

NCHRP 08-62 Transportation Performance Management

Insight from Practitioners

final report

prepared for

National Cooperative Highway Research Program

prepared by

Cambridge Systematics, Inc.

with

High Street Consulting Group

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date

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1.0 Introduction

NCHRP 08-62, *Transportation Performance Management Programs – Insight from Practitioners*, addresses the mechanisms that transportation agencies can use to expand and improve the use of performance measures in decision-making. To date, most research on transportation performance management has focused on either broad frameworks or building blocks for a performance management program or guidance on developing measures within specific functional areas (asset preservation, congestion or capacity expansion, environmental issues, and others). Previous research has not moved beyond measure selection to consider how measures are or should be used to support decision-making.

This research effort begins to address that gap. The primary product of the effort is a guidebook that identifies practices that individual transportation agencies can use to help connect the measures they are developing to the every day decisions they are making. This report provides a summary of the material generated to support the development of that guidebook, including a literature review, identification of established and emerging practices, case studies, and other efforts.

1.1 BASIC PRINCIPLES OF PERFORMANCE MANAGEMENT

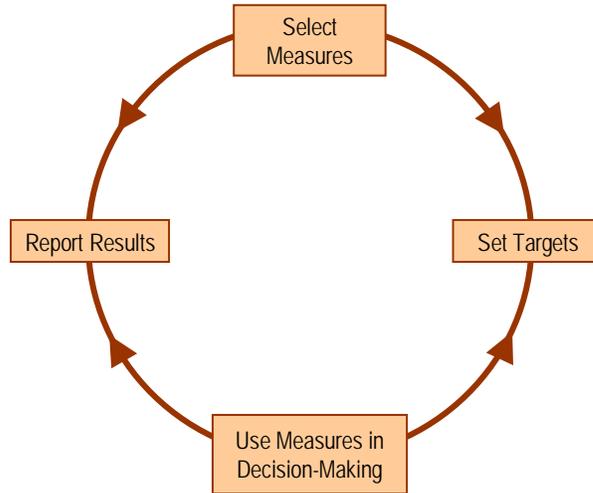
Performance management reflects a business practice oriented toward an improved use of resources (funding, staff, etc.) and a focus on accountability of decision-making. Two basic concepts have motivated the research conducted for this project:

1. Using performance measures to allocate resources to better achieve agency goals and objectives (*doing the right thing*); and
2. Using performance measures to help drive more efficient use of resources to get the best performance results from whatever allocation is made (*doing things right*).

Performance Management Structure

The research assumes a simple four-stage life cycle of performance management that begins with the selection of measures and works its way to reporting results (Figure 1.1). It is a continual process, not a static one, and, though simple, it connects to most or all of the functions that DOTs engage in to achieve their fundamental goals.

Figure 1.1 Performance Management Life Cycle



Management Decisions

The research is examining a broad range of decisions that performance management can usefully inform, including:

- Strategy decisions (e.g., which approach will best solve a problem?);
- Resource allocation decisions (e.g., how funding should a program receive?);
- Programming decisions (e.g., which projects should be selected for funding?);
- Operational decisions (e.g., where to deploy staff?); and
- Human resource decisions (e.g., who should receive a bonus?).

1.2 ORGANIZATION OF THE REPORT

This is an interim version of the final report and, as such, it is necessarily incomplete. The report is organized as follows:

- Section 2.0 reviews the relevant literature on performance measurement and decision-making;
- Section 3.0 presents the methodology used to identify and select potential case studies;
- Section 4.0 presents detailed case studies focused on the link between performance measures and decision-making;
- Section 5.0 presents the themes that were used to organize the guidebook; and
- Section 6.0 summarizes the practitioner review sessions conducted for this effort.

2.0 Literature Review

There is a considerable body of literature devoted to the subject of performance measurement at state departments of transportation (DOT), as well as to the more specific subject of performance management. A recent in-depth review can be found in NCHRP 8-36(47), *Organizing for Performance*.

Rather than repeat the material contained in previous reviews, the review for this project considered a small number of relevant studies to set the stage for the focus on decision-making. It considers relevant information from several types of organizations, including:

- Federal agencies and other national performance measurement efforts;
- Other national performance measurement efforts;
- U.S. transportation agencies, including state departments of transportation, transit agencies, and metropolitan planning organizations;
- International transportation organizations; and
- Nontransportation agencies, including private sector organizations, local governments, and nonprofit agencies.

The following sections review findings in these areas. A detailed list of references is available in Appendix A.

2.1 FEDERAL AND NATIONAL PERFORMANCE MEASUREMENT EFFORTS

Federal Agencies

Performance measures have been used by Federal agencies of all types. Since passage of the Government Performance and Results Act of 1993 (GPRA), Federal agencies have had to significantly expand their use of performance measures. The act required Federal agencies to develop specific outcome-oriented goals for their strategic plans; to link them with short-term goals; and to provide annual progress reports on results achieved.

The Government Accountability Office (GAO) has documented Federal agencies' use of performance measures in report titled *Results-Oriented Government: GRPA Has Established a Solid Foundation for Achieving Greater Results* (GAO, 2004). The report documents the increased use of performance measures following the adoption of the GRPA. The use of outcome-oriented performance measures in particular has expanded; to a lesser extent, agencies have started linking performance measures to resource allocation decisions. However, agencies still face

significant challenges when attempting to expand their use of performance measures, including:

- **Lack of Management Commitment** - Passage of the GRPA did not guarantee the commitment of agency leaders to performance management. Lack of consistent leadership includes the Office of Management and Budget, which oversees the GRPA requirements.
- **Inconsistent Use of Performance Data** - Though some managers make use of performance data, others are only collecting data. This may be because they are not involved in the selection of measures, because the data are not collected in a timely fashion, or because they feel they are not rewarded for using performance measures.
- **Human Capital Challenges** - Managers perceive a lack of authority to make decisions in response to performance information; a lack of adequate training in the uses of performance measures; and a lack of incentive to use them.
- **Unclear Impact of Federal Programs** - Agencies struggle to develop outcome-oriented goals when they are unsure of the impact of Federal programs.

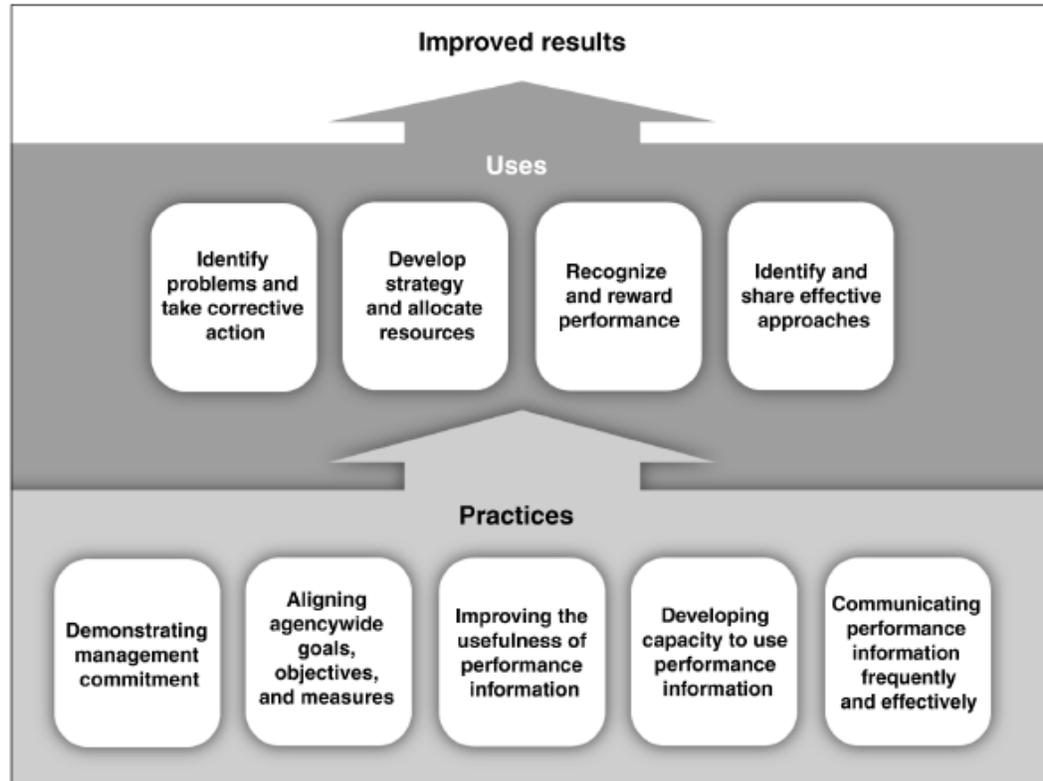
A second GAO titled *Managing for Results: Enhancing Agency Use of Performance Information for Management Decision-Making* identifies four uses of performance measures in decision-making: 1) to identify problems and take corrective action; 2) to develop strategy and allocate resources; 3) to recognize and reward performance; and 4) to identify and share effective approaches, (GAO, 2005).

The report also identifies five practices that support the use of performance measures in decision-making:

1. Agency managers must demonstrate leadership and commitment to using performance measures in decision-making. Management can show this commitment by hosting regular performance review meetings, and by involving staff from different levels of the organization in the meetings.
2. Agencies must align performance measures with agencywide goals and objectives. This can be achieved by creating a system of cascading performance measures that connect day-to-day activities with the agencies' strategic goals.
3. Agencies must aim to improve the usefulness of performance information. Measures should be selected based on their ability to inform decision-making at each organizational level, and should be appropriate to the level where the decision is being made.
4. Agencies should develop their capacity to use performance measures by ensuring they have appropriately trained staff and resources to carry out the performance measurement program.
5. Agencies should communicate performance information frequently and effectively so that managers have time to incorporate the information into their decisions.

Figure 2.1 summarizes the four uses of performance measures in decision-making and the five practices that support their use.

Figure 2.1 Federal Uses of Performance Measures and Supporting Practices



Source: Government Accountability Office, 2005.

Transportation Reauthorization

The Federal government will soon be considering the reauthorization of the Federal transportation legislation, most recently passed as SAFETEA-LU. Among the issues currently on the table for the new legislation is the concept of a performance-based Federal program. The American Association of State Highway and Transportation Officials (AASHTO) is sponsoring NCHRP project 20-24 (Task 58) to identify potential uses of performance measures to make decisions about the management of Federal-aid programs. The primary purposes of this effort are to:

- Develop alternative Federal-aid program mixes which include a review of the policy issues and potential programmatic changes recommended by the recent report of the National Surface Transportation Policy and Revenue Study commission titled “Transportation for Tomorrow”;

- Develop alternatives for Federal-aid program management which includes a state-driven performance management process; and
- Develop a reauthorization proposal that enhances accountability through performance-driven, outcome-based programs.

Government Performance Project

The Government Performance Project (GPP), established by the Pew Center on the States, published its fourth and most recent edition of the *State Management Report Card* in March 2008. This report, published on the PCS web site and printed in *Governing* magazine, assesses the state of management practices in all 50 states and identifies innovative approaches used by individual states. The Report Card contains grades for each state, and the nation as a whole, in four broad management categories: Information (average 50-state grade: B-); People (C+); Money (B-); and Infrastructure (B-). Grades were assigned at the end of a year-long intensive research and interview process involving teams of journalists and academics, and exhaustive discussions among Pew staff. The process examined each state's overall management structure and, for this edition, used interviews with state corrections departments to "inform the broader management conclusions reached in the process."

The remarkably candid and readable report accompanying the *Report Card* begins by assessing the state of government management in broad strokes. For example, the report opens with a reflection on the fact that, more than ever before, the Information management category has thoroughly intertwined with the other three categories. The report goes on to discuss emerging trends and highlight best practices in each of the four management categories, as well as less successful arrangements and examples of states that have fallen behind. For example, in the Information category, the report commends the Wyoming DOT for using a GIS-based financial record system so sophisticated that costs are tracked "down to the cost of the salt used between each mile marker on the state's snowy roads," while "New Hampshire has such a weak data-sharing system that it does not know how much it spends each month – kind of like an average Joe who's lost his checkbook." Following the nationwide assessments and highlights, grades are presented for each state, in each of the categories, and are accompanied by a one-page summary of the state's strengths and weaknesses in each of the grading criteria. Overall state grades range from A- (Utah, Virginia, and Washington) to D+ (New Hampshire).

The authors of the *State Management Report Card* deliberately emphasize the fact that "the purpose of the grades is to focus attention on the substantive issues of state government management," and that the report's primary purpose is to advance the GPP's mission "to improve service to citizens by strengthening government policy and performance" by sharing best practices and highlighting what works, as well as what does not. In a later section of the printed report, entitled "How We Grade," the authors lay out the entire research cycle, as well as all of the grading criteria. They stress in that section that "the GPP's methodology

favors common sense over a formula,” citing the example of New Jersey, which received a C+ for Infrastructure in spite of having an excellent management process, because their physical infrastructure was still in poor shape. The emphasis on results over processes is pervasive throughout the report (“even the best strategic plan is irrelevant if nobody in the state follows it”), and in fact, this is one of the most common and difficult challenges facing the states. This is most acute when performance data crosses paths with the legislative process.

2.2 TRANSPORTATION RESEARCH

State DOT-Focused Research

Although there has been a significant volume of work about performance measures at state DOTs, this review focuses on a small number of specifically relevant research reports that, together, form the foundation for the current effort. The state DOT research is organized into three topics: 1) performance-based planning; 2) strategic planning; and 3) performance management.

Performance-Based Planning

Two key efforts in the last decade address the use and development of performance measures for planning purposes. These two efforts help build a process to use performance measures in project selection and asset management. NCHRP Report 446, *A Guidebook for Performance-Based Transportation Planning* (Cambridge Systematics, Inc., 2000) discusses how performance measures can be used in transportation planning. It identifies the set of processes and concerns that impact how a DOT sets its goals and identifies measures to capture progress toward those goals. The report points out that decision-making occurs at many levels within an organization and that different measures may be required at each level to support decision-making, but all should be aligned to reflect overall agency goals and policies. The report identifies several challenges to the use of performance measures, including:

- **Political Barriers** - Decision-making in transportation, especially project prioritization, is a complex and political process, which would be oversimplified if driven only by quantitative performance measures.
- **Pace of Decision-Making in the Public Sector** - In the private sector, decisions are made more quickly and flexibly; whereas, decisions made by the public sector tend to be more slow, complex, and difficult to change. The inability to change decisions easily often creates resistance to using performance measurement.

NCHRP Report 551, *Performance Measures and Targets for Asset Management* (Cambridge Systematics, Inc. et al., 2006) provides a methodology to guide transportation agencies through the identification of performance measures suited to asset management and consistent with agency needs. The review identifies

four types of performance measures, some of which go beyond the traditional scope of asset management programs:

1. **Preservation of Assets** (e.g., pavement condition index, bridge health index);
2. **Mobility and Accessibility** (e.g., person-miles of congested travel);
3. **Operations and Maintenance** (e.g., average incident clearance time); and
4. **Safety** (e.g., fatalities per million VMT).

Ideally, these performance measures should be sensitive enough to show how much “the needle moves” as a result of different investments. This will allow measures to be used in the analysis of hypothetical scenarios, facilitating choice among them. However, performance measures are rarely used in this way.

In addition to these two key works, the Transportation Research Board’s Performance Measurement Committee (ABC30) has hosted three conferences on the use of performance measures by transportation organizations. The third conference titled *Delivering Results and Establishing Accountability* was held in Irvine, California, in 2007. This conference focused on issues of accountability, communication, use of data and tools, and current topics of interest. The proceedings of the second conference, *Performance Measures to Improve Transportation Systems*, indicate that there has been growth in the development and use of performance measures by transportation agencies in the past 20 years, and especially the last 5 to 10 years. Included are examples of how states are expanding performance measurement to new areas, such as incident management and congestion mitigation, and are becoming more sophisticated in their use of performance measures. This is evidenced by trends toward increased use of outcome-oriented performance measures and increased use of cascading performance measurement systems. In cascading systems, performance measures are developed for many levels of the organization, but can be “rolled up” to a small set of measures that reflects agency or system performance as a whole. Conference proceedings provided information to support the selection of case studies (see Section 3.0).

Strategic Planning

A number of research efforts have focused more specifically on supporting strategic planning with performance measures. This research aims to help transportation agency executives track progress toward agency goals.

Managing Change in State Departments of Transportation (Poister and Van Slyke, 2001) draws on interviews with DOT executives to identify performance measurement approaches. The report shows that, while many DOTs use conventional approaches to strategic planning, a few are leading efforts to explore new methods, such as the balanced scorecard approach that tie performance measures to an organization’s overall strategy. These methods help DOTs use their strategic plans (i.e., long-range, action, and business plans) to drive decisions and change. The most successful strategic management systems tie together performance measures, budgets, and the strategic plan.

Strategic Performance Measures for State Departments of Transportation (TransTech Management, 2003) provides guidance to CEOs and executives on how to integrate performance measurement into strategic planning, an approach referred to as “strategic performance management.” The report identifies the following four core functions associated with performance management.

1. **Internal Communication** - Performance management serves internal communication by enabling leaders to communicate strategic priorities to their employees;
2. **Business Management** - Performance management serves a business management function by providing an organizing theme and focus point for management frameworks;
3. **Decision Support** - Performance management serves a decision support function by informing decision-makers about emergent problems and needs within the transportation system; and
4. **External Communication** - Performance management serves an external communication function, allowing the department to communicate with stakeholders and customers about its priorities, accomplishments, and goals.

The report also identified several practices that support the use of performance measures in decision-making, including regular reporting of performance results. A committee composed of senior management can review performance results and take steps to address performance problems or share successes.

Strategic Planning and Decision-Making at State DOTs (Poister, 2004) synthesizes state DOT approaches to linking strategic planning with performance measures. In many cases, upper-level management uses performance measures to keep tabs on progress toward goals outlined in the strategic planning process. One clear way to integrate the two is through asset management, a systematic process of maintaining, upgrading, and operating physical assets cost-effectively. Measures from the asset management program can be used to drive decisions regarding the allocation of future resources.

Performance Management

Several recent research efforts have focused more specifically on performance management. This research more directly assesses questions related to decision-making and provides some of the clearest findings to support the ongoing research effort.

Effective Organization of Performance Measurement (Cambridge Systematics, Inc., 2006) assesses how transportation agencies, particularly state DOTs, incorporate performance measurement functions within their organizational frameworks. Using insights gained from case studies, the report identifies organizational attributes that contribute to a successful performance measurement program, three of which directly relate to linking performance measurement with decision-making:

- **Leadership** – Performance management requires substantial support of or initiation by top level leadership and support from career professionals and the organization as a whole. The presence of committed, top-level leaders fosters support for the use of performance measurement in decision-making. Career professionals can help ensure the stability of a program by ensuring overall employee buy-in and continued use of measures from one political administration to the next.
- **Performance Measurement Culture** – Creating a culture where performance measurement is accepted and supported helps motivate employees to participate and strengthens program continuity over time. Establishing widespread responsibility for performance measurement implementation is likely to ensure it has its greatest impact.
- **Cyclical Reporting** – Regular reporting of performance measures allows agency leaders to incorporate performance into their routine decision-making processes.
- **Linking Performance Measures with Actions** – Nearly all successful performance measurement programs connect performance measurements with actions or decisions. This helps agency staff and the public to take the performance measurement program seriously.

The American Association of Highway and Transportation Official's (AASHTO) recent report, *State DOT Performance Management Programs: Select Examples* (AASHTO, 2007), provides several case studies that demonstrate how DOTs are managing their agencies using performance measures. The report identifies five main uses for performance measures within the DOT context:

1. To support investment decision-making;
2. To support statewide planning;
3. To ensure accountability and responsiveness to stakeholders;
4. To quantify benefits of specific programs and infrastructure investments; and
5. To meet Federal and state legislative mandates.

The case studies in the AASHTO report reveal that the use of performance measures at state DOTs is expanding in both sophistication and scope, including application to relatively new areas of operation, such as congestion and system performance. This finding is consistent with previous reports that touch on trends in performance measurement.

Strategic Management at the Pennsylvania Department of Transportation (Poister et al., 2004) describes how the Pennsylvania DOT (PennDOT) has created a cascading strategic management system that includes the use of performance measures at many levels of department operations. PennDOT created the system in an effort to link its strategic planning program with decision-making, budgeting, and staff management. The system supports the integration of performance measures and decision-making in the following ways:

- **Aligning High-Level Goals with Operations-Level Goals** – Each of the PennDOT districts creates a strategic plan, accompanied by performance measures that support the department’s high-level goals. The districts also create business plans detailing how strategic plan objectives will be met.
- **Linking Performance Goals with Budgets** – The business plans developed by the PennDOT districts all contain specific budgets that invest resources in planned actions responding to strategic objectives. This gives managers the confidence that they will have sufficient resources to achieve the targets for which they will be held accountable.
- **Assigning Responsibility for Results** – Individual members of a high-level Strategic Management Committee are each assigned to be the “owners” of strategic objectives. Lower-level managers also are held accountable for achieving targeted results.
- **Remaining Policy-Neutral** – PennDOT’s strategic management system has survived several gubernatorial and legislative changes by remaining policy-neutral. It serves as a tool decision-makers can adapt to their needs regardless of their policy priorities.

Transit Agency Research

Transit agencies present a potentially interesting case for state DOTs to consider. Though their responsibilities are more focused, this focus may present an opportunity to truly manage the agency using performance measures. The following two research reports on performance management at transit agencies are particularly relevant to this review.

A Guidebook for Developing a Transit Performance Measurement System (Kittelson & Associates et al., 2003) provides an eight-step process for implementing or updating a performance measurement system at a transit agency, including a step to integrate “performance results into decision-making.” Agencies should choose a desired frequency for evaluation of the transit system; compare performance results to goals for each measure during evaluation; and develop specific action items to improve performance in areas where goals are not being met. It is important for agencies to be clear about defining how and when performance results should be included in the decision-making process.

Performance-Based Measures in Transit Fund Allocation (Stanley and Hendren, 2004) highlights some of the issues transit agencies face when attempting to integrate performance measures into resource distribution. Transit agencies often find that using performance measures to distribute resources is in conflict with the need for stable funding. Agencies find further difficulty in using performance measures to evaluate the cost-effectiveness of transit service, because they are usually mandated to provide services regardless of their cost. As a result, there is limited impetus for changing the fund allocation processes already in place, and the use of performance measures to drive transit fund allocation does not appear to be increasing.

International Transportation Organizations

The World Road Association (PIARC) has researched the use of performance measures worldwide by transportation agencies at various levels of government. A study of 18 cities around the world (including three in the United States) presented in *Evaluation of Transport Performance Measures for Cities* (PIARC Technical Committee on Urban Areas and Integrated Urban Transport, 2004) suggested mixed results. Although most cities reported collecting an increasing number of transportation performance measures across a variety of issues, these cities rarely identified measurable objectives against which those performance measures could be compared. This suggests that most city-level agencies, including those with responsibility for construction projects and/or multiple transport modes, are still in the immature phases of performance measure implementation. The report also found cities to be especially weak in “social equity” measures, reflecting a challenge still experienced by many jurisdictions in the United States.

The Internal Performance Improvement of Road Administrations (PIARC Technical Committee on Performance of Road Administrations, 2003) uses case studies across the world to identify best practices aimed at improving management of road administrations in four specific areas:

1. **Governance and Management Structures** - Improving efficiency and effectiveness of management structures, and instituting greater accountability;
2. **Management Systems** - Building stronger management information systems;
3. **Human Resource Management** - Improving training and employee retention to reduce human resource costs and achieve greater value out of each employee; and
4. **Financing Arrangements** - Improving funding allocation processes.

Case study-derived best practices are summarized under six topic areas, including “Management systems that support the organization’s outputs and performance measures or key performance indicators (KPI).” The report states that strong management information systems, covering anything from finances to quality assurance, are not only among the most important components of improved agency management but also are among the most robust case studies “to leverage development by transfer of experience.” The discussion of management systems touches on 11 different specific system types. One category, “performance management system[s],” arguably can encompass at least the data management and presentation aspects of all of the others.

A particularly strong example of a performance management system cited in the report is the National Performance Indicators (NPI) system maintained by Austroads, a multijurisdictional association of road administrations in Australia and New Zealand. The Austroads NPI system includes dozens of indicators in 11 broad groupings, covering safety, asset management, environmental impacts, system capacity, user satisfaction, and project management, among other things (NPI, 2008). The NPI data is noteworthy not only for the breadth and sophistication

of the indicators used, but also because it presents consistent and comparable data across a transportation system managed by nine separate agencies in two countries, allowing unprecedented benchmarking possibilities. These measures are used by individual state road authorities, such as VicRoads, for setting targets and monitoring conditions, as well as supporting budgetary requests during the normal budgetary planning cycle. The measures are then used in turn by the state governments to assess government expenditure priorities and the performance of the road authority as a “road system manager.”

Sustainability is an area where European transportation agencies at all levels of government are distinct from their counterparts in the United States. Investing in a sustainable transportation system has been a stated priority within many European agencies for a number of years, and the lessons learned there may provide useful guidance to U.S. transportation agencies as the concept gains wider recognition in this country. The Sustainable Mobility, Policy Measures, and Assessment (SUMMA) project, funded by the European Commission and completed in 2005, was created to “support policy-makers by providing them with a consistent framework for making tradeoffs, where appropriate, among the economic, environmental, and social components of sustainability.” The project is designed to better operationalize the implementation of the European Union’s sustainable transportation goals and provide guidance on measuring results. Using the EU’s adopted definition of sustainability, the *SUMMA Final Publishable Report* (SUMMA Consortium, 2005) presents a list of “outcomes of interest” related to sustainability that fall within three categories: 1) economic; 2) environmental; and 3) social. For each outcome, the report identifies appropriate performance measures. Finally, the Fast, Simple Model (FSM) is presented as a tool to predict both transportation demand and sustainability impacts. The report notes that many desired indicators, especially in the area of social outcomes, could not be measured, and had to be set aside for the time being.

Japan offers an example of a country with a maturing national performance management framework. In *Outcome-Oriented Performance Management of Road Administration in Japan* (Nishio et al., 2006), officials from that country’s Ministry of Land, Infrastructure and Transport (MLIT) describe the evolution of performance management within the agency’s Road Bureau. Following passage of the Government Agencies Policy Evaluation Law in 2002, the Road Bureau began producing annual performance plans and achievement reports with measurable outcome targets. The Bureau also transitioned from a budgeting process that allocates funds based on different project types (national highways, prefecture highways, etc.) to one in which allocations are outcome-oriented (congestion relief, regional connectivity, etc.). Though funding distributions among Japan’s 47 prefectures were not affected by this change, the Road Bureau also worked with the prefectures to develop regional performance plans and targets so that these regional governments also could better allocate resources. These efforts are complemented by a national road administration guidebook aimed at standardizing the use of performance data in project selection. The Road Bureau also conducts an annual *Survey of Road Users’ Satisfaction*. The authors found that

these efforts, combined with a movement toward increased use of performance-based employee reviews, have led to an agencywide culture of performance and greater accountability to the public.

2.3 INSIGHTS FROM OTHER SECTORS

Although performance measurement has received significant attention at many transportation agencies, making a link to decision-making has been among the most significant challenges facing agencies. This section examines lessons about performance management from other sectors that may be applicable to transportation agencies.

Management Literature

Peter F. Drucker is recognized as a leading scholar in the area of business management. *The Practice of Management* (Drucker, 1954), provides foundational insights into many dimensions of managerial practice. Drucker provides four criteria for classifying decisions to determine where in the organizational structure they should be made:

1. Whether it is a short- or long-term decision;
2. Whether it affects only a limited part of the organization or the organization as a whole;
3. Whether it involves the determination of organizational values and principles; and
4. Whether it is a recurring decision or a unique, one-time decision.

Drucker suggests that the use of performance measures is most appropriate in the “steering” of the organization toward its objectives, and labels this approach “Managing by Objectives.” He identifies eight categories of performance that managers should strive to measure using the best yardstick they can find, including market standing, innovation, productivity, physical and financial resources, profitability, manager performance and development, worker performance and attitude, and public responsibility.

Although indicators could be prepared in each area, Drucker emphasizes that the interpretation of the measures by managers is not a mechanical job. The judgment of the manager cannot be substituted with performance measures. Furthermore, there is always a risk that the objectives upon which the measures are based are faulty. All that can be done is to base judgments upon a solid foundation of reliable measurements.

In addition to discussing the relationship of organizational objectives and decision-making, Drucker analyzes the process of decision-making itself. He argues that effective decision-making takes place in stages:

- The manager defines the problem by observing its symptoms, which he points out are often mistaken for the problem itself.
- The manager analyzes the problem, using the input of his subordinates, and generates a set of possible solutions.
- The manager decides on one solution using the following criteria: the weight of the risk associated with each alternative as compared to the expected gains; the efficiency of the solution (e.g., which will give the greatest gains with the least effort?); the need for urgency or deliberation in making the decision; and the limitation of resources (namely, are the human resources available to successfully implement the solution?).
- When the final decision has been selected, the manager should not have to “sell” it. Instead, the workers should see the solution as their own, and should have been given an opportunity to help develop alternative courses of action.

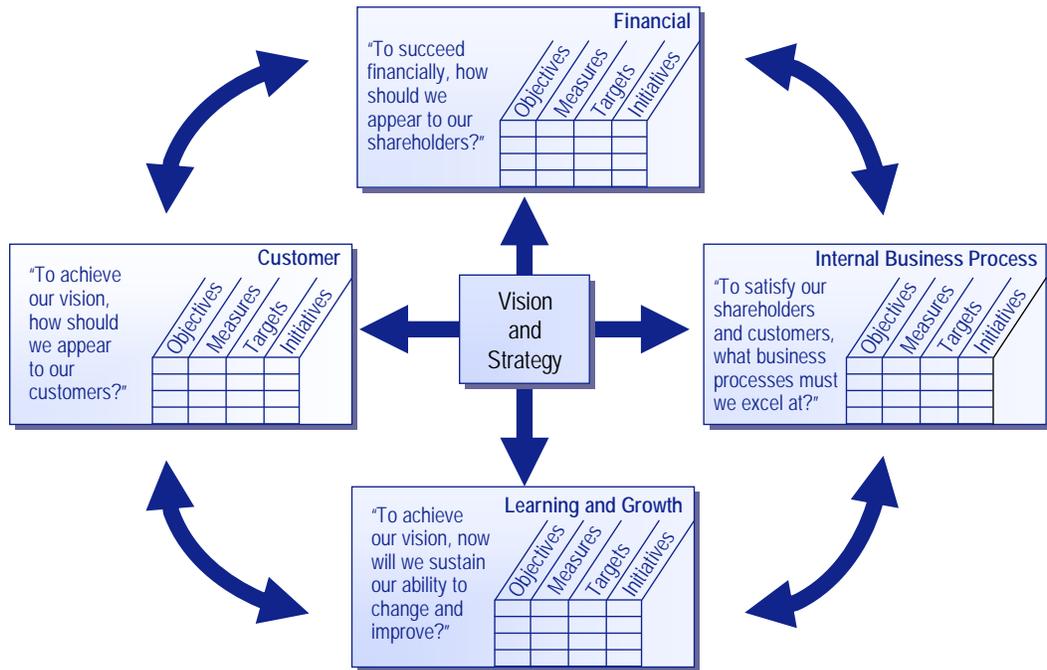
Robert Kaplan and David Norton have written a series of books designed to guide managers through the development and use of performance measures, including *The Balanced Scorecard* (Kaplan and Norton, 1996) and *Strategy Maps* (Kaplan and Norton, 2004). The Balanced Scorecard approach (Figure 2.2) is based on the assumption that managers need up-to-date information on many aspects of the business in order to successfully monitor progress toward future outcomes in four areas:

1. **Financial** (e.g., operating income, return on capital);
2. **Customer** (e.g., customer satisfaction, retention, new customer acquisition);
3. **Internal Business Process**; and
4. **Innovation and Learning** (e.g., employee satisfaction, training, skills).

The Balanced Scorecard is a response to the emphasis on financial metrics typical of business managers. In addition to financial data, it captures value creation activities that drive future business success. The scorecard also balances between objective, easily quantified measures and more subjective, qualitative measures. This ensures that managers take into account considerations (e.g., employee satisfaction) that may be qualitative, yet are crucial for the organization’s success.

The balanced scorecard approach was designed for business managers to help them think beyond a narrow focus on short term financial results. The approach has been tailored to public agencies, which often need increased focus on financial issues, along with an overall process to balance decision making across multiple constraints.

Figure 2.2 The Balanced Scorecard Approach



Source: Kaplan, R. S., and D. P. Norton, *The Balanced Scorecard*, Harvard Business School Press, Boston, Massachusetts, 1996.

A strategy map is an attempt to represent the causal relationships between the elements of the Balanced Scorecard. For example, an increase in customer satisfaction can drive an increase in annual operating income. Improvements in employee skills can improve customer satisfaction.

Although the work of Drucker, Kaplan, and Norton is intended primarily for private businesses, it provides several important insights useful in framing the questions of this report:

- It is important to map out how the activities of the component parts of an organization relate to one another and to the organizations' strategic goals. This ensures that all of the organization's activities are encompassed within its strategy.
- Decisions are made at different levels of an organization and over different time horizons.
- Decision-making is a process of weighing alternatives and balancing constraints. Performance measures contribute to the analysis of alternative courses of action. However, performance measures cannot substitute for manager judgment.

- Decision-making can be both reactive, where managers respond to and correct problems; and proactive, where managers set strategy regarding future courses of action.
- Managers should use multiple performance measures to guide their actions, and the group of performance measures they use should include qualitative measures. If too few measures are used, or if qualitative measures are not included, managers will be pushed toward decisions that might hurt the organization, such as profit maximization at the expense of employee satisfaction or short-term gains at the expense of long-term value creation.

Local Government

Cities and counties encounter many of the same challenges faced by DOTs. They must manage public infrastructure, provide public services, and are often held accountable for problems not entirely under their control. Thus, the experiences of cities and counties in integrating performance measures with decision-making may be applicable to DOTs.

One of the earliest efforts to use performance measures at the city level was the CompStat program, developed by the New York City police department. The program allowed police to pinpoint and manage crime hotspots throughout the City. Building on the concept of the CompStat program, the city of Baltimore under Mayor Martin O'Malley developed the CitiStat program. The program involves biweekly meetings with a core group of decision-makers who use data and statistics to identify problems and develop solutions. Managers present at the meetings must be prepared to discuss, and sometimes defend, their departments' performance over the previous period (City of Baltimore, 2007). O'Malley was recently elected governor of Maryland and is developing StateStat, which will touch all agencies, including transportation.

The International City/County Management Association (ICMA) is a helpful source of information on performance measurement at cities and counties. It is composed of government executives and urban experts from around the world who strive to introduce management principles into local government operations. ICMA's Center for Performance Management provides a repository of performance data from over 100 participating cities and counties from around the world. Participants use the data to compare their performance with peer governments.

Performance Management: When Results Matter, (ICMA, 2004), details some of the uses and benefits of performance management in the local government context. Benefits include improved objectivity in resource allocation, the ability to track improvements in city services over time, and the ability to make better informed policy decisions. Performance management can help local governments unite diverse stakeholders around the shared goal of building a better community.

The ICMA report presents techniques cities and counties have used to get the most out of their performance management programs. Performance management

supports credibility by engaging the public in the choice of performance measures, and sharing performance information on public web sites. Local agencies compare performance information with peer governments, such as cities of similar size or geography, to help local governments set realistic performance goals and learn best practices.

The Nonprofit Sector

Nonprofit organizations are different from state transportation agencies in their size, structure, and financial profiles. However, nonprofits and transportation agencies share some unique challenges when developing successful performance management programs. Nonprofits and transportation agencies must both wrestle with lofty organizational goals. For transportation agencies, these include such abstractions as “improving quality of life” or “protecting the environment.” For nonprofits, they might include “ending hunger.” Nonprofits struggle to establish appropriate benchmarks for progress toward these abstract goals (how much poverty reduction is enough?) (Kaplan, 2001).

Because of the difficulty of measuring progress toward abstract goals, many nonprofits rely on output-based measures of success, such as number of individuals served, amount of land preserved, or number of dollars raised. Recently though, several nonprofits have made progress toward developing outcome-based performance measures that reflect progress toward their strategic mission (Plantz et al., 2007).

Nonprofits wishing to adopt outcome-based measures of success have three main options (Sawhill and Williamson, 2001). They can redefine their mission narrowly enough to measure directly (e.g., from “ending hunger” to just “distributing food to the poor”). This allows for easy measurement, but risks oversimplifying social problems. They can research the impact of their programs on fundamental outcomes (e.g., do children participating in an after school education program really do better in school?). Finally, they can develop micro-level, measurable goals that imply success on a grander scale. The Nature Conservancy, for example, uses the continued biodiversity of the areas it manages as a proxy for its broader mission of safeguarding global biodiversity.

Having limited control over fundamental outcomes does not necessarily impede development of performance management programs at nonprofits. Though the American Cancer Society does not enjoy total control over the incidence of cancer, reduction in cancer mortality rates remains a strategic goal that guides the organization toward programs that reduce cancer-related deaths.

Another common challenge is the need to include multiple constituents in the decision-making process. Often, the emphasis on inclusion and collaboration in nonprofits leads to strategy documents that include long wish lists of goals. Although potentially politically difficult, nonprofits need to streamline their strategic plans to focus on a core set of goals and initiatives (Kaplan, 2001).

3.0 Outreach Methodology

To gain an in-depth understanding of how transportation agencies use performance measures in decision-making, the research effort conducted outreach with transportation agencies and other agencies. The ultimate goal of this effort was to conduct detailed interviews with a small number of organizations with advanced practices in linking performance measures to decision-making.

This section describes the several phases of the overall outreach effort, including a broad-based look at performance management practices using available documentation and selection of case studies for interview. It also identified the general process for conducting the case studies.

3.1 CASE STUDY SELECTION PROCESS

The case study selection process began with the development of a matrix of established and emerging practices (Appendix B). The matrix consisted of a detailed, annotated list of performance management practices at a large number of state DOTs and several nontransportation organizations for which information was readily available (e.g., in reports and on web sites or from team member experiences). Information was included from more than 30 organizations, including state departments of transportation, cities and counties, transit agencies, and nonprofits.

Development of the established and emerging practices matrix allowed identification of a smaller group of candidate organizations for case study follow-up. Final candidates were selected following the guidance of the project panel and according to the following principles:

- Focus on states with an emphasis on accountability-driven performance management. Because there has been a great deal of case study work in the area of performance tracking, efforts were made to select states that have reached the level of accountability-driven performance management.
- Highlight unique practices and applications of performance management. Because one of the aims of the research effort is to present the state of the art in performance management, the selection process took into account potentially innovative uses of performance measures.
- Bring in new experiences. States that have not been highlighted by previous research efforts were considered because they provide unique perspectives on performance management.
- Include non-DOT organizations. Several non-DOT organizations were included as potential candidates for case study in order to provide an outside

perspective on how agencies can use performance management to improve their practices.

After reviewing these criteria for each state and discussing candidates with the project panel, six agencies were selected for in-depth case study. Table 3.1 identifies these agencies and how they measure against the criteria above.

Table 3.1 In-Depth Case Studies

	Accountability Focus	Advanced Practices	New Experiences	Non-DOT
Florida DOT	Yes	Aligning goals and measures throughout organization	Frequently cited	No
Missouri DOT	Yes	Pay for performance	Infrequently cited	No
Ohio DOT	Yes	Linking organizational measures to personnel reviews; asset management	Infrequently cited	No
PACE Suburban Bus	Yes	Performance-based route selection	Not cited	Yes
Virginia DOT	Yes	Dashboard; project tracking; managing internal operations	Frequently cited	No
Washington DOT	Yes	Reporting; project tracking; maintenance; congestion evaluation	Frequently cited	No

Note: Evaluation criteria are best estimates, based on the review of the literature and information available prior to conducting the case studies.

In addition to the organizations listed above, several other organizations have been identified as shorter “sidebar” case studies. The sidebar case studies will generally highlight a single unique practice using readily available information and team member experience. These cases are intended to add depth and variety to the research findings. Sidebar cases include:

- **American Cancer Society** - Independent performance tracking team;
- **Arizona DOT** - Maintenance management and budgeting;
- **Baltimore CitiStat Program** - Detailed review of day-to-day city operations;
- **Kansas DOT** - Annual employee survey to improve managerial capabilities;
- **King County, Washington** - Balancing societal goals against agency responsibilities;
- **Prince Williams County and/or Fairfax County, Virginia** - Linking performance measures to budgeting;
- **San Diego Metropolitan Transit System** - Market research approach to service planning; and
- **Oregon DOT Highway Division** - Quarterly Business Review process.

3.2 IN-DEPTH CASE STUDY APPROACH

Each case study consisted of background research, interviews, and write-up. Background research was conducted before the interviews and built upon information collected for the established and emerging practices matrix (Appendix B). The background information was used to develop an interview guide tailored to each state designed to avoid asking questions for which answers already were available in published documents.

Review of existing material also assisted in the selection of a limited number of focus areas for each organization. For example, for the State of Washington, only the areas of maintenance, project delivery, and congestion management were included in the review. This focus on specific agency activities was done to avoid overly broad case studies attempting to capture every aspect of performance management within an organization.

Interviews were conducted by telephone or in person with selected agency managers and lasted approximately one to two hours. Several individuals were contacted for each state to ensure multiple perspectives were considered. Questions focused the following topics:

- Types of decisions made by the agency;
- Types of measures crucial for decision-making;
- Links between measures and decisions;
- Challenges and barriers in using measures in decision-making; and
- Successful uses of measures in decision-making.

Case study write-ups combined information gathered from the background research and the interviews. Interviewees were given an opportunity to review and comment on the write-ups, which are provided below.

4.0 Case Studies

This section summarizes the case studies that were conducted for NCHRP 8-62. These case studies will be used to help shape the guidebook and will provide examples of how best to link performance measures to decision-making. These case studies are based on a set of interviews with one or more staff members at each organization. In some cases, the research team is continuing to gather information.

4.1 MISSOURI DOT

Background

The Missouri Department of Transportation (MoDOT) has 6,995 employees (FY 2008) and an annual capital and operating budget of approximately \$2 billion. The department oversees approximately 32,000 miles of the busiest roads in Missouri or about 26 percent of all roads across the State. MoDOT also has responsibility for statewide planning of waterways, transit, aviation, and railroads. The Missouri State Government Review Commission has recommended that MoDOT's "Tracker" be adopted by all state agencies as a model performance measurement system.

MoDOT operates under a decentralized organizational structure with its headquarters office providing staff assistance and functional control for the various departmental tasks in 10 geographical districts. Each district contains about 10 percent of the total road mileage in the state highway system and is under the direction of a district engineer, who is in turn responsible for administering all department activities in the region.

Performance Management History

Like many DOTs, MoDOT has explored use of performance measures over many years. Prior to 2004, the department had experimented with a system of performance "dashboards," but staff indicate that the agency's leaders were not focused on performance management and the dashboards received only limited attention from staff and managers.

Starting in late 2004, with a change in department leadership, MoDOT began a bold and reenergized commitment to a comprehensive program of performance management. From an external perspective, the Tracker is a focal point for the department's new performance measurement system. Staff describes the Tracker as "the tip of the iceberg" in terms of the powerful influence that performance management now has across the agency. It is credited with improving delivery of transportation programs and services to the public of Missouri in the last several

years. Areas where MoDOT is perceived to have achieved the greatest success in using a performance management approach include, but are not limited to:

- Improving pavement condition;
- Reducing highway fatalities; and
- Controlling project budgets.

Additional benefits ascribed to these and other successes include stronger credibility with the public and other stakeholders and more efficient use of public funds.

MoDOT's performance management system is built around a set of 18 measurable and relevant "Tangible Results" that use simple language to describe agencywide strategic goals in terms of desired outcomes. The 18 Tangible Results are as follows:

1. Uninterrupted traffic flow;
2. Smooth and unrestricted roads and bridges;
3. Safe transportation system;
4. Roadway visibility;
5. Personal, fast, courteous, and understandable response to customer requests;
6. Partner with others to deliver transportation services;
7. Leverage transportation to advance economic development;
8. Innovative transportation solutions;
9. Fast projects that are of great value;
10. Environmentally responsible;
11. Efficient movement of goods;
12. Easily accessible modal choices;
13. Customer involvement in transportation decision-making;
14. Convenient, clean and safe roadside accommodations;
15. Best value for every dollar spent;
16. Attractive roadsides;
17. Advocate for transportation issues; and
18. Accurate, timely, understandable, and proactive transportation information.

The 18 Tangible Results are accompanied by a total of 108 measures that are listed in the October 2007 Tracker.¹ Senior MoDOT staff act as “Results Drivers” for each Tangible Result. Individual measures are steered by “Measure Drivers” who report to their respective results drivers.

Definition of Performance Management

MoDOT’s Mara Campbell describes performance management at the department as a way to “focus on results,” and other senior leaders interviewed for the case study agreed with this informal definition.

Linking Performance Measures to Decision-Making

The following sections describe MoDOT’s experience with implementing selected Tangible Results in areas where staff think the influence of performance management on decision-making is greatest, including:

- Safe transportation system;
- Fast projects that are of great value;
- Smooth and unrestricted roads and bridges; and
- Uninterrupted traffic flow.

Safe Transportation System – Changing Safety Engineering Solutions

MoDOT’s safety program has one simple focus – reduce fatalities. In place of the industry’s standard measure – fatalities per 100 million VMT – the department focuses primarily on the absolute number of people killed each year on Missouri highways. A tally is updated each day and prominently displayed in the offices of MoDOT’s leadership team and in the entry ways to the DOT’s main buildings. The shift in measurement focus is credited with generating new strategies for engineering safer roads. Other safety measures include:

- Number of impaired driver-related fatalities and disabling injuries;
- Percent of safety belt/passenger vehicle restraint use;
- Number of bicycle and pedestrian fatalities and disabling injuries;
- Number of motorcycle fatalities and disabling injuries;
- Number of commercial motor vehicle crashes resulting in fatalities;
- Number of commercial motor vehicle crashes resulting in injuries;

¹ A complete listing of Missouri DOT Tracker performance measures is available at http://www.modot.org/about/general_info/Tracker.htm.

- Number of fatalities and injuries in work zones; and
- Number of highway-rail crossing fatalities and collisions.

Don Hillis, MoDOT's Director of Operations is the results driver for the "safe transportation system" tangible result. When the department established the "Safe Transportation System" performance measures in 2004, Missouri experienced more than 1,200 fatalities per year on the state highway system. With this track record, the department and its customers shared great concern about reducing fatalities.

MoDOT is using safety performance measures to radically overhaul the types of engineering-focused highway safety strategies that are implemented across the State. To improve its safety performance, MoDOT is moving away from spending safety money on high-crash locations and is instead emphasizing investment in statewide solutions that eliminate causes of fatalities. The department is particularly proud of its statewide use of edge and centerline rumble strips and three strand median cable as innovative safety solutions. Median cable, for example, has now been installed on all interstate highways with medians of less than 60 feet. Adding median cable has *increased* the number of crashes as vehicles that run off the road get tangled in the cable, but it has significantly *reduced* fatalities, which are most common in head-on collisions.

MoDOT's safety performance measures have triggered a significant and sometimes painful cultural change among DOT safety personnel as they adjust to using new strategies and to the concept that they can influence outcomes in an area traditionally perceived to be largely outside a DOT's control.

MoDOT set a goal of lowering annual fatalities below 1,000 per year by 2008, but it already has met this goal a year ahead of schedule. Crossover fatalities dropped from 50 in 2005 to 26 in 2006.

Fast Projects that Are of Great Value – Adding Staff Accountability and Incentives

As it established the "Fast Projects That Are of Great Value" tangible result, Missouri faced tremendous growth in project needs and only limited transportation resources. Spending money wisely by delivering projects on time and on budget was identified as a critical priority for the department. But the department realized it needed new ways to manage projects to achieve this goal.

Dave Nichols, MoDOT's Director of Project Delivery, is the results driver for the "Fast Projects That Are of Great Value" tangible result. He and his colleagues are using project delivery performance measures to encourage changes to the way transportation projects are managed during the delivery process from initial planning through to final acceptance. The measures are encouraging greater staff accountability, but a "Performance Plus" program also is adding incentives for staff to improve their performance. This process has involved significant

cultural change among DOT project personnel as they adjust to greater accountability.

Measures used by MoDOT to track project delivery performance are as follows:

- Percent of estimated project cost as compared to final project cost;
- Average number of years it takes to go from the programmed commitment in the statewide;
- Transportation Improvement Program to construction completion;
- Percent of projects completed within programmed amount;
- Percent of projects completed on time;
- Percent of change for finalized contracts;
- Average construction cost per day by contract type;
- Unit cost of construction expenditures;
- Annual dollar amount saved by implementing value engineering; and
- Percent of customers who feel completed projects are the right transportation solutions.

MoDOT now sets a design, construction, and right-of-way budget for each project at about 30 percent design complete stage. The budget remains set for the life of the project and actual versus planned costs are tracked closely throughout the life of the project.

In contrast to some other areas of performance measurement at MoDOT, project delivery measures are tracked almost daily. A system called Statewide Project Information Management System (SIMS) is used to collect and track project data. Project managers report on costs and schedule each month and results are reported monthly to the Missouri Highway Commission.

While overall project delivery performance is reported in the Tracker, extensive amounts of data are collected on interim project milestones in each of the districts to ensure that progress is maintained throughout each projects lifespan. Every project has a manager who is responsible for coordinating delivery and keeping the project on schedule and on budget.² Smaller projects are discussed at the district level by the project manager and the district engineer. Large projects are reported on in a monthly statewide video conference.

² The project manager follows the project from planning to letting; after that point, oversight switches to the resident engineer, however, the project manager remains responsible for the project budget and schedule and stays in contact with the resident engineer.

Project delivery performance measures at MoDOT are showing great results. On average, MoDOT's projects were under budget by 2.7 percent in FY 2007.

Performance Plus – Encouraging Employee Responsibility

Another method that MoDOT uses to encourage performance in the project delivery area, among others, is the Performance Plus program. This program rewards MoDOT employees for going above and beyond the call of duty to increase productivity in the department's core business areas. The program began with a pilot project launched in April 2006 to reward construction project office employees for achieving a final construction cost of within 1 percent above the contract award amount (or less) on projects in MoDOT's Statewide Transportation Improvement Program. To date, it has yielded \$37 million in cost savings at a cost of \$500,000 in employee rewards.

The success of the pilot program paved the way for Performance Plus to become a permanent program at MoDOT. A key element of the Performance Plus program is that MoDOT employees are able to suggest ideas for improving productivity.

Smooth and Unrestricted Roads and Bridges – Refocusing Core Priorities

In public surveys conducted by MoDOT, Missourians have consistently indicated that the condition of the system should be the highest priority for the department. As it established the "Smooth Roads Initiative," Missouri faced a crisis of confidence among stakeholders and the public in its roads. Drastic action was needed to restore the trust of Missourians in MoDOT's ability to maintain its system. Kevin Keith, MoDOT's Chief Engineer, is the results driver for this tangible result.

MoDOT is using performance management in this focus area to re-emphasize the importance of preservation and to hold districts accountable for ensuring the actions they undertake yield the greatest benefit for major roads in Missouri. This has involved significant cultural change among DOT project personnel as they adjust to greater accountability and to development of new pavement strategies that sometimes conflict with traditional engineering practices. Pavement measures are not used to set overall budgets or allocate money between districts; allocations are set by legislatively mandated formulas and districts must work with the money they are given.

Measures used are as follows:

- Percent of major highways that are in good condition;
- Percent of minor highways that are in good condition;
- Percent of vehicle miles traveled on major highways in good condition;
- Percent of deficient bridges on major highways;

- Percent of deficient bridges on minor highways; and
- Number of deficient bridges on the state system (major and minor highways).

MoDOT has focused on improving the condition of major roads. Major roads are only about 5,000 miles of the system, but they account for 80 percent of travel. As a result, the condition of minor roads is actually declining slightly. In addition, the department has switched from spending 70 percent of its budget on capacity to 70 percent of its budget on preservation.

The Smooth Roads Initiative started with a plan for each district that mapped out what could be achieved with available funds. Districts have discretion to choose which projects they implement, but they must meet with the Chief Engineer at MoDOT twice a year to discuss their performance results. Progress is being made by picking the right roads to focus on and the right solutions to implement.

Pavement performance measures are showing great results. Over the last three years, major roads in Missouri have gone from 60 percent in good condition to 78 percent in good condition, with a target of 85 percent by 2011.

Uninterrupted Traffic Flow – Promoting Innovation

Getting funds to support operations needs is always challenging. Funding signal re-timing projects or incident patrols is not as popular as launching a big new project. MoDOT's public opinion surveys show, however, that Missouri drivers expect to get to their destinations on time and without delays; "uninterrupted traffic flow" is the Tangible Result that defines this outcome. It has helped MoDOT staff prioritize this issue.

The measures MoDOT uses to help gauge progress in achieving the Tangible Result include:

- Average travel indices and speeds on selected roadway sections;
- Average rate of travel on selected signalized routes;
- Average time to clear incident, and average time to clear traffic backup from incident;
- Number of customers assisted by the Motorist Assist program;
- Percent of Motorist Assist customers who are satisfied with the service;
- Percent of work zones meeting expectations for traffic flow; and
- Time to meet winter storm event performance objectives on major and minor highways.

Performance Measures Encourage Innovation. The uninterrupted traffic flow result is helping to put a spotlight on traffic management issues statewide in Missouri. MoDOT works to ensure that motorists travel as efficiently as possible on the state system by better managing work zones, snow removal and highway incidents, and by using the latest technology to inform motorists of possible

delays and available options. Performance measures are dramatically changing how MoDOT conducts all of these activities, for example:

- **Variable Speed Limits** - MoDOT will launch a variable speed limit program on the I-270 corridor in the St. Louis area in May 2008; and
- **Cell Phone Data Collection** - MoDOT is using cell phone data probes to collect more sophisticated travel information.

Challenges and Successes

Performance measures at MoDOT are constantly evolving, but MoDOT's leaders consider their agency to be among a growing number of state DOTs that are rapidly advancing use of performance-based management of transportation systems. Performance measurement and management is a top priority for Pete Rahn, the department's Director and current President of AASHTO.

Successes include a 28 percent jump between 2004 and 2007 in the share of pavement on major roads that is rated in good condition; exceeding targets for reductions in fatalities; and bringing in projects at an average of 2.7 percent below budget in FY 2007. Contributing factors for these successes include:

- **MoDOT's Tracker Emphasizes Results Not Measures** - Each Tangible Result is carefully worded to describe a result or outcome. The phrase "focus on results" is often used by MoDOT's leaders to describe their performance management program. They explain that the measures are only important if they can be shown to influence results. In implementing the department's performance management program, MoDOT's leadership team uses measures to show managers and their staff which results are most important to the State of Missouri's transportation system. By choosing to include a measure in the Tracker, agency leadership is sending a message to staff that it is important. An important characteristic of the Tangible Results is that Results Drivers will add, change, or delete individual measures as needed to ensure a focus on results.
- **MoDOT's Performance Management Program Is Based on Customer Expectations** - MoDOT's performance management philosophy is driven by customers' expectations. The department pays close attention to the results of surveys, focus groups, and Road Rallies to better understand what customers want and it uses this information to shape strategic direction. Customer expectations are infused in the Tangible Results described in the Tracker.
- **MoDOT's Measures Provide Clarity of Focus and Vision** - Like the Tangible Results on which they are based, MoDOT's measures are designed to be as clear and direct as possible. The primary measure for safety, for example, is now the absolute number of deaths on the road each year NOT the more abstract rate of fatalities per 100 million VMT, which can fall even as fatalities are rising. Total crash numbers or rates also are secondary.

- **MoDOT Has a Strong Link Between Performance Management and Strategic Planning** - MoDOT's strategic plan was developed at a "strategic advance" session convened by incoming Director Pete Rahn in November 2004 to engage MoDOT's executive staff and their FHWA partners in creating a mission statement for the department and 18 "Tangible Results" on which success of the DOT's mission depends.³ The strategic plan determines the agency's general direction, the products provided to customers, and the focus needed among agency personnel.
- **MoDOT Works Hard to Select the Right Measures** - Each of the Tangible Results is backed by several performance measures that are designed to show results. Measures are used by MoDOT staff on a day-to-day basis to help guide decisions about how to achieve desired results. If a measure is found not to address a Tangible Result, it may be dropped or replaced.
- **MoDOT's Staff Is Accountable for Tangible Results Outcomes** - Responsibility for each of the Tangible Results is assigned to a senior MoDOT manager who becomes the "Results Driver." Responsibility for individual measures is assigned to a "Measure Driver" who is responsible for overseeing data collection, analysis, and reporting. This approach allows departmental goals to be linked to division and work unit actions. All measures are reported at a quarterly Tracker meeting led by MoDOT's director. The Tracker meetings are used to identify and address issues. Staff, however, do not wait to discuss measures at the Tracker meeting. Senior managers review data, discuss results, and develop strategies on a continual basis to address their Tangible Results.
- **Measures are Altering MoDOT's Impact on Transportation in Missouri** - In Missouri, the number of vehicle crashes is not changing significantly, but fatalities are down. Likewise, major roads are smoother, but minor roads are less smooth. These results are deliberate and they reflect the priorities set by the Tangible Results. These are results that MoDOT's leaders expect as they seek to spend resources on major roads that have 80 percent of VMT and install median guard cable that stops head-on collisions but causes property damage when vehicles tangle with them.
- **MoDOT's Tracker Report Provides External Visibility** - The quarterly Tracker report provides a focal point for the department's performance management program.⁴ Distribution of the Tracker is widespread due to its publication on MoDOT's web site, but it is most frequently read by members of Missouri's legislative body, Missouri's Governor's Office, AASHTO, FHWA,

³ MoDOT's mission is to provide a world-class transportation experience that delights our customers and promotes a prosperous Missouri.

⁴ A copy of the latest Tracker (October 2007) can be found at: http://www.modot.org/about/documents/Tracker_PDF_Oct07/Oct2007Full.pdf.

other state DOT staff, and news media. It has been a powerful tool in enhancing the agency's credibility with these audiences. It is, however, a high-level document that provides an overview only. Performance measures at MoDOT are a day-to-day part of business across all major functional areas. The agencywide Tracker is supplemented by district- and division-level "sub-Trackers" that provide additional drill down detail. This not only provides a direct link between business units and the overall department goals, but keeps communication lines open within units so all are aware of the direction and actions needed to enhance performance.

- **MoDOT Has Created a Performance Culture** - Performance management is changing the way MoDOT works. Forty-five of Missouri's most senior staff has a signed value statement in their office that attests to their willingness to take risks. Staff thinks about how to better achieve results by incorporating best practices and innovations that help achieve desired results. The Tracker meetings help educate staff about how performance management works across the department.

Challenges remain for MoDOT:

- Performance management works better in some areas than others. While MoDOT has been able to achieve significant progress in controlling project budgets, keeping projects on schedule is proving more difficult to control.
- DOT Culture has to Change - Because performance management is having deep-seated impacts on MoDOT, it also is changing employee behaviors. Over the last three years, 10 of MoDOT's 40 senior manager positions have turned over. In part, this may be because of unwillingness among some staff to make the behavioral changes needed to thrive in a performance management-based culture.
- Performance Management Means Long-Term Tradeoffs - MoDOT's performance management program means taking significant risks. Property damage crashes, for example, are likely to rise as a result of the measures in place, while conditions on minor roads are likely to worsen. Short-term solutions for fixing major roads may have long-term life-cycle costs.
- MoDOT is not using performance management to directly allocate resources. This is an often-cited role for performance measures, but it is not one that MoDOT practices. Safety measures, for example, are not used by MoDOT to set overall budgets or allocate money between districts. Funding at MoDOT is set by legislatively mandated formulas and a popular vote is required to increase transportation funds. Districts must make do with what they get, and are given great discretion over how to spend money so long as they make progress toward desired results.

Case Study Interviews

The following persons were interviewed for this case study:

- Mara Campbell, Director of Organizational Results, MoDOT;
- Don Hillis, Director of System Management, MoDOT;
- Kevin Keith, Chief Engineer, MoDOT; and
- Dave Nichols, Director of Program Delivery.

4.2 OHIO DOT

Background

The Ohio Department of Transportation (ODOT) operates the seventh largest highway system in the United States with approximately 49,000 lane-miles. These highways support the fifth greatest traffic volume. ODOT has the second largest inventory of bridges in the nation, as well, with over 15,000 bridges. ODOT had over 6,000 employees in FY 2006 and an annual capital and operating budget of close to \$3 billion.

ODOT operates under a decentralized organizational structure with headquarters providing staff assistance and functional control for the various departmental tasks in 12 geographical districts. Each district is managed by a deputy director, who has responsibility for administering all department activities in the region.

Performance Management History

Performance management at ODOT began in the mid-1990s when ODOT started three efforts that each contributed to bringing a performance-based framework to major agency decision-making.

1. An agencywide reengineering process, based on Total Quality Management (TQM);
2. A strategic planning process to help ODOT better select projects that met the fundamental mission of the organization; and
3. A shift to a decentralized department structure.

Some of the key supporting efforts to help manage the change that began in the mid-1990s included mandatory training for all staff in the organization (not just managers) and starting to identify indicators to track progress toward TQM.

The move to TQM began through a partnership with Xerox. Xerox won a Malcolm Baldrige Award in the 1990s, which required them to share their success with others. Xerox helped ODOT develop its TQM effort and lent an executive to see it through. Xerox recommended that ODOT apply for a Baldrige award in the 1990s, but the organization was not ready at that time.

In 1999, the Ohio Partnership for Excellence (OPE) was established, using the same basic criteria as the Baldrige award. By the early 2000s, every ODOT district office and headquarters had applied to the first tier of the OPE, which requires a 50-page self-assessment and evaluation by a set of examiners. More recently, several ODOT staff have served as examiners for the OPE.

During the shift to a decentralized structure, ODOT management held meetings with each unit to better understand their responsibilities and how they could be measured. This formed the basis of the performance measures used to evaluate the organization and employees. Over the last several years, ODOT has identified a matrix of 65 performance measures and targets that make up the organizational performance index (OPI). The OPI addresses all ODOT functions and its measures are reported in a biennial business plan. ODOT currently is evaluating which OPI measures to continue tracking and what new measures may need tracking during the FY 2008-2009 biennium.

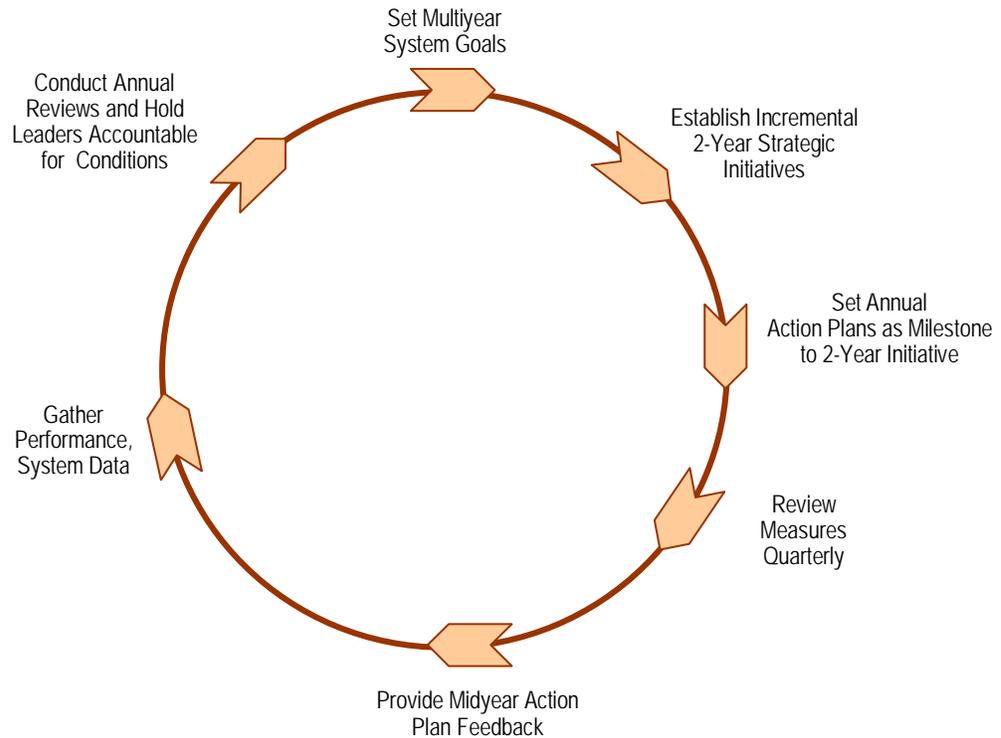
Over the last decade, ODOT has refined its management approach to focus on using performance measures to make decisions about the system preservation of bridges and pavements, routine highway maintenance operations, major investment programs, such as safety and new capacity projects. ODOT's efforts in asset management have been described elsewhere (U.S. Domestic Scan on Best Practices in Transportation Asset Management, scan report developed through NCHRP 20-68, July 2007), but the key overlaps are addressed here as well.

Figure 4.1 presents ODOT's overall vision of performance management.

Definition of Performance Management

For the Ohio DOT, performance management is the process of stating objectives in a strategic plan, evaluating progress toward those objectives, and making future decisions in light of the progress made. Performance measures and process improvements are part of an overall package to evaluate and improve the organization, not just to measure progress.

Figure 4.1 Ohio DOT Vision of Performance Management



Source: Ohio Department of Transportation.

Linking Performance Measures to Decision-Making

ODOT has developed several practices to help link performance measures to decision-making.

Resource Allocation

Many of ODOT's efforts in performance management have been geared toward improving the allocation of resources to specific functions. One key example is in managing pavement and bridge conditions. The challenge for ODOT was to develop measures that met the needs of both management and engineers. Decision-makers desire a macro-level number that can inform funding decisions. Pavement and bridge engineers preferred more detailed data. ODOT worked with representatives from both groups to develop two forms of high-level indicators - overall condition and the rate of change. The overall condition reflects the past and present state of these assets; degradation rates when no actions are performed reflect the condition changes over time and help predict the expected conditions based upon given funding levels. ODOT strives for the steady-state, the goal of being able to sustain performance goals in these assets with available funding. These indicators are useful for determining when the agency needs to act and are easy to communicate across the organization and with stakeholders and elected officials.

ODOT's basic process is as follows:

- Collect pavement and bridge condition data by district and examine current expenditures;
- Predict future pavement condition based on current expenditures and models detailing expected change in conditions;
- Determine the total funding needed to meet system preservation goals; and
- Allocate funding between districts and between the pavement and bridge programs to best meet the preservation needs of the system. Districts and pavement that fall below performance targets receive a larger share of funding to address these deficiencies.

Using this process, ODOT has seen a significant improvement in pavement and bridge quality over the last several years. Figure 4.2 presents the 10-year improvement in pavement and bridge quality as a result of these efforts.

Project Selection

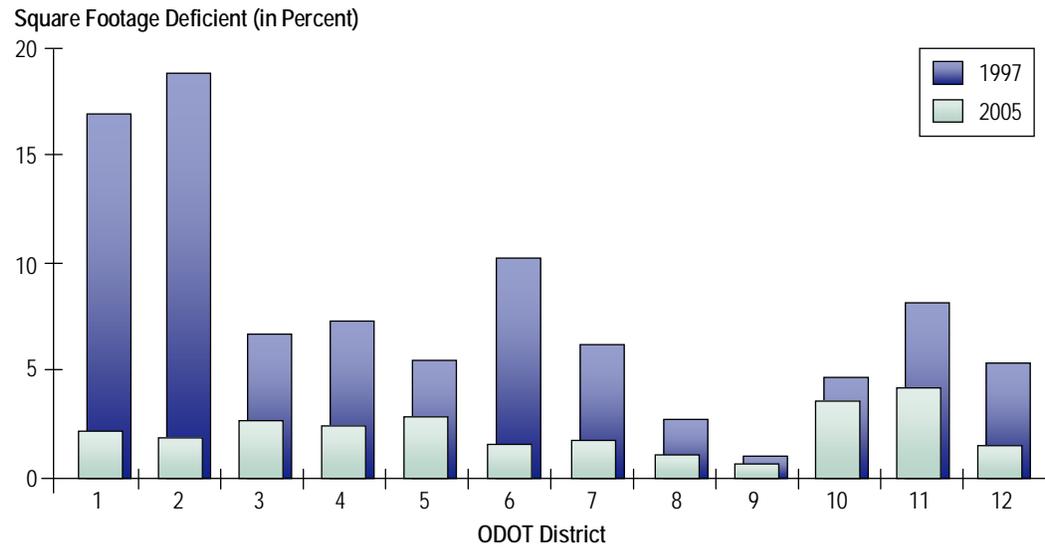
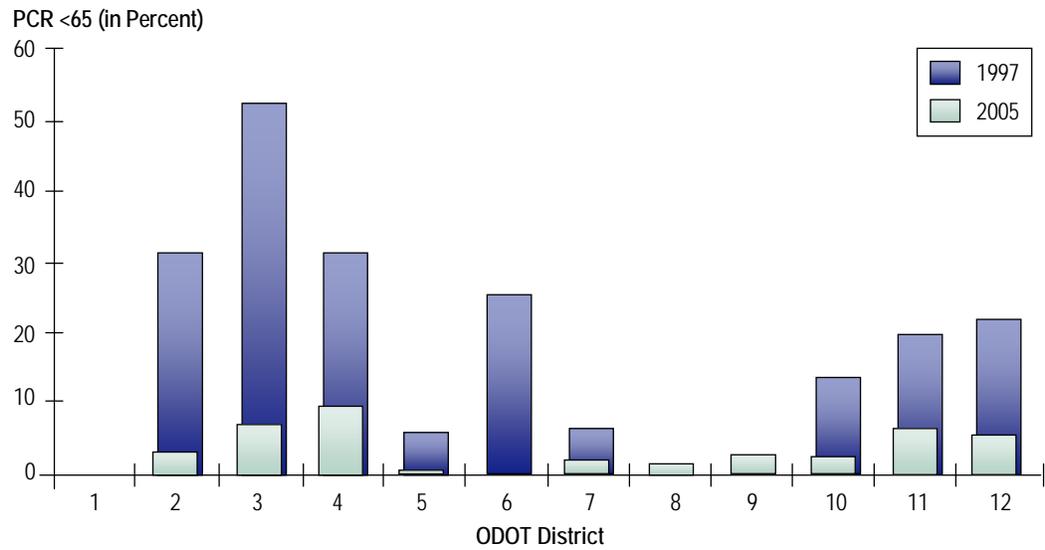
Another initiative of ODOT's has been an attempt to use a more rigorous process of prioritizing major capital projects based on their expected benefits in terms of system performance. The Transportation Review Advisory Council (TRAC) was established in 1997 to review all projects over \$2 million that "increase mobility, provide connectivity, increase the accessibility of a region for development, increase the capacity of a transportation facility, or reduce congestion."⁵ The process was set up to address the imbalance between the amount of funding available (not much) and the project needs identified (a lot). Currently, projects must be at least \$5 million and "reduce congestion, increase mobility, provide connectivity, increase a region's accessibility for economic development."

The TRAC is a committee consisting of the ODOT director, six members appointed by the governor, one appointed by the president of the Ohio Senate, and one appointed by the speaker of the Ohio House. The TRAC is tasked with providing a fair, data-driven approach to selecting transportation projects.

Projects reviewed by TRAC are nominated by the department of transportation, metropolitan planning organizations, county engineers, transit authorities, county commissions, municipalities, and port authorities. The TRAC uses a scoring procedure that weighs factors such as traffic volume, congestion, crash rate, roadway classification, location within a major corridor, local participation, economic development potential, and others. The methodology includes specific methods to address nonhighway projects, operations and intelligent transportation system (ITS) investments, and bypasses.

⁵ <http://www.dot.state.oh.us/trac/>.

**Figure 4.2 Effect of Performance-Based Asset Management Strategy
1997-2005**



Source: Ohio Department of Transportation.

Projects are scored on the above evaluation by ODOT staff and placed into three tiers based on those scores:

- **Tier I** – Projects recommended for construction in the upcoming six-year construction program;
- **Tier II** – Projects recommended for further development (i.e., environmental, design, or right-of-way) and projects that are ready to construct and should be considered, if more funding becomes available; and
- **Tier III** – Projects that are not recommended for further development due to cost, low scores, or a lack of funding.

The TRAC committee reviews the list of projects, can challenge individual scores, and vote on a final set of projects to recommend for construction in the upcoming six-year construction program. Committee members are permitted to use considerations beyond the scored attributes of the project, such as:

- Project timing relative to other governmental or private sector activities;
- Project attributes that cannot be captured by the scoring system;
- Emergencies, such as natural disasters or catastrophic infrastructure failures;
- Very low- and very high-cost projects; and
- Previously unanticipated delays to project readiness.

Performance Appraisals

One change that helped ODOT further tighten the link between performance measures and decisions was a modified staff appraisal process that considers the performance of the transportation system. For upper-level managers (the district and division heads), personal performance was gauged in part based directly on system performance. For example, pavement and bridge performance in a district was used to evaluate the deputy directors' performance in that district. All senior managers are required to have system-level performance measures to evaluate their contribution to system performance.

Other staff in the districts or central office has less direct influence on system performance, but many of these employees have measures that describe their contribution toward system performance. Most staff have measures pulled directly out of the OPI and others have measures that reflect their contributions to the OPI or other agency goals and objectives. Because pavement preservation has been a key focus of the organization over the last 10 years, many of the employee reviews included pavement conditions. Individual measures are selected for staff collaboratively. Staff have the opportunity to define their own measures, but must have management buy-in.

The ODOT performance appraisal program has been designed to create incentives for teamwork. Measures for individuals are connected to broad organizational outcomes, providing staff with an incentive to help others in the agency to

improve overall performance. For example, the manager of the Planning Division provides funding and training to the districts to help ensure that they are meeting their targets. One of this manager's performance metrics can be related to pavement quality, which the training indirectly helps to improve.

Business Planning and Strategic Initiatives

Another initiative that ODOT has undertaken to improve the link between performance measures and decision-making is the development of a *Biennial Business Plan*. In 1996, ODOT started producing a state-of-the-system report. This report provided information about system conditions using a series of performance measures.

Over time, the process of developing a business plan has evolved and is now required by law to be conducted for each biennium. The legislation has left the requirements vague and the structure open. Because ODOT already had been conducting the state-of-the-performance report, this became the basic structure for the business plan, which includes:

- Information on the agency's mission and values;
- Challenges that the agency faces in the current biennium;
- Strategic initiatives that the department intends to address in the current biennium;
- Agency goals for a longer term, usually seven years; and
- Performance metrics to gauge progress toward those goals.

One aspect of the business planning process at ODOT has been the attempt to build in frankness to these assessments. Many DOTs create visions, goals, objectives, and strategies, but ODOT makes an attempt to make the goals and strategies manageable and achievable.

A second important effort by ODOT has been the development of a targeted set of strategic initiatives that can be achieved. In previous business plans, managers developed strategies for their individual business units without consideration of the department. More recently, ODOT has adopted a more focused approach to develop a consensus around a small number of strategic initiatives. The 2008-2009 biennium has includes the following seven initiatives:

1. Restore fiscal responsibility by adjusting ODOT's finances to address continued construction cost inflation, flat state revenues, and past program decisions; and adopt improved procedures in the Major New Construction program to match realistic trends in revenue and construction costs;
2. Promote a comprehensive state and Federal finance agenda, emphasizing cooperation instead of competition, to advance Governor Strickland's "Turnaround Ohio" transportation initiatives;

3. In addition to priorities of safety and congestion-reduction, broaden the criteria for project selection, especially in the category of Major New Construction, to include economic development, benefit/cost analysis, and opportunities for multimodal integration and urban revitalization;
4. Establish “Smart Growth” strategies to ensure ODOT projects take growth and local land use issues into account;
5. Implement and advance cost-effective strategies for pavement preservation;
6. Implement additional cost-effective strategies for traffic flow and traveler information; and
7. Embrace environmental stewardship by implementing internal strategies to promote clean air and energy independence.

Although all of these initiatives are substantial, they are largely things that ODOT can make clear progress on. Each initiative is connected to a handful of specific action items, including assigning responsibilities to specific divisions or individuals.

Information Technology and Data

One of the core supporting elements to ODOT’s overall performance management effort has been investments in data and information technology (IT) infrastructure. During the transition to total quality management described previously, ODOT IT staff focused on things that they could do to help ODOT be more efficient, which included developing a means to link key legacy databases to improve ODOT’s ability to analyze the transportation system and providing easy access to performance data to ODOT employees.

Over the last 10 years, ODOT has developed a single referencing system that allows the agency to link its legacy mainframe databases. The Base Transportation Reporting System (BTRS) is used to link each of these data sets. ODOT ports data out of its legacy systems to a data warehouse each night allowing for daily updates.

ODOT’s success in utilizing performance measures to support decision-making is due in part to its open data process. All employees have access to performance data and can easily examine relevant measures or calculate new measures. A data warehouse application is part of the standard build of ODOT computers. It includes numerous standard queries and allows employees to build their own.

Examples of the use of the data warehouse include:

- Safety staff use the data warehouse for all safety analysis. For example, they can easily evaluate the relationship between system conditions and traffic crashes.
- Accounting staff use the data warehouse to examine the status of projects and billing and to conduct audits.
- District and HQ staff use the data warehouse to conduct all pavement and bridges analyses.

The flexibility of the data warehouse allows ODOT to generate and change measures easily. For example, the current OPI was a report developed to support the previous political administration. With a new administration, ODOT can easily refine and change the measures and create a new report as needed.

An Organizational Focus on Quality

ODOT has taken seriously one of the key lessons of performance management – that it is not enough to have an initiative; the whole organization must participate and support that initiative. ODOT has used several efforts to maintain this focus on quality, including:

- **Establishing an Office of Quality and Organizational Development** – The mission of this office is to support the districts and central office in their efforts toward continuous improvement through training, facilitation, benchmarking efforts, and communication. The office acts as a central clearinghouse for all of ODOT’s attempts to improve its efficiency.
- **Ensuring Training for All Employees** – In the mid-1990s, when ODOT adopted TQM, all 7,000 employees were trained, not just the management. This made it clear to employees that they needed to be part of the overall effort and provided employees with knowledge they could use to implement performance management in their jobs.
- **Taking Employees Ideas Seriously** – ODOT has had several processes over the years to gather employee ideas for efficiency improvements and to follow through on adopting them. The current Ohio governor has a centralized initiative to collect ideas from state employees. These are reviewed by a team within the organization and those that are deemed feasible and beneficial are either assigned to a specific staff person or to a team of individuals to implement. ODOT has and continues to use other methods to generate process improvement ideas.
- **Recognizing Employees for Their Independent Efforts to Improve Efficiency** – ODOT conducts an annual event called Team Up ODOT (see below) that allows process improvement teams to showcase their work.
- **Tracking Customer Satisfaction through Surveys and Complaints** – ODOT contracts with the University of Cincinnati to conduct a biennial survey of

customer satisfaction. This provides a high-level review of customer satisfaction. More useful has been an effort to track customer complaints and to develop process improvement teams when several customers make the same or similar complaints.

The success of ODOT's initiative is due in part to earlier failures. Before the early 1990s, road users were not thought of as "customers" at ODOT. In 1992, the governor launched a management audit of all state agencies, which was conducted by private sector volunteers. ODOT staff and management both recognized at that time that their jobs were in serious risk of privatization. In response, ODOT supported the TQM initiative and management and staff jointly worked on a partnership to improve quality. Quality Service through Partnership (QStP) has been written into the Collective Bargaining Agreement since 1992 and the Quality Office is a direct partnership between ODOT management and the Ohio Civil Services Employee Association (OCSEA). The OCSEA has played a vital role in ensuring that the focus on quality has been maintained, regardless of the interest of elected officials.

Encouraging Employee Innovation – Team Up ODOT

Team Up ODOT is held each May and supported jointly by ODOT and the Ohio Civil Service Employees Association (OCSEA). The goal of Team Up "is a celebration of the results of teamwork; it is an acknowledgment of how public employees have focused their efforts on improving the way ODOT meets the needs of its customers."⁶ Participation is voluntary. Teams submit a registration form on-line that includes a problem statement, description of the improvement, and results focused on cost savings that can be directly attributed to the team's innovation or improvement.

The event functions like a trade show, with each team staffing a booth with posters and other information about their improvements. In 2007, 38 teams presented their work; in 2006, 40 teams; and in 2005, over 60 teams. The event includes participants from organizations outside ODOT that have made improvements relevant to the agency.

The following are a few examples of teams that presented at the 2007 Team Up ODOT event:

- The District 1 "Berm Savers," created a consistent, cost-effective process for restoring berms. The team researched and field tested several devices that could be conveniently pulled behind a tractor, including one device of their own design. After settling on a vendor and purchasing their new "Berm-Master" attachment, the district reduced the cost per mile for berm restoration from \$640 in 2004 and over \$1,600 in 2005 to \$106 in 2007. The district

⁶ <http://www.dot.state.oh.us/VirtualTeamupODOT/2007/Default.htm>.

restored more miles of berm in 2007 than in 2005 and 2006 combined, with a total savings of over \$100,000 per year.

- The District 4 In-House Design section developed new techniques for stabilizing steep and tall road embankments, which are especially common in that district. The new techniques, which include “soil nailing” and reticulated concrete blocks, have resulted in cost savings of 50 percent and time savings of 200 percent over traditional methods of stabilization, such as retaining walls and other major earthwork.
- The District 9 “Cone Corralers” purchased an enclosed horse trailer to use for storage and distribution of traffic cones to mark lane closures. This improved safety over a pickup truck because the trailer is lower to the ground and is enclosed. The trailer saves \$98 per day over the traditional open pickup truck tailgate method.
- In District 4, a team discovered that the inventory of culverts was out of date, resulting in poor coordination of culvert maintenance and replacement activities with road resurfacing projects. After launching a GPS inventory and inspection process, the district had GPS located 98 percent of mainline culverts within two years, rated 80 percent of them, and now incorporates culvert data into all road resurfacing projects.

Also taking place at the annual Team Up ODOT event is the presentation of the Total ODOT Performance (TOP) awards that recognize ODOT employees and teams whose outstanding performance supports ODOT’s mission, values, and goals. Nominations are submitted and awards given in seven categories:

1. The MVP Award, which recognizes “an individual who consistently demonstrates and encourages coworkers to use quality tools and practices in everyday activities.”
2. The Outstanding Customer Service Award.
3. The Employee Mentoring Award.
4. The Impact Award, which is “given to an active Quality Coordinator, Quality Advocate, or facilitator who exemplified enthusiasm, dedication and loyalty in their efforts, showing others the value of using quality tools and practices, while meeting day-to-day work expectations.”
5. The Communication Award, which is “given to the employee or employees who kept coworkers informed of current issues within their district or division.”
6. The Process Improvement Award, which recognizes process improvements implemented in the prior year that result in measurable positive benefits.
7. The Director’s Humanitarian Award, which recognizes an employee’s outstanding service “above and beyond the normal course of their job duties.”

The TOP awards are presented jointly by the director of the DOT and the president of OCSEA. In an effort to recognize all of the employees making a difference at ODOT, the TOP Award program also recognizes all award nominees that did not win on the Team Up ODOT web site.

Challenges and Successes

ODOT has faced several challenges in its attempts to implement performance management, including:

- **Some Things Are Hard to Measure, Especially at First** – For example, ODOT has a major initiative underway now to improve the tracking of change orders on projects because the information that the current process provides is unclear. Change orders often play a key role in determining if a project is late or on time and potentially in tracking staff and contractor performance.
- **Clear Definitions Are Vital** – For example, many DOTs, including ODOT, track percent complete. But this is effectively meaningless until you define at the stage of the process at which a project is considered done and what stage is most appropriate to measure to. At the national level, there are significant variations in how DOTs calculate the same measures. ODOT currently is supporting an effort on pavement smoothness because IRI is calculated differently in different states, making it hard to compare condition.
- **Organizational Culture Presents a Significant Barrier to Change** – At ODOT, the confluence of top leadership buy-in and employee concerns about job privatization contributed to a whole agency approach.

Some of ODOT's key successes include:

- **Getting Many Employees in the Agency to Take Ownership of the Quality Effort** – Organizational performance indicators have been decentralized and are monitored and managed by the responsible offices. Part of ODOT's effort has been to recognize that individuals should have freedom to move within the organization if their skill sets are relevant. Over the last 10 years, ODOT has seen qualified employees move to new functions and hiring requirements strengthened to invest in capable and accountable employees.
- **Providing Information to the Public** – ODOT's customers are now accustomed to getting information on agency and system performance. Both the general public and the legislature expect this information, making it difficult for any one governor or legislator to eliminate the focus on quality.
- **Political Trust** – ODOT's efforts to back up their claims with data and analysis have built trust between the legislature and ODOT. Politicians are better informed about transportation issues. This has been crucial for key initiatives, such as ODOT's focusing on achieving a steady condition state on existing assets before investing in system expansion.

Case Study Interviews

The following individuals were interviewed for this case study:

- Leonard Evans P.E., Transportation Systems Administrator;
- Carol Schubert, Statewide Management Quality Coordinator, Office of Quality and Organizational Development; and
- Willa O'Neill, Statewide Union Quality Coordinator, Office of Quality and Organizational Development.

4.3 VIRGINIA DOT

Background

VDOT is one of six departments within the Office of the Secretary of Transportation. Others include the Department of Motor Vehicles, Department of Aviation, Department of Rail and Public Transportation, Virginia Port Authority, and Motor Vehicle Dealer Board. The Commonwealth Transportation Board (CTB) consists of 17 members appointed by the governor establishes and oversees administrative policy for Virginia's transportation system. The CTB allocates highway funding to specific projects, locates routes, and provides funding for airports, seaports, and public transportation.

Virginia has the third-largest state-maintained highway system in the country (behind North Carolina and Texas), with about 57,000 centerline miles of roads and over 19,000 structures (bridges and large culverts). Employment levels at VDOT have diminished slightly in recent years, and currently stands at 9,823 statewide, with 1,776 in the central office and 8,047 in field offices. Projects and services are delivered and managed through nine maintenance and construction districts and five regional operations centers.

Performance Management History

VDOT has had a long history of developing performance measures. In the late 1980s, the department had over 200 measures that were collected and reported, though the links to decision-making at that time were not clear, and over time the measures were largely unused.

In 2002, Phillip Shucet was appointed as the commissioner of the department and he used performance measures to tackle a project delivery problem. Due to a combination of funding issues, management practices, rapidly growing needs, and other factors, VDOT had committed to a set of projects that it was unable to deliver on time or on budget. The first contemporary performance management initiative at VDOT was the establishment of on-time and on-budget performance measures with the intention of fixing the project delivery process. Along with this, VDOT developed its first dashboard, which provides a quick snapshot of overall performance, as well as the ability to drill down to individual projects.

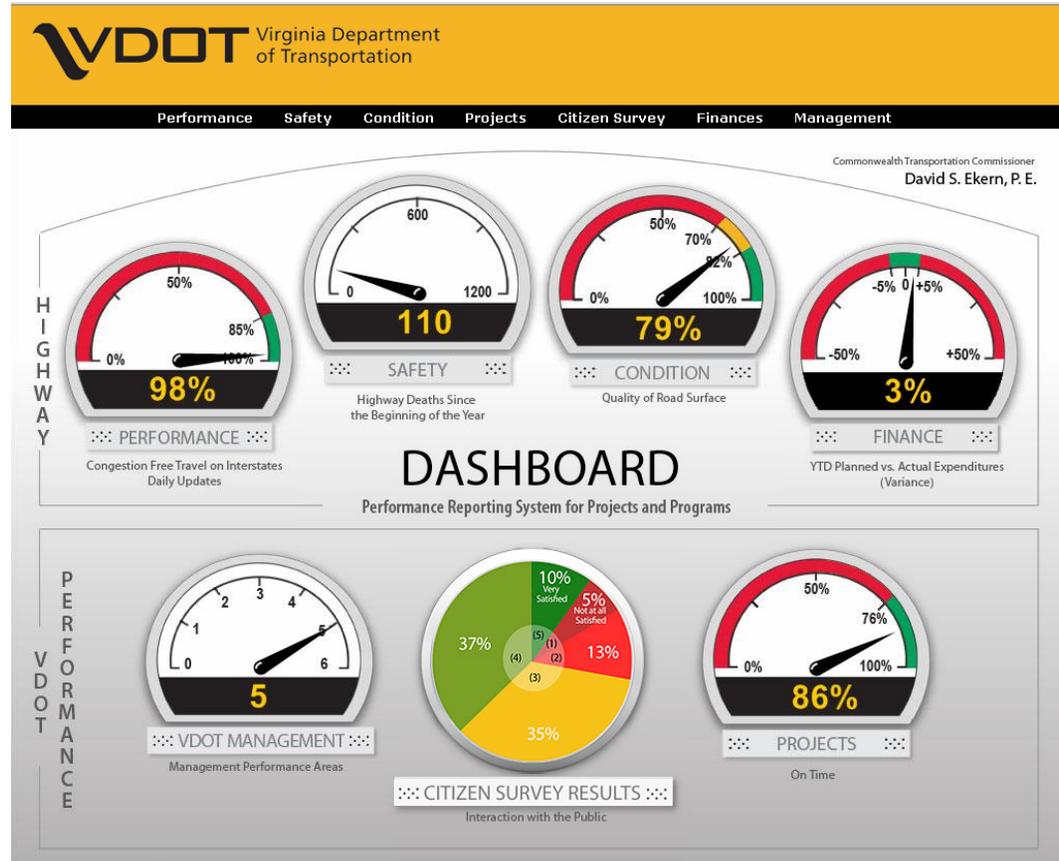
The dashboard uses detailed performance data to spotlight how VDOT is performing in key areas. It has increased accountability within VDOT and helped focus the agency on the importance of delivering projects on time and on budget.

Since the development of these original measures, VDOT has expanded the dashboard to include seven key areas (Figure 4.3):

1. **Highway Performance** - Congestion-free travel on interstates, updated daily, as measured by percent of vehicle miles of travel on interstates by level of service grade, percent of travel speed above 45 miles per hour in HOV lanes, and average travel time on peak routes;
2. **Safety** - Highway crashes, injuries, and fatalities, including a separate analysis for work zone crashes;
3. **Condition** - Quality of the road surface and bridges;
4. **Finance** - YTD planned versus actual revenues and expenditures and changes in agency buying power over time;
5. **VDOT Management** - Part of a Virginia Management Scorecard that tracks management performance at all state agencies on human resource management, government procurement, financial management, technology, performance management, and resource stewardship;
6. **Citizen Survey Results** - Overall citizen satisfaction with VDOT and satisfaction with individual agency functions, such as communication and information, incident response, planning for needs, responsiveness to citizens, system preservation and maintenance, and management of public funds; and
7. **Project Delivery** - On-time and on-budget delivery of projects and environmental compliance.

More recently, VDOT has been examining the question of improving internal operations with performance measures. For VDOT, internal operations includes all of the activities that take place that support the higher-level measures shown in the dashboard. Much of this information is for internal use, though the dashboard also includes the ability to drill down into significant detail about individual districts, projects, etc.

Figure 4.3 Virginia DOT Dashboard



Source: Virginia DOT web site, <http://dashboard.virginiadot.org/default.aspx>.

Figure 4.4 demonstrates VDOT’s thinking on the necessary connections that must be built between internal operations and overall system performance of the sort that is reported on the dashboard. Measures are intended to be linked to broader societal goals, agency-specific actions, and within an agency to organizational units and employees. Although different levels of analysis suggest different measures, it is important to think about the linkages among these areas when designing a performance management program.

Figure 4.4 Virginia DOT – Linking Performance Management throughout the Agency

Impact To:	Type: (examples)	Measure (examples)	Key Factors: (examples)
All of Society	Core Indicator	Trans. Contribution to GDP	User cost of trans.
Road Users	Program Outcome	Excess user cost of trans.	Pavement condition, crash risk, Vhr of delay, travel time reliability
Agency	Program Output	Pavement condition, Crash risk, Vhr of delay, reliability	On-time, On-budget work. Safety proj. Incident resp., time, signal timing
Org Unit	Unit Output	On-time, On-budget, Proj. effect, Incident resp., signal timing	Quantity and cost of work units, Quality of data, analysis & mgt decisions
Employee	Employee Output	Quantity, timeliness, & quality of work, Innovative contrib.	Training, competency, mgt & direction, opportunities provided

VDOT also has been working on an internal dashboard to help drill down to these deeper levels (Figure 4.5).

Definition of Performance Management

VDOT staff defines performance management as making decisions about how to allocate resources based on performance objectives and current performance. Essentially, this is an optimization problem, calculating the difference between where an agency is now and where it wants to be in the future, and allocating resources to bridge that gap.

Figure 4.5 Virginia DOT Internal Dashboard

	Bristol	Salem	Lynchburg	Richmond	Hampton Roads	Fredbrg	Culpeper	Staunton	NOVA	CO	State
Project Development											
Adv. On-Time	83.3%	73.9%	69.2%	87.5%	61.5%	50.0%	83.3%	95.8%	53.3%	N/A	74.8%
Cost Estimation	100.0%	60.0%	78.6%	100.0%	40.0%	66.7%	50.0%	90.0%	100.0%	N/A	78.0%
Fed Oblig. - act.v-plan	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Project Delivery											
On-Time Const.	100.0%	100.0%	84.6%	85.0%	100.0%	100.0%	100.0%	100.0%	100.0%	N/A	95.4%
On-Time Maint.	92.3%	95.5%	100.0%	100.0%	0.0%	75.0%	85.7%	100.0%	100.0%	N/A	93.4%
On-Budget Const.	87.5%	57.1%	92.3%	65.0%	85.7%	62.5%	50.0%	92.9%	75.0%	N/A	75.9%
On-Budget Maint.	92.3%	86.4%	100.0%	77.8%	100.0%	75.0%	100.0%	71.4%	52.9%	N/A	80.2%
Env. Compliance	98.9%	98.8%	99.1%	99.2%	98.1%	99.3%	100.0%	99.2%	96.7%	N/A	98.9%
CQIP Compliance	90.0%	93.8%	N/A	93.8%	93.7%	91.0%	87.9%	N/A	N/A	N/A	91.5%
Construction Ln Miles	14.3	4.0	10.3	6.0	N/A	19.5	18.5	N/A	18.8	N/A	92.4
Construction Bridges	1.0	1.0	4.0	2.0	N/A	2.0	3.0	N/A	0	N/A	13.0
Asset Management											
Pavement - Interstate	12.0%	4.4%	N/A	22.1%	21.6%	27.8%	17.1%	11.1%	19.7%	N/A	17.2%
Pavement - Primary	18.1%	22.4%	9.1%	16.6%	12.7%	16.0%	9.9%	17.9%	17.5%	N/A	15.8%
Bridge Condition	56.8%	63.0%	68.1%	65.1%	72.0%	65.7%	72.7%	65.8%	87.2%	N/A	67.5%
Maint. Spending	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-93.2%	-93.2%
Administration											
Administrative Budget	C	C	C	C	C	C	C	C	C	N/A	N/A
Inventory Compliance	C	C	C	C	C	C	C	C	C	N/A	N/A
SWAM	37.8%	31.0%	81.9%	47.3%	32.3%	36.6%	67.2%	38.9%	22.9%	40.5%	37.9%
Lost Time Injury Rate	3.7	1.5	6.7	1.3	2.3	N/A	2.7	1.8	2.5	N/A	2.1
Off&Admin Util Female	11.8%	17.6%	14.3%	19.4%	21.5%	22.2%	19.8%	17.7%	25.1%	43.6%	26.0%
Off&Admin Util Minority	1.7%	1.5%	6.1%	12.5%	14.1%	5.6%	1.2%	2.4%	27.0%	24.1%	14.3%
Prompt Pay Cert.	100.0%	100.0%	100.0%	99.0%	98.0%	98.0%	98.0%	100.0%	99.0%	99.0%	99.0%

Linking Performance Measures to Decision-Making

The emphasis of this case study is on Virginia DOT’s efforts to develop a needs-based budget process for their maintenance and operations functions. At Virginia DOT, the maintenance and operations functions are defined broadly to include preservation activities (pavement and bridge primarily), maintenance (maintaining assets such as signs, striping and signals, fixing potholes, and other related investments), operations (day-to-day operations of the system, including incident management, traveler information, etc.), and minor construction projects. Major construction projects are addressed separately.

Up until five years ago, the construction program was larger than the operations and maintenance program, but this is no longer true today. Maintenance and operations were \$1.26 billion in FY 2008 (July 1, 2007 to June 30, 2008). Virginia sets construction allocation in by formula.

The VDOT case study provides information about three key practices for linking performance measures to decision-making, including:

1. Resource allocation;
2. Data integration; and
3. Working with the legislature.

Resource Allocation

In September 2007, VDOT created its first performance-based needs assessment for maintenance and operations and submitted that to the Virginia governor. This high-level document is required as part of the budgeting process. It identifies funding levels for programs within the maintenance and operations program and provides a justification for the overall program budget.

Currently, VDOT is addressing the distribution of the overall maintenance and operations budget to its nine districts. In the past, both the overall budget levels and the district budgets were set using historic data. The new needs-based budget uses management system tools – such as bridge and pavement management systems, and less sophisticated tools for pipes, signs, markings, and other more minor assets – to define overall needs and needs for individual districts. The overall needs already have been submitted to the governor and VDOT is using them to allocate funding to districts.

As VDOT transitions to a performance-based system, they are using a “hold harmless” provision. Essentially this means each district will receive a minimum of what they received last biennium. Districts with a greater share of targeted needs will receive proportionally more funding above this minimum amount.

VDOT began the process of estimating needs in 2002 and focused on maintaining Virginia’s transportation infrastructure in its current condition. At that time, measures were identified for pavement and bridge assets. The bridge measure has been updated more recently and VDOT currently is developing measures for other key infrastructure, such as ITS, signals, and others. Table 4.1 lists the current set of measures and targets used to support the resource allocation effort.

Table 4.1 VDOT’s Performance Measures and Targets for Resource Allocation

Asset	Measure	Target	2007 Performance
Pavement	Percent of network with fair or better ride quality	≥ 85% – I	93.6% – I
		≥ 85% – P	88.0% – P
Pavement	Percent of network in deficient condition	≤ 18% – I	19.1% – I
		≤ 18% – P	21.2% – P
		No target set – S	24.2% – S
Bridges/Culverts	Percent of bridges rated as structurally deficient	≤ 3% – I	2.8% – I
		≤ 6% – P	5.9% – P
		≤ 11% – S	10.8% – S
Cross Pipe	Percent of inventory in need of repair or replacement	≤ 10% – I	10.2% – I
		≤ 20% – P	21.4% – P
		≤ 20% – S	18.2% – S
Paved Ditches	Percent of inventory in need of repair or replacement	≤ 25% – I	24.1% – I
		≤ 25% – P	26.1% – P
		≤ 10% – S	8.8% – S

Asset	Measure	Target	2007 Performance
Unpaved Ditches	Percent of inventory in need of repair or replacement	≤ 17% – I	17.4% – I
		≤ 8% – P	8.0% – P
		≤ 10% – S	10.2% – S
Unpaved Shoulders	Percent of inventory in need of repair or replacement	NA – I	NA – I
		≤ 18% – P	18.0% – P
		≤ 16% – S	15.0% – S
Guardrail	Percent of inventory in need of repair or replacement	≤ 2% – I	1.5% – I
		≤ 2% – P	1.6% – P
		≤ 3% – S	2.5% – S
Guardrail Terminals	Percent of inventory in need of repair or replacement	≤ 4% – I	3.5% – I
		≤ 4% – P	3.4% – P
		≤ 4% – S	3.6% – S
Pavement Markings	Percent of inventory in need of repair or replacement	≤ 30% – I	30.6% – I
		≤ 65% – P	66.5% – P
		≤ 70% – S	71.7% – S
Signs	Percent of inventory in need of repair or replacement	≤ 5% – I	7.9% – I
		≤ 5% – P	5.0% – P
		≤ 10% – S	10.2% – S

Note: I = Interstate; P = Primary; S = Secondary.

VDOT's goal is to improve the methodologies they use over the next several years, by investing in systems and data for assets beyond pavement and bridge. VDOT intends to build predictive models for other assets such as signals, ITS, and others. The objective is to develop a consistent understanding of needs within these asset areas across the State.

In general, district administrators have been in favor of using the needs-based district allocations (instead of the previously used allocations). District administrators have shifted their focus from trying to figure out what to do with their budget to focusing on targets and performance.

One of the biggest challenges of performance-based resource allocation that VDOT faces is in the specific formula used to provide funds to its districts, especially during the first iteration of this effort. VDOT has developed six scenarios to use for discussion purposes with the districts and senior management toward developing a final allocation. Examples of these scenarios include:

- Providing each district funding based on its total share of targeted needs across all categories (pavement, bridge, signs, etc.);
- Funding pavement and bridge needs in each district at 100 percent (in general, both districts and headquarters staff feel more confident about the pavement and bridge models than they do about the models for other assets) and funding the remaining assets proportional to needs and remaining funds.

VDOT districts also will be allowed to comment on the scenarios and suggest others, representing the first time that the districts have had a major voice at the table in setting resource allocations. VDOT headquarters staff who are responsible for setting the allocation are in the process of meeting with the district administrators to discuss the new process.

Role of the Legislature

With the growth of the maintenance and operations program, VDOT's activities have attracted strong interest from the legislature. In 2002, a study by the Joint Legislative Audit and Review Committee (JLARC) recommended that VDOT adopt an asset management approach to maintenance and operations functions. This pushed the idea of requiring a needs assessment connected to specific organizational goals. In 2007, the legislature passed a law requiring VDOT to present a report to the governor and Commonwealth Transportation Board describing the condition of the current system, the needs to maintain and operate the system, and the targets used to determine those needs. This report must be submitted each year by September 15. The law allows VDOT to select its own measures, but does force the agency to use measures to make decisions about funding for all maintenance and operations programs, which amount to \$2.98 billion for the FY 2009 to FY 2010 biennium.

Evaluating Organizational Productivity

In considering the performance of the department, VDOT has been actively trying to understand the source of good performance. This practice focuses on evaluating data to assess the productivity of individual divisions, business units, and staff. VDOT's knowledge management group has the mandate to identify efficient practices throughout the organization. This group also is gathering best practice knowledge from staff who are retiring.

For the last 18 months, this group has been developing a work accomplishments system that tracks the quantity of labor, equipment, materials, and money associated with a detailed set of activities conducted by the Maintenance and Operations Division. The objective of this effort is to understand the variability in productivity of individual units. The key questions to be addressed include:

- What is the expected unit cost for doing certain kinds of work? This information is a ground up method to estimate funding needs for specific maintenance and preservation activities by district. It also could support a more detailed geographic analysis.
- Is variability in unit costs due to work inefficiency or external factors? VDOT is using sophisticated statistical models to understand which units are most efficient. This information can be used to estimate the difference between expected and actual costs for a given unit or to help identify best practices that make individual units particularly efficient and spread those practices to other units.

Challenges and Successes

VDOT recognizes that the process of develop performance measures and managing with them is a long one. Though they expect that someday everything in the organization will be measured, they have a long way to go. Some of the key challenges they face include:

- Picking the Right Measures - Even the physical condition measures used by VDOT have significant room for growth. The current measures focus on engineering standards, but the fundamental goal of pavement condition is service, and the measures should indicate if infrastructure usable. This is partly about how targets are set - what level is appropriate to define a road as deficient. Getting to some of these measures may require data that currently are not collected.
- One major challenge that VDOT faces in the resource allocation process is the simple fact that needs outstrip available resources. Even with a needs-based allocation, some determination has to be made about the return on investment and which programs will receive less than the “needed” amount.
- As noted above, data quality is a significant problem that VDOT currently is tackling. The models used to evaluate future conditions are necessarily an abstraction and are only as good as the data that go into them.
- VDOT faces significant challenges capturing appropriate and adequate data for safety and congestion measures. VDOT is just getting to a point where it can measure travel time on certain segments of interstate. VDOT’s measure of congestion is based on fixed count stations, but there is incomplete evidence that the fixed count stations are indicative of overall system conditions. In the safety area, VDOT cannot currently link safety data to condition data on systemwide basis due to issues with different linear referencing systems and sources of data. Improved data integration will help VDOT understand the relationship between system conditions and safety improvements and help with the selection of projects.

VDOT attributes much of its success with performance management to early efforts in project management and asset management. Although the previous work in asset management focused on preservation, it created the template for a broader look at performance-based decision-making. Over the last several years, the department has recognized the need to develop a new vision for asset management, broadening it to help the department decide how to spend money on effectively anything.

Case Study Interviews

Jeff Price, Assistant Director, Operations Planning.

4.4 WASHINGTON DOT

Background

The Washington State Department of Transportation (WSDOT) is a large state agency of 7,000 employees and a \$3 billion annual budget (2008). It owns, manages, and maintains 20,000 state highway lane-miles; 3,400 bridges; 28 ferry vessels and 20 terminals; Amtrak passenger rail, and the Grain Train, which runs 89 grain cars. WSDOT currently is managing over 1,000 active projects, which together constitute the largest infrastructure program in the State's history.

Performance Management History

WSDOT has applied performance management tools to nearly every aspect of agency business. The original impetus for this strong agencywide emphasis on performance management was an accountability crisis that occurred during the late 1990s in response to funding shortfalls, rapid growth in investment needs, voter repeal of a key revenue source, and erosion of trust between the department and the legislature. A new transportation secretary was brought in specifically to improve the agency's accountability through performance management. He emphasized a culture of performance management, accountability, and transparency; and the agency became well-known for publishing a comprehensive quarterly performance report known as the "Gray Notebook."

Linking Performance Measures to Decision-Making

As the director of the Strategic Assessment Office put it, the Gray Notebook report is not *used* for performance management; it is the *product* of performance management. Publication of the Notebook occurs after the data contained within it have been reviewed, discussed, and used in decisions made in the department and by the legislature. This case study does not focus on the Gray Notebook itself, but instead examines specific business areas within WSDOT that use performance data to help shape decision-making. The areas of focus contained within it are:

- Project delivery;
- Highway maintenance; and
- Congestion management, including capital planning, demand management, and operations.

These areas of focus were chosen because WSDOT is recognized as having strong practices in each area. Each focus area is discussed in turn below.

Project Delivery – Building Trust with Legislators

Over the past seven years, WSDOT has transformed itself from a government agency described by some as "in crisis" to one that the State's legislature and its

taxpayers have entrusted with two significant revenue increases, including a “Nickel” gas tax in 2003 and a 9.5-cent gas tax in 2005 also known as the Transportation Partnership Account (TPA). These revenue increases follow a decade of not only no increase in revenues, but also a voter repeal of the Motor Vehicle Excise Tax (MVET), a critical revenue source that ultimately resulted in a 30 percent loss of total capital funding. Alongside WSDOT’s “Pre-Existing Funds (PEF),” the two new funding programs have been essential to ensuring many important transportation improvements are built across the State and they demonstrate the revitalized confidence placed in WSDOT by its stakeholders.

Much of the explanation for the recent transformation at WSDOT lies in the department’s efforts to introduce accountability and transparency in its project delivery process. WSDOT made on-time and on-budget project delivery a priority and instituted a “no surprises reporting” mantra. This approach combines quantitative project data and results with detailed narratives that candidly and openly explain project successes or concerns in a proactive and transparent manner. By using performance measures to manage on-time and on-budget delivery of projects and to publicize results, WSDOT has built a high degree of trust with its stakeholders.

WSDOT reports on project delivery at two levels: the program and project level. At the program level, WSDOT compares the legislative expectation for the projects that have been delivered to date to the actual cumulative budget of the projects that have been delivered. At the project level, WSDOT reports on the status of hundreds of projects currently underway, many of which take years to complete. Project delivery performance is reported every quarter in the Beige Pages of the Grey Notebook.

The Beige Pages include three parameters for every project – cost, scope, and schedule. These parameters vary depending on whether the project is complete, in construction, or in the pipeline for construction. Some projects are budget and reported by program. Nickel and TPA projects in construction are measured using Advertised On-Time, Completed On-Time, Project within Scope, and Project On-Budget. Nickel and TPA projects in the project delivery pipeline are measured using Original Planned Advertisement Date versus Current Estimated Advertisement Date and Original Baseline Cost versus Current Estimated Cost. Because PEF projects are budgeted by program, the delivery of these projects is reported within six categories of work.

The Beige Pages executive summary rolls up program level and percent of projects completed on time, within scope and on budget for the Nickel, TPA, and Preexisting Funds (Figure 4.6).

Figure 4.6 WSDOT Program Delivery Performance Data

Performance Information <i>As of December 31, 2007, Dollars in Thousands</i>	Nickel (2003)	Partnership Account (TPA, 2005)	Combined Nickel & TPA	Pre-Existing Funds
Total Cumulative Number of Projects ¹	153	238	391	-
Total Cumulative Program Value ²	\$3,965,112	\$8,870,540	\$12,835,652	-
Schedule, Scope and Budget Summary: Results of Completed Projects				
Cumulative to Date, 2003 – December 31, 2007	See Pages 5-8	See Pages 5-8	See Pages 5-8	See pages 33-38
Total Number of Projects Completed	89	36	125	-
% of Projects Completed Early or On-Time	90%	94%	91%	-
% of Projects Completed Within Scope	100%	100%	100%	-
% of Projects Completed Under or On-Budget	89%	75%	85%	-
% of Projects Completed On-Time and On-Budget	81%	69%	78%	-
Current Legislative Expectation (Baseline)	\$1,213,975	\$88,646	\$1,302,621	-
Current Estimated Cost to Complete (WSDOT)	\$1,210,338	\$88,018	\$1,298,356	-
% of Total Program On Budget	100.3%	100.7%	100.3%	-

Source: WSDOT Gray Notebook.

To help diagnose issues and concerns, WSDOT also tracks and reports on-time completion of key milestones for each project, including project definition (determining the function, limits, and boundaries of the project), preliminary engineering, environmental documentation, right-of-way certification, advertisement date, and operationally complete (when a user has free, unobstructed user of a facility).

For cost, scope, and schedule parameters, deadlines are set early in project development (typically when design is around 30 percent complete and Federal and state environmental review are complete). Project teams are required to keep to these parameters or explain why they have deviated. Project managers generally discuss concerns with their regional administrator, but Public Quarterly Project Review (QPR) meetings also are held in each region to discuss project status issues and describe solutions for resolving them. Projects with schedule, scope, or budget concerns are identified within the Beige Pages, including a detailed description of these concerns. This helps hold project managers accountable for on-time and on-budget performance of their projects.

The greatest challenge WSDOT faces in its project delivery measures is managing costs. Rapid increases in construction materials costs have made it difficult to keep costs within initial estimates. WSDOT has developed several strategies to address this issue and incorporates detailed cost reporting in its Beige Page reports.

Congestion Management – Identifying and Prioritizing Needs

Washington's growing population and economy has yielded rapid increases in congestion. Since 1980, the state population has increased by 50 percent. The number of vehicle miles traveled has doubled, while capacity on Washington state highways has remained stagnant. Pressure on the State's infrastructure has led WSDOT to change its approach to both measuring and addressing the problem of congestion.

WSDOT has developed a suite of measures to identify and address congestion on the transportation system. These measures are based on vehicle flow and speed data from over 4,000 loop detectors placed throughout the highway system. Specific measures include:

- **System Productivity: Vehicle Throughput** – Measures how many vehicles move through a highway segment in an hour.
- **Reliability: Peak Travel Time and 95 Percent Reliable Travel Time** – Measures how long it takes to complete a route during the peak period of congestion and at 95 percent worst travel time.
- **Cost of Congestion Measures** – Annual cost of delay and related measures.

WSDOT reports these measures in the Annual Congestion Report, published in the September edition of the Gray Notebook. More detailed analysis of congestion data also is provided to internal audiences. For example, the Operations division publishes the *Traffic Operations Performance Monitoring Report* each quarter that provides detailed analysis of operations strategies, such as incident response.

One of the key ways that performance measures have shaped decisions at WSDOT is by fundamentally changing the method used to identify and prioritize congested corridors. With many corridors experiencing some congestion, evaluating traditional metrics, such as level of service (LOS) thresholds, yielded billions of dollars of needs over a 20-year timeframe. Using the throughput efficiency measures generated for the Gray Notebook's annual congestion report, WSDOT began using a speed threshold to identify highway deficiencies. The throughput performance measures reveal that maximum throughput is typically achieved when vehicles move at 70 to 85 percent of the posted speed limit. Roadways where speeds fall below 70 percent of the posted speed limit are considered deficient. This has narrowed down the deficiency list significantly (by roughly one-third) and enables WSDOT to focus scarce resources on the most needed corridors. The department uses the maximum throughput measure to select projects for inclusion in its proposed program of highway improvements (the *Highway System Plan*), which is ultimately presented to the legislature.

WSDOT has used its congestion measures to support funding increases. Data showing sustained, intractable congestion over several years and the effect of WSDOT's strategies to mitigate congestion helped to generate support for policy and program changes. The data, in part, helped the legislature recognize that the widening gap between growth in travel demand required new infrastructure investment. The performance measurement program has built public trust and legislator confidence in WSDOT's ability to deliver programs and projects effectively, key drivers behind the two recent revenue increases.

Congestion Management – Performance Measures as a Diagnostic

Another use that WSDOT makes of its congestion management measures is to identify and respond to emerging problems. In several cases, congestion data have revealed trends or emerging problems that prompted corrective action by the department or the Washington State Legislature. Some examples include:

- **Correcting a Decrease in HOV Travel Times** – Providing HOV lanes to incentivize carpooling is a key component of WSDOT’s congestion-reduction strategy. Accordingly, HOV travel speeds and travel-time reliability are monitored. Recently, trends revealed an increase in travel times on HOV lanes due to more frequent use. WSDOT is developing an action plan to restore travel times on HOV lanes.
- **Identifying a Major Source of Nonrecurring Congestion** – Reducing incident-related congestion is another important WSDOT congestion-reduction strategy. WSDOT monitors incident response times and has found that many long (over 90 minutes) incidents involve motor carriers. WSDOT has implemented an extraordinary incidents towing program that provides tow truck operators a financial incentive to clear incidents involving heavy trucks within 90 minutes of dispatch. The program is still under evaluation, because most long incidents involving motor carriers occur in the off-peak, and may not have a serious effect on traffic.
- **Focusing Commute Trip Reduction Programs on Most Congested Corridors** – WSDOT evaluates the effectiveness and efficiency of its Commute Trip Reduction Program, which is aimed at encouraging alternative commute options in the workplace. A recent review of the program revealed that it could be more efficient if efforts were focused on highway corridors with the most congestion. As a result, the legislature passed the Commute Trip Reduction Efficiency Act in 2006, which targets the program around congested corridors.

The examples above demonstrate how congestion performance data has been useful in better targeting existing congestion reduction programs and in identifying new ones. However, the data and measures themselves are not always the only cause of innovation. Often, the first hand experience of professionals in the field provides the impetus for exploring innovative practices. Performance measures are then used to confirm and justify investments in strategies that are known to be successful through the first hand experiences and observations of practitioners.

Demonstrating the quantitative benefit of operations strategies in reducing congestion has been challenging for WSDOT. WSDOT began developing, and is still refining, a range of congestion measures that can reflect the full benefits of its operational and demand-management strategies. WSDOT uses before and after studies to demonstrate how travel times improved due to strategies such as retiming traffic signals, using ramp meters to control the flow of vehicles onto highways, and travel times in HOV lanes relative to general purpose lanes.

Congestion Management – Policy Shift toward Operations

The performance data also has helped WSDOT executive-level management recognize increasing capacity alone cannot adequately address congestion. The department has adopted and communicated a three-dimensional approach to addressing congestion: “Manage Demand, Operate Efficiently, and Add Capacity Strategically.” On the ground, this means that multiple solutions are evaluated for congested corridors, including operational strategies, demand reduction, and addition of new capacity. The “lost throughput” measure has been instrumental in highlighting tolling as a key congestion management strategy to policy-makers at the state, regional, and local levels. This measure points out the importance of managing demand to reduce congestion and restore system efficiency.

Compelling performance data have allowed WSDOT to establish and expand investments in operations, such as incident response and demand-reduction programs. WSDOT uses before-and-after evaluations of operations projects to demonstrate their benefit in terms of reduced travel times or delay avoided. Examples of policy and budget changes include:

- **Instant Tow Program** – In April 2007, WSDOT initiated the Instant Tow Program, which guarantees payments to tow companies who respond instantly to calls from motorists without state trooper verification. From initiation through the end of 2007, 475 Instant Tow Calls were recorded and dry run fees paid on 26 occasions. A 2003 study from the Washington State Transportation Center found that the program reduced overall incident duration an average of 15 minutes.
- **Incident Response Program** – WSDOT has increased funding of the incident response program by 17 percent since 2003 (from \$8.2 million to \$9.5 million) due to compelling data showing the cost-effectiveness of the program in reducing congestion. The June 2003 version of the Gray Notebook identified a 20:1 benefit/cost ratio for instituting incident management on I-405 in the Seattle area. Vehicles in this corridor saw a reduction in delay of 7 minutes per incident, compared to a 17-minute average prior to implementation.

Highway Maintenance – Refocusing on Core Priorities

WSDOT began developing a maintenance performance measurement system in the late 1990s, when the maintenance department’s budget came under increased scrutiny. Prior to that time, the budget for each biennium was based on historical expenditures. After creation of the Maintenance Accountability Process (MAP) in 1997, maintenance data have been used to support legislative budget requests. The core function of the MAP is to provide routine reports of maintenance results, expressed in terms of level of service (LOS) by maintenance activity. The MAP process has been credited with attracting improved levels of investment in some underperforming maintenance areas.

The MAP process involves collecting and translating system condition data into a standardized LOS metric for over 30 maintenance activities. Raw data on system conditions are collected through statistically valid, random sampling procedures. Table 4.2 shows measures from the MAP Manual used to evaluate drainage maintenance. Translating system condition data into a uniform LOS measure in this way allows external customers, such as legislators, to quickly understand the status of the system.

Table 4.2 WSDOT MAP Manual Extract

Component				Service Level				
Drainage Maintenance				A	B	C	D	F
Num	Activities	Condition Indicators	Outcome Measures	Threshold				
2A1	Maintain Ditches	Ditches with sediment buildup, unable to carry design flow.	Percent of ditches greater than 50 percent filled with sediment/debris.	0-1%	1.1%-5%	5.1%-10%	10.1%-15%	>15%
2A2	Maintain Culverts	Cross culvert pipes plugged with dirt and/or debris, unable to carry design flow.	Percent of pipes/culverts greater than 50 percent filled, or otherwise deficient.	0-2%	2.1%-5%	5.1%-10%	10.1%-20%	>20%
2A3	Maintain Catch Basins and Inlets	Catch basins and inlets than are blocked or have sediment build-up.	Percent of inlets blocked 50 percent or more with debris, or CB with sediment buildup reaching or exceeding flow line of outlet pipe.	0-3%	3.1%-7%	7.1%-15%	15.1%-30%	>30%
2A4	Maintain Detention/Retention Basins	Silt basins unable to hold design capacity.	Percent of silt basins greater than 25 percent filled with sediment.	0-1%	1.1%-5%	5.1%-10%	10.1%-15%	>15%
2A5	Slope Repair	Unrepaired erosion or slides encroaching on, or undermining the shoulder or traveled lane.	Percent of centerline miles with slides or erosion encroaching on, or undermining the shoulder or traveled way.	0-2%	2.1%-4%	4.1%-7%	7.1%-10%	>10%

WSDOT headquarters compiles the LOS results for every maintenance component and presents the results in an annual level of service report that is used to support the budget request. The report also shows whether levels of service targets, which are established biennially by the state legislature, were met in each category. Most, but not all, targets are set as a function of the budget allocated to each activity. Figure 4.7 presents the Annual Level of Service Report for 2007. This presentation shows, at a glance, how WSDOT is performing relative to its targets.

Figure 4.7 WSDOT Maintenance Activities and Targets

Maintenance Accountability Process
Activity Service Level Targets and Service Levels Delivered
Statewide - CY 2007

Activity	1.0 +	1.9 A	2.0 -	2.0 +	2.9 B	3.0 +	3.9 -	4.0 +	4.9 -	5.0 +	5.9 -
Group - 1 Roadway Maintenance and Operations											
1A1 Pavement Patching, Repair & Crack Sealing					⊖	✓					
1A3 Shoulder Maintenance					✓ ⊖						
1A4 Sweeping and Cleaning				✓ ⊖							
1B1 Safety Patrol					✓	⊖					
Group - 2 Drainage Maintenance and Slope Repair											
2A1 Maintain Ditches					✓ ⊖						
2A2 Maintain Culverts							⊖	✓			
2A3 Maintain Catch Basins and Inlets					⊖				✓		
2A4 Maintain Detention/Retention Basins							✓ ⊖				
2A5 Slope Repair				✓	⊖						
Group - 3 Roadside and Vegetation Management											
3A1 Litter Pickup								⊖			✓
3A2 Noxious Weed Control				✓	⊖						
3A3 Nuisance Vegetation Control				✓	⊖						
3A4 Control of Vegetation Obstructions						⊖	✓				
3A5 Landscape Maintenance								⊖	✓		
Group - 4 Bridge and Urban Tunnel Maintenance and Operations											
4A1 Bridge Deck Repair						⊖	✓				
4A2 Structural Bridge Repair							⊖		✓		
4A3 Bridge Cleaning					✓		⊖				
4B1 Movable and Floating Bridge Operations		✓		⊖							
4B2 Keller Ferry Operations					✓ ⊖						
4B3 Urban Tunnel Systems					✓ ⊖						
Group - 5 Snow and Ice Control Operations											
5B1 Snow and Ice Control Operations		✓	⊖								
Group - 6 Traffic Control Maintenance and Operations											
6A1 Pavement Striping Maintenance						⊖	✓				
6A2 Raised/Recessed Pavement Marker Maint.					⊖		✓				
6A3 Pavement Marking Maintenance								⊖		✓	
6A4 Regulatory Sign Maintenance						⊖			✓		
6A5 Guide Sign Maintenance					✓ ⊖						
6A6 Guidepost Maintenance								⊖	✓		
6A7 Guardrail Maintenance		✓ ⊖									
6B1 Traffic Signal Systems						⊖	✓				
6B2 Highway Lighting Systems					⊖				✓		
6B3 Intelligent Transportation Systems					✓	⊖					
Group - 7 Rest Area Operations											
7B1 Rest Area Operations					✓ ⊖						

Scores calced using raw data

Key	
⊖	Current Law Budget Service Level Commitment
✓	2007 Service Level Delivered
⊖	Missed target

The MAP process and related activities described above are intended to serve as a management tool, allowing for more objective and informed decision-making. Like many performance management tools, they are evolving over time and have stronger impacts on some decisions than others. Some of the uses include:

- Justifying and defending budget requests;
- Guiding budget cuts; and
- Prioritizing maintenance activities.

WSDOT uses the MAP data to make specific budget requests, such as identifying the cost to improve LOS in a specific maintenance area; identifying funding

needed to fix a pattern of missed LOS targets; and highlighting likely future maintenance deficiencies due to rising costs for key maintenance inputs, such as asphalt and deicer. WSDOT also provides narrative explanation of data findings, such as whether the data are part of a multiyear trend or a one-year anomaly, weather events or flood damage, unique equipment problems, data collection problems, and others.

Though the MAP data are an important component of justifying any budget request, there are limits on the use of the MAP data in determining the annual maintenance budget. For example, the legislature sometimes increases the annual LOS target for a given activity without providing additional budget. The legislature recently mandated that the LOS for litter removal be increased from a “D” to a “C-,” but no additional funding was provided to meet the target. Similarly, budgets have not been adjusted to reflect the increased costs of maintenance associated with the aggressive capital expansion program funded by the 2003 and 2005 gas tax increase packages; as a consequence, many targets have been missed in recent years.

Just as MAP data can be used to justify budget increases, they also can be used to identify and manage adverse impacts when budgets are reduced. WSDOT has developed a Maintenance Priority Matrix to help focus budget cuts. The matrix represents WSDOT maintenance management staff’s best understanding of how critical each maintenance activity is to meeting the DOT’s broad policy objectives, particularly safety, reliability, and environmental stewardship. The matrix is sometimes, but not always, used by the legislature when making budget reduction decisions. For example, when a citizen initiative passed in 2000 led to a drastic reduction in DOT funding, the WSDOT maintenance group proposed cuts to areas lower-priority areas, primarily rest areas and highway lighting. This proposal was not accepted by the legislature, which instead decided on an across the board budget reduction to all activities.

Though the legislature does not always use the Maintenance Priority Matrix to make decisions, the department does use the matrix to shift funds among competing maintenance priorities. Regional maintenance engineers may reserve a portion of the budget for midyear adjustments to individual activity budgets to correct LOS deficiencies in high-priority areas. They also can shift funds from low-priority activities to high-priority underperforming activities, following the Maintenance Priority Matrix. Prior to development of the Maintenance Priority Matrix, maintenance activities were prioritized based on a simple rule of thumb. Those activities closest to the roadway centerline, such as striping and paving, received the highest priority while those farthest from the centerline, such as roadside vegetation control, received a lesser priority.

Challenges and Successes

Performance management is well-integrated into decision-making processes with the department. Contributing factors to WSDOT’s success include:

- **WSDOT Emphasizes Accountability Across the Organization** – Agency culture emphasizes accountability, reinforced by frequent meetings between managers and staff to review performance results. Divisions host quarterly project review meetings to make sure projects are on time and on budget. All results are published in the Gray Notebook; WSDOT’s quarterly performance report to the governor, the legislature, and the public.
- **WSDOT Emphasizes Collecting and Using the Right Measures** – WSDOT continually refines its measures to ensure that they inform decision-making. It has replaced measures that no longer served their original purpose (e.g., replacing LOS with a system throughput measure), and developed fine grained measures that reflect the impact of policy decisions (e.g., measures that register the impact of incident management).
- **WSDOT Integrates Measures into Budget Requests** – At WSDOT, it is routine practice for performance data to accompany budget requests. These data frequently impact legislative decision-making. For example, the budget for the incident response program was increased because of data demonstrating its cost-effectiveness.
- **WSDOT Routinely Evaluates Its Programs** – In addition to collecting baseline data on traffic conditions, WSDOT frequently evaluates the effects of individual congestion-reduction strategies and other types of programs using before-after studies and other methods. This information is used to inform both policy and investment decisions.
- **WSDOT Uses Performance Data at Many Levels of Its Operation** – Performance measure reports are created and tailored to the needs of different audiences within the organization and outside it. For example, congestion data are used on day-to-day basis by traffic engineers at the Traffic Management Center; a detailed operations report is used by managers to make longer-term decisions; and the same data also are eventually used to shape legislative policy. Using data at multiple levels provides a greater opportunity to shape decision-making throughout the organization.
- **WSDOT Recognizes the Limits of Performance Data** – Because performance data are rarely sufficient to demonstrate causality, WSDOT provides accompanying detailed narratives. For example, a missed maintenance LOS target will include information about the rising cost of materials; some performance results include before-and-after analyses. Including analysis and interpretation is critical to provide a complete analysis of an issue and is more compelling than data alone.
- **Performance Reporting Is Not a Spectator Sport** – WSDOT managers indicate that to be successful and meaningful, performance reporting requires ongoing commitment and hands-on involvement of all management levels.

In increasing the usefulness of performance measures in decision-making, WSDOT confronts several challenges:

- **Measures Do Not Demonstrate Causality** - Performance measures typically show the symptoms of a problem, not the cause of a problem. Managers must use their judgment and experience to identify the root causes of their performance findings, potentially injecting subjectivity into the decision-making process. For example, maintenance managers must use their judgment to explain missed maintenance LOS targets (data entry error, rising material costs). WSDOT has tried to overcome this challenge by refining its measures to better show causality and by using tightly quality controlled and scrutinized data and narrative to explain performance results.
- **Measures Are Sometimes Insufficiently Sensitive** - Sometimes existing measures cannot adequately show the results of WSDOT actions. WSDOT is working to develop sufficiently fine-grained measures that demonstrate the impacts of all its operational strategies to reduce congestion.
- **Measures Sometimes Lag Decision-Making** - Though performance measures do inform decision-making, they sometimes lag the decision-making process. They are used to confirm the first-hand experience and judgment of professionals rather than lead them to new conclusions.
- **Measuring Everything Is Not Possible** - The strong department-wide emphasis on performance measurement can have some unintended consequences. Most significantly, the focus on measurement results in pressure to cut programs whose benefits are not easily measured. For example, it is difficult to justify investment in programs such as the public 511 travel information line and web site. These services are used frequently by the public but it is difficult to evaluate their impact on congestion. Similarly, routine agency business, such as updating manuals and conducting staff training, are known to be of value; but their ultimate impact cannot be measured directly.
- **IT Systems and Related Resources Cannot Keep Pace with Data and Analysis Demands of Performance Management** - Developing and expanding performance measurement raises public- and policy-level expectations for continuous and enhanced reporting. The complexity and detail of performance reporting presented in the quarterly Gray Notebook requires ongoing commitment and resources, as well as staff expertise that is difficult to sustain. Capital funding has significantly increased for WSDOT but funding for data and analysis has generally declined. While WSDOT's performance measure and analysis processes have become more sophisticated over time, existing legacy systems have not kept pace with these new demands and often cannot accommodate expanded tracking and reporting needs. Similarly, the MAP process accounts only maintenance outcomes, but cannot show the cost of "buying" a certain LOS. A comprehensive maintenance management system that integrates the MAP process, the existing maintenance management system, and other asset-specific systems (e.g., the culvert management system)

would allow a more precision the estimated cost of achieving maintenance targets, but would require substantial additional funding to develop.

- **Need for Leading and Lagging Indicators** – Many of WSDOT’s metrics are focused on lagging conditions, such as maintenance LOS, the measure of which captures the impact of actions taken in the past. Lagging indicators are not good predictors of future funding needs. For example, it might take several years before a sharp increase in the cost of asphalt shows up as reduced pavement LOS. Although there would be a real need for additional funds for asphalt cost increases, it would be difficult for WSDOT to make this case based solely on LOS results. Understanding the relationship between leading and lagging indicators is an important step to developing a performance.

Case Study Interviews

The following individuals were interviewed for this case study:

- Daniela Bremmer, Director, WSDOT Strategic Assessment Office;
- Clint McCarthy, Performance Reporting Manager, WSDOT Strategic Assessment Office;
- Rico Baroga, Maintenance Accountability Process Manager, WSDOT Office of Maintenance and Operations;
- Shuming Yan, Technical Services Manager, WSDOT Urban Planning Office;
- Pat Morin, Systems Analysis and Priority Programming Manager, Systems Analysis and Program Development Office; and
- Ted Trepanier, WSDOT State Traffic Engineer.

WSDOT has recently reported on several of their practices at the Transportation Research Bureau annual conference. Some key resources include:

- A TRB paper titled *Making the Case for Funding* on WSDOT’s experience in project delivery measurement and reporting and regaining public confidence: http://www.wsdot.wa.gov/NR/ronlyres/03F8B4DE-F2AE-4383-9669-BD92C849D1B2/0/2007_TRB_Funding.pdf.
- A TRB paper titled *Maximizing Highway System Capacity: Measuring and Communicating System Performance in an Evolving Field*:
- http://www.wsdot.wa.gov/NR/ronlyres/464B9718-C441-470E-9E83-C9F0D3F1D238/0/2007_TRB_Measuring_System_Performance.pdf.

4.5 FLORIDA DOT

Background

The Florida Department of Transportation (DOT) is a decentralized agency, employing nearly 7,500 people in seven districts, a central office, and Florida's Turnpike Enterprise. The agency oversees a state highway system of over 41,000 lane-miles and 6,000 bridges, and has an annual budget of nearly \$8 billion. The agency's decentralized structure means that districts are organized and structured differently, and the most detailed funding allocation decisions are made at the district level. The agency's Work Program is developed through a two-way planning and input process between the MPOs, districts, and central offices. The Florida Transportation Commission (FTC) and the legislature provide top-down statutes and performance standards to guide the process.

History of Performance Management

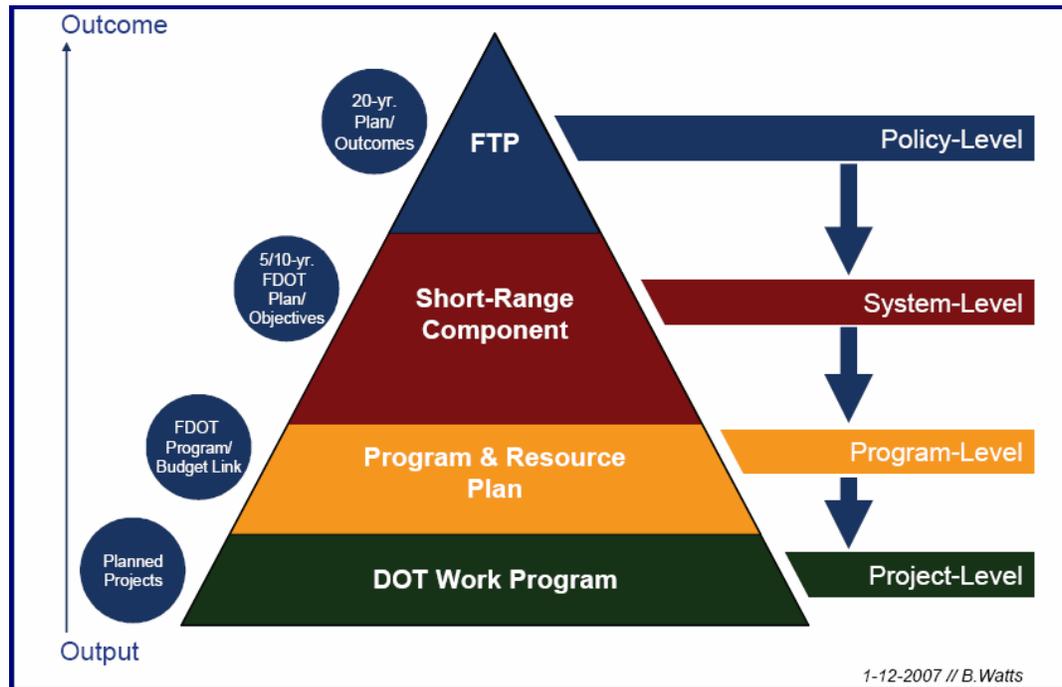
Performance Measurement Framework

The Florida Department of Transportation's Performance Measures Framework (Figure 4.8) follows the same relationships as the State's planning framework. It begins with the Florida Transportation Plan (FTP), composed of a 20-year policy plan and a detailed Short-Range Component with a 5- to 10-year planning horizon. The long-range component of the FTP contains five broad goals:

1. A safer and more secure transportation system;
2. Enriched quality of life and responsible environmental stewardship;
3. Adequate and cost-efficient maintenance and preservation of transportation assets;
4. A stronger economy through enhanced mobility for people and freight; and
5. Sustainable transportation investments for Florida's future.

These five goals are supported by 29 long-range objectives. However, the FTP does not identify targets or performance measures. Quantitative targets are defined in the Short-Range Component, which replaces the 29 long-range objectives with 13 short-range objectives tied to quantifiable performance measures. These objectives span four of the five goal areas (there are no measures for the goal of "enriched quality of life and responsible environmental stewardship"). All of the measures are outcome-oriented with the exception of one output measure related to the Florida Strategic Intermodal System (SIS), which has its own performance-based funding allocation process (see discussion of the Strategic Investment Tool below).

Figure 4.8 Florida DOT Performance Measures Framework



Next in the top-down progression of Florida's planning framework are the 10-year Program and Resource Plan and the 5-year DOT Work Program. These two documents are created in tandem, and the lead central office in this process is the Program and Resource Allocation Office, within the Office of Financial Development.

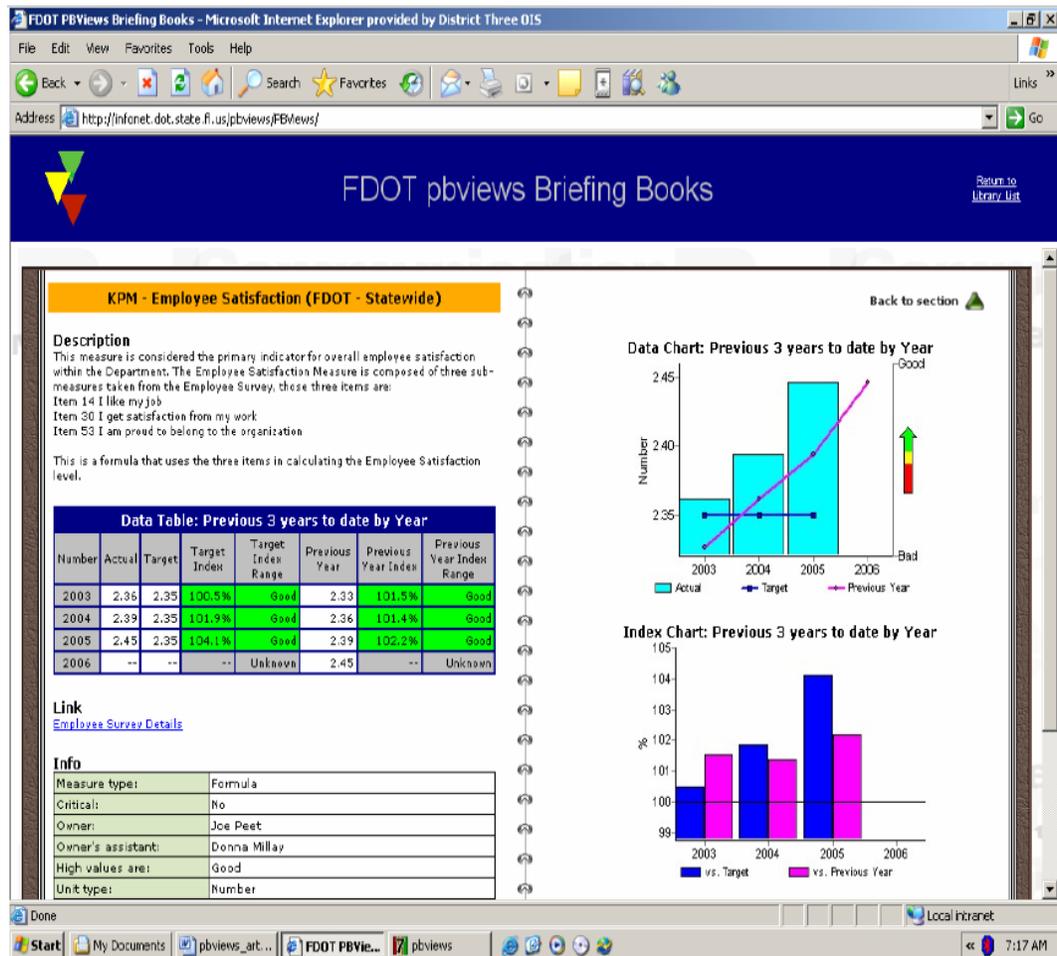
pbviews

In 2006, FDOT's Executive Board adopted a resolution requiring all performance measures to be stored in a single location. *pbviews* is the software package that the Florida DOT utilizes to manage and present the agency's numerous performance measures. Deployment of new performance measures and the transition to centralized storage of all measures in *pbviews* is still ongoing. The system stores measures in a hierarchical system, and also distinguishes between statewide measures and several geographic strata, such as districts and individual office/facility locations. Atop the performance measurement hierarchy are the DOT's five key performance measures (KPM):

- Transportation system safety;
- Customer and market focus;
- Production performance;
- Transportation system performance; and
- Organizational performance.

The KPMs are aggregate measures that organize primary and secondary tiers of measures. For example, the Production Performance KPM consists of 3 primary measures (construction, production management, and cost estimate measures) and 12 secondary measures. Each primary and secondary measure is assigned a relative weight as the measure data are entered into *pbviews*. The system allows viewers to examine each primary measure, secondary measure, and KPM by individual locations or statewide. Figure 4.9 shows a sample *pbviews* Briefing Book for a KPM. Targets are set by a variety of different groups. Some high-level performance measures, particularly in the areas of highway maintenance, Strategic Intermodal System (SIS) funding, and transit funding are set by the state legislature. The remaining primary targets are set by the Executive Board, and secondary measure targets are set by the program offices and the districts (“measure owners”).

Figure 4.9 Example of a *pbviews* Key Performance Measure “Briefing Book”



Note: The Key Performance Measure shown here, *Employee Satisfaction*, is no longer its own KPM.

Linking Performance Measures to Decision-Making

Program and Resource Plan and DOT Work Program Development Process

The annual cycle of updating the Program and Resource Plan and the FDOT Work Program is the main point of feedback into the resource allocation process. The plan update process kicks off in July of each year, and includes adding a new fifth year to the Work Program, adding a new 10th year to the Program and Resource Plan, and making other necessary revisions to existing years in the plan horizons, particularly in the areas of pavement and bridge maintenance. In preparation for Executive Board planning meetings, the Program and Resource Allocation Office assembles available transportation system performance data and summarizes the data in information packets. The data in the packets are supplied by the measure owners by way of the *pbviews* measurement and analysis system. The Program and Resource Allocation Office supplements performance data extracted from *pbviews* with more in-depth quantitative analysis, tables, and figures.

Resource allocation decisions are made by the department's Executive Board, which is comprised of the department secretary, three assistant secretaries, the district secretaries, and numerous program heads. Allocations are driven by a number of output- and outcome-oriented performance targets required by statute, including:

- Eighty percent of pavement on the State Highway System meets department standards;
- Ninety percent of FDOT-maintained bridges meet department standards;
- One hundred percent of the State Highway System meets acceptable maintenance standards;
- Fifteen percent of discretionary capacity funding must be used for transit projects; and
- Fifty percent of discretionary capacity funding must be applied to the Strategic Intermodal System (the department's own performance target for this is 75 percent.)

As the above targets are mandated by state law, meeting them is the department's first priority. Maintenance is funded off the top, and determining the standards against which these measures are applied is the Executive Board's responsibility. Revisiting these standards is one of the first steps in the Program and Resource Plan and Work Plan update process. In the most recent update, the resurfacing standard for road segments with speed limits of 45 mph or less was reduced in an effort to emphasize maintenance on higher-speed roadways.

Preservation of the State's pavement and bridge assets is an area where the link between past performance and ongoing resource allocation is especially strong. The maintenance performance reports prepared by the Program and Resource

Allocation Office include detailed data on statewide and district-by-district trends, including breakdowns by maintenance types and roadway classifications. The Resurfacing report, for example, specifically highlights the relationship between the percentage of the system resurfaced in each year (by district and roadway type) and overall pavement quality, as well as the trends in maintenance costs (Figure 4.10). These past trends directly influence future year output targets and cost assumptions used in the budgeting process.

Figure 4.10 FDOT “Resurfacing Program” Report
Sample Figures

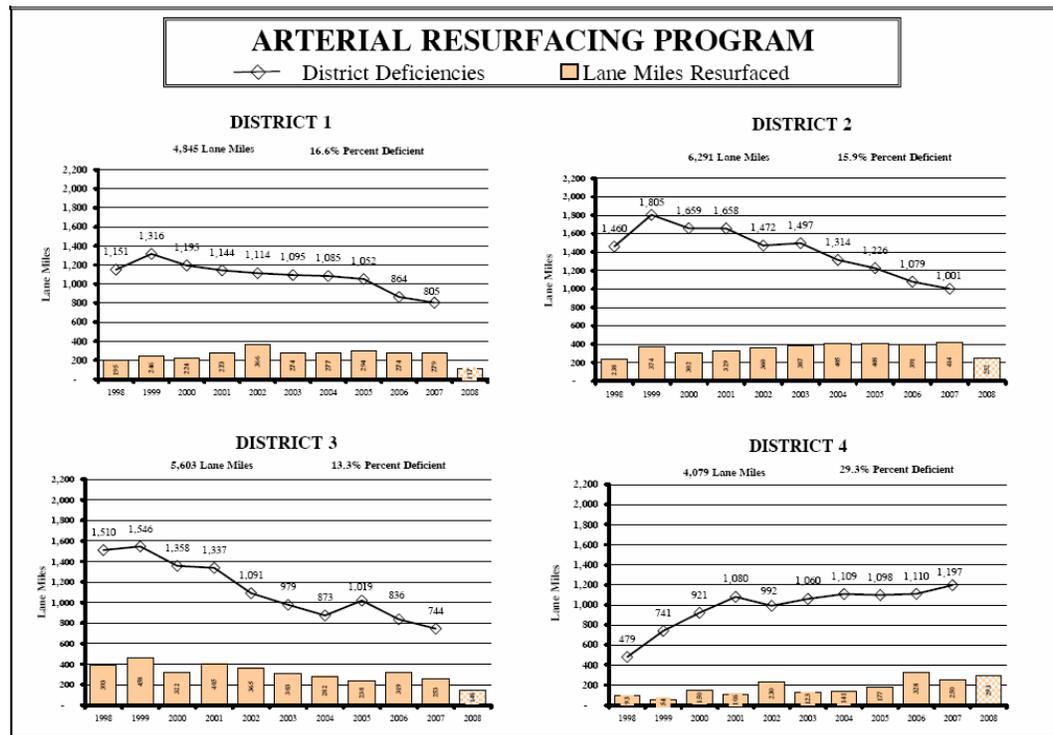
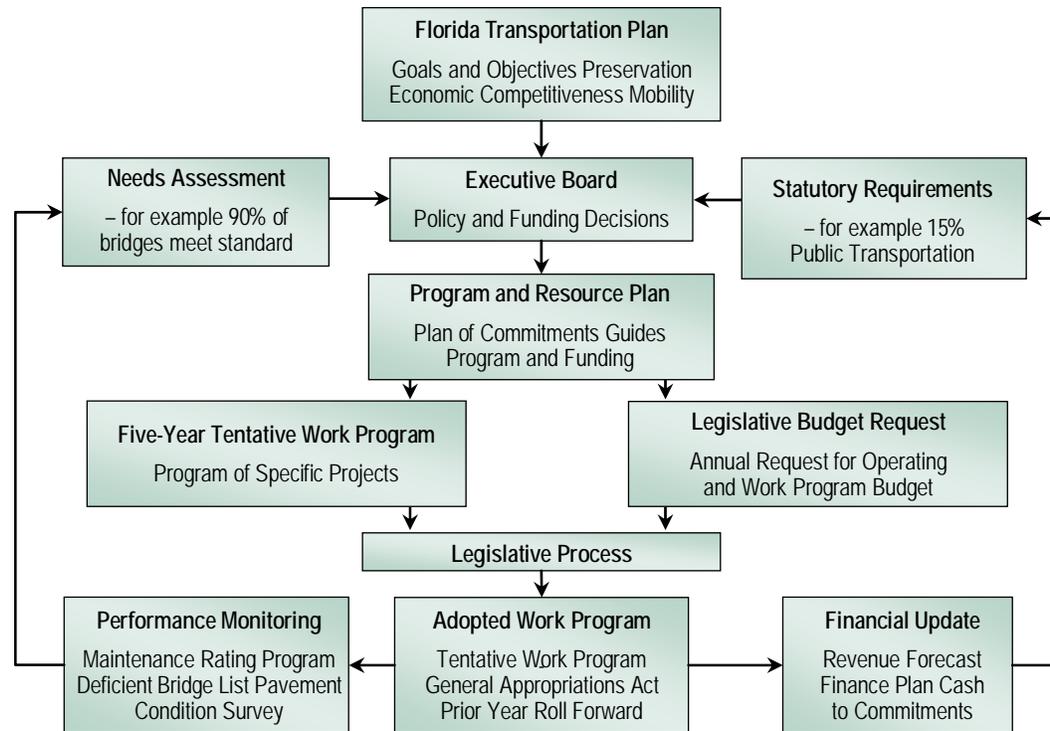


Figure 4.11 FDOT Work Program and Program and Resource Plan Development Process



Source: Program and Resource Allocation Office, Florida DOT.

Allocations for preservation and maintenance are determined statewide by forecasting the number of lane-miles of resurfacing, bridge replacements, and so forth, necessary to maintain minimum standards, and applying those values to cost factors to determine necessary funding levels. Other capital expenditures are determined primarily by the district offices, in consultation with local governments and MPOs. The DOT central office oversees funding for bridge replacements and the Strategic Intermodal System (SIS).

The bulk of project-specific funding decisions, including maintenance, are made at the district level. By statute, discretionary capacity funds not allocated to the SIS are distributed to the districts according to a formula that applies equal weight to population and fuel tax revenues. The Program and Resource Plan dictates the distribution of funds to different program areas, but beyond that, it is primarily the responsibility of highly autonomous district offices to manage those funds.

SIS Strategic Investment Tool

By statute, as well as department policy, the majority of discretionary capacity funds are allocated to the Strategic Intermodal System, a statewide system of high-priority highways, rail lines, ports, terminals, and intermodal facilities. SIS project funding allocations are determined by the DOT central office in consultation

with the districts. The Strategic Investment Tool (SIT) was developed as a method for prioritizing SIS highway and connector projects. Managed by the Systems Planning Office, the SIT uses 25 weighted prioritization criteria that fall within five main categories: 1) safety and security; 2) system preservation; 3) mobility; 4) economics; and 5) quality of life. The SIT is applied to both state-wide projects and district-level funding decisions. The criteria used in SIS project prioritization are shown in Table 4.3. These performance measures are to be reported in *pbviews*, combining and expanding upon the primary and secondary measures that constitute the five KPMs.

Table 4.3 SIS Strategic Investment Tool Prioritization Criteria

Goal Measures	Measure	Maximum Score
Safety and Security	Crash Ratio	10
	Fatal Crash	4
	Bridge Appraisal Rating	3
	Link to Military Base	3
	Possible Subtotal	20 points
System Preservation	Volume/Capacity (v/c) Ratio	10
	Truck Volume (AADTT)	6
	Vehicular Volume (AADT)	2
	Bridge Condition Rating	2
	Possible Subtotal	20 points
Mobility	Connector Location	1
	Volume/Capacity (v/c) Ratio	4
	Truck Volume (Percent Trucks)	2
	Vehicular Volume (AADT)	2
	System Gap	2
	Change in v/c – LOS (Mainline segments only)	3
	Interchange Operations (Interchanges only)	
	Bottleneck/Grade Separation	2
	Delay	4
Possible Subtotal	20 points	
Economics	Demographic Preparedness	5
	Private Sector Robustness	5
	Tourism Intensity	5
	Supporting Facilities	5
	Possible Subtotal	20 points
Quality of Life	Land and Social Criteria	4
	Geology Criteria	4
	Habitat Criteria	4
	Water Criteria	8
	Possible Subtotal	20 points
Total Maximum Score		100 points

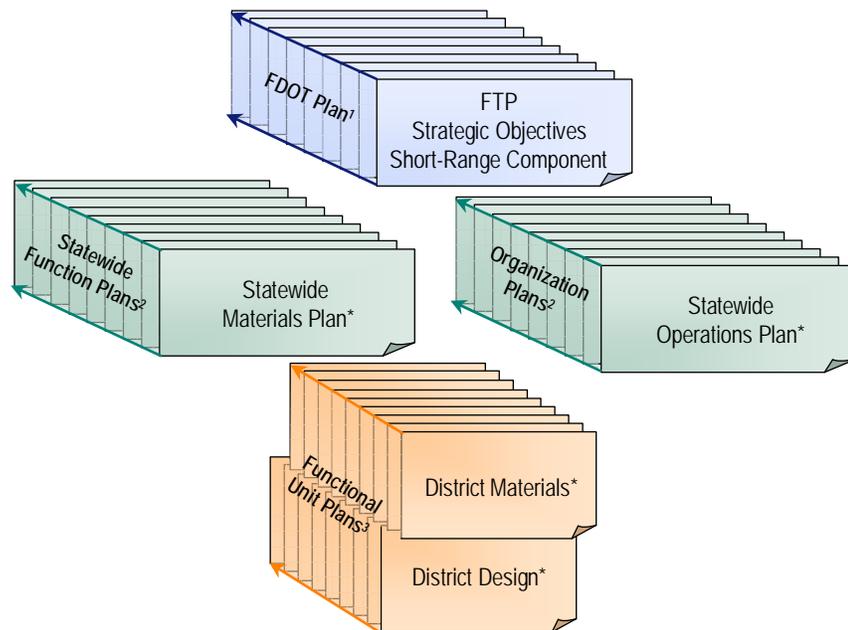
Tiered Business Plans

Florida DOT has long promoted a highly decentralized management structure that gives considerable independence to district secretaries. This results in wide

variations in the funding priorities and decision-making processes among different districts, and can pose a challenge to implementing a centralized performance management structure. Florida DOT's five-tiered Business Plan seeks to maintain accountability and transparency for processes that may not be standardized across the department. Developed as a system for implementing the department's Business Model (based on the National Baldrige Criteria for Excellence), the Business Plan attempts to link together all of the department's statewide objectives, statewide business functions, organizational units, district functional units, local offices, and individual employees under a single set of criteria and toward a unified goal of advancing the department's strategic goals.

The first three tiers of the Business Plan are illustrated in Figure 4.12. Tier 1 (the "FDOT Plan") incorporates all of the statewide planning documents, such as the Florida Transportation Plan, the Short-Range Component, and the Strategic Plan. Tier 2 plans include Statewide Function Plans (business plan for each of functions, such as Planning, Construction, etc.) and Organizational Plans (plans for each district). Only one Tier 2 functional plan has been completed to date (Design). Tier 3 Plans isolate functions at the regional level (District 4 Construction, District 6 Materials, etc.). The final two tiers are Tier 4, which consists of plans for each individual office, maintenance facility, etc., and Tier 5, which consists of a plan for every Department employee. As of 2007, all business plan tiers were phased in.

Figure 4.12 Florida DOT Business Plan Tiers 1 through 3



Note: Plans shown are example plans. Plans are conducted for each division and unit.

Each subordinate tier must be reported to and approved by the appropriate manager on a quarterly or biannual basis, with the exception of Tier 5 employee

plans, which are evaluated as part of the annual employee review cycle. For consistency and to encourage linkages, Tiers 1 through 4 are completed using the same form (Figure 4.13), which calls for Objectives, Activities, Performance Measures, Targets, Progress, and Responsible Parties, all in the context of the department’s seven Business Model Criteria. According to instructions published by the DOT Performance Management Office, “Sources of Existing Measures may be laws, rules, regulations, procedures, process maps, the Key Performance Measures established by the Executive Board, etc.” Offices are not obligated to conform to department-wide standards for all performance measures, but they are required to demonstrate accountability for all of their functions.

Figure 4.13 FDOT Standard Business Plan Format

BUSINESS PLAN Function/Office: Tier:						
CRITERIA AREA	OBJECTIVES	ACTIVITIES	PERFORMANCE INDICATORS (Measures)	TARGETS (% , #, Score, Timeframe, etc.)	PROGRESS (CURRENT STATUS)	PERSON(S) RESPONSIBLE
MISSION						
VISION						
1. LEADERSHIP						
2. STRATEGIC PLANNING						
3. CUSTOMER & MARKET FOCUS						
4. MEASUREMENT, ANALYSIS, KNOWLEDGE MANAGEMENT						
5. HUMAN RESOURCE FOCUS						
6. PROCESS MANAGEMENT						
7. ORGANIZATIONAL RESULTS						

Tier 5 of the Florida DOT Business Plan describes the department’s expectations of each individual employee, and how those expectations relate to the higher tiers of the Business Plan. This linkage is the connection between Tiers 3 and 4 and the Employee Performance Accountability and Bonus System (EPABS), the agency’s on-line employee performance review program. One section of the EPABS program, titled “work activities expectations,” forms the basis for Tier 5. The Tier 5 document is supposed to take those expectations and articulate how they relate to the objectives in Tiers 3 and 4. Specifically, employees are required to know the Tiers 3 and 4 objectives, the performance measures and targets are used to advance those objectives, and their role (and associated performance measures) in meeting those objectives.

Challenges and Successes

Performance-based resource allocation is an evolving practice at Florida DOT. FDOT has long been recognized as a leader in performance measurement across

many of its business functions and is developing and strengthening the link between performance measures and decision-making. Conversations with several FDOT staff and others familiar with department processes have highlighted a number of challenges that the agency is working to overcome as it seeks to improve the link between performance measurement and funding allocation decisions.

- **Florida DOT Has Prioritized Maintenance and Preservation** – Statutory requirements for quality pavement, bridge, and overall state highway system conditions have fostered an environment where expectations are known in advance and are consistent from year to year. Several interviewees commented on the fact that these statutory requirements, and off-the-top funding for maintenance, have cemented Florida DOT’s commitment to putting preservation first. Given the consistency of this commitment, the Program and Resource Office has developed a highly successful process for projecting future output requirements and cost assumptions based on past performance. Accurate projection of funding requirements for these off-the-top programs sets the tone for overall success in the budgeting process.
- **Florida DOT Is Improving Performance-Based Accountability in a Decentralized Environment** – The Florida DOT is decentralized to the point that different districts do not necessarily follow the same management structures or contain all of the same program offices as one another. This promotes innovation among district secretaries and senior managers, and allows for district-specific solutions to regional issues, but it also poses an inherent challenge to maintaining a consistent, performance-based management and resource allocation system. Florida DOT has worked hard to mitigate these challenges. The tiered Business Plan is a key contributor to the unification and alignment of agency goals. The five tiers were created with the idea that “Information and requirements flow from Tier 1 to Tier 5 ... while feedback, supported by measures (facts), flows upwards.”⁷ Implementation of *pbviews* as a centralized clearinghouse for performance measures also has played an important role. With these tools and strong leadership from the central office and the districts, Florida DOT has introduced clear accountability linkages that connect the agencywide business model to each and every employee, even in the reality of differing district priorities and management styles.
- **Florida DOT Is Still Dealing with Uneven Performance Measure Quality and Targets** – Statutorily mandated performance targets for roadway and bridge maintenance have resulted in great stability in the way that those programs are funded, with future funding decisions clearly linked to past performance. Funding decisions for other program areas are less clearly linked

⁷ From “Building and Linking the Tiers: Understanding the DOT Business Plan,” prepared by the Performance Management Office, April 2006.

to performance. This is most apparent when examining the Short-Range Component of the Florida Transportation Plan, which lays out the quantifiable targets by which all programming decisions are to abide. For example, the goal of “A Safer and More Secure Transportation System” presents safety data across all modes, including rail (and highway-rail grade crossings), seaports, and airports, but offers performance targets only for highway, pedestrian, and bicycle safety. Similarly, the goal of “Enriched Quality of Life and Responsible Environmental Stewardship” does not include any performance targets in the Short-Range Component, but rather presents a number of “Strategies.” One such strategy is use of the Efficient Transportation Decision-Making (ETDM) process, the State’s GIS-based collaborative environmental review process. ETDM is not a tool for making resource allocation decisions per se, so the connection between project selection and specific agency goals remains unclear.

There are many more measures available than those described in the Short-Range Component, including a number of measures that are associated with the agency’s Key Performance Measures and that have stated targets articulated in the *pbviews* system. However, it is not clear how these measures and targets relate to the Florida Transportation Plan, which is the statewide guiding document for transportation decision-making. This may also be partly a function of performance targets being set by program managers at the district level, rather than statewide.

- **Florida DOT’s Performance Measure Framework Is Still Incomplete** - In some cases, performance targets have not been created because associated performance measures are not yet available. In the mobility area, for example, several interviewees identified the lack of well-defined and data-supported travel-time reliability measures and targets. This is an area that Florida DOT is actively working to develop.
- **Performance Measure Ownership Is Sometimes Poorly Defined** - One challenge identified by a number of interviewees was the lack of well-defined ownership of the performance measurement and reporting infrastructure at FDOT. For example, the Program and Resource Allocation Office is responsible for preparing information packets to be used in the plan development cycle, but that office is not responsible for reporting performance data (this is the responsibility of the program offices) nor for maintaining performance measure databases. This latter role is performed by the Performance Management Office, which manages *pbviews*. *pbviews* also is not fully implemented yet, and some measures are not yet reported through that system. Additionally, other performance measure-related activities do not utilize *pbviews*, including the Florida Transportation Commission’s annual Production and Performance Report (an independent oversight report prepared using data primarily supplied by the DOT).

This challenge might be characterized as a side effect of attempting to transition to a more robust performance reporting system in *pbviews*, and of

Florida's highly decentralized business model. As *pbviews* is more fully deployed, it may become more efficient and could achieve greater recognition as a clearinghouse for performance data across all districts and programs. Full implementation of Florida DOT's five-tiered business plan system plays an important role as well, as it requires districts and program offices to identify performance measures and targets for all goals and objectives, regardless of how that performance data is collected and where it is stored.

Case Study Interviews

The following individuals were interviewed for this case study:

- Bob Romig, Cambridge Systematics, Inc. (former Director, Office of Policy Planning, Florida DOT);
- Christie Holland, Program and Resource Allocation Manager, Florida DOT;
- Rick Creamer, Supervisor, Program Plan Development, Florida DOT; and
- Anita Vandervalk-Ostrander, Cambridge Systematics, Inc. (former Manager, Central Statistics Office, Florida DOT).

4.6 PACE SUBURBAN BUS SERVICE

Background

Pace, one of three transit agencies under the Regional Transit Authority (RTA) of northeast Illinois, began operation in its current administrative form in 1984. Pace is a unique transit agency because, although it operates in the third-largest metropolitan area in the United States (Chicago), the service focuses almost exclusively on the suburbs, with only a few routes actually entering the city of Chicago. Pace operates 240 fixed bus routes, serving 210 communities across a service area of over 3,500 square miles, with a resident population of 5.4 million.⁸ Feeder services connect to 122 Metra (commuter rail) and 25 CTA (Chicago rapid transit) stations. The Pace service area is divided into nine operating divisions, each with its own garage and operations staff.

Given the challenges that are inherent to operating a suburban transit system, Pace is under constant pressure to provide services that are both comprehensive and cost-efficient, with the dual missions of connecting suburban communities and providing feeder service to Chicago-bound commuters (and, increasingly, reverse commuters). This has led Pace to become an industry leader in the collection and integration of performance data into the ongoing process of service planning and evaluation. Today, the agency uses a number of software tools to

⁸ http://www.pacebus.com/sub/about/history_facts.asp.

collect real-time service data, compile reports, inform dispatchers and the public, monitor route performance, perform service planning, address customer complaints, and more.

Performance Management History

Pace's efforts in performance management revolve around data systems that are used to monitor system performance and conduct service planning, including:

- **HASTUS** - This is a widely used modular transit management software package, capable of everything from route planning to personnel management. Pace uses the route planning and scheduling optimization modules.
- **Cubic** - Also widely deployed in the transit industry, this automated fare collection system records payment and fare data from fareboxes. Previously, Pace used Cubic to control the farebox interface, which in turn controlled the bus destinations signs. These functions are now controlled by the Intelligent Bus System (see below).
- **Intelligent Bus System (IBS)** - Managed through the Siemens TransitMaster software package, the IBS encompasses numerous on-board and operations management functions. TransitMaster brings together data from a number of different sources, including route data from HASTUS; a GPS-based Automatic Vehicle Location System; as well as detailed passenger count data. These data are linked and automatically uploaded to most vehicles, allowing unique functionality such as automatic transit signal priority and automatic communication between buses regarding transferring passengers.

This is only a partial list. Pace maintains other databases and software tools, including the Computer-Aided Dispatch system; a Route Profile tool that uses data from various sources to provide a comprehensive snapshot of every Pace route; safety/accident databases; fuel logs; cleaning logs; and others. Many of these systems exchange data between one another, and Pace produces several monthly and quarterly reports that combine data from these many sources into an integrated and useful form for performance tracking purposes. A few examples of regular reports include:

- **Quarterly Route Review** - This report compares route performance on a quarterly basis, and includes Action, Review, and Watch lists that identify underperforming routes in terms of a number of metrics (Tables 4.1 and 4.2). These performance measures are derived primarily from IBS, Hastus, and farebox data. Routes that fail to meet two of the four primary performance standards appear on the Review List, while those that fail at least three of the four primary standards appear on the Action List. The Watch List contains any route that fails to meet any one of seven performance standards (primary and secondary) or that lost more than 20 percent ridership over the preceding quarter.

Table 4.4 Pace Action and Review List “Primary Standards” for Fixed Bus Routes

Service Type	Productivity	Subsidy per Rider	Recovery Ratio	Cost per Vehicle Mile
CTA Connector	14.5 weekday/15.0 weekend	\$4	18%	\$6
Intra-Community	11.3 weekday/11.8 weekend	\$5	18%	\$6
Suburban Link	9.4 weekday/10.4 weekend	\$5	18%	\$6
Metra Feeder	13.7 weekday only	\$5	18%	\$6

Note: Productivity target for each category is 50 percent systemwide average for that category. Routes missing two of the above targets are on the “Review List,” those missing at least three are on the “Action List.”

Table 4.5 Pace Additional Watch List Standards for All Service Types

Passengers per Revenue Mile	Cost per Passenger	Cost per Revenue Hour
0.60	\$7	\$125

Note: Routes falling below any one of the three standards listed in the table above or in the previous table, or whose ridership drops 20 percent over the previous quarter, appear on the “Watch List” for that quarter.

- Monthly Ridership Report** - This report is a more detailed version of the quarterly report and provides additional information on operations, including: service levels, ridership, revenue, expenses, fuel usage, detailed labor cost data, complaints/grievances, accident rates, lift usage, detailed fare payment data, and on-time performance. Information is provided at both the system and division levels.
- Route Profile Tool** - This interactive Microsoft Excel workbook allows analysts to retrieve detailed operating data for any Pace bus route, such as ridership, revenue, and vehicle miles and hours, and 10 performance indicators (see screenshot below). It also details the route’s historical performance using its quarterly appearance on Review, Action, and Watch lists over the preceding six years. A notes section for each route profile provides a place for planners to include other important information, such as schedule changes, reroutes, or the initiation or cancellation of service. Figure 4.14 presents a screenshot from this tool.

Figure 4.14 Screenshot from Pace Route Profile Tool Interface

Pace Route Profile 3rd Quarter 2007

Enter Route # Here
Route: 610 **River Road - Prairie Stone Express** **Date:** 8/3/1992

Provides weekday rush hour express service between the Rosemont CTA Blue Line Station and Sears at Prairie Stone Business Park.

Days of Service: Weekdays Saturdays Sundays **Cust. Satisfaction Survey Results** [N-12007.C](#)

Operates Minority Service: **Peak Headway:** 25 **On-Time Performance:** NA

Fare Type: Regular / Express **Route Type:** Regular **Service Type:** CTA Connector

Operated by: Pace Northwest **Link to Map:** <http://www.pace/> **Link to Schedule:** <http://www.p>

Planner: Adam Analyst: Linda Scheduler: John

This route serves the following communities: Hoffman Estates, Rosemont, Chicago.

Route operates in portions of the following counties:

Chgo Cook	Sub Cook	DuPage	Kane	Lake, IL	McHenry	Will	Lake, IN
100.00%							

Weekdays:

Core Service	Yes	No										
	X											

This service is performing poorly and is on the review list.

HISTORICAL PERFORMANCE - A=Action List, R= Review List, W = Watch List

	2002	2003	2004	2005	2006	2007	2008
1ST Quarter					R		
2ND Quarter				R	W		
3RD Quarter				R	R	R	
4TH Quarter				R	R		

Trips operating from: 5:48 **to** 18:10 No midday Service.

Ridership Trends

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
2006	233	217	253	252	295	256	268	254	256	260	255	227
2007	280	253	248	237	294	327	296	275	253	278	239	
2008												

3rd Quarter 2007 Performance

Revenue per Rider	PAX per Rev Hr	PAX per Rev Mile	Cost per PAX	Subsidy per PAX	Recovery Ratio	Estimated Cost	Estimated Revenue	Cost per Rev Hr	Cost per Veh Mile
\$0.75	19.78	0.56	\$5.26	\$4.51	14.3%	\$1,446	\$206	\$104.01	\$2.15

Linking Performance Measures to Decision-Making

Pace’s service area includes many rapidly growing communities, and commuting patterns throughout the Chicago metropolitan area are continually shifting. These shifts include a marked increase in suburb-to-suburb commutes and city-to-suburb reverse commutes over the past several decades. In order to ensure that fixed route bus services continue to best meet the needs of residents and workers throughout suburban Chicagoland, planners at Pace regularly examine and reevaluate the agency’s services. This is accomplished through periodic review of the performance reports described above and through comprehensive district-by-district restructuring initiatives.

Managers and the Pace Board of Directors regularly review system performance reports in order to stay abreast of service issues and the overall performance trends at the agency. The board meets monthly, and review of performance

measures is an important part of the agenda. The board makes decisions regarding service changes, and while there are no strict criteria for the elimination of a route, the Action, Review, and Watch lists generated in the quarterly reports are a significant determinant.

When evaluating a route for possible restructuring, dispatchers are instructed to deploy APC-equipped vehicles on that route as frequently as possible, enabling the collection and analysis of stop-by-stop passenger count data. Planners also have the ability to examine schedule adherence and on-time performance at any level of aggregation, down to individual trips and at each stop along a given route. All of these data are compiled and analyzed in a flexible GIS environment that allows planners to identify critical locations served by a route, locations, and causes of persistent delays, and so forth. Such information improves planners' ability to restructure routes or make schedule adjustments that improve the quality and reliability of Pace services.

Operations

IBS technology described above also has helped Pace identify and respond to emerging problems in the area of operations. For example, the AVL system provides both long-term performance data and allows dispatchers to be more responsive to issues on the road that may affect service. It also allows managers to better investigate and verify customer inquiries and complaints about service. The system also automatically alerts bus operators if they accidentally deviate from their routes, reducing the delay caused by such errors. IBS data reports allow managers to examine schedule adherence by driver, enabling them to identify whether some drivers have greater difficulty maintaining satisfactory on-time performance. For buses with passenger counters installed, dispatchers can monitor passenger loads in real time and anticipate resulting delays or service disruptions.

Future Expansion of Performance Management at Pace

The following is a list of some additional performance-based management approaches that are planned at Pace:

- **Transit Operations Decision Support System (TODSS)** - One challenge encountered by Pace dispatchers is the sheer volume of data available to them with the deployment of IBS and other real-time data systems. To overcome this challenge, Pace currently is working with consultants to develop the TODSS, a more user-friendly, dashboard-type visual interface for dispatchers to better use IBS data that comes in from in-service vehicles. The system would include an automated system of menus to assist dispatchers in responding to emergencies and other incidents such as vehicle breakdowns or special events.
- **Additional Performance Targets or "Benchmarks"** - Planners at Pace currently are working to develop additional performance targets to use as

benchmarks in evaluating the wide array of performance data now available through IBS. Such benchmarks would likely vary by route type, as they do now. New benchmarks would require approval of the board of directors, and thus, are not publicly available at this time.

- **Performance Management of Paratransit and Vanpool Services** - Currently, IBS data are only collected on fixed route vehicles. Some similar data, such as ridership and lift usage, are collected on paratransit and vanpool vehicles, but those vehicles currently lack the automated “intelligent” equipment installed on buses, and similar benchmarking and performance measurement frameworks have not yet been developed. Integrating paratransit and vanpools into Pace’s performance-based management approach that currently applies to fixed route service is an important challenge for Pace.
- **Integrating with RTA Performance Measures** - The RTA, Pace’s parent agency, is in the process of developing systemwide performance measures and benchmarks. Planners and executives at Pace are planning to work with the RTA with the goal of compatibility and interchangeability of Pace and RTA performance measures and benchmarks.

Challenges and Successes

Some of the successes experienced by Pace, include:

- **Pace Implemented Its New System Smoothly and Took a Proactive Approach to Addressing Employee Concerns** - One challenge that Pace management had to address with the implementation of the IBS technology framework was how the agency’s drivers would react to and interact with the system. Many drivers were initially wary of the system because of a perception that they were being spied on by their managers, and many also had difficulty properly operating the system. Comprehensive training simultaneously mitigated both of these challenges. Today, even long-time employees appreciate the system because of the numerous automated functions that relieve drivers of a number of responsibilities, such as fare collection, stop announcements, and destination signs. Drivers also have benefited from dispatchers’ use of IBS data to investigate customer complaints. For example, because IBS data frequently shows that drivers are not responsible for an alleged missed stop or early departure, drivers no longer need to hear or respond to many such complaints.
- **Pace Is Better Equipped to Analyze and Solve Service Issues** - IBS data and HASTUS planning tools have assisted Pace to not only identify chronic schedule adherence issues, but also to quantify what it would take to return chronically late routes to an acceptable on-time performance. Sometimes, the solution is modification of a route or timetable, but in other cases, the solution is to add additional buses and runs to a route and provide greater schedule cushioning. Pace staff planning staff indicated that prior to the advent of better operations monitoring through IBS, there were routes that

were known to be virtually incapable of remaining on schedule. Improved data and analysis tools have allowed these problems to be quantified and potential solutions identified.

- **Pace Has Found That Knowing the Solution Does Not Always Translate to Implementing It** – A concern among many transportation agencies implementing performance measurement is the feeling that better monitoring sometimes brings more problems to light, giving the false impression that things are getting worse. At Pace, a related issue is the fact that greater analysis of the *cause* of service problems does not always empower the agency to correct them. Although IBS and HASTUS planning tools have enabled the agency to quantify the changes needed to improve service, limitations in funding, staff, and equipment often prevent Pace from actually implementing these necessary changes. This highlights the fact that better data is only half of the solution.
- **Pace’s Reputation in the Regional Planning Community Has Greatly Improved** – A positive side effect of the deployment of IBS at Pace has been its impact on the agency’s regional profile. Pace provided IBS-derived data to the RTA for that agency’s strategic planning initiatives, and Pace has generally experienced positive relationships with the municipalities in its service area. Local officials now regularly approach planners at Pace for assistance in local service planning, and most municipalities demonstrate a great deal of deference and trust in the judgment of Pace planning staff in making service decisions that impact their communities.

Case Study Interviews

The following individuals were interviewed for this case study:

- Lorraine M. Snorden, Manager, Department of Planning Services, Pace;
- Mike Bolton, Deputy Executive Director for Strategic Services, Pace;
- Patricia Santillan, Operations Analyst, Department of Planning Services, Pace; and
- John Braband, Manager, Department of Operations, Pace.

5.0 Guidebook Findings

The Guidebook developed for this project is organized around four broad insights and numerous specific examples of transportation agencies that are implementing transportation performance management programs. The guidebook is intended to provide transportation agencies with insights that will help them as they craft solutions to their unique challenges and address their agency's specific goals.

Every transportation agency is a unique combination of existing organizational structures, geographic and demographic circumstances, and history. As such, it is not intended that a transportation agency would apply the insights from this guidebook as a whole. Instead, the guidebook provides a menu of approaches that individual agencies can adapt to their specific circumstances.

The guidebook is organized around four broad insights and numerous specific insights from transportation agencies that are implementing performance management initiatives. The four broad insights from the research are:

- **Performance management helps an agency focus.** When initiating a performance management system, it is vital to focus measurement efforts on the agency's highest priorities. Successful performance management initiatives are typically born out of specific agency challenges, rather than an interest in improving management. These programs use an incremental, responsive, and transparent approach to build and grow their performance management systems. As performance management programs grow and evolve, agencies can use measures to identify and to diagnose additional challenges.
- **Performance management must engage with employees.** Employees are the lifeblood of a transportation agency and any new management initiative will only be as successful if all levels of employees are included in the process. One focus of performance management is on improving the efficiency of transportation agency operations. Efficient operations require employees to understand the challenges that the agency faces and the program that the agency is initiating to address those challenges. Performance management should ensure that all staff are accountable for system performance.
- **Performance management increases customer satisfaction.** Performance management requires transportation agencies to think of the users of the transportation system as customers and to work to understand their perspective when developing both transportation programs and the measures used to evaluate them. In an era of easily available information, an important component of a program is providing access to the public in terms that they can understand and addressing the issues that concern them.
- **Sustain performance management by building constituencies.** Although the support of an agency CEO is often crucial to get a performance management

program started, the true mark of a successful program is one that survives changes in political administrations and CEOs. Performance management programs that last typically have a wide range of supporters and data users, including legislatures, the public, interest groups, and others, in addition the administration. Many transportation agencies that have successfully implemented performance management are able to pitch the usefulness of the program and data to new administrations who can set their own priorities, but continue to manage their programs using data and analytic techniques.

For each of the four topics, the guidebook provides several focused insights, each of which is supported by specific guidance and examples from the research. The overall set of insights is shown in Table 5.1.

Table 5.1 Performance Management Insights Matrix

Topic	Insight
Performance Management Helps an Organization Focus	Initiate a Performance Management Program to Identify and Address or Avoid a Compelling Problem
	As a Program Develops, Use Measures to Diagnose Problems
	Support Performance Management with a Nimble Strategic Planning Process
	Use Performance Management to Improve Agency Transparency
Performance Management Must Engage with Employees	Senior Management Must Support the Program
	Hold Staff Accountable for Agency Performance
	Empower Staff to Take Ownership of the Program
	You May Not End with Who You Started with
Performance Management Increases Customer Satisfaction	Align Performance Targets with Customer Expectations
	Learn How to Better Balance Multiple Constraints in Decision-Making
	Build Agency Credibility via Modest, Customer-Focused “Quick Fixes”
Sustain a Performance Management Program by Building Constituencies	CEOs Must Work to Institutionalize Performance Management
	Ensure Many DOT Managers and Employees Are Involved in Performance Management
	Use Performance Management to Build Bridges with State Legislators
	Make Performance Management Efforts Visible to the Public

6.0 Practitioner Review

Practitioner review sessions were conducted with four DOTs to achieve two basic objectives:

1. Obtain detailed feedback on draft document: “Transportation Performance Management Programs – Insights from Practitioners.” What improvements would make this document more useful to state DOTs?
2. Identify and discuss additional examples for possible incorporation into the Guide.

The four DOTs selected for this review and their reasons for selection were as follows:

- **New Jersey** – New Jersey DOT has made use of performance measures in various agency functions over the years, including as part of planning, capital programming, and other areas. The Future in Transportation program is a collaborative effort with local and regional partners and business to develop transportation solutions that fit within the local context. The Capital Investment Strategy is an attempt to use goals, objectives, and performance measures and targets to structure the selection of capital projects for development.
- **Kansas** – Kansas DOT is preparing to launch the state’s first new statewide transportation program in about a decade. The landscape in Kansas for investing in transportation infrastructure has changed since KDOT’s last program began in 1999. Revenues for transportation spending have shrunk while project construction costs have soared and finding balance between preservation needs and capacity expansion is proving politically challenging. Performance measurement, however, is recognized by the Department’s leaders to be a key management tool for making the next statewide program a success. KDOT has in place a comprehensive program of measures, but the agency has wrestled with how to maximize the value of its performance measures.
- **Indiana** – Indiana DOT is in the early stages of a major 10-year capital program referred to as Major Moves. Under this program, the DOT’s annual construction budget will quadruple between 2006 and 2015 and all 92 counties in the state will receive state funding for implementing local transportation projects. INDOT used a performance-based approach to select the projects for inclusion in the Major Moves program. The methodology accounts for a number of factors in the areas of transportation efficiency (benefit/cost, congestion, connectivity, etc.), safety, economic development, and customer input. This initiative could provide a good opportunity to explore performance management issues related to program management and project delivery. In addition, INDOT currently is working to develop a performance measurement system that will provide information on the benefits and

operational efficiency of its Freeway Management System and traffic signal systems.

- **Georgia** - Georgia DOT does not have a long history of performance management, but has recently begun pursuing initiatives in this area. In response to a backlog of needs that significantly exceeds its available budget, the Georgia DOT is currently reevaluating how it allocates transportation resources. As an initial step in this effort, the DOT is working with its planning partners to develop a series of performance measures that will help drive project prioritization decisions. The research team will discuss this effort with the DOT and explore any further performance management aspirations. Georgia DOT represents the proposed candidate that is at an earlier stage in the process.

6.1 REVIEW PROCESS

Prior to the review sessions, the four DOTs were contacted by phone and e-mail to arrange for their participation. As part of this process, they received the following basic pitch for participation:

The research team is developing a guidebook for NCHRP on performance management techniques. The overall objective of this effort is to help transportation agencies use performance measures and data to improve the effectiveness and transparency of their decision-making processes.

You should care about this because:

- Performance management is a concept of growing importance. Transportation programs in some states and some Federal programs require use of performance measures and rigorous data analysis to justify expenditures. Now, there are serious discussions to make the next Federal transportation authorization performance based – that is, to allocate funding to programs based on the performance of those various programs and on the likely improvement that the program would make. Focusing on performance management now can put transportation agencies ahead of the curve as new regulations and requirements are considered.
- States are facing greater challenges and less funding to address them. Between Federal and state requirements, aging infrastructure, and interest groups who pay close attention to how governments spend their tax dollars, it is vital to program agency funds in ways that are as effective (i.e., they get the job done) and efficient (i.e., they represent smart use of funding) as possible. Performance management can help transportation agencies make the best use of their resources and provide evidence to state legislatures of the need for additional funding.
- System users are demanding more information. Changing technology and increased information accessibility have expanded the demand for

information about transportation system performance. Performance management can provide agencies with valuable tools in communicating with the public and stakeholders.

NCHRP has developed several useful guidebooks on performance measurement and related topics. This guidebook builds on previous efforts by identifying practices that transportation agencies and others are using to more closely link performance measurement to decision-making.

The guidebook is organized around the following four broad insights and includes several specific examples derived from case studies conducted for the research:

- Performance management helps an agency focus;
- Performance management must engage with employees;
- Performance management increases customer satisfaction; and
- Sustain performance management by building constituencies.

An agenda was developed for each session, which ranged from 2 hours to a half day meeting. The agenda included:

- An overview of NCHRP 8-62 status and next steps;
- An overview of host agency's performance management initiatives;
- Discussion of draft guidebook and feedback from host agency, addressing questions such as:
 - Is the overall structure of the guidebook clear and effective?
 - Do the insights and examples resonate with your agency? Which are the most meaningful for your situation? Which are the least?
 - Are there any major gaps in the subject matter?
 - Does Section 7.0 provide a useful framework for organizing your thinking on how your agency could move forward? What additional implementation guidance would be beneficial?
- Discussion of host agency's performance management initiatives, including:
 - Current and planned efforts;
 - Types of decisions supported and strategies for linking performance data to these decisions;
 - Organizational and technical issues faced;
 - Lessons learned; and
 - Next steps.

The remainder of this section identifies the feedback received from the sessions with each of the DOTs.

6.2 KANSAS

Overall Impressions

- Report was well received by KDOT staff. Comments like “good,” “well-written,” and “informative” were uniform. Staff felt the report offers a useful resource for all DOTs.
- KDOT staff liked the text boxes throughout the document that highlighted actual examples of performance management in action and were in favor of doing more in this regard.

Specific Feedback

- Will there be an executive summary? This would be useful to readers.
- Section 1.1 KDOT staff agreed with this summary of benefits - no additional comments.
- Section 1.1, Performance Management Helps Agency Managers Improve Business Processes. Another example from Kansas is how greater scrutiny of maintenance quality data is revealing new ways to address maintenance issues.
- Page 1-3, Can the table of other documents include web links to the documents cited?
- Section 2.0. KDOT staff commented favorably on this section and indicated it does a good job of describing the key management processes. Can this study include a sidebar box on an actual DOT’s experience? These are very helpful.
- Section 2.1 strategic planning. Emphasize upfront that this process does not need to be over-involved and complex. In fact, that can cause it to fail. Do not worry if strategic plans evolve over time.
- Section 2.2.1 selecting measures. Measures should not be static - prepare to refine and/or drop measures as they evolve.
- Section 3.0 - KDOT was interested in a basic organizational question of how to create a focal point within the organization for performance management. They felt that KDOT has not been entirely successful in this regard and this has slowed development of their program. They thought the report should say that a successful program requires clear identification of a staff person with leadership responsibility for performance, who has staff to support them, and who prepares regular documents that help reinforce performance themes.
- KDOT often struggles to keep performance measures on their agenda when other issues, e.g., economic stimulus or developing a new program take up attention and time. This could be incorporated as an example of the difficulties of doing performance measures well?

- KDOT staff observe that in their case, the Department has not had a “crisis” that provoked performance measures. They suggest toning this language down to reflect fact that measures do not always come from crisis. In Kansas, they are trying to use measures to avoid problems in the future. I have indicated several points where this could be done.
- Page 3-1, last paragraph – KDOT sees measures as important, but also thinks the guidebook should highlight the framework of leadership, education, and staff support is needed to keep the measures in focus.
- Section 3.1 – Performance management should respond to an existing problem. KDOT says that they are trying to use measures to avoid problems in the future rather than to mitigate damage. Suggest revising title to include avoiding problems.
- Page 3-3, organize around a bold leadership initiative. KDOT says that leadership is critical, but it must include awareness and education throughout the Department, not just the upper echelons of management. They are finding that they have not done enough to educate all staff about performance measures.
- KDOT indicates that an “agencywide initiative” must mean leadership and staff resources and education of all employees to be successful.
- Page 3-3, focus on initiating a performance management system, not completing it. KDOT staff liked this point a lot!
- Section 3.2 (page 3-4). Kansas likes to use its performance management program as a way to generate new thinking about problems – examples include creating a new bridge classification system of “good,” “fair,” and “poor” that is easier to understand; and a new maintenance performance management system that is being developed. Do not be afraid to drop measures that are not helping.
- Section 3.3, support performance management with a nimble strategic planning process. KDOT staff thinks this is a really important point to make. If the strategic planning process becomes too involved, it will die under its own weight. KDOT has learned that it is vital to make the expectations inherent within a performance management program clear to all staff. Strategic planning must not stay within the upper leadership, it has to be translated to all staff. Engineers like a clear set of directions on what to do and what is expected!
- Page 3-7 performance management should highlight agency problems. As mentioned earlier, performance measurement can also be about avoiding problems by spotting trends before they become an issue.
- Page 3-7, remember the big picture. KDOT staff suggest this point may be too general.

- Section 4.0. Engage with employees. KDOT feels like this is the most important elements for the success of a performance measurement program.
- Page 4-1, note about information technology staff. Why highlight this role in a DOT? Performance measures important to lots of other DOT people – maintenance crews, planners, design teams, environmental specialists, etc., etc. Suggest adding additional roles.
- Section 4.1, senior management must support the program. Add additional sections within Section 4.1 that address: 1) creation by leadership of a performance measures position(s) within the agency and 2) education of employees as a precursor to ensuring they are engaged.
- Page 4-3, management participation in the planning process. KDOT felt that this role needs to be led by a person whose time is dedicated to performance measures, with support coming from department heads.
- Page 4-3. Sell Program to State’s political leaders. KDOT Did not like term “sell,” which implies “hard sell” aspect. Need softer word.
- Section 4.2, hold staff accountable. This section should be more nuanced because sometimes measures do not provide a clear picture of results – there may be good reasons for apparently poor performance that mean someone should not be “punished.” E.g., change orders are not always a sign of poor project management.
- Page 4-4. Incorporate performance data into reviews. Need to be careful about how this is presented. Numbers are usually only part of the story.
- Section 4.3, empower staff. This section should mention that training is needed to make empowerment work.
- Section 6.0, sustaining performance management. Need to strike a balance though between becoming siloed versus having a staff person that provides a focal point for performance management.
- Section 6.2. Include something about education, training, and awareness building for all DOT staff in this section.

6.3 GEORGIA

Overall Impressions

- Feedback on the draft Guidebook was very positive. Both reviews thought it was well structured, informative, and very helpful for practitioners. Felt it was one of the best documents on the subject that they have read.

Specific Feedback

- Overall structure of the report is good. Liked that the guidebook started with high-level theory and drilled down to application.
- Recommended adding an executive summary focusing on the take away messages. GDOT's take on these messages are:
 - CEO should focus measurement efforts on their highest priority (often the highest priority will be obvious during a crises).
 - Agencies can use measures to identify problems and to diagnose them so that they can be addressed.
 - Importance of measures for external stakeholders in terms of accountability and communicating priorities.
- Graphics on pages 2-1 and 2-2 - felt they were good graphics, but more likely helpful in terms of *defining* the flow or process of management processes and not *teaching* about the process.
- Liked discussion of leading/lagging indicators. Recommended that it be expanded because each type of measure plays a critical role in driving decisions.
- Section 2.1.4 - dealing with implementation strategies - felt this step is "critical."
- Section 2.2.1 - dealing with Using Measures in Decision-Making, specifically Human Resources Decisions - it is important to make sure that each staff person understands his/her contribution to the mission, and that the level of contribution should be part of the staff review process. There could be a danger of making a "scorecard" a part of a review, though, as people may start to manipulate how they present their work and accomplishments. Accountability has to drive the process of improvement, not focus on blame and punishment. This discussion is consistent with the concept of "principle-centered leadership."
- Section 2.2 - dealing with evaluation the system - felt this section is consistent with GDOT's experience.
- Section 3.0 - an important theme is to measure what is important, and not to just measure everything. This concept is highlighted well by the statement in the Guide that, "The quality and specificity of the measures selected is far more important than the overall number or breadth of available measures."
- Section 3.1 - noted that it is critical to define one key message/one pressing issue for a DOT to communicate throughout the agency and then to use this message to focus performance management efforts. This is highlighted well in Section 3.1, in particular this sentence is powerful - "Once broad agency challenges are identified, performance measures can help illuminate their underlying causes." Felt that one of the most important messages in the

Guide is that CEOs should tie the measurement program to their most urgent challenge. If there is one take-away message for CEO's it should be this.

- Section 3.4 – regarding “performance management should highlight problems” – this message resonated with GDOT. The challenge is helping staff understand the importance of solving process problems rather than their immediate issues (i.e., fighting fires).
- Section 4.4 – noted that the statement on page 4-7, “strategic promotions for employees who engage in and take ownership of the process probably provide the best and most feasible path to implementing a performance management system,” is a powerful message and should be emphasized. Recommended that the rest of the section, and particularly the title be softened and that the points be explained better. Observed that the relationship between being a successful engineer and a good project manager is inversely proportional.

Highlights of Performance Measurement Efforts at GDOT

- The Strategic Planning group at GDOT has been closely tracking performance measurement work at a number of peer DOTs for quite some time. Approximately five years ago, the group initiated an effort to measure State Transportation Improvement Program (STIP) delivery which initiated a larger performance measurement effort within the Department.
- GDOT has developed a very robust performance measurement system called TRAQS, which was intended to serve as a “scorecard” for a number of DOT efforts related to STIP delivery and Department operations. GDOT collects over 300 performance measures as part of TRAQS, and has developed a series of dashboards and reports for various audiences, and has also created an on-line system that all employees have access to. The system is organized around 5 Department goals, with transportation objectives and the large metric library clearly linked within the overall TRAQS performance measurement framework.
- Few staff actually use the system or the reports because: 1) performance management concepts were never communicated throughout the Department; 2) too many measures are collected creating a cumbersome system to communicate; and 3) performance measurement efforts were driven too strongly by one group (Strategic Planning) in the Department causing the rest of the agency to lose a sense of ownership for and interest in performance management.
- GDOT appears to be practicing “performance measurement” rather than “performance management.” The agency appears to have done an excellent job of collecting and reporting measures, but not using them to improve agency performance (“a lot more measuring, than managing by the measures”).

- Current senior management within the Department appear to have an understanding of the need for performance management, but due to a number of reorganization and management issues (including the hiring and firing of a new Commissioner within one year), the Department has not been able to focus on strategic planning efforts. Mr. Davis stated that the Office of Strategic Planning is currently in a “holding pattern” until issues within the Department are resolved, and management becomes stable.
- GDOT has developed a fairly extensive Employee Engagement Survey. GDOT conducts the survey each year. The survey has been used to identify specific behaviors managers need to exhibit in order to engage employees. These behaviors have been integrated into the management review process.

Insights from GDOT’s Experience

- A crises (STIP delivery at GDOT) is a perfect jumping off point for a performance management initiative.
- Effort must be driven by management.
- When one office “owns” performance management, other offices assume that they just have to provide data and may not take an active interest in the program.
- Management meetings tend to start by addressing immediate fires. When this is the first item on the agenda, the topic can become all consuming and leave little opportunity for proactive performance management.
- There is a danger that staff and external stakeholders begin to view accountability as a negative thing (more sticks than carrots).
- DOT staff often need training on the importance of and mechanics of process management.
- Agencies should develop measures that are useful in solving problems. If not, they may begin to measure for measurement’s sake.
- Previous unsuccessful performance initiatives can be a significant barrier to new ones. Also, even if the measurement program is good, if an agency loses momentum, it can be difficult to regain it.
- The most valuable information an agency can have is “what’s wrong.”

6.4 INDIANA

Overall Impressions

- Feedback on the draft Guidebook was very positive. Felt it was one of the best short documents they have read.

Specific Feedback

- Despite the quality of Guide, a short executive summary is needed to get the main points across. Given the nature of the DOT work environment, few staff will have the time to read the entire document.
- Liked the internal “practitioner review strategy” that was sent out to the practitioner reviews. Thought this was an excellent hook for the guide, and a good start for the executive summary.

Highlights of Performance Measurement Efforts at INDOT

- INDOT began their performance management process four years ago in response to the governor’s statewide performance initiative referred to as Program Results: an Outcome-Based Evaluation or PROBE. The objectives of PROBE are to:
 - Align state resources according to program priorities and effectiveness;
 - Identify obstacles that may hinder performance and identify recommendations for corrective action; and
 - Move toward a performance-informed budget by introducing performance results into the State’s budget development process.
- INDOT now collects and reports 205 metrics. They have organized the measures by function - external (reported quarterly), tactical (same measures as the external group, but reported by District); and operational (more detailed, organized by INDOT’s organizational chart, and reported monthly). The measures are stored in Management Information Portal (MIP). This system contains standard reports designed for various audiences and provides INDOT staff with performance data.
- INDOT has tied their budget to their performance management program. A measure is reported for each line item of their budget. The audience for these measures are the State’s Office of Management and Budget.
- Since INDOT’s measures are organized by its organizational chart, it is easy to associate individual staff with each measure. Performance results are incorporated into personal performance reviews. Performance-based incentives account for 7 percent of the annual budget for staff salaries. INDOT has set the incentive program so that employees only receive a bonus if they achieve something that was a planned improvement.
- INDOT reports performance results monthly to a group of external stakeholders (representatives from contractor, consultant, and utility associations, etc.). This group forms committees to address specific problems that are identified through the performance management program.

- INDOT’s performance management program is on its third administration, without any major changes. The CEOs have viewed the program as a resource for understanding and addressing the agencies problems.

Insights from INDOT’s Experience

- “If you’re not keeping score, you’re just practicing.”
- Support of upper management (and in INDOT’s case, the governor) is critical for success.
- Transportation is a long-term business. However, DOT’s must operate in the context of short-term politics. The combination of these two realities is a significant barrier to performance management.
- Performance reports are reviewed at monthly management meetings. This sends a message that the system is important and helps shift the culture of the agency.
- One way to help span multiple administrations is to document everything – these are the measures we have, this is how they are calculated, this is how they can be used.
- When dealing with a new administration, performance measurement programs can be framed as resource for the new management – e.g., here’s is all this great information that you can use to help identify and solve problems.

6.5 NEW JERSEY

Overall Impressions

- The reviews and examples of State DOTs practices are very interesting. One thing that would improve the guidebook would be to include a matrix that lists all recommendations and cross reference with an evaluation of each based on practicality, short versus long timeframes to implement, cost, staff and customer acceptability, expected problems, potential political issues, risk/success rate, etc.

Specific Feedback

- Examples that focus on “budget shortfalls” are the most relevant for NJDOT. The Washington State DOT example that focused on budget shortfalls, accountability, rapid growth in investment needs, voter repeal of a key revenue source (NJ Transportation Trust Fund), and erosion of trust between the department and the legislature reflected NJDOT’s situation the most.
- NJDOT has not experienced an agencywide concern about possible large-scale outsourcing and privatization of agency responsibilities.

- Discuss the need for having consistent performance measures among transportation agencies that regularly coordinate with each other: State DOT, FHWA, State Mass Transit Agency, Toll Rd Authorities, MPOs, Port Authorities, etc.
- More discussion on the development of realistic, practical, and manageable goals, objectives, and performance measures.
- Outcome versus output performance measures: Discuss the best applications of outcome-based as opposed to output-based performance measures. It is difficult to enhance accountability if you do not have performance measures that lend themselves to precise measurements (cause and effect relationships) that can be directly linked to staff activities and dollars spent (e.g., safety and congestion). While outcome-based performance measures (system condition improvements over time) are preferred, there are problems with trying to develop these performance measures for specific transportation program categories that are not physical assets. In many cases the best that can be used are output-based performance measures (number of projects implemented).
- Discuss the problem of continuously changing performance measures. It is difficult to measure changes in your success rate if your performance measures keep changing. It is hard to hold staff accountable when you are dealing with this issue.

Highlights of Performance Measure Initiatives at NJDOT

- Last year a truly “integrated” Statewide CIS was developed. An enhanced collaborative effort was implemented to ensure that capital investments for New Jersey’s transportation system are planned and implemented in a seamless and transparent manner. NJDOT, NJTRANSIT, NJTA and SJTA transportation assets and supporting programs were integrated into a cohesive Statewide CIS. An Executive Committee including all of these agencies, along with the state’s three MPOs and the FHWA participated to produce an overall investment plan for transportation “Statewide” Input and participation from fellow transportation agencies encouraged the formation of a partnership to be formed in the development of a “unified” capital investment strategy.
- As a result, the SCIS, for the first time includes transportation investments in common categories across agencies, rather than separate strategies for each agency. This integrated approach provides a foundation for understanding the “total” state investment needed in roads, bridges, and public transit. It is better designed to address state highways and mass transit systems as well as toll road authority facilities that all interconnect to form a complex, larger transportation network that has interrelated problems. The current SCIS fosters a collaborative approach to making the

best use of available transportation funding, which, in turn, provides for the most efficient and effective use of resources.

- The SCIS Outlines recommended resource allocation investment targets, derived from performance-based alternative funding scenarios that can be used to guide development of the NJDOT, NJ TRANSIT, and Toll Road capital programs. A more extensive “asset management approach” was implemented resulting in specific investment targets where resources are allocated by the following asset categories and asset support programs: bridge assets, road assets, airport assets, transportation support facilities assets, mass transit assets, safety management, congestion relief, multi-modal support, and local system support. Constrained and Desired investment targets linked to performance were produced to identify “where we are now and where we would like to be” in order to achieve our improved infrastructure and operational condition level goals and objectives.
- The results of performance analyses for alternative budget scenarios were used to make cost-effective tradeoffs, “dividing the pie” of projected revenue across different program categories. This is a step within our CIS process that the Department had never really achieved before. Recommending performance-based investment targets that are constrained to reflect the reality of our budget situation is a huge step forward.
- Within the framework of established policy guidelines, the process to select the Recommended Constrained Investment Targets made every effort to optimize the overall performance of the budget-getting the most “bang for our bucks.” This approach tries to make certain that scarce financial resources are used as economically as possible to address our most important needs.
- Types of decisions supported and strategies for linking performance data to these decisions:
 - Statewide Capital Investment Strategy-resource allocation decisions;
 - Project Selection;
 - Capital Programming; and
 - Asset Management Programs.
- We developed a resource allocation process that converts alternative condition levels based on performance analyses to desired and constrained investment targets. The Statewide Capital Investment Strategy (SOS) is a decision-making tool used to develop investment options *for* transportation program categories based on goals, objectives, and performance measures. It provides strategic direction in the formulation of the capital program, and demonstrates to stakeholders how well current and proposed capital programs

perform over time, subject to investment scenarios, to achieve statewide goals. Within the resource allocation process, it provides investment options for major transportation asset categories and is used to ensure that plans drive programs. For example, by linking broad goals and policies to the specific investment choices, the SCIS recommends annual investment targets by asset program categories.

- The CIS sets out the overall *strategy* that the NJDOT follows for investing capital transportation dollars in the future. In a time of many competing needs, and not enough money to address them all, the CIS provides for a more budget-sensitive, cost-effective, greater return on public investments. It simply tells us how we can get more “*bang for our bucks.*” It enables the policy-makers to formulate careful decisions about which projects and programs receive funding. The result is a more cost-effective approach of improving the overall quality of New Jersey’s transportation system.
- In a time of limited resources, it will not be possible to meet all of our objectives for every program and for all the other pressing demands and needs of transportation customers as quickly as we would like. It is the purpose of our CIS to improve our decision-making process by selecting choices more efficiently and effectively as we face the transportation investment challenges of the future.

Insights from NJDOT’s Experience

- Continue to use the same performance measures for as long as possible until such time as they become obsolete. Changing performance measures consistently does not provide the ability to adequately evaluate change correctly. Many times, for “policy” reasons, performance measures are changed from year to year and as a result, a true analysis cannot be completed. The performance measure that is being used now is not measuring the deficiency the same way and conflicting, misleading results can be produced.
- As a guideline, discuss in detail the importance of tying the selection of performance measures to goals and objectives.
- It is difficult to relate investment levels to improved condition levels. For example, with regard to safety management, there really is not an overall cause and effect relationship. Dollars spent does not necessarily result in a reduced crash severity rate or fatality rate due to the fact that most crashes result from driver behavior problems and not deficient roadway design. Most crashes result from behavioral issues due to a lack of education and enforcement as opposed to deficient engineering factors.
- Performance “indicators” are the best that can be used as opposed to “measures.” Fatalities are “random occurrences.” There are too many factors that cause fatalities that are outside of the control of the transportation practitioner. Measuring whether or not a physical safety improvement reduced fatalities unless it is specifically related to a design flaw is not realistic.

Driver behavior issues are more closely linked to (alcohol, lack of seatbelt, driver distractions (cell phone usage)) fatalities than implementing a physical safety improvement. You cannot hold staff accountable by using “fatalities” as a performance measure.

- Lack of knowledge in developing goals and objectives.
- Trying to quantify performance and the corresponding annual investment scenario targets for nonphysical asset support programs (e.g., safety, congestion, multimodal support, local support system). For some program areas that pertain to physical assets such as roads and bridges, the capital investment strategy methodology has developed to the point that quantitative assessments can be made of the effect of different funding levels on the future condition of elements of the transportation system. However, for the non-physical asset support programs, more qualitative methodologies that are less predictable (that are output-based instead of outcome-based) are employed to measure expected performance condition levels.
- Focusing first on the development of measurable goals and objectives. It was apparent in last year’s process that not everyone understood how to develop clear, measurable, and realistic objectives. This is an important part of the process because ultimately, it is what should be used to measure success.
- Using the same performance measures for each program category. In some cases, the Toll Road Authorities use different performance measures. As a result, the performance analyses cannot be fully integrated statewide with NJDOT condition level analyses. Management system data can only be analyzed within each separate system.
- With regard to several program categories such as bridge assets, road assets and congestion relief, there is a significant difference in “where we are now” and “where we would like to be.” Our ability to invest in infrastructure improvements at the levels needed to shrink the current and projected backlog and significantly enhance performance can not be realized due to a lack of adequate funding. Can the SCIS process for most program categories lead to more efficient ways to stretch our current dollars and select more effective projects that function to preserve our infrastructure better? Should the SOS process through asset management recommend more efficiencies through new design policies and programs, scheduling practices, or better use of new technologies to prevent or slow infrastructure deterioration (i.e., fund and implement more preventive maintenance)? The inability to provide funding to properly reconstruct, rehabilitate, maintain, and preserve our roadway infrastructure can prove to be an extremely expensive situation in the future.
- What is the best methodology for measuring economic development performance as it relates to transportation improvements?
- Initiate, Design, Execute, and Apply are excellent steps toward implementing a performance management system. However, consider adding another step:

“Re-evaluate.” This refers to basically going through a reevaluation phase that feeds back into the Design phase so that adjustments can be made to performance measures and procedures. Also, under Apply, more discussion (a separate section) should be considered for “training.” I do not believe that staff in many cases, really understand whether specific measures can be used to correctly measure performance just because a measure is available.

A. Resources

A.1 LITERATURE REVIEW BIBLIOGRAPHY

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A.2 AGENCY PERFORMANCE MEASUREMENT PROGRAMS

- Missouri DOT Tracker;
- WSDOT Gray Notebook;
- Ohio DOT Organizational Performance Index; and
- Other states and agencies links to web sites.

B. Established and Emerging Practices

Many states are making use of performance measures with varying levels of sophistication. Common, well-established practices include the following:

- **Sharing Performance Measures with the Public and Stakeholders to Improve Accountability** – Many states publish performance information so the public understands how tax dollars are being used.
- **Including Performance Measures in Strategic Planning Documents (e.g., Long-Range Transportation Plans)** – Many states include performance measures in their strategic planning documents.
- **Tracking Progress toward Strategic Goals** – Many states demonstrate progress toward performance goals by regularly reporting on performance measures.
- **Ranking Capital Projects** – Many states use performance criteria to rank capital projects; for example, they might take into account bridge conditions when prioritizing bridges for funding.
- **Regular Management Reviews of Performance Information** – Many agency managers regularly review performance results. However, the directness and consequences of performance review varies by agency. For example, some organizations, such as the city of Baltimore, require department heads to defend their performance during regular performance review sessions with the Mayor.

The fact that these practices are well-established shows that many departments of transportation are devoting significant resources and time to performance measurement. However, most of these practices fall into the category of “basic tracking” of performance. They demonstrate the agency’s progress toward its strategic goals, but are not necessarily linked to decision-making processes.

Some DOTs are engaged in practices that are more directly linked to decision-making. Many involve connecting performance measures to resource allocation, as in the linking of performance measures with budgets, staff compensation, or capital investment programs. Some of these practices include:

- **Identifying Problems and Needs** – Some agencies use performance information to identify and rectify emergent problems. This often requires fast mobilization of resources to address performance deficiencies.
- **Conducting Tradeoff Analysis** – Some agencies use performance measures to conduct tradeoff analysis. This involves analysis of different performance outcomes given several decision scenarios. For example, an agency may

analyze how attainment of pavement performance goals will be affected given different investment levels.

- **Linking Performance and Funding** – Some states link performance measures directly to business plans, budgets, or legislative budget requests. This helps ensure resources are directed toward activities that will enhance the agency’s ability to meet its performance targets.
- **Alignment of Performance Measures throughout the Organization** – Some agencies align performance measures horizontally by using consistent measures across agency divisions. Some agencies also align measures vertically by linking measures used at the lowest levels of the organization with those used at the highest levels. This ensures that performance information flows to the highest levels of the organization where it can be used in managerial decision-making.

The practices identified in the review of previous research are organized into four areas:

- Table B.1 lists decision support practices;
- Table B.2 lists business management practices;
- Table B.3 lists external and internal communication practices; and
- Table B.4 lists resource allocation practices.

In each table, a set of transportation agencies are identified that conduct use these practices in performance management. This is not meant to be a comprehensive list, just a sample of agencies using the practice.

This initial examination of agency practices was developed for two basic purposes:

1. To help identify potential candidates for the case studies conducted part of the research and;
2. To develop an initial set of concepts to be used in conducting interviews and organizing the guidebook. These practices were identified at an early stage of the research and are not intended as its final product.

In addition to the practices listed here, there are several structural characteristics of performance measurement programs that are common among states. In particular, legislative mandates requiring performance management are very common among state departments of transportation. Some of the states DOTs that require performance measurement include Arizona, California, Maryland, Michigan, Iowa, Oregon, South Carolina, Virginia, Vermont, and Washington

Table B.1 Established and Emerging Decision Support Practices

Practice	Subpractice	Organization
Tracking progress toward strategic goals	–	Arizona DOT, Maryland DOT, Minnesota DOT, Montana DOT, New Mexico DOT, Ohio DOT, South Carolina DOT, Washington DOT, Federal Aviation Administration
Using performance measures to rank capital projects	–	Arizona DOT, Ohio DOT, Georgia DOT)
Using performance measures to identify problems and needs	Uses customer satisfaction surveys to identify performance problems	Most DOTs, Capital Area TA, Lansing, Michigan
	Use of performance measures to identify underperforming transit routes and to take corrective action	Baltimore MTA
	Adjustments to maintenance program based on observed performance trends	Iowa DOT
	Use of a centralized complaint line to identify emerging performance problems	City of Somerville
Using performance measures for tradeoff analysis	Using tradeoff analysis to develop performance-based plans, to prioritize projects, to set performance targets	Arizona DOT, Ohio DOT, Minnesota DOT, Georgia DOT, Montana DOT, Vermont DOT

Table B.2 Established and Emerging Resource Allocation Practices

Practice	Subpractice	Organization
Linking performance measures and funding	Targeting funds to address safety performance problems	Missouri DOT
	Linking legislative budget requests to performance measures	Federal Aviation Administration
	Ensuring resources are available to meet performance goals	California DOT
	Linking performance information to business planning or budgeting activities	Florida DOT, Minnesota DOT, Maryland DOT, Missouri DOT, Ohio DOT, Pennsylvania DOT, Montana DOT, SANDAG, South Carolina DOT
Setting performance targets	Setting targets based on anticipated funding levels through the forecast horizon	Idaho DOT, Michigan DOT, Minnesota DOT, Montana DOT, Ohio DOT, Washington DOT
	Setting targets by comparing performance across organizational units	Florida DOT, American Cancer Society
	Setting targets for different time horizons	Maryland DOT, Minnesota DOT
	Setting targets for different geographic areas	Texas DOT
	Setting targets based on funding levels, performance trends, and tradeoff analysis.	Minnesota DOT, Montana DOT
	Setting performance targets based on peer comparisons	American Cancer Society

Table B.3 Established and Emerging Business Management Practices

Practice	Subpractice	Organization
Regular management reviews of performance results	–	Florida DOT, Michigan DOT, Minnesota DOT, Missouri DOT, Ohio DOT, Oregon DOT, Pennsylvania DOT, South Carolina DOT, Virginia DOT, City of Baltimore, City of Somerville, Washington DOT
Use of an employee satisfaction survey to improve organizational performance	–	Kansas DOT, Minnesota DOT, Federal Aviation Administration
Use of customer satisfaction surveys to help develop performance targets	–	Kansas DOT,
Maintaining a central repository or database of performance information	–	Michigan DOT, Florida DOT (at the organizational level)
Linking staff actions and performance goals	Assigning staff ownership over performance results	Ohio DOT, Oregon DOT, PennDOT, Missouri DOT, South Carolina DOT,
	Incorporating system results into staff performance reviews	Ohio DOT, Iowa DOT Federal Aviation Administration,
Using performance measures to compare progress among similar organizational units	–	American Cancer Society, Florida DOT, South Carolina DOT
Using an independent body to evaluate performance	–	Florida DOT, American Cancer Society
Alignment of performance measures throughout the organization	–	Ohio DOT, Florida DOT, Iowa DOT, Pennsylvania DOT, Maryland DOT, Montana DOT, Minnesota DOT, South Carolina DOT, American Cancer Society, DART, MTA NYC, WMATA

Table B.4 Established and Emerging External and Internal Communication Practices

Practice	Subpractice	Organization
Performance reporting	Use of on-line tools to communicate results	Virginia DOT, Federal Aviation Administration
	Publishing performance results on a predetermined schedule	Missouri DOT, Maryland DOT, New Mexico DOT, South Carolina DOT, Washington State DOT, Transit authority of River City
Presentation of system performance to the public as part of policy formulation process	–	Montana DOT

B.1 DETAILED PRACTICES

This section provides detailed information about the practices described in the summary section above.

State Departments of Transportation

Arizona Department of Transportation (AzDOT)

- **Tracking Progress toward Strategic Goals** - The Arizona DOT (AzDOT) has established a set of performance measures to accompany its long-range transportation plan, "MoveAz." These include mobility and economic competitiveness, connectivity, safety, preservation, reliability, accessibility, and resource conservation (AzDOT, 2004).
- **Performance Measurement by Legislative or Governor's Mandate** - AzDOT's use of performance measures in project programming is required by law (Padgette, 2006).
- **Ranking Capital Projects** - The department uses a modified version of performance criteria when prioritizing projects for capital funding (programming). Arizona DOT staff develop a set of candidate projects and rank them using performance criteria and other considerations such as the significance of the route, route continuity, cost-effectiveness, and the recommendations of experts in the field. A seven-member State Transportation Board appointed by the governor reviews the recommendations and selects a final set of projects (AzDOT, 2007).
- **Using Performance Measures in Tradeoff Analysis** - AzDOT uses a unique performance measurement system for its maintenance activities. In order to track maintenance conditions on the highway system, it assigns a maintenance "level of service" (LOS) to a statistically selected sample of its highway segments. This allows the DOT to produce a reliable estimate of maintenance conditions throughout the network without having to conduct a full inventory, and allows it to document the relationship between maintenance conditions and maintenance expenditures. The intention is for the LOS information to drive future budgeting decisions and allow for tradeoff analysis. For example, the LOS approach can answer questions such as "how much will it cost to move from an LOS A to a B? What will happen to the condition if the roadside budget is cut by 10 percent?" (Cambridge Systematics, Inc., 2007).

California Department of Transportation (CalTrans)

- **Performance Measurement by Legislative or Governor's Mandate** - The California Transportation Commission, a nine-member body appointed by the governor, has recently instituted a requirement that the State Transportation Improvement Program (STIP) include objective, uniform criteria for measuring system performance and project cost-effectiveness (CTC, 2005).

- **Ensuring Resources are Available to Meet Performance Goals** – Caltrans has two separate performance measurement programs. The first is the Program-Level Action Plan (PLAP) program, an initiative of Caltrans’ parent agency, the Business, Transportation, and Housing Agency (BTH). The intention of the PLAP program is to ensure that resources are aligned to meet departmental goals and objectives. Objectives are specific, measurable, and time-dependent. The divisions develop the strategies, action steps, performance measures, and resource requirements to achieve goals. The other performance measurement program used by Caltrans is the Transportation System Measures program, which is a separate performance measurement program used to monitor system conditions (Padgette, 2006).

Florida Department of Transportation (FDOT)

- **Aligning Performance Measurement throughout the Organization** – The Florida DOT uses an integrated performance measurement system at all levels of the organization, including the state level, the executive level, and the organizational level, as will be described in the ensuing bullets. The highest-level oversight is provided by an independent body, the Florida Transportation Commission, which reports annually on DOT progress to the state governor and legislature. The Commission then works with the department to make recommendations to improve performance (Cambridge Systematics, Inc. et al., 2006).
- **Comparing Performance across Organizational Units** – To inform its recommendations, the Florida Transportation Commission analyzes historical performance data and compares performance across districts (Cambridge Systematics, Inc. et al., 2006).
- **Regular Review of Performance Measures** – At the executive level, the DOT Executive Board establishes and reviews key department-wide performance measures on a monthly basis. These measures are divided into five categories: Transportation System Safety, Customer and Market Focus, Production Performance, Transportation System Performance, and Organizational Performance (Cambridge Systematics, Inc. et al., 2006).
- **Linking Performance Measures and Budgets** – The DOT also produces the Short-Range Component, an annual performance report on the State’s progress in implementing the long-range transportation plan. The Short-Range Component is linked to the departmental budgeting process and work plan (Cambridge Systematics, Inc. et al., 2006).
- **Using an Integrated Database for Performance Monitoring** – At the lowest level of the department, each program area conducts performance monitoring using the *pbviews* performance measurement system database (Florida DOT, 2007).

Georgia Department of Transportation (GDOT)

- **Using Performance Measures in Tradeoff Analysis** - The Georgia Department of Transportation incorporated performance measurement into its 2005-2035 Statewide Transportation Plan. Performance benchmarks were used to assess the status and needs of highway, transit, and aviation modes, and to analyze and compare investment scenarios (No-Build and Build/Financially Unconstrained) (Georgia DOT, 2007a).
- **Ranking Projects with Performance Measures** - Georgia DOT currently is in the process of developing a mechanism for prioritizing projects based on performance measures (Georgia DOT, 2007b).

Idaho Transportation Department (IDT)

- **Setting Performance Targets Based on Funding Levels throughout the Forecast Horizon** - The Idaho Transportation Department considers both system conditions and available funds when setting performance targets for its assets. For example, it would be desirable to have zero percent deficient pavements, but the agency cannot afford this. Instead, it relates proposed network condition to anticipated funding (Cambridge Systematics, Inc. et al., 2006).

Iowa Department of Transportation (IaDOT)

- **Performance Measurement by Legislative or Governor's Mandate** - Iowa's Accountable Government Act requires each Iowa state agency to prepare both a Strategic Plan and a Performance Plan that includes performance measures (Cambridge Systematics, Inc. et al., 2006).
- **Tracking Progress toward Strategic Goals** - The Iowa DOT uses its strategic plan to set performance targets for the agency (Cambridge Systematics, Inc. et al., 2006).
- **Horizontal Alignment of Performance Measures** - The DOT tries to keep performance measures used at the district level consistent. For example, all of the districts use a pavement condition index of 1-100 and the Federal sufficiency and adequacy rating for bridges (Cambridge Systematics, Inc. et al., 2006).
- **Use of Performance Measures in Staff Reviews** - Performance results have some impact on staff reviews, but this varies depending on the district (Cambridge Systematics, Inc. et al., 2006).
- **Adjusting Maintenance Program Based on Performance Trends** - The Iowa DOT adjusts its maintenance program based on observed performance measure trends. For example, mowing activity was modified to focus on safety considerations (i.e., sight distance) rather than aesthetics, and funds were shifted to address the edge rut problem for safety reasons (Cambridge Systematics, Inc. et al., 2006).

Kansas Department of Transportation (KDOT)

- **Use of an Employee Satisfaction Survey to Improve Organizational Performance** - In 2007, KDOT contracted with Gallup to conduct the first of what will be an annual survey of its more than 3,000 employees. The survey's 20 questions are carefully selected based on work by Gallup to show the strength of "positive energy" among employees. The survey is built around a management philosophy that this positive energy generates a more effective workforce and is highly dependent on the relationships between employees and their direct supervisors. Survey results are distributed to all supervisors, who are expected to develop approaches for raising their "scores" by improving their managerial capabilities (e.g., setting clearer expectations, giving more praise, etc. (KDOT, 2007).

Maryland Department of Transportation (MDOT)

- **Performance Measurement by Legislative or Governor's Mandate.** - Performance measures in the Maryland Transportation Plan (MTP) are established in consultation with an independent advisory committee appointed by the governor. Members of the committee come from 13 member groups defined in the law (Maryland DOT, 2005).
- **Tracking Progress Toward Strategic Goals** - MDOT sets high-level performance goals in the MTP, which is the department's long-range vision for transportation in Maryland. The DOT tracks progress toward the goals laid out in the MTP by publishing an Attainment Report on Transportation System Performance. The report highlights MDOT's performance and provides elected officials and the general public with information on the effectiveness of policies, programs, and investments (Maryland DOT, 2005).
- **Linking Performance Information to Business Planning or Budgeting Activities** - The MTP goals are directly linked to the agency's capital planning process laid out in the Consolidated Transportation Program (CTP). The CTP is composed of detailed listings and descriptions of the capital projects that are proposed for construction, or for development and evaluation during the next six-year period (Maryland DOT, 2005).
- **Alignment of Performance Measures throughout the Organization** - Consistent performance measures are used by the Maryland Department of Transportation, its five modal administrations, and the Maryland Transportation Authority (Maryland DOT, 2005). Some of the modal administrations within the DOT, such as the Motor Vehicle Administration, also have had success in vertically aligning performance measures so that decision-makers can use performance information in daily operations. In other administrations (highways, transit, aviation, ports), the link between performance measures and decision-making currently is less direct (Cambridge Systematics, Inc. et al., 2006).

- **Setting Different Performance Targets for Different Time Horizons** - For many of the performance areas, separate short- and long-term targets are developed to reflect changing fiscal constraints over time (Cambridge Systematics, Inc. et al., 2006).

Michigan Department of Transportation (MDOT)

- **Regular Review of Performance Results** - Michigan DOT conducts regular meetings with representatives from the planning, delivery, operations, and financial functions (including field staff) to assess the relationship between committed design and delivery schedules, available revenues, and advancing toward the DOT's performance targets (Cambridge Systematics, Inc. et al., 2006).
- **Using an Integrated Database for Performance Monitoring** - Michigan DOT maintains a central repository of over 100 performance measures. The repository, known as the Transportation Management System (TMS) provides decision-makers throughout the agency with access to the same performance data (Cambridge Systematics, Inc. et al., 2006).
- **Setting Performance Targets Based on Funding Levels throughout the Forecast Horizon** - Michigan DOT sets performance targets based on funding levels through the forecast horizon (Cambridge Systematics, Inc. et al., 2006).

Minnesota Department of Transportation (MnDOT)

- **Tracking Progress toward Strategic Goals** - The Minnesota DOT (MnDOT) long-range transportation plan establishes 10 policy goals, ranging from "preserve the essential elements of the existing system" to "protect the environment." The plan establishes a total of 41 measures that are used to track progress toward meeting the policy goals (Minnesota DOT, 2003).
- **Setting Performance Targets Based on Funding Levels, Performance Trends, and Tradeoff Analysis; Setting Different Performance Targets for Different Time Horizons** - MnDOT has developed a sophisticated system for setting performance targets. Measures are categorized by how well established they are (mature, emerging, and experimental) and different performance targets are set for different time horizons. Some "mature" measures have 6-, 10-, and 20-year performance targets, while other emerging and developmental measures are more experimental in nature. The level of the various targets are set based on funding levels throughout the forecast horizons, previous performance trends, and tradeoff considerations (Minnesota DOT, 2003; Cambridge Systematics, Inc. et al., 2006).
- **Aligning Performance Measures throughout the Organization** - MnDOT aligns performance measures throughout the organization in a "pyramid" structure that links the highest-level policy goals of the organization with its day-to-day activities. The highest-level measures are established in the long-

range plan, and are used to drive the creation of district plans and modal plans (Aeronautics, Transit, Rail, etc.). In turn, those plans are linked to MnDOT's two-year business planning activities. The two-year business plans are linked to one-year work plans (Halvorson et al., 2003).

- **Linking Performance Information to Business Planning or Budgeting Activities** - The MnDOT Business Plan incorporates performance measures from the statewide plan and sets achievable two-year targets for reducing the gap on selected measures. Some targets may be supported by investment proposals to the legislature, others by internal reallocations (Halvorson et al., 2003).
- **Regular Review of Performance Results** - Performance measures are discussed at quarterly meetings (face-to-face and videoconference) with DOT executive staff. A combination of Dashboards, PowerPoint slides, and reports are used to support discussion (Padgett, 2006).

Missouri Department of Transportation (MoDOT)

- **Regularly Publishing Performance Results** - The Missouri Department of Transportation began publishing "Tracker: Measures of Departmental Performance" in January 2005 and has continued to do so quarterly. The publication is part of the department's stated commitment to being open and transparent. The report includes 18 measurement areas such as "Safe Transportation System" and "Efficient Movement of Goods" which together comprise 111 total performance measures (Missouri DOT, 2007).
- **Assigning Staff Ownership over Performance Results** - Specific staff responsible for performance measurement and performance results are named within each performance area in the "Tracker" (Missouri DOT, 2007).
- **Linking Performance Information to Business Planning or Budgeting Activities** - In addition to the performance measures reported in "Tracker," every headquarters business unit maintains a scorecard of measures tied to its work plan. These scorecards track the implementation of strategies in the department's business plan, as well as service delivery and work processes in key core functions (Transportation Research Board, 2005).
- **Regular Review of Performance Results** - Business unit scorecards are reviewed by top management on a quarterly basis and are used as a management tool to ensure the accountability of these units in advancing the department's strategic plan (Transportation Research Board, 2005).
- **Targeting Funds to Address Safety Performance** - Missouri DOT also has made extensive use of performance data in safety decision-making. For example, engineers at MDOT analyzed safety data and determined that cross-median crashes were a significant issue along the interstate. They began installing cable median barriers throughout the network to prevent

cross-median crashes. As a result, cross-median crash fatalities dropped by over 90 percent (Chandler, 2007).

Montana Department of Transportation (MDT)

- **Tracking Progress toward Strategic Goals** - The Montana DOT's long-range transportation plan, TRANPLAN 21, sets out the organization's overall policy goals. Progress toward goals is measured through an annual performance report (Montana DOT, 2004).
- **Alignment of Performance Measures throughout the Organization; Linking Performance Information to Business Planning and Budgeting Activities** - The Montana DOT uses a system called "P3" (Performance Programming Process) to align the organization around its performance goals. P3 is a method for ensuring an optimal transportation investment program and for measuring progress toward the agency's strategic goals. The P3 process ties together the following elements:
 - Montana's Long-Range Transportation Plan;
 - System performance (e.g., construction, project delivery, and system monitoring);
 - Investment decisions laid out in the State Transportation Improvement Program (STIP); and
 - The funding distribution plan, which is linked to specific performance goals (Montana DOT, 2004).
- **Setting Performance Targets Based on Funding Levels throughout the Forecast Horizon; Using Performance Information in Tradeoff Analysis** - The P3 process allocates money and sets performance targets based on need and forecasted performance. Tradeoff analysis is conducted to determine how future performance will vary given various expenditure levels, and levels of investment are set to maximize the likelihood of achieving future targets (Padgette, 2006).
- **Presentation of Performance Results to the Public as Part of a Policy Formulation Process** - As part of the P3 process, Montana also solicits public feedback on its performance through public opinion surveys and stakeholder meetings. Feedback is incorporated into future policy formulation and long-range planning (Cambridge Systematics, Inc. et al., 2006).

New Mexico Department of Transportation (NMDOT)

- **Regular Reporting of Performance Results** - The NMDOT reports on performance on a quarterly basis through a reporting program called "Good to Great" (New Mexico Department of Transportation, 2007).
- **Tracking Progress toward Strategic Goals** - The "Good to Great" report highlights progress toward several performance benchmarks developed for

each of the agencies' five strategic priorities. It also includes full reports of activity from each of the DOT districts (New Mexico Department of Transportation, 2007).

Ohio Department of Transportation (ODOT)

- **Tracking Progress toward Strategic Goals** - ODOT's long-range plan, *Access Ohio*, defines the organization's high-level goals and lists performance measures, known as Organizational Performance Indicators (OPI) to support some of those goals, particularly those relating to system preservation and maintenance (Ohio DOT, 2004; Ohio DOT, 2006).
- **Regular Management Reviews of Performance Results** - Managers track OPIs on a monthly and quarterly basis to observe trends and problems so they are addressed as quickly as possible. When goals are not being met, districts must develop a plan to correct their failures (Cambridge Systematics, Inc. et al., 2006; Ohio DOT, 2004; Ohio DOT, 2006).
- **Alignment of Performance Measures throughout the Organization** - ODOT aligns the use of performance measures throughout the organization by linking the goals laid out in its long-range plan with biannual business plans and individual action plans for key staff (Cambridge Systematics, Inc. et al., 2006; Ohio DOT, 2004; Ohio DOT, 2006).
- **Assigning Staff Ownership over Performance Results and Incorporating System Results into Staff Performance Reviews** - ODOT's Business Plan guides the development of individual action plans for key staff which are primarily responsible for meeting performance goals (about 200 employees). Action can be taken if these staff do not achieve results (Padgette, 2006).
- **Linking Performance Measures to Business Planning or Budgeting Activities** - Biannual business plans link the OPIs to ODOT's funding program (Ohio DOT, 2003; Ohio DOT, 2006).
- **Use of Performance Measures in Tradeoff Analysis and to Rank Capital Projects; Setting Performance Targets Based on Funding throughout the Forecast Horizon** - A Funds Management Committee works to identify how to allocate funds to support the OPIs. They recommend to ODOT Senior Management the mix of performance targets and associated funding levels supported by trend analysis, deterioration projections, and tradeoff analyses among alternative scenarios. Sensitivity scenarios are presented by district that show, for example, how different levels of investment will lead to different maintenance results. In the end, a negotiation process exists to determine where funds are allocated and a balance must be achieved amongst projects (Cambridge Systematics, Inc. et al., 2006).

Oregon Department of Transportation (ODOT)

- **Performance Measurement by Legislative or Governor's Mandate** – Performance measurement is required by law in Oregon. State budget requirements establish 22 measures, with an emphasis on cost-effectiveness. Ten new measures were recently added that emphasize asset management (Padgette, 2006).
- **Regular Management Reviews of Performance Results** – The Oregon DOT Highway Division's recently developed performance management system includes high-level measures that address the functions of each of several sections within the Highway Division. Section heads gather at quarterly business meetings to evaluate each of the measures. The system identifies both measures that currently can be used and prospective measures that need to be developed for areas for which the division does not have data or measures readily available (Cambridge Systematics, Inc., 2006).
- **Assigning Staff Ownership over Performance Results** – Specific staff are assigned ownership over the action items emerging from the quarterly business meetings. This ensures that action is taken to improve performance results (Cambridge Systematics, Inc., 2006).

Pennsylvania Department of Transportation (PennDOT)

- **Aligning Performance Measures throughout the Organization** – PennDOT has created a cascading strategic management system that integrates performance measurement into many levels of department operations. An overall strategic plan sets strategic objectives and performance targets for the entire department. Each of the PennDOT districts creates a strategic plan, accompanied by performance measures, that supports the goals of the department-wide strategic plan, (Poister et al., 2004).
- **Linking Performance Measures to Business Planning or Budgeting Activities** – In addition to creating strategic plans, each PennDOT district also creates a business plan detailing how the strategic plan objectives will be met. The business plans contain specific budgets that invest resources in planned actions corresponding to strategic objectives. This gives managers the confidence that they will have sufficient resources to achieve the targets for which they will be held accountable (Poister et al., 2004).
- **Assigning Staff Ownership over Performance Results** – Members of a high-level Strategic Management Committee are assigned to be the “owners” of strategic objectives (Poister et al., 2004).
- **Regular Reviews of Performance Results** – Performance results are discussed quarterly during face-to-face meetings between the district engineers and bureau chiefs within the highway division. In addition, the department secretary conducts performance meetings two times per year (Padgette, 2006).

South Carolina Department of Transportation (SCDOT)

- **Performance Measurement by Legislative or Governor’s Mandate** - State law requires the rolled-up results of district performance to be provided to the House Ways and Means Committee and the Finance Committee of the State General Assembly (Cambridge Systematics, Inc. et al., 2006).
- **Alignment of Performance Measures throughout the Organization; Linking Performance Measures to Business Planning or Budgeting Activities** - SCDOT’s Strategic Plan sets out seven broad goal areas with performance measures to support each one. The performance measures are linked with those used in district-level business plans (Cambridge Systematics, Inc. et al., 2006).
- **Tracking Progress toward Strategic Goals; Regular Reporting of Performance Results** - Each district office must report progress toward achieving strategic plan objectives through monthly, quarterly, and annual reports. Reporting focuses on system maintenance measures (Cambridge Systematics, Inc. et al., 2006). In addition, SCDOT publishes an annual Accountability Report that includes various performance measures. It is a vehicle for both short- and long-range planning (South Carolina DOT, 2006).
- **Using Performance Measures to Compare Progress among Similar Organizational Units** - The Accountability Report makes both temporal and peer performance comparisons to illustrate progress (South Carolina DOT, 2006).
- **Regular Review of Performance Results** - An abbreviated set of measures is provided monthly to the SCDOT Commission, Executive Director, and staff members. This “dashboard” includes measures related to safety, incident response, construction contracts awarded, cable rail cost, cable rail hits, and toll operations. Exact measures vary based on present concerns. Each quarter, managers review division-specific performance measures at a more in-depth level (South Carolina DOT, 2006).

Texas Department of Transportation (TxDOT)

- **Setting Different Performance Targets for Different Geographic Areas** - The Texas Department of Transportation (TxDOT) coordinates closely with metropolitan transportation planning organizations (MPO) around the issue of congestion. TxDOT works with MPOs to establish target congestion levels that vary depending on the mix of system conditions in the metropolitan area. The larger areas with congestion on most of the system tend to have higher target values than the smaller metropolitan areas with more of the roads operating at free-flow speeds (Cambridge Systematics, Inc. et al., 2006).

Vermont Agency of Transportation (VTrans)

- **Performance Measurement by Legislative or Governor’s Mandate** - In 2002, the Vermont General Assembly mandated the use of an asset management approach in transportation. This requires VTrans to use performance measures in the preparation of the transportation investment program submitted to the legislature. As each program is developed, the agency examines the impact it will have on the attainment of performance goals. In this way, asset conditions affect where funding emphasis is placed (VTrans, 2007).
- **Use of Performance Measures in Tradeoff Analysis** - VTrans analyzes possible performance outcomes by projecting performance into the future using different funding scenarios (VTrans, 2007).

Virginia Department of Transportation (VDOT)

- **Performance Measurement by Legislative or Governor’s Mandate** - Virginia DOT’s governing board recently passed a requirement that Virginia DOT maintain its Dashboard with auditable data. This requirement was passed just prior to the Commissioner’s announced resignation and is viewed as a mechanism to preserve the program in subsequent administrations (Padgette, 2006).
- **Use of an On-Line Tool for Performance Reporting** - Virginia DOT’s “Dashboard,” a web-based interface for tracking on-time and on-budget delivery of every DOT project, grew out of concerns with project delivery delays. Users can drill down into specific districts, corridors, and projects. Performance measures are posted on-line whether they are complete or not. This is intended to encourage data owners to submit accurate data (Padgette, 2006; Virginia DOT, 2007).
- **Regular Reporting of Performance Results** - The department also produces a Quarterly Report Card, tied to the dashboard, which shows department performance in meeting construction budgets and schedule deadlines (Virginia DOT, 2007).

Washington State Department of Transportation (WSDOT)

- **Tracking Progress toward Strategic Goals** - The Washington DOT’s Strategic Plan, “Business Directions” lays out the department’s six key initiatives, most of which focus on system maintenance, and details its work plan. Progress toward strategic plan goals is tracked quarterly through publication of the Gray Notebook (Washington DOT, 2007).
- **Regular Reporting of Performance Results** - Each quarter, the DOT publishes a comprehensive performance report called Measures, Markers, and Mileposts (commonly known as The Gray Notebook). The Gray Notebook connects WSDOT’s initiatives with statewide outcome goals. The Grey Notebook is organized into two sections. Beige pages report on delivery of

projects funded in the 2003 transportation funding package, and white pages describe key agency functions and provide regularly updated system and program performance information (Washington DOT, 2007).

- **Regular Reviews of Performance Results** – The secretary of the DOT meets face-to-face regularly with DOT staff to discuss performance measurement issues (Padgette, 2006).
- **Setting Performance Targets Based on Anticipated Funding Levels through the Forecast Horizon** – The performance goals set by the DOT are often fiscally constrained. A certain funding level is made available by the legislature for a particular category of project and this is translated into an achievable target (Cambridge Systematics, Inc. et al., 2006).

Cities

City of Baltimore, Maryland, CitiStat Program

- **Regular Management Reviews of Performance Results** – The CitiStat program was developed by former Baltimore Mayor Martin O’Malley to help him keep abreast of the city’s day-to-day operations. The program involves biweekly meetings with a core group of decision-makers who use data and statistics to identify problems and develop solutions for each department. Managers present at the meetings must be prepared to discuss, and sometimes defend, their department’s performance over the previous period. The program focuses on detailed aspects of day-to-day city operations, such as the number of potholes filled or the level of absenteeism and overtime work (City of Baltimore, 2007).

City of Somerville, Massachusetts, SomerStat Program

- **Regular Management Reviews of Performance Results** – The City of Somerville, Massachusetts recently initiated a performance monitoring program called SomerStat. Central to the SomerStat program are regular forums where city decision-makers meet to discuss the latest data on the city’s performance in the areas of finance, personnel, and operations. At the forums, decision-makers identify opportunities for improvement and track the implementation of the city’s strategic plans (City of Somerville, 2007).
- **Linking Performance Measures to Business Planning or Budgeting Activities** – The SomerStat program includes the production of a program-based budget that links cost and revenue to departments’ service delivery activities and goals. The annual budget development process provides an opportunity for the city to set goals that will be tracked throughout the following year. The budgeting process also helps to tie departmental performance with the allocation of resources (City of Somerville, 2007 and Walters, 2007).
- **Use of a Centralized Complaint Line to Identify Performance Problems** – The SomerStat program includes a 311 Call Center where residents can leave

feedback about city services and submit requests that they can track on-line. Reports from the call center are incorporated into both the SomerStat forums and the development of the program-based budget (City of Somerville, 2007).

Transit Agencies

Baltimore MTA

- **Using Performance Measures to Identify Underperforming Transit Routes -** The Baltimore MTA evaluates route performance based on the number of boarding per mile and per trip; the farebox ratio and the subsidy per boarding. MTA groups all routes into “successful,” “acceptable,” and “problem.” It monitors problem routes on a monthly basis before implementing route changes designed to improve performance (Kittelsohn & Associates et al., 2003).

Capital Area Transit Authority, Lansing, Michigan

- **Use of a Customer Satisfaction Survey to Identify and Remedy Performance Problems -** For example, one survey identified that customers were concerned with nuisance behavior on buses; resources were stepped up to enforce a new “zero tolerance” policy and new resources were dedicated to enforcement. Customer satisfaction subsequently improved (Kittelsohn & Associates et al., 2003).

Dallas Area Regional Transit (DART)

- **Aligning Performance Measures throughout the Organization -** The DART strategic plan has provided a tool for prioritizing projects and making management decisions based on their impact on the plan. By using the balanced scorecard approach, DART is able to drive the strategic plan downward from the vision and mission through the management and into individual performance appraisals (Lawrie, 2006).

New York Metropolitan Transit Association

- **Aligning Performance Measures throughout the Organization -** Performance indicators are selected by the MTA, the regional transit agency, and specific targets for those indicators are established by responsible departments in each subsidiary agency. These are then approved by the agency’s president and the MTA board. NYCTA has developed a small set of strategic goals, quantified by performance measure targets. Within each goal, a more specific set of strategies and targets are laid out that wrap up to the higher-level goals (Lawrie, 2006).

River City, Transit Authority, Louisville, Kentucky (TARC)

- **Regular Reporting of Performance Results** – As part of its strategic planning process, TARC compiles a monthly report highlighting progress in key performance areas (e.g., customer service, transportation, and maintenance). The performance report provides year-to-date performance data and comparison data for the previous calendar year. TARC’s management team reports on progress toward overall performance objectives on a quarterly basis (Lawrie, 2006).

San Diego Association of Governments/Metropolitan Transit Development Board (SANDAG)

- **Linking Performance Measures with Business Planning or Budgeting Activities** – Performance measures were used to assess the impact and priority of transit capital projects in the 2030 regional transportation plan. Performance measures included the degree to which the project would serve transit-supportive corridors and commuter needs; its cost-effectiveness (subsidy/passenger); and its integration with the transit network (Kittelsohn & Associates et al., 2003).

Washington Metropolitan Area Transit Authority (WMATA)

- **Aligning Performance Measures throughout the Organization** – WMATA uses a “corporate alignment plan,” a tool for managing progress much like a business plan, to align annual performance targets with the strategic plan. It contains annual goals, objectives, and performance metrics set by management. These allow the organization to track its accomplishments. The plan also uses the balanced scorecard approach (Lawrie, 2006).

Other Organizations

American Cancer Society

- **Use of an Independent Body to Evaluate Performance; Comparing Performance across Organizational Units** – The American Cancer Society is a national nonprofit organization dedicated to eliminating cancer and providing support to cancer patients. The ACS has established a dedicated, independent team to develop and track performance in the 13 divisions. The team meets annually with each division to share performance information, provide recommendations for improvement, and to share best practices. All division-level performance information is confidential, but comparisons between divisions are used to inform the recommendations of the analysts (Personal Communication, 2007).
- **Setting Performance Targets Based on Comparisons Across Organizational Units** – Division-level performance is used to set standards and targets across the organization (Personal Communication, 2007).

- **Aligning Performance Measures throughout the Organization** - Division-level performance measures used by the ACS “roll-up” into high-level strategic performance measures used by the ACS leadership to guide strategy for the whole organization (Personal Communication, 2007).

Federal Aviation Administration

- **Tracking Progress toward Strategic Goals** - The Federal Aviation Administration’s strategic plan, the “Flight Plan,” lays out the agency’s goals related to safety, capacity, international leadership, and organizational excellence. The agency reports on progress toward its performance targets on a quarterly basis (FAA, 2007).
- **Linking Legislative Budget Requests to Performance Measures** - Performance results from the Flight Plan are used in Federal budget requests (FAA, 2007).
- **Regular Reporting of Performance Results** - The FAA assigns the color of red, yellow, or green to each performance target depending on whether the target is off-track, needs improvement, or on-track, and publishes the results in a monthly web-based performance scorecard. The agency must meet 90 percent of its Flight Plan performance targets in order for employees to receive yearly bonuses (FAA, 2007).
- **Use of an Employee Satisfaction Survey to Improve Organizational Performance** - In 2003, the FAA distributed an employee attitude survey to its 48,900 employees. Survey results were used to set employee satisfaction targets for the ensuing years. Employees’ pay is in part contingent on meeting satisfaction performance targets (FAA, 2003).

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