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# Technical Methods

## Part 2

### Performance Measurement in Transportation Planning

**“Leading for results means that performance must be planned, not just reported”**



# Learning Objectives

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Describe a sample technical process for developing performance measures

Understand appropriate applications

Identify potential analysis techniques

Identify data needs

Examine noteworthy practices

## Sample Technical Process for Developing Performance Measures

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1. Select Appropriate Application
2. Link to Goals and Objectives
3. Select Performance Measures
4. Identify Data Needs
5. Identify Analytical Tools
6. Report Results

# 1. Select Application

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Establish planning context and scale

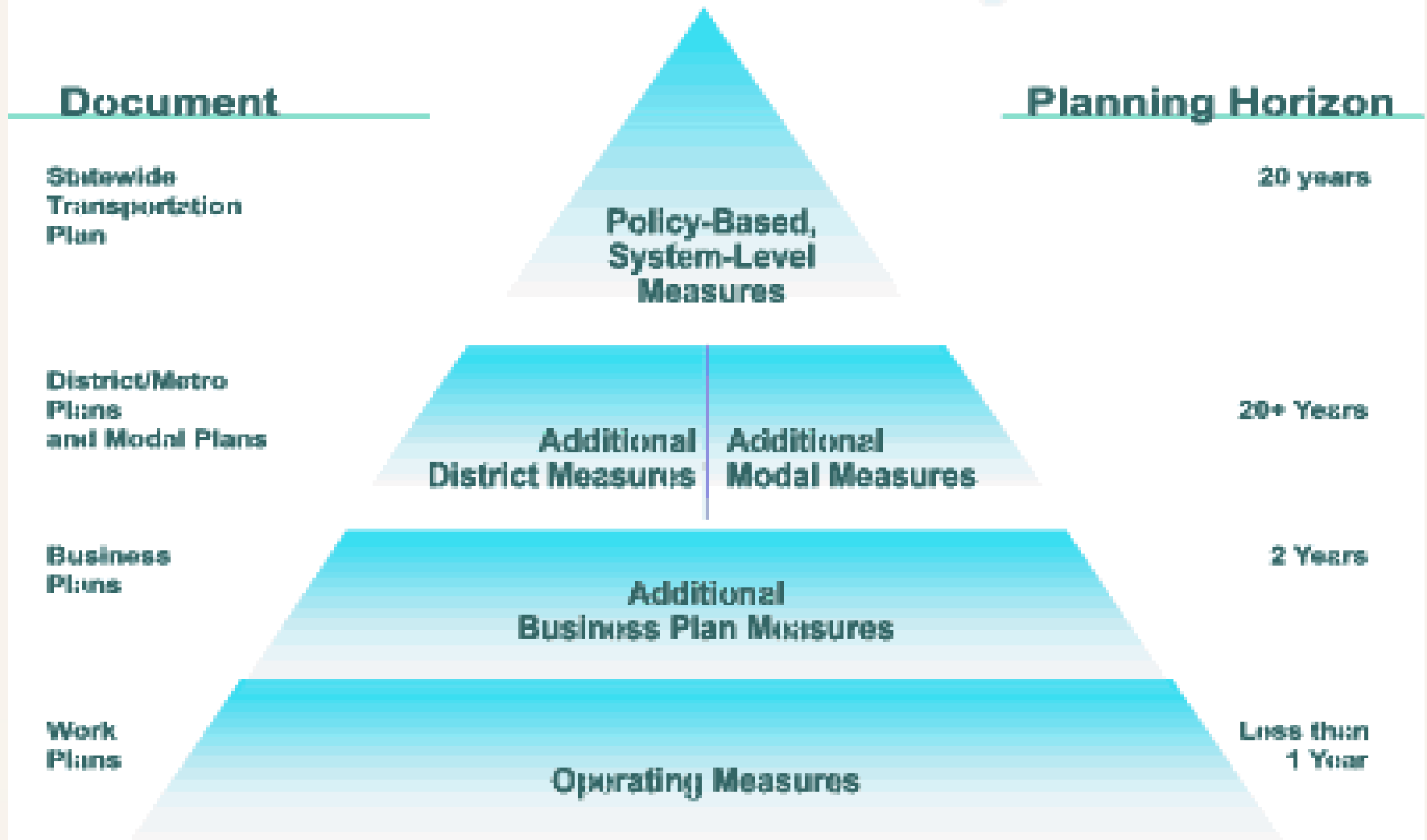
Relate performance measure computations to metropolitan or statewide plan/TIP implementation, etc.

Develop in a cooperative fashion

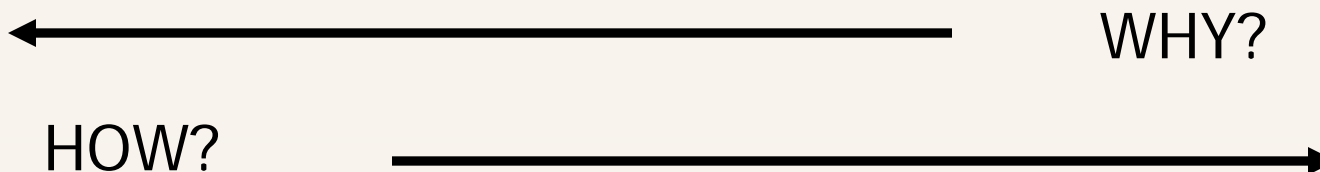
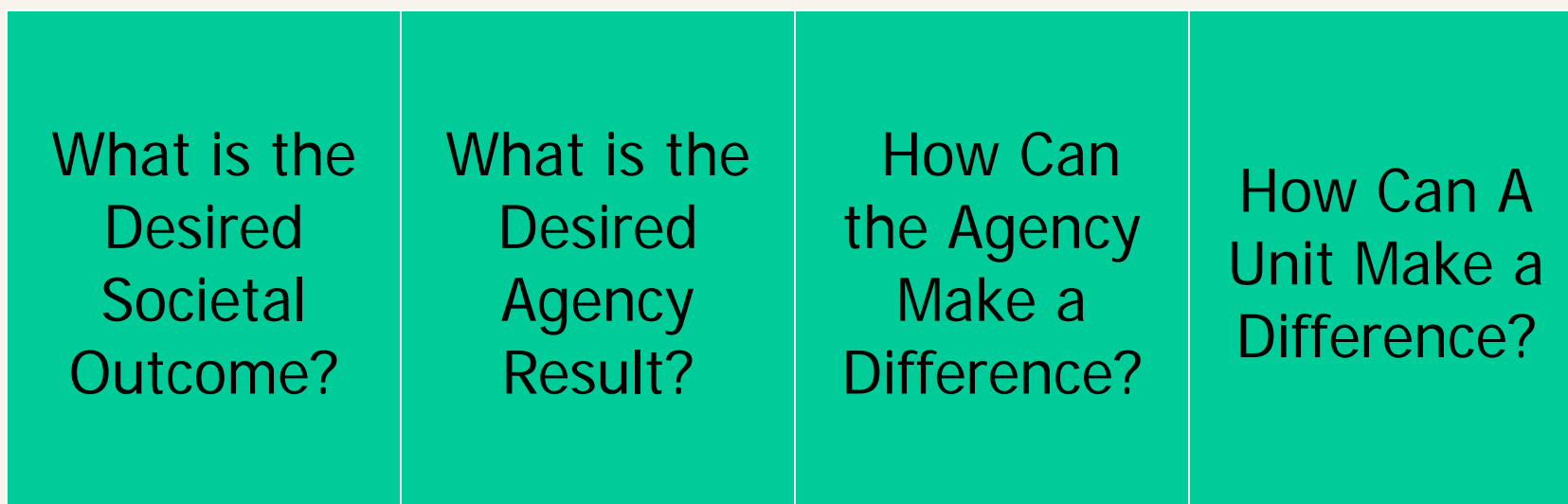
Establish Advisory Committee or Task Force to guide technical process

# For example: Minnesota DOT

## Performance Measures Pyramid



# Performance Planning Framework



## 2. Link Measures to Goals and Objectives

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### Develop clear definitions for

- “goals”, “smart objectives”, etc.

### Establish standards

- A desired achievement or target (i.e., setting the bar)

### Select broad categories of relevance to planning

- Accessibility, mobility, safety, environment, operations, etc.

# Setting Performance Targets

- Targets are based on:
  - Past performance
  - Performance of peers
  - Performance standards
  - Service/Industry benchmarks
  - Market research

## What Do DOTs Commonly Measure?

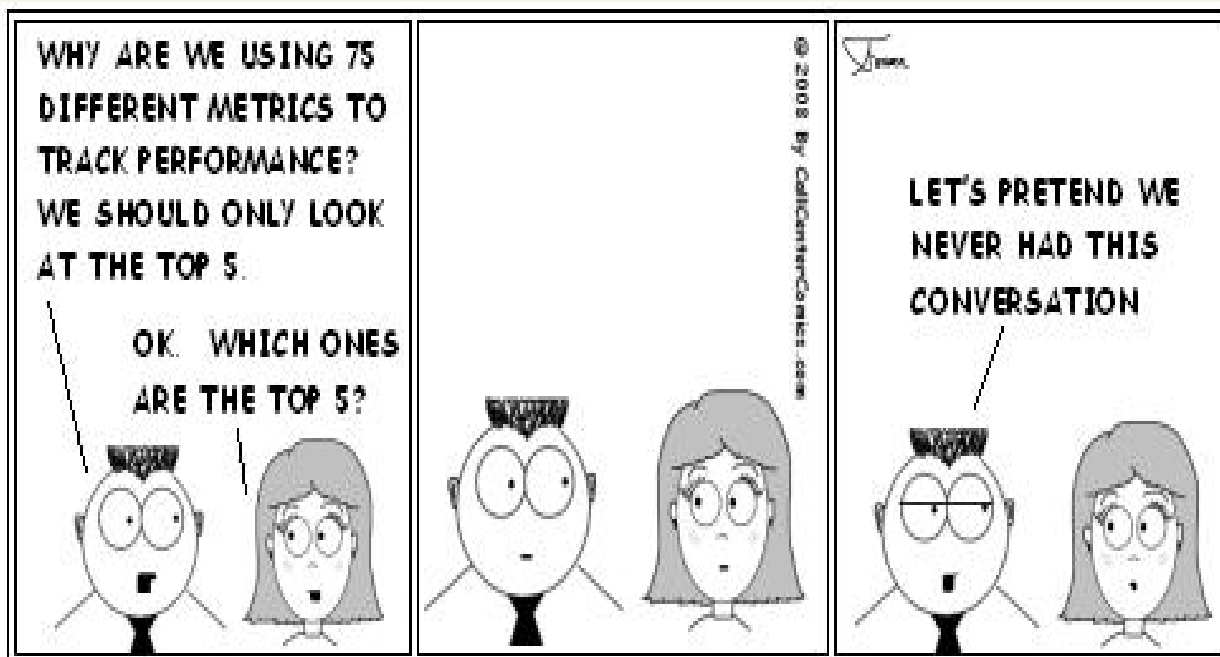
- Mobility and Congestion
- Safety
- Quality of Life
- Environment
- Economic Development
- System Preservation
- Project Delivery
- Maintenance

*Source:* Measuring Performance among State DOTs; AASHTO, March 2006.

## What Measures Do They Often Use?

- Delay
- Extent of Congestion
- Incident Duration
- Speed
- Throughput
- Travel Time
- Travel Time Reliability

## The Quandry with Performance Measures!



## 3. Select Measures

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Be measurable and provide for cost-effective data collection

Have a clear and intuitive meaning

Be comparable across time and geographical areas (modes, facilities, corridors, subareas)

Have a relationship to actual system performance

Facilitate periodic refinement

**Table 16: Linkage of Performance Measures to Objectives**

Objectives	Performance Measure	Source
1.1.1 - Rehabilitate and/or reconstruct existing road and bridge facilities where necessary, and continue to maintain existing facilities.	Number of road and bridge rehabilitation projects programmed and accomplished.	Regional Transportation Improvement Program (RTIP); Regional Transportation Plan (RTP); Trinity County DOT; Caltrans District 02
1.1.2 - Provide reliable all-weather access to all developed communities of the county.	Number of communities with alternative access routes, and number of projects programmed and implemented to improve	Regional Transportation Improvement Program (RTIP); Regional Transportation Plan (RTP); Trinity County DOT;
1.2.3 - Provide safe passing zones on State highways and county roads.	Number of passing zones on highways and county roads.	Accident data from Trinity County DOT, Caltrans District 02, and CHP; General Plan Circulation Element; Regional Transportation Plan (RTP)

## 4. Identify Data Needs

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### Generated by performance measures

- Operations measures require traditional data, such as traffic counts, travel time studies, etc.
- Outcome oriented measures (e.g., reliability) may require more innovative or spatial GIS data

### Tempered by cost and resources

### Updated and collected on a periodic basis

## Data Analysis Tips

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Start simple

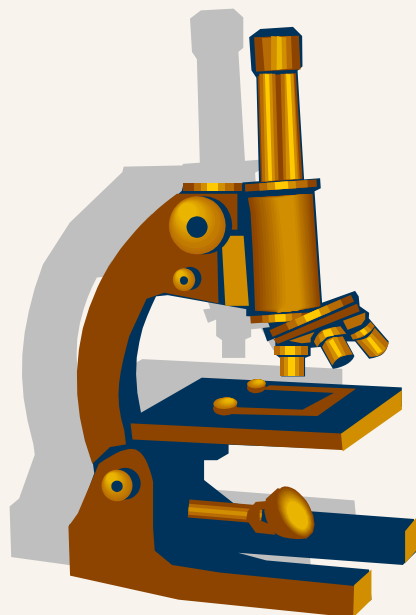
Examine trends and comparisons

Build on existing data

Use spreadsheets before investing in expensive software packages



# Let's Take a Closer Look at One Measure....



## Example – Maryland Department of Transportation Performance Measure Information Training (July 2006)

### 1. Data Definition Example

#### BWI Revenue per Enplaned Passenger

##### Terms

- Revenue – revenue paid or due the Maryland Aviation Administration from BWI Airport
- Enplaned passengers – passengers that board an aircraft at BWI, even if such passengers previously disembarked from another aircraft

##### Method of Calculation

- Divide revenues as defined by total number of enplaned passengers

## Example – MDOT (cont.)

### 2. Data Documentation

- **Data location – where is it?**
  - Electronic files
  - Hard copy
  - Third party
- **Data owner – who entered the data?**
  - Primary contact
  - Secondary contact

## Example – MDOT (cont.)

### 3. Control Procedures: Ability to Replicate the Data

- **Input control = data collection**
  - Verify that data was accurately collected (i.e., written guidance for data collection and calculation and training)
- **Process control = data analysis**
  - Verify that analysis and calculation of the performance measure is accurate (i.e., periodic review of measure calculation, such as Excel formulas and database language)
- **Review control = review process**
  - Verify that performance measure data has been reviewed for accuracy (i.e., internal review or formal quality assurance/quality control process)

## Example – MDOT (cont.)

### 4. Program Performance

- **Why did performance change over the last fiscal year?**

**Example – BWI Revenue per Enplaned Passenger**

#### **Action taken**

- **Awarded a new food service, retail, and consumer services concession contract**

#### **Challenges faced (operational, resource, data, other)**

- **Resource – Increased operating costs**
- **Other – Regional airport competition**

## Example – MDOT (cont.)

### 5. Strategies

- **What are future performance strategies?**

**Example – BWI Revenue per Enplaned Passenger**

#### **Strategies (new, ongoing)**

- **Ongoing – initiate parking strategies to increase long-term and overnight parking revenues**

#### **Challenges faced (operational, resource, data, other)**

- **Other – remain poised to take advantage of airline industry recovery while remaining sensitive to our low-cost airport creed**

## 5. Identify Analytical Tools

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Spreadsheets

Regression and Cost/Benefit Analyses

Models

- Travel Demand Forecasting (metropolitan and statewide)
- Microsimulation (Synchro, Paramics, CorSim, etc.)

# Survey Tools

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## Travel Surveys

- Activity surveys
- External Station surveys
- Transit onboard surveys
- Truck surveys
- Employer surveys
- Special Generator surveys
- Parking Surveys

## 6. Report Results

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Be clear and concise

Tailor information to target audience – in general, information should increase moving down from decision makers to managers and planners

Simplify and visualize for the public

Establish reporting cycle – annual vs. other time frame



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# 2009 ANNUAL ATTAINMENT REPORT

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## on Transportation System Performance

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Implementing the Maryland Transportation Plan &  
Consolidated Transportation Program

*Martin O'Malley, Governor  
Anthony G. Brown, Lt. Governor  
John D. Porcari, Secretary*

# SYSTEM PRESERVATION & PERFORMANCE

## OBJECTIVES:

- Preserve and maintain the existing transportation network
- Maximize operational performance and efficiency of existing systems

## PERFORMANCE MEASURES

MONITORING AGENCY	PERFORMANCE MEASURE	PAGE
MAA	Airline cost per enplaned passenger (CPE)	28
MAA	Non-airline revenue per enplaned passenger (RPE)	28
MPA	Drudge material placement capacity remaining for Harbor and Bay maintenance dredging	29
MPA	Revenue versus operating expense	30
MTA	Operating cost per passenger trip	25
MTA	Operating cost per revenue vehicle mile	26
MTA	Passengers per revenue vehicle mile	24
MVA	Alternative service delivery transactions as percent of total transactions	27
MVA	Cost per transaction	27
SHA	User cost savings for the traveling public due to incident management	23
SHA & MDTA	Number of bridges and percent that are structurally deficient	22
SHA & MDTA	Percent of roadway miles with acceptable ride condition	22

Maryland's transportation network is a valuable asset to the State's economy. Therefore, preserving and maintaining the existing infrastructure is MDOT's first budgetary and planning priority. The State continues to optimize performance by prioritizing investments that provide the best return. Key to this approach is extending the useful life of existing facilities and equipment before undertaking costly capacity expansion projects. Given the rising costs of materials, construction, and fuel, implementing innovative solutions to achieving operational efficiencies is critical to meeting user demand and facilitating the seamless movement of people and goods around the State.

Routine maintenance, such as roadway resurfacing, engineering safety improvements, and equipment replacements, is essential to preserving transportation infrastructure assets. Maryland's transportation agencies continue to identify new maintenance solutions and value-added technologies to improve performance across existing modal infrastructure.

For example, Maryland uses access management techniques to increase capacity, maximize performance, and reduce congestion on Maryland's transportation network. Increasing spacing between signals and interchanges, implementing exclusive turn lanes, and encouraging land use policies that limit access to highways are just a few access management strategies the Modal Administrations and MDTA have employed.

## KEY INITIATIVES:

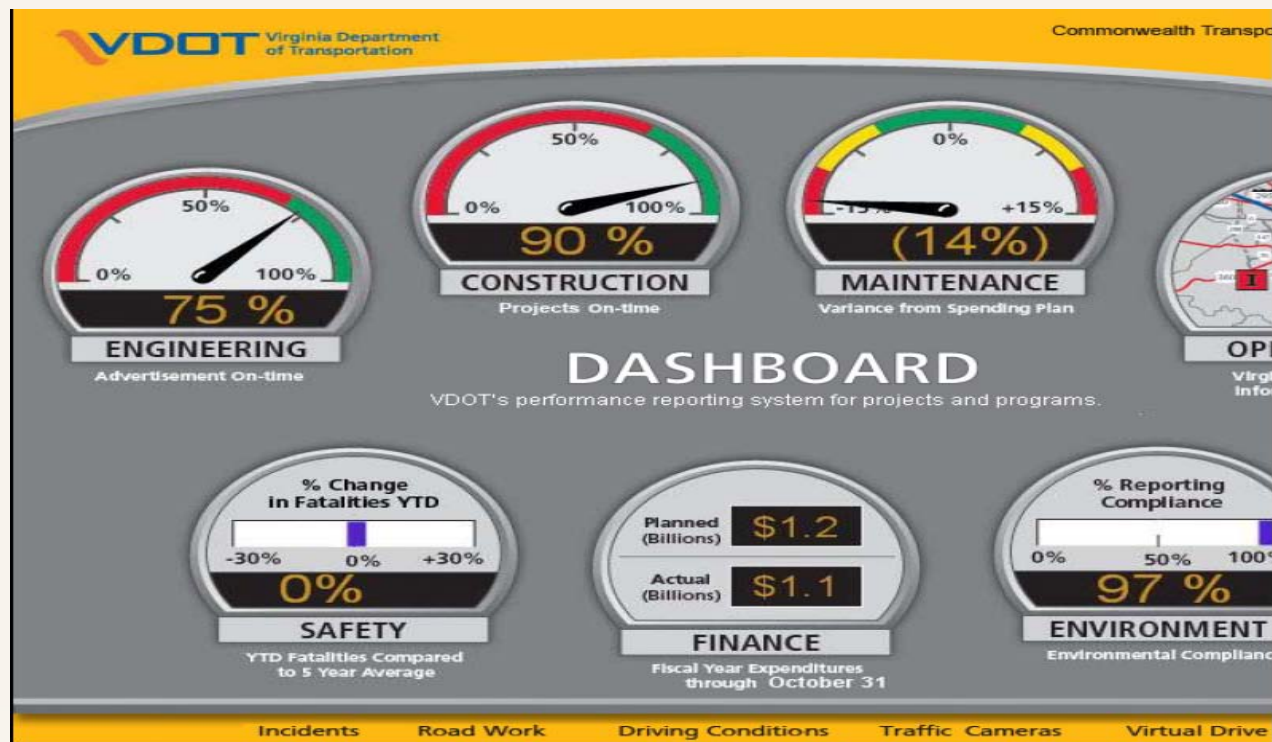
- **MDOT:** Utilize the Capital Program Management System (CPMS), a software database that allows agencies to identify and track capital project work schedules, cash flows, and expansion & preservation categories.
- **MAA:** Focus advertising and awareness campaigns to passengers on the advantages and options BWV Marshall provides, such as parking, concessions, and transit options.
- **MPA:** Improve the reliability of Seagirt Yard Crane's GPS auto steering system by incorporating new software.
- **MTA:** Support Commuter Choice Maryland, a comprehensive online commuting resource guide that offers tax-free commuter benefits and cost savings to attract transit ridership.
- **MDTA:** Construct I-95 Express Toll Lanes<sup>SM</sup> and the Intercounty Connector to relieve congestion north of Baltimore.
- **MVA:** Promote eMVA, an online store where customers can conduct business, such as license and registration renewals, without visiting an MVA location.
- **SHA:** Participate in the I-95 Corridor Coalition, an alliance of transportation agencies, toll authorities, and related organizations aimed at coordinated strategies to improve network performance throughout the I-95 Corridor.



## MDOT Annual System Report

# Communication – Virginia DOT

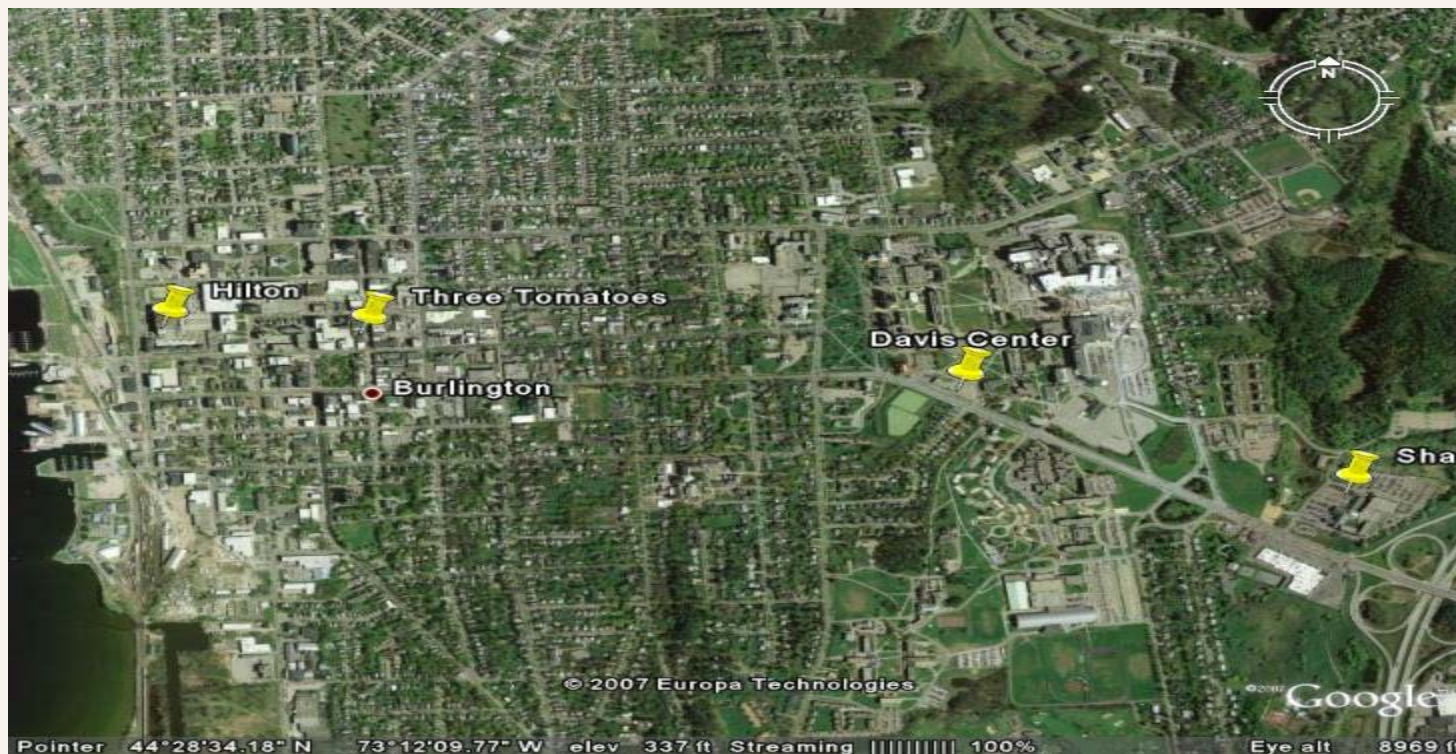
<http://dashboard.virginiadot.org/>



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## MPOs are in on the Action too!!



## Chicago MPO – Chicago Metropolitan Agency for Planning

*The Regional Indicators Project*

<http://www.goto2040.org/indicators.aspx>

**The Regional Indicators Project is part of CMAP's innovative *GO TO 2040* comprehensive planning campaign. In order to develop and evaluate strategies for implementing the *GO TO 2040* Regional Vision, CMAP is collaborating with [The Chicago Community Trust](#) to create indicators for predicting and measuring economic, environmental, social, and cultural variables that affect quality of life.**

***An indicator is a quantitative measure that describes an economic, environmental, social or cultural condition over time. Examples include the unemployment rate, infant mortality rates, number of new business start-ups, or air quality indexes.***

## San Francisco MPO - Metropolitan Transportation Commission

[http://www.mtc.ca.gov/planning/2035\\_plan/index.htm](http://www.mtc.ca.gov/planning/2035_plan/index.htm)

Three Es Guide Transportation 2035 Vision

### **Economy**

Maintenance and Safety

Improve Condition of Assets

Reduce Collisions and Fatalities

Reliability

Reduce Delay

### **Environment**

Clean Air

Reduce Vehicle Travel

Climate Protection

Reduce Emissions

### **Equity**

Equitable Access

Improve Affordability

Livable Communities

TBD

# Dallas-Fort Worth MPO - North Central Texas COG

## Regional Performance Summary of Congestion Measures

	2007	2030 Plan
Vehicle Miles of Travel	151,392,421	241,219,970
Vehicle Hours Spent in Delay (daily)	1,026,960	1,697,274
% Increase in Travel Time due to Congestion	34.32%	36.87%
Annual Cost of Congestion (billions)	\$4.2	\$6.6

<http://www.nctcog.org/trans/mtp/2030/>

# Savannah MPO – medium size example

**SAFETY and Security GOAL** - Increase the safety and security of the transportation system for motorized and non-motorized users.

***Goal 2 Objectives***

- Minimize frequency and severity of vehicular accidents
- Promote projects which aid in hurricane evacuation

- Eliminate at-grade rail crossings
- Expand transit service area and increase service frequency

***Goal 2 Performance Measures***

- Total accidents per million miles traveled
- Injury accidents per million miles traveled
- Fatal accidents per million miles traveled
- Hurricane evacuation route status
- Transit/other safety projects

Savannah MPO 2030 LRP

Here's a wonderful resource.....

**NCHRP**

NATIONAL  
COOPERATIVE  
HIGHWAY  
RESEARCH  
PROGRAM

Report 446

“A Guidebook for Performance-Based  
Transportation Planning”

Transportation Research Board

[http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_rpt\\_446.p  
df](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_446.pdf)

## Resources

NCHRP Report 446 – “A Guidebook for Performance-Based Transportation Planning”; Transportation Research Board, 2000.

Rural Transportation Performance Measures

[http://www.ruraltransportation.org/pages/page.asp?page\\_id=114606](http://www.ruraltransportation.org/pages/page.asp?page_id=114606)

I-95 Corridor Coalition Performance Measures Course (online)

<http://www.i95coalition.org/i95/Training/PerformanceMeasuresCourse/tabid/92/Default.aspx>

# SHRP2 Highway Research Product

SHRP2 (Strategic Highway Research Program)

Project Number C02

System-Based Performance Measurement Framework or Highway  
Capacity Decision Making in a web-based tool

<http://shrp2webtool.camsys.com>

## Enhance Performance through Collaboration!!

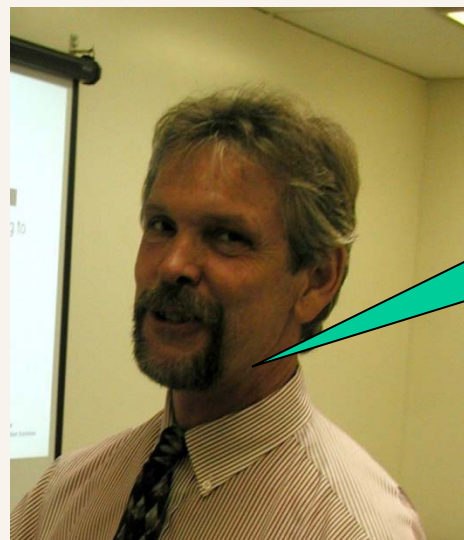


# Questions?



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CIAO!