generating more advanced measures of outcome and effectiveness. For example, numerous participants in the workshops expressed skepticism about the ability of their agency's models to predict transit ridership, non-motorized, truck trips, or even non-work auto trips, with any accuracy. Most

models start out with the objective of forecasting future peak hour or daily auto trips, and many do not progress beyond that stage. Thus, the models are limited to producing estimates of roadway V/C ratio and several derivatives (e.g., average speed, aggregate delay, total VMT, etc.) Useful measures of mobility and accessibility often require more disaggregate information, for example, average travel time to major employment centers, or percentage of a population that can reach specified services within a given travel time. Extracting performance measurement data such as VMT in a specified corridor or point-to-point travel times is usually a tedious manual process.

In a similar way, some larger agencies are making significant progress in the application of geographic information systems (GIS) technology to transportation planning and modeling. These systems greatly facilitate generation of measures that combine some form of spatial data (e.g., density, income, auto ownership or other population characteristics) with transportation data (location of transit facilities, designated freight routes, etc.) For many other agencies, however, the necessary investment in the development, use, and upkeep of an integrated GIS is prohibitively expensive.

One additional glaring area of analytical limitation is in the longer distance, intercity markets that state DOTs are concerned with. Relatively few states have working statewide models that can be used to evaluate, for example, investment in alternative intercity travel modes.

Useful additional research and product development, therefore, would include those efforts focused on developing *and disseminating* lower-cost analytical tools, especially forecasting models and geographic information systems, to potential users. Suggestions include:

- Continue efforts sponsored by FHWA and others to improve the state of intercity and statewide forecasting and distribute information to potential users.
- Continue efforts to disseminate the results of projects such as the Travel Model Improvement Program (TMIP) to agencies around the country, with appropriate attention to improving model system components such as mode choice models and “post processors” which can significantly improve one’s ability to generate system performance data.<sup>1</sup>
- Support the further development and deployment of sketch planning methods for evaluating alternative transportation alternatives. A number of these models have been developed which provide a lower-cost approach to screening alternatives and determining relative impacts and benefits of different transportation projects and strategies. In recent years, FHWA has sponsored development of such tools which provide comparative evaluation of different modal investments and even intelligent transportation system (ITS) strategies. Further work is required to refine, document, and deploy these lower-cost sketch planning benefit models to a larger cross section of public agencies.

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<sup>1</sup>Post processors include a variety of analytical models developed to use travel demand model output to generate more accurate estimates of a variety of factors, such as speed, queuing, spreading of peak demand over a longer time period, etc.

- Generally speaking, more funds should be devoted to the broad distribution of numerous analytical methods and tools that have already been developed. Examples include the “Quick Response Freight Manual” and the “Short-Term Model Improvement Program” which could probably benefit a wider audience if more funding were available for training and user support.

## ■ 4.2 Data Collection and Maintenance

The Phase I research confirmed that collecting and maintaining data to support performance-based planning programs is a critical obstacle. The vast majority of agencies we visited or spoke with indicated that their data collection resources are limited; that existing data collection programs will continue to consume most of the available resources; and that it is difficult to convince executive decision-makers and others of the need for and value of additional or different data collection programs.

Existing data collection methods tend to be labor intensive and thus expensive. Because they are expensive, they tend to be done periodically rather than continuously, and thus do not do a good job of reflecting the dynamic nature of transportation system conditions. Whether for highways or transit, most current methods require some form of manual surveillance and data reduction.

In the area of freight movements, these constraints are even more apparent. Freight shipments are more varied in content, and vary more over time, than passenger movements, so accurate data collection is a complex, costly process. Cooperation from the private sector has been limited due in part to concerns about competitiveness and security reasons.

Surveys have been used by many agencies to collect a variety of data with value in the performance measurement context. These include a variety of “user” surveys, customer perception and satisfaction surveys, goods movement surveys, etc. Some agencies have placed a great deal of emphasis on customer surveys, while others have openly questioned the usefulness of customer perception and opinion data. Like manual data collection, these methods are expensive, and are perceived by some to be disruptive or invasive. For these reasons, they tend to be done infrequently.

The most dramatic payback would appear to come from further investment in deployment of ITS technologies that will accelerate the shift towards automated collection of a wide variety of transportation data. Equally important is the fostering of partnerships that will help bring that data in a useful format to a wide variety of public and private users. Section 4.0 of the Phase I draft Final Report (reproduced in Appendix B of this report) provides additional discussion of the current data collection and manipulation methods, shortcomings, and benefits of future methods that rely on emerging ITS technologies.

## ■ 4.3 Information Sharing

The issue of disseminating technology has already been raised above. When new methods are developed, it is important that they are not “abandoned” or left on the shelf waiting for potential users to discover them. The above examples indicate that this is true specifically of analytical methods and tools, but it is also true generally of the performance-based planning methodology and base of experience that is accumulating at a number of sites around the country.

Because of the rate at which additional agencies are testing performance measurement methods, it is difficult for any research publication to remain current for very long. It has become apparent during the course of conducting the case studies that information becomes dated quickly and opportunities for leveraging or “piggy backing” off the experience of others are lost because information travels slowly and erratically.

To help address this situation, we suggest that relevant research products be made available to interested parties in electronic format. Whether through CDs or over the World Wide Web, products such as the Performance-Based Planning Manual would reach a larger audience more quickly if distributed in this fashion. A very important by-product of this method of distribution is that it would be relatively simple and inexpensive to set up a two-way forum for commentary and discussion on the usefulness of such products. If practitioners were able to provide direct feedback on their experiences in applying the research products in their own situations, it would also be possible to develop a continuously updated reference manual that incorporates this more recent information and makes it available to a larger audience. Again, the key point to be made is that when a field of knowledge is moving through a period of rapid growth and a “steep learning curve” it is going to be more difficult for traditionally-published reports to stay on top of developments and provide current information.