Connections 2030 Performance Monitoring

Cambridge Systematics, Inc.

Final Report No. 0092-09-11, TPF-5(036)
January 2011

WISCONSIN DOT
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Technical Report Documentation Page

1. Report No. WisDOT 0092-09-11	2. Government Accession No No	3. Recipient's Catalog No
4. Title and Subtitle Performance Measures for the Long Range Plan		5. Report Date January 2011 6. Performing Organization Code
7. Authors Joseph Guerre		8. Performing Organization Report No.
9. Performing Organization Name and Address Cambridge Systematics, Inc 115 S. LaSalle Street, Suite 2200 Chicago, IL 60604		10. Work Unit No. (TRAIS) 11. Contract or Grant No. 0092-09-11/TPF-5(036)
12. Sponsoring Agency Name and Address Wisconsin Department of Transportation Research and Library Unit 4802 Sheboygan Avenue Madison, WI 53707		13. Type of Report and Period Covered Research Report September 2009 – February 2011 14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

The Wisconsin Department of Transportation (WisDOT) recently updated its long-range multimodal plan. This plan, referred to as Connections 2030, provides a policy framework for moving towards a safer and more efficient transportation system that supports economic prosperity and enhances the quality of life in Wisconsin.

This report recommends a performance monitoring program that WisDOT can use to track the implementation of the policies defined in Connections 2030, and assess their impact on the overall performance of the state transportation system.

17. Key Words	18. Distribution Statement
Connections 2030, Long Range Transportation Plans, Performance Measures, Planning, Programming, Multimodal, Wisconsin	No restriction. This document is available to the public through the Wisconsin Department of Transportation 4802 Sheboygan Avenue Madison, WI 53707

18. Security Classif.(of this report) Unclassified	19. Security Classif. (of this page) Unclassified	20. No. of Pages 48	21. Price

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

report

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January, 2011

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1.0 Introduction

The Wisconsin Department of Transportation (WisDOT) recently updated its long-range multimodal plan. This plan, referred to as Connections 2030, provides a policy framework for moving towards a safer and more efficient transportation system that supports economic prosperity and enhances the quality of life in Wisconsin.

This report recommends a performance monitoring program that WisDOT can use to track the implementation of the policies defined in Connections 2030, and assess their impact on the overall performance of the state transportation system.

1.1 CONNECTIONS 2030 COMPONENTS

The performance monitoring program recommended in this report addresses the three hierarchical components of Connections 2030 – themes, policies and policy action items.

- The following transportation **themes** serve as the overall organizational mechanism for the Connections 2030:
  - Preserve and maintain Wisconsin's transportation system;
  - Promote transportation safety;
  - Foster Wisconsin's economic growth;
  - Provide mobility and transportation choice;
  - Promote transportation efficiencies;
  - Preserve Wisconsin's quality of life; and
  - Promote transportation security.
- Connections 2030 defines a set of **policies** within each theme. These policies are designed to guide planning, investment decisions, and project delivery. Overall, the plan contains 37 policies. For example, the preservation and maintenance theme includes three policies:
  - Implement cost-effective maintenance activities on Wisconsin's state trunk highway system;
  - Preserve Wisconsin's state trunk highway system infrastructure; and
  - Preserve Wisconsin's airport system infrastructure.
- Within each policy, Connections 2030 identifies a set of **policy actions items**. These items represent specific actions that WisDOT can take in order to implement the policies. Overall, the plan defines 400 policy action items. For

example, it provides the following four policy action items within the "preserve Wisconsin's airport system infrastructure" policy:

- Complete the State Airport System Plan update to identify long-term needs;
- Implement Airport Improvement Program projects;
- Continue to implement Airport Improvement Program preservation projects in coordination with local airport authorities; and
- Continue to work with stakeholders and the general public to evaluate and update the State Airport System Plan, as needed, through the planning period.

1.2 RECOMMENDED MONITORING APPROACH

The recommended performance monitoring approach will enable WisDOT to answer two fundamental questions regarding the implementation of Connections 2030:

- Are we doing what we said we would do?
- Are these actions having their desired effect?

From an external perspective, the ability to answer these questions will improve WisDOT's transparency and accountability. Internally, the monitoring effort will provide WisDOT staff with information needed to improve implementation efforts and influence the development of future plans. The proposed approach contains two elements:

- **Policy action item tracking**. Section 3 of this report provides details on an approach for tracking the progress of the individual policy action items defined in Connections 2030. Using the policy action items as the basic building block of the monitoring effort will enable WisDOT to roll up implementation information to the policy level and the theme level.
- **System performance measures.** Section 4 of this report recommends a targeted set of system-level performance measures that WisDOT can use to track trends in the overall performance of the state transportation network. These measures can serve as lagging indicators of the overall success of Connections 2030.

It is recommended that WisDOT conduct the activities described above at least every six months, organize the results by theme, and incorporate them into a Connections 2030 performance monitoring report. It is further recommended that access to the report be provided to external audiences annually. The audience for this report includes WisDOT staff responsible for implementing the policies in Connections 2030 and external stakeholders, such as planning partners, elected officials and the general public.

2.0 Literature Review

This section summarizes results of a literature review conducted as part of this effort. The review drew heavily upon a number of best practice reviews conducted previously by the research team as part of other national research efforts related to performance management. Findings from these previous efforts were augmented with a review of approaches used by agencies to monitor the implementation of policy plans because this topic was not well covered in previous efforts. Section 2.1 describes the previous efforts; Section 2.2 provides a summary of the trends and lessons in performance-based planning and programming in practice at other agencies; Sections 2.3 through 2.9 provide a summary of typical measures in use at other state DOTs and MPOs for each Connections 2030 theme; and Section 2.10 presents the findings of the implementation tracking review.

2.1 Recent Performance Measure Reviews

Cambridge Systematics has conducted a formal review of performance measurement practices through numerous projects and studies. The reviews cover a broad set of U.S. state departments of transportation, local planning organizations, foreign agencies, and private sector organizations; and a wide range of topics. These research efforts relate to three areas:

- Ongoing discussions regarding the establishment of a performance-based Federal-aid highway program:
  - NCHRP 20-24(67), State DOT CEO Leadership Forum.
  - FHWA - Performance-Based Management of Federal-Aid Highway Programs.
  - NCHRP 20-24(58), Toward Developing Performance Based Federal-Aid Highway Programs.
  - 2009 FHWA/AASHTO Performance Measures Peer Exchange.
- Selection and calculation of performance measures:
  - NCHRP Report 551, Performance Measures and Targets for Asset Management.
  - NCHRP 3-68, Guide to Effective Freeway Measurement.
  - NCFRP 3, Performance Measures for Freight Transportation.
- Incorporation of performance measures into transportation decision making processes:

- NCHRP Report 666, Target-Setting Methods and Data Management to Support Performance-Based Resource Allocation by Transportation Agencies.
- NCHRP 8-62, Transportation Performance Management Programs – Insight from Practitioners.
- NCHRP 8-36(47), Effective Organization of Performance Measurement.
- International Scan: Linking Transportation Performance and Accountability.

Information from the literature reviews and results of each of these studies has been extracted for this study. This material is presented below. More detail on each of these reports and the types of agencies reviewed for each is provided in Appendix A.

2.2 USE OF PERFORMANCE MEASURES IN PLANNING AND PROGRAMMING

Over the last 15 years, there has been a dramatic increase among state departments of transportation (DOTs) in the use of performance management principles to plan, prioritize, track, and improve the effectiveness of nearly all DOT functions to achieve the agency's fundamental goals. Performance information helps to guide decisions about priorities and resource allocation, not just for capital project delivery but also for internal agency management and operations. Performance management (and overall use of performance measures) has been applied for many purposes in state DOTs:

- Providing a foundation for policy formulation and systemwide planning;
- Issuing "report cards";
- Tracking progress toward publicized policy goals and agency priorities;
- Supporting investment decision-making in resource allocation, performance-driven investment decisions, formalized performance-based budgeting, and strengthened internal program management;
- Demonstrating accountability and responsiveness to stakeholders, ensuring "wise use of tax dollars";
- Assessing the status of a program, evaluating its cost- and performance-effectiveness;
- Meeting or responding to Federal and state legislative mandates and reporting requirements;
- Guiding improved delivery of services, focusing on desirable outcomes and alternative methods of delivering these results;

- Engaging an agency within a comprehensive, statewide performance initiative aimed at broad-based improvement in government delivery of services and accountability; and
- Improving communication within the agency itself as well as with transportation system users, political leaders, other stakeholders, and the public at large.

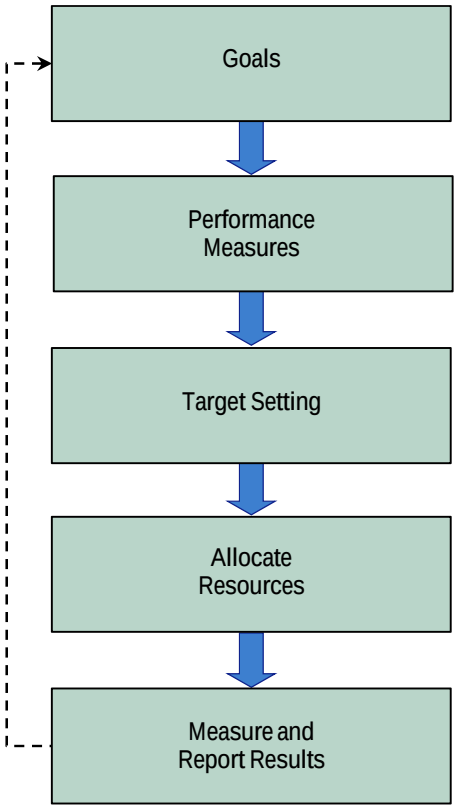
At one end of the spectrum are agencies that have limited data mining and reporting capabilities or practices beyond those needed to meet Federal requirements. At the other end are a handful of agencies with well-developed performance management programs that help drive every aspect of the organization including budgeting and project selection processes. In between are the rest of the state agencies with some level of predictive capability. These agencies have a commitment to using system and agency performance data to improve effectiveness and efficiency but with only some elements of a comprehensive performance management system in place. Progress and improvements in the performance management process are cyclical and occur incrementally over time, requiring sustained leadership over a number of years to achieve full implementation.

Despite institutional differences among agencies, several elements of best practice are frequently noted among the most advanced performance-based systems:

- The application of performance measures throughout the agency that are integrated vertically, horizontally, and among processes;
- The application of performance measurement in a systematic, documented way;
- Strong executive/managerial support and involvement in performance reviews and decisions on reallocating resources, in central and district offices, as well as among program and key business unit managers;
- Recognition that performance measurement can involve a culture change within the agency, with steps taken to focus on the positive aspects of this change while mitigating the potentially negative aspects;
- Transparency of performance results and their implications for transportation customers and stakeholders, as well as the owning/operating agency; and
- Several agencies link organizational performance and transportation system performance. This concept has existed for some time in the private sector, but now is being considered by public sector DOTs.

A "performance management framework" has been developed to illustrate the basic performance management principles that can be integrated into all of the critical functions and operations of a transportation agency, from program development to delivery to agency operations (Figure 2.1). Each step in the framework is described below.

Figure 2.1 Performance Management Framework



Goals. The first step in a performance-based approach is to define long-range goals to which all subsequent decisions are mapped back. These goals help to identify what is important and guide how progress should be assessed. In the context of Connections 2030, the themes represent "goals", as represented in this figure.

Performance Measures. Performance measures are a set of metrics used by organizations to monitor progress toward achieving a goal. The criteria for selecting measures often include:

- Feasibility;
- Policy sensitivity;
- Ease of understanding; and
- Usefulness in actual decision-making.

Subsequent section of this report recommend performance measures for use in monitoring the implementation of Connections 2030.

Targets. A target is a specific value for a performance measure that an agency hopes to achieve. For example, achieving a 25 percent reduction in highway fatalities by 2030. Once WisDOT has implemented a set of Connections 2030 performance measures, it is recommended that it consider setting specific, fiscally-constrained targets in subsequent planning efforts.

Allocate Resources. Resources can be allocated in terms of prioritizing and selecting investment strategies and programming funds for implementation and/or directing internal agency (staff, management, other) resources to support attainment of long-term goals. The system level performance measures recommended below could provide a basis for allocating resources in subsequent planning efforts.

Measure and Record Results. This step entails tracking and reporting progress toward overall goals. Reports vary widely by agency and monitoring focus. Section 3 of this report provides examples of what a Connections 2030 monitoring report could look like.

The following sections describe examples of performance measures used by transportation agencies, organized by the Connection 2030 themes. **Measures flagged with an * have received attention recently for possible inclusion in a national performance measurement program** that is being considered by the American Association of State Highway and Transportation Officials (AASHTO) and the Federal Highway Administration (FHWA).

2.3 MEASURES RELATED TO PRESERVING WISCONSIN'S TRANSPORTATION SYSTEM

Preservation measures are used to assess the condition of a transportation system and the effectiveness of actions designed to keep it in a state of good repair. While conceptually similar across asset types, the specifics of preservation measures are often asset-specific.

As most state DOTs' system assets are primarily highway-related, most measures focus on pavement and bridges. All states already report several measures for national reporting purposes via HPMS and NBI, and most use them and other measures for asset management within the state. With these data readily available, therefore, and with preservation an important theme in most states, some of the following types of measures are typically found in state long range transportation plans:

- Pavement
  - Average International Roughness Index (IRI)*;
  - Percent of pavements in good, fair, or poor condition*;
- Bridges
  - Percent classified as Structurally Deficient (SD), weighted by deck area*;

- Percent classified as Functionally Obsolete (FO), weighted by deck area;
- Percent classified as good/fair/poor*;
- Number of scour critical bridges; and
- Number of posted bridges.

Some states with an active role in public transportation also track measures of transit vehicle age.

2.4 MEASURES RELATED TO PROMOTING TRANSPORTATION SAFETY

Safety is often gauged by the number, frequency, severity, and cost of accidents. Safety is affected by road user behavior, vehicle operations, roadway conditions, and other factors, some of which may be outside the control of the state DOT.

The data used to estimate safety outcomes are derived from police reports and aggregated at the state level. The NHTSA develops a census of detailed crash reports for crashes that involve fatalities as part of the Fatality Analysis Reporting System (FARS). FARS establishes detailed standards in reporting and requirements for the type of information provided. As these data are available to all states, and with the prominence of the safety goal among states (and an AASHTO goal to reduce fatalities by 50 percent by 2030), all state long-range plans examined have one or more of the following measures:

- Number of fatalities*;
- Fatality rate (using VMT);
- Number of serious injuries*; and
- Rate of serious injuries (using VMT).

Additionally, as part of state Strategic Highway Safety Plans (which take a multi-departmental, cross-functional approach to transportation safety), states often track behavioral measures such as observed seat belt use and activity measures that track the number of safety belt citations, number of impaired driving arrests, and number of speeding citations issued during grant-funded enforcement activities.

2.5 MEASURES RELATED TO FOSTERING WISCONSIN'S ECONOMIC GROWTH

States use economic growth and development measures to monitor and increase direct and indirect impacts of transportation on the economy. In some states and regions these measures are grouped with "freight" measures. Several typical measures for reviewed agencies include:

- Speed*, delay, or reliability* on Interstate, National Highway System, or on any designated freight-significant corridors;
- Number and percent of bridges allowing clearance for double-stack containers; and
- Freight volume by mode including TEU throughput at ports.

Many agencies simply apply typical measures related to "Promoting Transportation Efficiencies", such as speed, delay, level of service, and others, to corridors with heavy freight movement or that are identified as critical to the economy.

For the Ohio DOT Futures Plan (GoOHIO), which is currently under development, economic growth is one of the key goals. Economic development measures being considered include:

- Targeted industry employment travel shed; and
- Change in number of jobs.

2.6 MEASURES RELATED TO PROVIDING MOBILITY AND TRANSPORTATION CHOICE

"Mobility and Transportation Choice" overlaps with several common goal areas used by state DOTs and MPOs, often referred to as "mobility" or "accessibility". These goal areas also overlap with WisDOT's theme of "Promoting Transportation Efficiencies". Essentially, these goal areas usually examine the movement of people and goods and the ability of people and goods to reach desired activities or destinations, which includes multiple means of access. Typical measures include:

- Hours of delay
- Hours of delay per VMT or per commuter*
- Congestion cost*
- Transit usage (passenger miles traveled and passenger miles per service mile)
- Mode share

Some measures are applied by agencies in a mode-neutral manner to evaluate strategies: they can be applied to any mode individually (e.g., person-hours of delay on a transit route) or combined across modes (e.g., person-hours traveled by all modes from zone A to zone B).

The Strategic Highway Research Program (SHRP) 2 C02 project provides a useful summary of types of measures of accessibility in use:

- **Job Accessibility –** Number of jobs within a reasonable travel time (30 or 45 minutes, for example) for a region's population. This type of measure captures employment opportunities accessible to potential employees.
- **Destination/Market Center Accessibility –** Average travel time to major regional destinations. This type of measure captures access to recreation, major shopping areas, etc.
- **Labor Force Accessibility –** Number of residents within a reasonable travel time of a region's employers. This type of measure captures the size of the labor pool for existing or potential employers.
- **Environmental Justice Accessibility Impact –** Relative jobs, destinations, and labor force accessibility for environmental populations versus the general population. This type of measure captures the extent to which the transportation system provides better access for some groups than others.

Such accessibility measures can be applied for each mode independently, or across all modes. These measures also overlap heavily with measures used to gauge and promote economic growth.

2.7 MEASURES RELATED TO PROMOTING TRANSPORTATION EFFICIENCIES

For many agencies this theme overlaps with "Provide Mobility and Transportation Choice", under the general concept of the efficient movement of people and goods. Generally these measures include the time and cost of making a trip and relative ease or difficulty and predictability with which a trip is made.

- Hours of delay (vehicle-hours and person-hours);
- Hours of delay per VMT or commuter*;
- Travel time reliability*;
- Cost of congestion*; and
- Level of Service (LOS), or VMT and VHT weighted by LOS (e.g., percent of VMT in congested conditions).

However, it is often difficult to distinguish the impacts on a system level of operational strategies versus investments in new capacity. Example measures focused on improving the operations efficiency and reliability provided by the existing system include:

- Incident response time*;
- Incident clearance time*; and
- Lane closures (lost lane-hours) due to work zones* and weather events.

2.8 MEASURES RELATED TO PRESERVING WISCONSIN'S QUALITY OF LIFE

The terms quality of life, sustainability, and livability are used interchangeably in many contexts to communicate a common understanding of the relationship between community wellbeing, individual health, the economy, and the natural environment. Most transportation agencies include the terms livability, sustainability, or quality of life in their vision or mission statements, but relatively few explicitly define them or include them as a specific agency goal or performance measure. Several existing programs have developed different multi-disciplinary definitions of livability or quality of life, including:

- PennDOT and NJDOT Smart Design Guidebook;
- CalTrans Smart Mobility 2010 Framework and California Regional Progress Report;
- WSDOT Livable Communities Policy;
- Transportation 2035 Plan – Metropolitan Transportation Commission; and
- Go to 2040 Plan - Chicago Metropolitan Agency for Planning.

The CalTrans Smart Mobility 2010 Framework is one of the most recent and impressive examples of a performance-based approach to transportation planning and investment that is dedicated to the principles of livability, sustainability, Smart Growth, and context sensitive solutions. According to the framework, "Smart Mobility moves people and freight while enhancing California's economic, environmental, and human resources by emphasizing: convenient and safe multimodal travel, speed suitability, accessibility, management of the circulation network, and efficient use of land." The goal of the measures in the framework is to demonstrate the relationship between specific land use and transportation decisions and consequent effects on economic, social, and environmental conditions.

Several key lessons about quality of life or livability measures emerge from the literature review:

- Quality of life is multidimensional – No matter how it is defined, livability has many dimensions, which no single measure can capture. More than one measure will need to be identified to effectively capture the livability of a state.
- Quality of life is contextual – What makes a place livable is not the same across every type of area. For example, transit level of service or walkability will be quite different in an urban area than in a rural area, or a suburban area. Therefore, different measures, or different thresholds are needed in different contexts.

- Quality of life is multi-disciplinary – The elements of livability include land-use, the environment, economics, and other social dimensions. Therefore, the process to identify a set of measures that are effective should involve experts representing a range of agencies and perspectives.

Since livability is a relatively new goal for most transportation agencies and data sources for measuring many livability outcomes are limited, many agencies begin evaluating livability through output-based performance measures. Common examples of output-based livability performance measures include:

- Adoption of a Complete Streets Policy;
- Development of an Integrated Transportation & Land Use Plan, Bicycle & Pedestrian Plan, etc.;
- Miles of sidewalk or bicycle path constructed; and
- Number of new mixed-use developments permitted.

For outcome measures, some agencies include measures from other goal areas (e.g., safety, mobility and transportation choices, and economic growth) under the livability or quality of life umbrella. Example measures being applied by agencies that are unique to this theme, however, include:

- Consistency with Local Land Use & Transportation Plans;
- Connectivity Index;
- Community Character (e.g. resident satisfaction);
- Partnerships and Public Involvement;
- Jobs/Housing Balance ;
- Location Efficiency; and
- Housing and Transportation Index (Housing and Transportation Cost/Affordability).

WisDOT includes environmental policies within the "Quality of Life" theme. Within the agencies reviewed, "environment" is often a separate goal area, but overlaps significantly with "livability". Common measures include:

- Transportation contribution to pollutants and green house gas emissions*; and
- Volume of untreated runoff from roads*.

2.9 MEASURES RELATED TO PROMOTING TRANSPORTATION SECURITY

Since security goes well beyond what can be controlled by state DOTs, performance measures related to security are typically not tracked or reported. No examples of security measures were found in the reports reviewed as part of this effort.

2.10 PLAN IMPLEMENTATION MONITORING

This section presents the results of a new literature review conducted as part of this effort that focused on approaches used to monitor the implementation of policy plans.

A straightforward approach to qualitative assessing implementation status is to qualitatively report on the progress with text. An example of this qualitative reporting style from the Virginia Department of Rail and Public Transportation (DRPT) is shown in Figure 2.2.

Figure 2.2 Virginia DRPT Action Report

Action Item 4.2 – *Support establishment of a permanent Rail Fund and development of a process for determining rail priorities.*

> ***Accomplishment 4.2 –*** *The Rail Enhancement Fund, which is funded through the state rental car tax, is a permanent funding source for passenger and freight rail capital improvement projects. Governor Warner appointed a Rail Advisory Board which has developed policies and procedures for the funding of specific projects. The CTB is expected to approve grants for specific projects by the end of 2005.*

Action Item 4.3 – *Work with both public and private sector interests to improve the state's rail infrastructure and passenger and freight rail service.*

> ***Accomplishment 4.3 –*** *A Statewide Multimodal Freight Study is underway and will identify freight-related infrastructure, forecast traffic, identify current and future needs, and provide recommendations for state planning and programming policies. A Freight Advisory Committee will be named.*
>
> *DRPT is working with CSX and VRE to implement improvements in the Washington, D.C. to Richmond corridor utilizing $65 million provided through the Virginia Transportation Act of 2000.*
>
> *VTrans2025 outreach efforts specifically targeted transportation providers, including the rail industry, and other private sector stakeholders.*

Some agencies find this method of reporting to be cumbersome and verbose, and prefer a more simplified reporting method. An alternative is to use a predefined implementation scale to indicate progress. In this approach, a set of general benchmarks are defined. In each reporting cycle, a staff member familiar with each item (typically a project manager) determines its appropriate benchmark. Frequently this information is augmented with comments that provide

additional context on the implementation progress. The strengths of this approach are its simplicity and consistency. Table 2.1 provides examples of implementation scales. Further details on each approach are provided below.

Table 2.1 Example Implementation Scales

FedCenter	California DOT	Oregon DOT	Virginia DOT	Pennsylvania DOT	Capability Maturity Model
Developed	Not Started	Limited Progress	Red	No Longer Being Addressed	Initial
Endorsed	Early Progress	Making Progress	Yellow	No Progress	Repeatable
Deployed	Underway	Significant Progress	Green	Completion behind Schedule	Defined
Verified	Substantial Progress			Completion on Schedule	Managed
	Complete			Complete	Optimized

FedCenter

The Federal Facilities Environmental Stewardship and Compliance Assistance Center (FedCenter) adapted the ISO 14001 criteria for environmental management to assess the degree of implementation of their Environmental Management Standards (EMS). FedCenter evaluates several elements of each EMS implementation. The implementation status of each element is determined by the questions sampled in Table 2.2.

Table 2.2 FedCenter Evaluation Criteria

Element	Developed	Endorsed	Deployed	Verified
Policy	Has an EMS policy been created that addresses all required points?	Has top management signed and stated support for the policy?	Is it available to the public? Has it been communicated to the employees? Does the remainder of the EMS reflect the policy commitments?	Employees are aware of and understand the policy.
Aspects	Has a procedure been created in accordance with criteria? Does it provide for keeping information up to date?	If using ISO 14001, has the organization approved the significance criteria?	Have aspects been identified? Is information being communicated to others developing other parts of the EMS?	Does the significant aspect list accurately reflect the operations?

California Department of Transportation (Caltrans)

Caltrans uses a qualitative process to assess progress in the implementation of the California Strategic Highway Safety Plan (SHSP). The California SHSP consists of 16 Challenge Areas, and each Challenge Area includes several Actions. Each month, Action Leads report if one of their Actions can be promoted to the next of hierarchy of five status levels. The Action Lead usually attaches a comment describing this progress or an explanation is no progress is made. These status levels and comments are reviewed at monthly SHSP Steering Committee meetings in the report format shown in Figure 2.3.

Figure 2.3 Caltrans SHSP Implementation Report

Challenge Area 11: Improve Commercial Vehicle Safety

SHSP Ref. #	Lead Agency	Lead Individual	Action Description	≤ 2 yrs	> 2 yrs	1. Not Started	2. Early Progress	3. Underway	4. Substantial Progress	5. Completed	Comments
11.01	DMV	Robert Benson	Establish minimum training standards for new commercial vehicle drivers.		◆						No Change to status this month.
11.02	CHP	Craig Root	Increase the number of strike force operations.	●							CHP conducted 28 commercial strike forces statewide during April utilizing 120 uniformed personnel and 28 non uniformed inspectors. These strike forces
11.03	Caltrans	James Anderson	Conduct joint studies at high-crash collision locations involving commercial vehicles, identify appropriate infrastructure improvements, and make adjustments as needed.		◆						Caltrans is in negotiations with a consultant to finalize the details of a contract to determine the latest high-crash locations to study.
11.04	CHP	Craig Root	Enhance the Commercial Industry Education Program.	●							Personnel from CHP HQ travelled statewide and completed three enhanced Driving Strategies Program presentations.
11.05	CHP	Craig Root	Increase Biennial Inspection of Terminal inspections from 2006 levels.		◆						In the month of April, CHP completed 1,568 BIT inspections. This was a slight increase over the 2006 levels (1,559).
11.06	Caltrans	Suzy Namba	Study the feasibility of improving commercial vehicle safety by adding additional rest stops in identified locations, and increase the number of rest stops as needed.		◆						Contract Number 65N0334 Update Safety Roadside Rest Area (SRRA) Master Plan is expected to be executed by June 30, 2009.
11.07	Caltrans	James Anderson	Advertise next rest stop location, use rest stop smart technology, and add rest stop information on the Caltrans website.		◆						Caltrans is working on several solutions including improving transporter access to real time info regarding commercial rest area parking locations and availability
			Number of Actions At Each Stage of Implementation			0	4	0	3	0	

Last Updated:
5/28/2009

Challenge Area Leaders
Ray Baghshomali (Caltrans)
Craig Root (CHP)

Monthly Reporting Period Ending: 5/31/09

Legend
X Change in action implementation status from prior month's reporting period.
Change in action comments from prior month's reporting period.

Oregon DOT

The Oregon ODOT tracks the implementation of policies defined in its long range transportation plan using a combination of summary comment and success indicators. An example of these reports is shown in Figure 2.4.

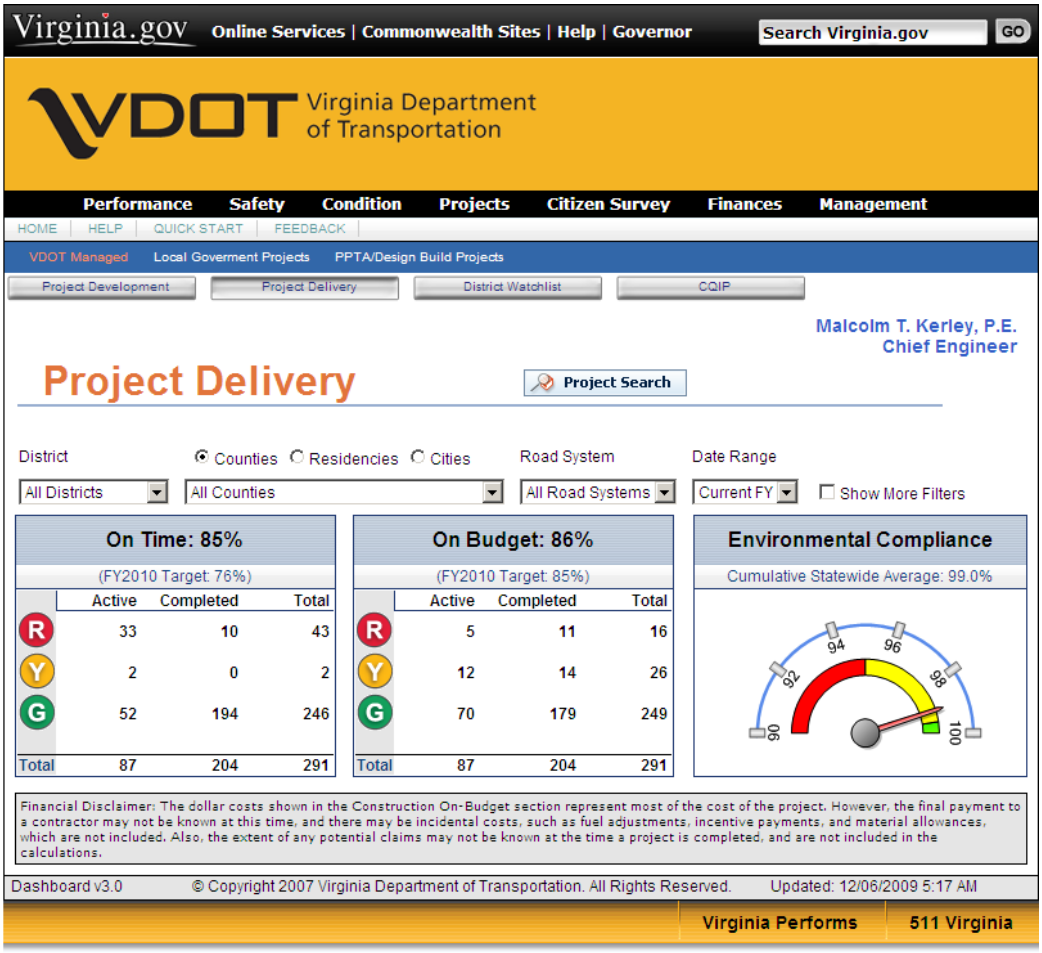
Figure 2.4 Oregon DOT Policy Implementation Report

OTP Policies and Evaluations	Significant Progress	Making Progress	Limited Progress
Policy 1A - Balance: It is the policy of the State of Oregon to provide a balanced transportation system. A balanced transportation system is one that provides transportation options at appropriate minimum service standards, reduces reliance on the single occupant automobile where other modes or choices can be made available, particularly in urban areas, and takes advantage of the inherent efficiencies or each mode.			
Progress Summary: The expansion of the lightrail in the Portland area and Eugene's planned rapid transit increases the passenger network. Progress for other populated areas of the state has been varied. Improvements have been made to the passenger service in the Willamette Valley. But rail passenger service to Eastern Oregon has been cut, and regional air passenger service to parts of the state is lacking. Oregon has an extensive rail network that is helping to provide cost-effective choices for shippers. The state highway network is largely in place to support truck freight movement.	X		
Policy 1B - Efficiency: It is the policy of the State of Oregon to assure provision of an efficient transportation system. The system is efficient when (1) it is fast and economic for the user; (2) users face prices that reflect the full costs of their transportation choices; and (3) transportation investment decisions maximize the net full benefits of the system. (Full benefits and costs include social and environmental impacts, as well as the benefits of mobility to users, and construction, operations and maintenance costs.)			
Progress Summary: System efficiency, as defined by the policy is ambitious. Pricing the transportation system is a focus of the policy. Measures to assess "social and environmental impacts" are not in place. Weight-mile taxes are in place for heavy vehicles the importance of charging for parking in urban places is better understood, and a pilot project to test a pilot project to test vehicle miles traveled (VMT) tax is underway. Significant progress has been made with transportation demand management (TDM) measures.			X
Policy 1C - Accessibility: It is the policy of the State of Oregon to promote a transportation system that is reliable and accessible to all potential users, including the transportation disadvantaged, measured by availability of modal choices, ease of use, relative cost, proximity to service and frequency of service.			
Progress Summary: With the help of grants through ODOT, every community over 2,500 people has a handicapped accessible vehicle for local services. Coordination of needed transportation services is being developed by the Department of Human Services for their clientele. Ninety percent of communities in Oregon have intercity bus or rail service. Increased service frequency and better coordination with other transportation services are needed.	X		

Virginia DOT

The Virginia DOT maintains a public performance measure "dashboard." The dashboard consists of several dials and charts that indicate quantitative measures, such as highway deaths, congestion free days, and expenditures. The dashboard includes one dial for project delivery, which uses a quantitative scale of project completeness. The project delivery page is shown in Figure 2.5.

Figure 2.5 Virginia DOT Dashboard - Project Delivery Page



The agency assigns each project one of the following status levels, which address both project timeliness and budget.

- Red – incomplete projects with completion dates in the past, or projects that cost significantly more than the contract amount.
- Yellow – projects with projected completion dates later than the original completion date, or projects that cost moderately more than the original contract amount.
- Green – projects with contract completion dates that are later than the present day and the projected completion date, or projects that cost not much more than the original contract amount.

The dashboard allows users to explore each project in more detail, as illustrated in Figure 2.6.

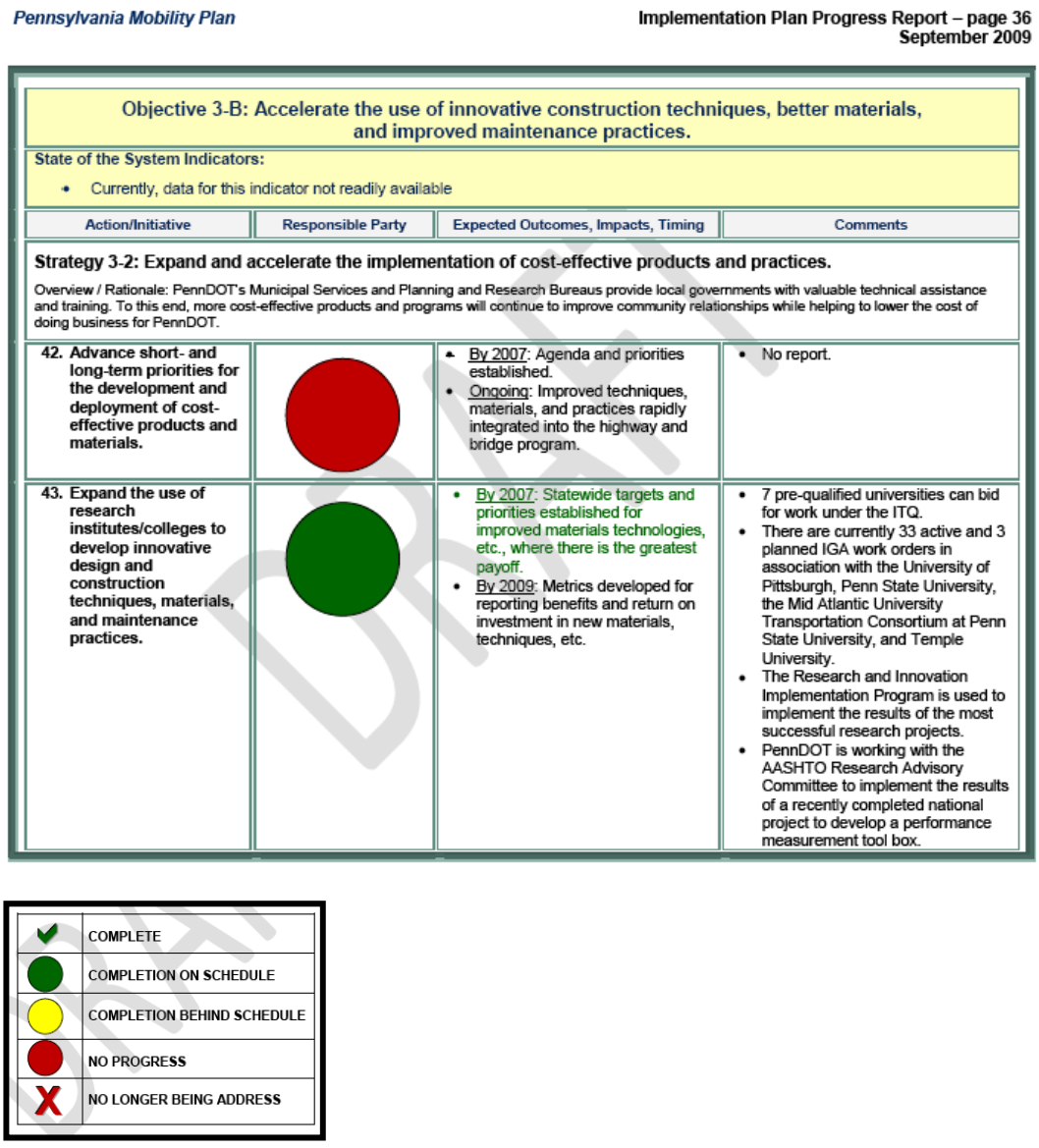
Figure 2.6 Virginia DOT Dashboard – Project Details Page

District	Route	Description	Contract ID	Original Award Amount	Cost of Work		Current Contract Amount	On Time	On Budget
					Current	Final			
Hampton Roads	0175	BRIDGE OVER LEWIS CREEK CHANNEL AND BLACK NARROWS (Accomac, Accomack County) (0175-001-V12,C502,B606)	U00001896B06	$68,687,079	$60,957,853	Active	$69,249,194	R	G
Salem	0221	WIDEN EXISTING 2 LANES TO 4 LANES WITH A 4M FLUSH MEDIAN (Bedford, Bedford County) (0221009V10)	G00057581C02	$15,397,521	$15,540,279	Active	$15,776,539	R	G
Hampton Roads	0143	1.666 K.M. GRADE,DRAIN,ASP.PAVE,SIGNALS,UTILITIES,&LANDSCAPE (Williamsburg, ***) (0143-121-F05,C501)	U00013429C01B	$14,660,039	$14,250,808	Active	$14,701,558	G	G
Northern Virginia	0001	BRIDGE REPLACEMENT ON ROUTE 1 OVER NEABSCO CREEK (Manassas, Prince William County) ((NFO)0001-076-141,C501)	B00016422C01	$18,166,744	$16,262,987	Active	$19,654,653	G	Y
Hampton Roads	0058	1.221KM.GRADE,DRAIN.,ASP. PAVE (***, ***) (0058122104,C501)	U00017546C01	$9,739,067	$7,162,917	Active	$9,969,204	Y	G

Pennsylvania DOT

The Pennsylvania DOT produces a long range transportation plan implementation progress report that includes symbols that convey project status and summary comments. An example report is shown in Figure 2.7.

Figure 2.7 Pennsylvania DOT LRTP Implementation Report



Pennsylvania Mobility Plan

Implementation Plan Progress Report – page 36
September 2009

Objective 3-B: Accelerate the use of innovative construction techniques, better materials, and improved maintenance practices.

State of the System Indicators:

- Currently, data for this indicator not readily available

Action/Initiative	Responsible Party	Expected Outcomes, Impacts, Timing	Comments
Strategy 3-2: Expand and accelerate the implementation of cost-effective products and practices. Overview / Rationale: PennDOT's Municipal Services and Planning and Research Bureaus provide local governments with valuable technical assistance and training. To this end, more cost-effective products and programs will continue to improve community relationships while helping to lower the cost of doing business for PennDOT.			
42. Advance short- and long-term priorities for the development and deployment of cost-effective products and materials.		• By 2007: Agenda and priorities established. • Ongoing: Improved techniques, materials, and practices rapidly integrated into the highway and bridge program.	• No report.
43. Expand the use of research institutes/colleges to develop innovative design and construction techniques, materials, and maintenance practices.		• By 2007: Statewide targets and priorities established for improved materials technologies, etc., where there is the greatest payoff. • By 2009: Metrics developed for reporting benefits and return on investment in new materials, techniques, etc.	• 7 pre-qualified universities can bid for work under the ITQ. • There are currently 33 active and 3 planned IGA work orders in association with the University of Pittsburgh, Penn State University, the Mid Atlantic University Transportation Consortium at Penn State University, and Temple University. • The Research and Innovation Implementation Program is used to implement the results of the most successful research projects. • PennDOT is working with the AASHTO Research Advisory Committee to implement the results of a recently completed national project to develop a performance measurement tool box.

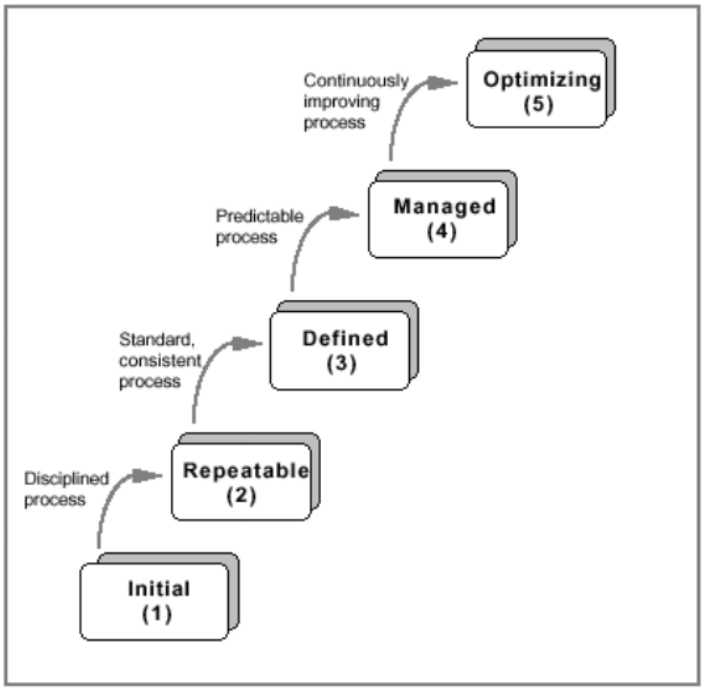
✔	COMPLETE
●	COMPLETION ON SCHEDULE
●	COMPLETION BEHIND SCHEDULE
●	NO PROGRESS
X	NO LONGER BEING ADDRESS

Capability Maturity Model

The Software Engineering Institute of Carnegie Mellon developed the Capability Maturity Model (CMM) to assess progress in continuous implementation. Though originally designed to support the process of software design, the CMM represents a general path towards disciplined progress evaluation that is applicable to policy implementation.

The model is organized into five levels, as shown in Figure 2.8. The CMM provides an example of tracking processes (or activities) that have no predefined completion point. In this example, a process is never "complete". Instead it continues to be "optimized".

Figure 2.8 The Five Levels of Software Process Maturity



3.0 Implementation Tracking of Policy Action Items

Connections 2030 identifies approximately 400 policy action items. It is recommended that WisDOT use a qualitative approach for tracking the degree to which these policy action items are implementing. The recommended approach considers two important aspects of implementation for each item:

1. What phase of implementation is it in?
2. Is it advancing?

The first question can be answered by selecting one of the following phases for each item:

- **Planning** – The "planning" phase consists of developing a detailed implementation plan for an action item. At a minimum, the implementation plan should address the following:
  - Who "owns" the action and will be responsible for tracking it?
  - Who else needs to be involved to make the action a success?
  - How will this item be funded?
  - What is its implementation schedule?

  Depending on the complexity and nature of the action item, the implementation plan may also provide a task structure and a more detailed staffing plan, schedule, and budget.
- **Implementation** – An item moves to the "implementation" when the plan is complete.

The second question can be answered by placing each item into one of the following categories:

- **Advancing –** Work on the item is proceeding as planned;
- **Delayed –** Work on the action item is delayed; or
- **Dropped –** The action item has been dropped and will no longer be implemented.

3.1 SAMPLE MONITORING TEMPLATE

A sample spreadsheet has been provided with this report to help illustrate how the elements described above can be tracked and rolled into a performance report.

The basic building block of this approach is the status of each policy action item. This information can be rolled up into policy and theme summaries. The summaries include a graph of the status of the underlying action items. These graphs can be augmented with a description of progress, challenges, next steps, supporting quantitative information (such as the system performance measures recommended in Section 4), and other items.

The sample spreadsheet consists of the following three tabs:

- **Policy action item tab.** This tab displays progress information for each policy action item. Figure 3.1 represents an illustrative example for the "Promote Transportation Safety" theme. (All data presented in Figures 3.1, 3.2 and 3.3 are fictitious. They are provided for illustrative purposes only.) It uses a green/yellow/red scale to indicate progress. Colors are entered into the spreadsheet by entering 1 (green), 2 (yellow), or 3 (red) and applying conditional formatting to fill these cells with the corresponding colors. The tab also provides space for a qualitative description of the progress, supporting information, comparison of progress to anticipated progress from the last reporting period, goals for the next reporting period, and the identification of who is responsible for tracking the item.
- **Policy tab.** This tab rolls up the information on progress for all policy action items within a policy. Figure 3.2 represents an illustrative example for the "Promote Transportation Safety" theme. Columns for "Achievements" and "Challenges" provide space for a qualitative description of progress at the policy level, and any additional supporting data. A separate column is provided for identifying interrelated policies.
- **Themes tab.** The tab rolls up information on all themes. Figure 3.3 shows an illustrative example. Columns for "Achievements" and "Challenges" provide space for a qualitative description of progress at the theme level, while indicating any additional supporting data.

Figure 3.1 Example Action-Level Template

Legend

- Advancing
- Delayed
- Dropped

Theme	Policy	Other Initiatives	Policy Action Item	Planning	Implementation	Progress Evaluation	Goals for Next Reporting Period	Monitoring Responsible
Promote Transportation Safety	Improve emergency response	Other WisDOT initiatives realated to this action item	Support the Statewide Traffic Operations Center's development of best practices for incident management and a process to regularly review and update these practices.			Qulatative assetment of progress		
Promote Transportation Safety	Improve emergency response		Continue to use video technology and sensors to allow faster detection and response to incidents.					
Promote Transportation Safety	Improve emergency response		Continue to invest in communication system redundancy and integration throughout the plan period.					
Promote Transportation Safety	Improve standards for infrastructure		Continue and/or increase investments in roadway engineering and operational improvements that reduce the negative influences of roadway design, roadway condition or environmental factors, as well as soften the impact of driver error.					
Promote Transportation Safety	Improve standards for infrastructure		Improve planning, training, and design practices for safer management and operation within work zones.					
Promote Transportation Safety	Improve standards for infrastructure		Continue to work with the Office of the Commissioner of Railroads and private railroad companies to identify potential rail crossing safety improvements such as signals, gates, grade separations, or closing crossings, and discourage trespassing by installing fencing.					
Promote Transportation Safety	Improve standards for infrastructure		Continue to support safety-engineering improvements at airports, ranging from technical improvements (landing and navigational aids) to simpler treatments (runway lighting).					

Figure 3.2 Example Policy Summary Template

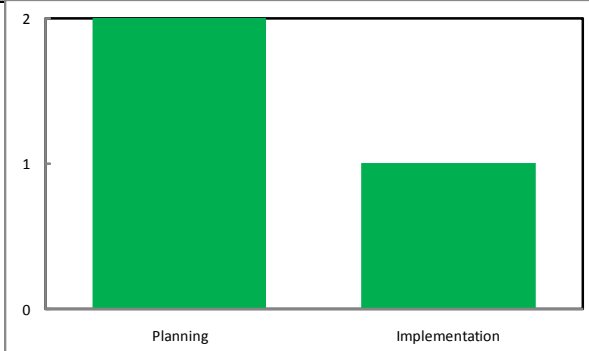
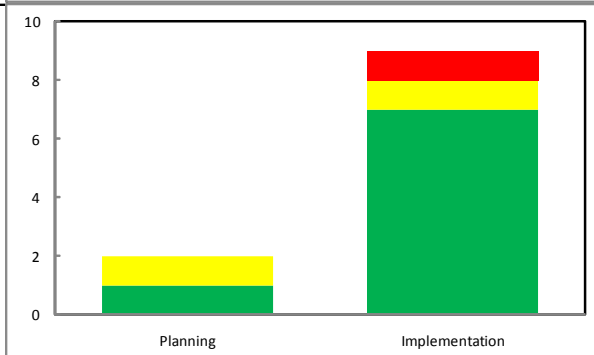
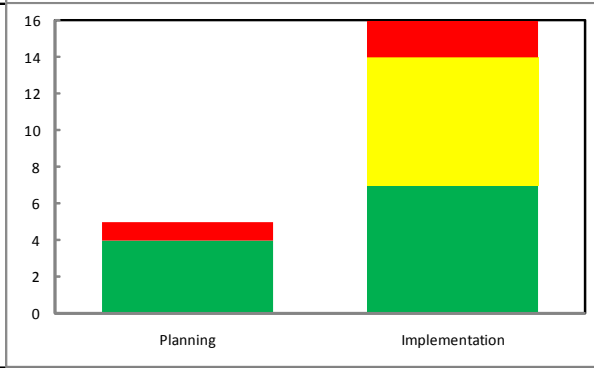
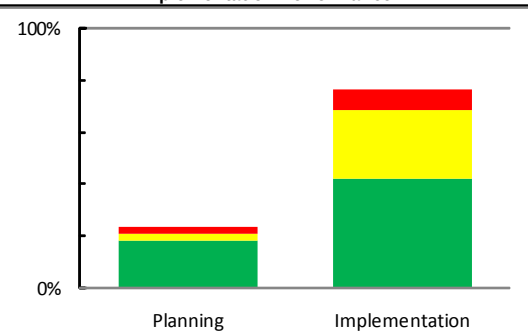
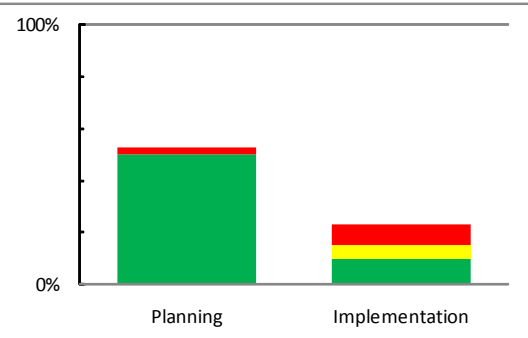
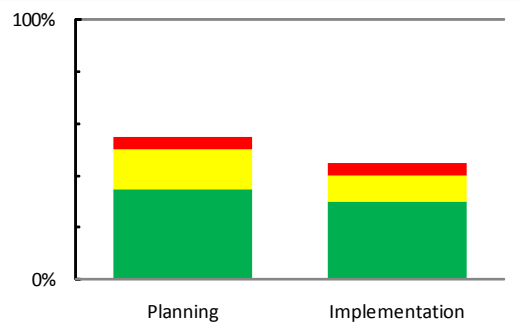
	Implementation Performance	Description of Achievements	Description of Challenges	Interrelated Policies
Promote Transporation Safety				
Improve emergency response		• Description of overall progress at policy level. • How is it positively affecting other policies, or being positively affected by other policies? • Is there any quantitative or qualitative evidence that supports the claims of achievement?	• Description of challenges at policy level. • Description of proposed strategies to address challenges • How are these challenges affecting other policies, or how is this policy being affected by challenges of other policies? • Is there any quantitative or qualitative evidence that supports the claims of challenges, e.g., customer feedback?	• List policies from this or other themes that are interrelated
Improve standards for infrastructure				
Modify driver behavior				

Figure 3.3 Example Theme Summary Template

Theme	Implementation Performance	Description of Achievements	Description of Challenges
Promote Transporation Safety		• Description of overall progress at theme level, • Is there any quantitative or qualitative evidence that supports the claims of achievement, e.g., customer feedback or system-level improvements?	• Description of overall challenges at theme level. • Is there any quantitative or qualitative evidence that supports the claims of challenges, e.g., customer feedback or system-level improvements?
Foster Wisconsin's Economic Growth			
Preserve and Enhance Wisconsin's Quality of Life			

4.0 System Performance Measures

4.1 INTRODUCTION

The overall purpose of Connections 2030 is to improve the condition and function of transportation in Wisconsin, and ultimately to improve the quality of life for the residents of the State. System performance measures can help WisDOT, elected officials, and stakeholders understand if over time the policies and actions defined in Connections 2030 are having their desired effects on a larger scale.

The recommendations in this section are based on lessons learned that were identified during the literature review, including:

- Select a targeted set of measures (there is often a tendency to select too many measures, that make it difficult for audiences to clearly understand overall performance);
- Select measure that align with agency goals (in the context of Connections 2030, align with the themes);
- Select measures that can be calculated with existing data; and
- Select measures that can be easily understood by non-transportation professionals.

In addition to meeting these criteria, many of the measures recommended below are consistent with the general approach being discussed by AASHTO and FHWA regarding a potential nationwide transportation performance management program. It is anticipated that this national work will be incorporated in some way into the next Federal transportation reauthorization bill. While the details of these efforts are still in flux, consideration of recent national performance measures discussions early in the development process can give WisDOT a head start when the details become finalized. Also, it should be noted that it is not possible for all of the recommended measures to meet this criterion because Connections 2030 goes beyond the scope of the national performance discussions.

It is recommended that WisDOT calculate and report nine performance measures as part of the Connections 2030 performance monitoring efforts. WisDOT provided the research team with documentation on performance measures recommended for use by MPOs in Wisconsin. While several of the measures recommended below are generally consistent with this list (these measures are flagged below with an *), the details on how the measures should be calculated and reported often vary. For example, the MPO list includes a count of traffic

fatalities. Based on recent work conducted by AASHTO and FHWA, it is recommended that fatalities be reported as a 5-year average in order to smooth out year-to-year anomalies. Therefore, a 5-year average is recommended for WisDOT. Another example is the pavement performance measure. The MPO list recommends International Roughness Index (IRI) for pavements. It is anticipated that a future national performance measurement program categorize pavement as good/fair/poor, based initially on IRI value. To be more consistent with these national discussion, "present of pavement in good condition" is recommended for WisDOT.

The recommended measures for Connections 2030 are:

- Percent of pavement in good condition*;
- Percent of bridges in good condition*;
- Traffic fatalities (5-year average)*;
- Percent of travel on freight corridors experiencing uncongested conditions*;
- Percent of all travel experience uncongested conditions*;
- Miles traveled on bus and light rail*;
- Miles traveled on bus and light rail per mile of service offered;
- Housing and transportation affordability index; and
- Vehicle emissions*.

All of the recommended measures require minimal calculation or interpretation using available data. In some cases, WisDOT may already be calculate a version of a measure using different definitions, calculations methods, or data sources. In these instances it is recommended that the existing versions of the measures be used.

4.2 PRESERVE WISCONSIN'S TRANSPORTATION SYSTEM

Pavement Preservation

Performance measure – Percent pavement in good condition

Background – Pavement service quality metrics such as WisDOT's Pavement Distress Index (PDI) and Present Serviceability Index (PSI) can help in assessing pavement deterioration, estimating road user costs, and identifying appropriate pavement strategies. Reporting pavement condition as "percent good" enables non-technical audiences to understand the general state of the system.

Calculation

- Consult with WisDOT's pavement staff to define "good". One option is to use the "should" or "must" thresholds currently defined in Meta-Manager for PDI or PSI. Of these two indices, PDI is preferred as the basis for this performance measure because it provides an indication of overall pavement structural adequacy rather than pavement roughness, which is the focus of PSI. Consistent with existing WisDOT practices, the "good" threshold may vary depending on functional class.
- Sum all highway lane miles with pavement condition better than the defined threshold(s), then divide by total highway lane miles.

Data availability – Data required for this measure are available in Meta-Manager.

Bridge Preservation

Performance measure – Percent bridges in good condition

Background – WisDOT uses three indices for assessing bridge condition – deck condition, sufficiency rating, and rate score. Similar to pavement condition, translating one of these indices into "percent good" will enable non-technical audiences to better understand the results.

Calculation

- Consult with WisDOT's bridge staff to define "good". One option is to use the "must" threshold currently defined in Meta-Manger for bridge sufficiency rating or rate score. These indices are preferred over deck condition because they provide a better indication of overall bridge structural adequacy.
- Sum the deck area for bridges with a condition better than the defined threshold for "good", and divide by the total deck area.
- Report as a percent.

Data availability – Data required for this measure are available in Meta-Manager.

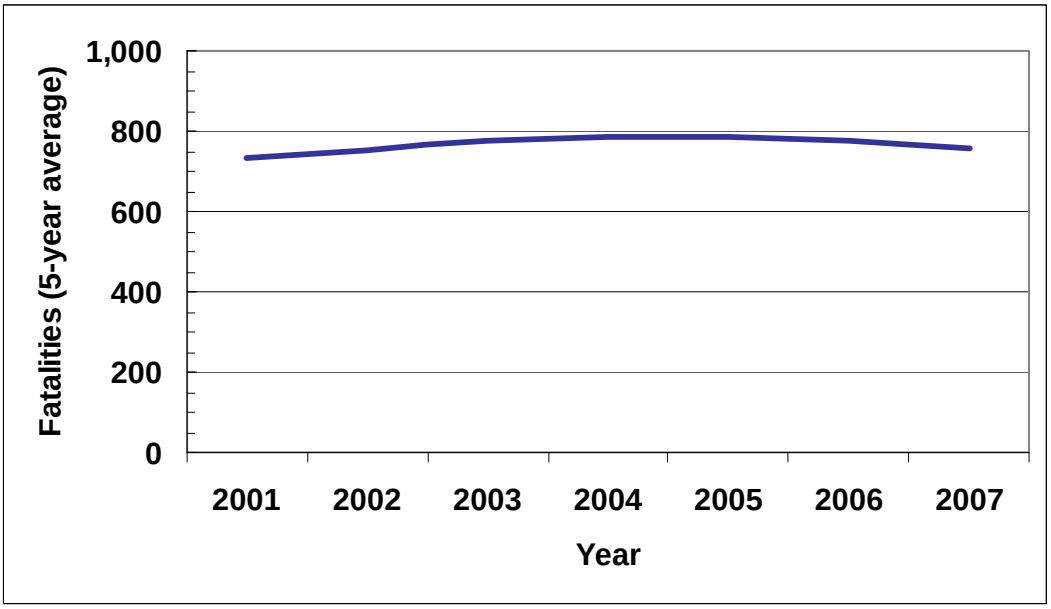
4.3 PROMOTE TRANSPORTATION SAFETY

Performance measure – Traffic fatalities (5-year average)

Background – Averaging safety data helps to smooth out misleading anomalies that can occur from year to year. A 5-year average is recommended in order to maintain consistency with the Wisconsin Strategic Highway Safety Plan.

Figure 4.1 illustrates the recent trend in this measure based on data provided in Connections 2030. It indicates recent improvements in overall traffic safety.

Figure 4.1 Traffic Fatalities



Calculation – sum the number of highway fatalities for the previous 5 years, and divide by 5.

Data availability – Data required for this measure are available through the WisTransPortal.

4.4 FOSTER WISCONSIN'S ECONOMIC GROWTH

Performance measure – Percent of travel on freight corridors experiencing uncongested conditions

Background – WisDOT maintains traffic level-of-service (LOS) data in its MetaManager. Converting LOS data into this measure reflects the perspective of system users and is easily understood by stakeholders and the public. This measures is consistent with that recommended below for the "Promote

Transportation Efficiencies" theme. For this theme, the measure is focused on freight significant corridors because efficient freight movement is a vital component of overall economic prosperity.

Calculation

- Define "freight significant corridors." One option is to use the backbone system as currently designated.
- Consult with WisDOT traffic staff to define LOS thresholds that represent "uncongested" conditions. One option is to use the LOS thresholds defined in MetaManager. Note that these values vary by functional class and urban/rural distinction.
- Sum the segment lengths along the designated corridors with LOS meeting the defined thresholds multiplied by the segment's average annual daily traffic (AADT). The result is vehicle miles traveled (VMT) experiencing uncongested conditions.
- Divide the result by the total VMT along the identified corridors.

Data availability – Data required for this measure re available in Meta-Manager

4.5 PROVIDE MOBILITY AND TRANSPORTATION CHOICE

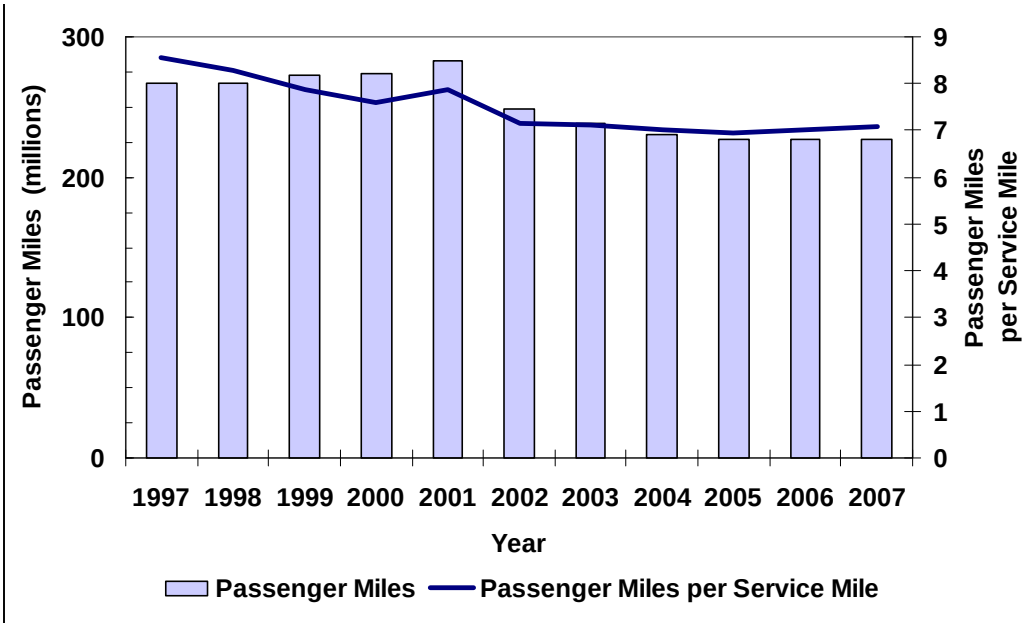
Performance measures

- Miles traveled on bus and light rail
- Miles traveled on bus and light rail per mile of service offered

Background – Bus and light rail service is a key component of this transportation theme. The recommended measures reflects two dimensions of transit service – the amount of service provided (the supply side of transit) and the degree to which this service is provided in areas where the public will take advantage of it (the demand side of transit).

Figure 4.2 illustrates these two measures over a 10 year period using data in the National Transit Database (NTD). Both metrics decreased recently before leveling off.

Figure 4.2 Transit Trends



Calculation

- Miles traveled on bus and light rail
  - Obtain passenger miles traveled (PMT) data from the NTD for all systems in Wisconsin.
  - Sum the PMT on bus and light rail modes.
- Miles traveled on bus and light rail per mile of service offered
  - Obtain vehicle revenue miles (VRM) data from the NTD for all systems in Wisconsin.
  - Sum the VRM on bus and light rail modes.
  - Divide by PMT on bus and light rail.

Data availability – this measure can be calculated with data available on the NTD's website - http://www.ntdprogram.gov/ntdprogram/data.htm

4.6 PROMOTE TRANSPORTATION EFFICIENCIES

Performance measure – Percent of traffic experiencing uncongested conditions

Background – This measure is the same as that described above for the economic growth theme, except that for this theme it should be calculated for all travel on the state system. It is recommended that this measure be calculated

separately for urban and rural areas to reflect differences in how congestion is experienced users in these two areas.

Calculation

- Consult with WisDOT traffic staff to define LOS thresholds that represent "uncongested" conditions. It is likely that the same thresholds used for the economic theme will also be used for this measure.
- Sum the lengths of segments in urban areas with LOS meeting the defined thresholds multiplied by the segment's average annual daily traffic (AADT). The result is vehicle miles traveled (VMT) experiencing uncongested conditions.
- Divide the result by the total VMT along urban segments.
- Repeat for rural segments.

Data availability – Data required for this measure are available in Meta-Manager.

4.7 PRESERVE WISCONSIN'S QUALITY OF LIFE

Two metrics are recommended for this theme – net migration rate and fuel consumption. While typically not considered to be performance measures, these two metrics can provide insight into the overall quality of life in Wisconsin.

Housing and Transportation Affordability Index

Performance measure – Housing and Transportation Affordability Index

Background – The average American family spends more than half of its income on housing and transportation. The Housing and Transportation (H+T) Affordability Index was developed by the Center for Neighborhood Technology (CNT) as a means of approximating the affordability of communities based on the combined costs of housing and transportation. The H+T Index has been calculated and is available for 337 metropolitan areas and over 161,600 neighborhoods in the United States, capturing 80 percent of the population.

The H+T Index is equal to total housing and transportation costs in an area divided by income. The Index utilizes the U.S. Census' Selected Monthly Owner Costs and Gross Rent data to calculate housing costs. Transportation costs are calculated using nine variables, mostly derived from U.S. Census data: residential density, gross density, average block size, transit connectivity index, job density, average journey to work time, household income, household size, and commuters per household. These variables are used to predict auto ownership, auto use, and public transit usage at the census block group level, from which transportation costs are estimated.

Calculation and Data Availability

This measure is already calculated by CNT for every Wisconsin metropolitan area. To get a state average of this metric, the indices for each area can be weighted by number of households in that area and summed.

Data for this measure can be obtained for the Center for Neighborhood Technology website: http://htaindex.cnt.org/

Data can be obtained by selecting each urban area within Wisconsin on the map. "Display" should be set to "summary table of statistics". From this table, one can obtain the "average H+T index" for the region and the total number of households. Data for each metropolitan area are shown in Table 4.1.

Table 4.1 Summary of H+T Index by Metropolitan Area - 2010

Metropolitan Area	Average H+T	Households
Appleton-Oshkosh-Neenah	45%	136,597
Duluth-Superior, MN-WI (WI approximated)	52%	29,717
Eau Claire	53%	57,178
Green Bay	47%	87,295
Janesville-Beloit	47%	58,617
Kenosha	48%	56,057
LaCrosse, WI-MN (WI approximated)	51%	49,232
Madison	46%	173,465
Milwaukee-Waukesha	48%	587,651
Minneapolis-St. Paul, MN-WI (WI approximated)	49%	42,615
Racine	46%	70,819
Sheboygan	47%	43,545
Wausau	49%	47,702

Source: Data from http://htaindex.cnt.org/

The average H+T Index in Wisconsin, weighted by number of households in metropolitan areas, is 48 percent.

Vehicle Emissions

Performance measure – Tons of criteria air pollutants and green house gasses.

Background – This is a measure of mobile source emissions. Emissions associated with both criteria air pollutants (e.g., ozone and particulate matter) as regulated under the U.S. Clean Air Act, and greenhouse gases, provide a direct, easily communicated measure of environmental impacts associated with transportation.

Calculation and Data Availability

Criteria air pollutant emission data is available from the US. Environmental Protection Agency (EPA) (http://www.epa.gov/air/data/). Air pollutant and green house gas emissions can also be calculated using traffic data and emissions rates from the EPA's MOBILE 6 and MOVES. All calculations regarding air pollutants should be closely coordinated with the nonattainment areas in the state and respective MPOs that may already be estimating emissions as part of the transportation conformity process.

4.8 PROMOTE TRANSPORTATION SECURITY

No system performance measures are recommended for this theme. It is recommended that progress in the security area be based solely on the implementation tracking approach described above in Section 3.

Appendix A. Annotated Bibliography

This Appendix provides an annotated list of several recent research projects that included best practice reviews related to performance management and performance-based planning. Highlights from these studies are presented in the Literature Review in Section 2, and lessons learned have been incorporated into the performance measure recommendations in Section 4.

Performance-Based Federal-Aid Highway Program

NCHRP 20-24(67), State DOT CEO Leadership Forum. Preparation for the 2009 State DOT CEO Leadership Forum, focusing on performance management within the framework of a federal performance-based system, began with a state-of-the-practice literature review. A survey of state DOT use of performance measures, by goal area, and application of performance-based resource allocation from the CEO perspective was implemented—approximately 25 states responded. Using this information and discussion from the Forum itself, the research team developed a white paper summarizing recent state DOT experiences related to performance-based program management with consideration of upcoming Congressional authorization.

FHWA - Performance-Based Management of Federal-Aid Highway Programs. The Federal Highway Administration (FHWA) in preparing for Congressional authorization by identifying and evaluating options for implementing a performance-based Federal-Aid Highway Program. This research focuses on how performance management is used by state, local, and foreign transportation agencies, as well as non-transportation governmental agencies and private companies, for resource allocation, project/program evaluation, and overall accountability. Dozens of state and regional agencies and organizations are being examined through an in-depth literature review and interview process. The research includes an evaluation of options for implementing multimodal performance management and an identification of issues and assessment of options related to the use of benefit-cost analysis in such performance-based systems.

NCHRP 20-24(58), Toward Developing Performance Based Federal-Aid Highway Programs. This project supported AASHTO in developing a proposal for a performance-based Federal-aid highway program, starting with a description of the current state of practice in performance-based management at the Federal and state level. This research also assessed alternative Federal-Aid Program mixes and their impact on performance and state fund allocations, assessing other changes to Federal requirements (laws and rules) to affect improved performance management accountability, and developing

alternative Federal-Aid Program management reauthorization proposals. Specifically, the research examined elements of a performance-based program such as performance measure areas, specific candidate measures, approaches for setting national performance targets and evaluation of the data and tools available to support the consistent generation of selected performance measures across all states.

2009 FHWA/AASHTO Performance Measures Peer Exchange. In August, 2009 FHWA and AASHTO sponsored a peer exchange to continue the discussions on a potential Federal-aid highway program. The peer exchange began with updates from FHWA, AASHO, and the U.S. House of Representatives Transportation and Infrastructure Committee on their performance measure initiatives. Participants from several state DOTs then discussed issues, challenges, and commonalities in terms of measuring performance in the areas of preservation, freight/economic development, safety, congestion, system operations and the environment.

Measure Selection and Calculation

NCHRP Report 551, *Performance Measures and Targets for Asset Management.* Through this project, the research team developed practical guidance on implementing performance measures that strengthen asset management efforts. The objectives of this project were to recommend performance measures that can improve resource allocation in the areas of facility preservation, operations, and improvement; and develop a framework to help transportation agencies select suitable performance measures and set performance targets. As part of the effort, the research team compiled a database of over 1,000 performance measures used by various transportation agencies.

NCHRP 3-68, Guide to Effective Freeway Measurement. This research resulted in a Guide on the measurement of freeway performance. The Guide covers the planning and operations of freeways and meets the needs of a large spectrum of potential local, regional, and national users. The potential uses of the Guide include transportation planning, programming, and design; land use planning; air quality conformity; emergency response; evaluation of the national freeway system; information for travelers and freight carriers; and research. The Guide focuses on congestion and mobility performance of freeways but also touches on safety, environmental, physical condition, and customer satisfaction aspects of performance. The Guide covers the four main aspects of freeway performance: 1) what measures should be used to monitor and predict freeway performance; 2) how can the measures be developed from data and modeling methods; 3) how can performance measures be communicated; and 4) how can performance measures be used to influence investment and policy decisions.

Ten metropolitan areas were identified where exemplary use of freeway performance measures is being made, and benchmarking interviews were conducted. These interviews identified best practices in the use of freeway performance measures. A tentative Guide was prepared covering appropriate

performance measures, data requirements, and reporting techniques, which was then validated by presenting it to users of freeway performance information in seven metropolitan areas.

NCFRP 3, Performance Measures for Freight Transportation. The research team for NCHFRP 3 identifying measures to gauge the performance of the freight transportation system. The products of the research effort will include a set of freight transport performance indices organized into a "freight dashboard." The dashboard will summarize the performance of the nation's freight transport system – its cost, reliability, safety, environmental externalities, infrastructure condition, and future trends. These measures will be used to support investment, operations, and policy decisions by a range of stakeholders, both public and private, and reflect local, regional, national, and global perspectives. Tasks include best practice literature review, stakeholder interviews, development of framework to measure performance of the freight system at national, regional, and local levels, conducting case studies where performance measures are applied, and assessing data quality.

Incorporating Measures into the Decision Making Process

2010 Performance-Based Planning and Programming Forum. In the Fall of 2010, AAASHTO, FHWA, American Association of Metropolitan Planning Organizations (AMPO), American Public Transportation Agency (APTA), and the National Organization of Development Organizations (NADO) co-sponsored a national forum on performance-based planning and programming. The goal of this forum were to explore performance management practices, research needs, and opportunities for better coordination across agency types.

NCHRP 8-70, Target-Setting Methods and Data Management to Support Performance-Based Resource Allocation by Transportation Agencies. The purpose of this research is to develop a comprehensive framework for performance management, to describe in detail the performance measure target setting process within the framework, and to identify and analyze the data management systems needed to support performance-based decision-making by state DOTs. Twenty case studies are being conducted to assess leading practices in the public and private sector. Public sector studies include national, state, regional, and local governments, as well as international examples from Japan and Australia. The final product of the research will be an "Annotated Guide to Target-Setting and Data Management for Performance Resource Allocation."

NCHRP 8-62, Transportation Performance Management Programs – Insight from Practitioners. This research included an investigation performance management programs at state DOTs and other transportation agencies. It examines the state of the practice for developing performance measures, collecting data, and using these measures and data to direct long-term and day-to-day agency decision-making. The focus of the research is on using performance measures to improve communication, business management, and resource allocation and decision-making.

NCHRP 8-36(47), Effective Organization of Performance Measurement. This study assessed how transportation agencies, particularly state DOTs, incorporate performance measurement functions within their overall organizational frameworks. The study report documents lessons learned for transportation organizations that are setting up new programs or adjusting and reorganizing existing programs. It identifies the most effective organizational attributes that contribute to a successful performance measure program. In addition to assessing a sample of governmental transportation organizations, information was drawn from the private sector and general management literature.

International Scan: Linking Transportation Performance and Accountability. For two weeks in July and August of 2009 an international scanning team visited six transportation agencies to benchmark how they practice performance management and demonstrate accountability by linking their organizational performance to their budgets. The scanning tour was able to capture the evolutionary progress in international Performance Management since a similar 2004 tour to several of the same countries. The 2009 scanning tour also examined how best-in-class transportation agencies used performance measures to manage, explain, deliver, adjust, and account for their transportation budgets. The agencies visited were:

- The Swedish Road Administration in Stockholm Sweden;
- The British Department for Transport in London, England;
- The New South Wales Road and Traffic Administration, and AUSTROADS , in Sydney, Australia;
- The Victoria Department of Transport ,and the National Department of Transport, in Melbourne, Australia;
- The Queensland Department of Transport and Main Roads in Brisbane, Australia;
- The New Zealand Transport Agency, in Wellington, New Zealand.

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