

# ***Designing and Building a System for Measuring and Monitoring Performance Measures in Real Time***

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## **Disclaimer**

- *Views expressed represent the opinion of the presenter and do not necessarily reflect the official view or policies of FHWA, TxDOT or any other operating agency.*



## Outline

- Background on performance measures
- Discuss past and ongoing research projects
  - Focus on development and use of real-time operations data
- Highlight issues and lessons learned



## What is Performance Measurement?

- Statistical evidence to determine progress toward specific, defined organizational goals
  - Physical performance (e.g., the number of vehicles served)
  - Customer satisfaction (e.g., % of trip that arrive in acceptable time)
- Tool to improve, guide, and enhance decision-making process



## What is Performance Monitoring?

- Assessing the current performance of the roadway
  - Identify location and severity of operational problems



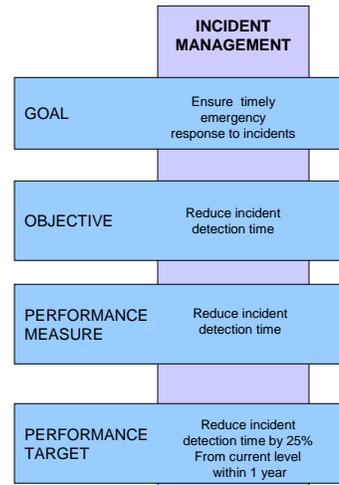
## Why should we be interested?

- Because FHWA is interested in performance measures
- Increases accountability
  - If you don't measure results, you can't tell success from failure.
  - If you can't see success, you can't reward it.
  - If you can't see failure, you can't correct it.
- Assists decision-making process



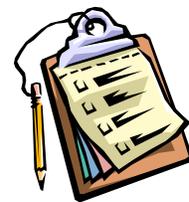
## How do I derive a Performance Measure?

- Derived from goals and objectives
- Drive the means of collecting the data, not vice versa.
- Should aid in the decision-making process
- Must provide the ability to diagnose problems and assess outcomes
- Should reflect interest and desires of stakeholders



## What makes good performance measures?

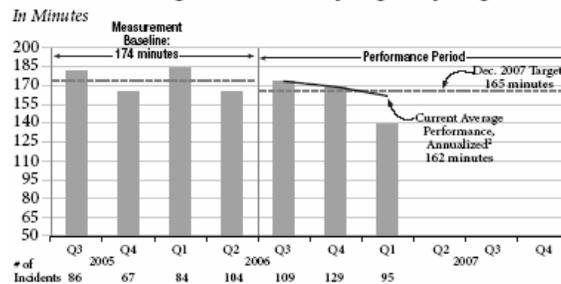
- Limited number of measures
- Easy to measure
- Simple and understandable
- Must be collected over appropriate time frame
- Appropriate level of sensitivity
- Geographically appropriate



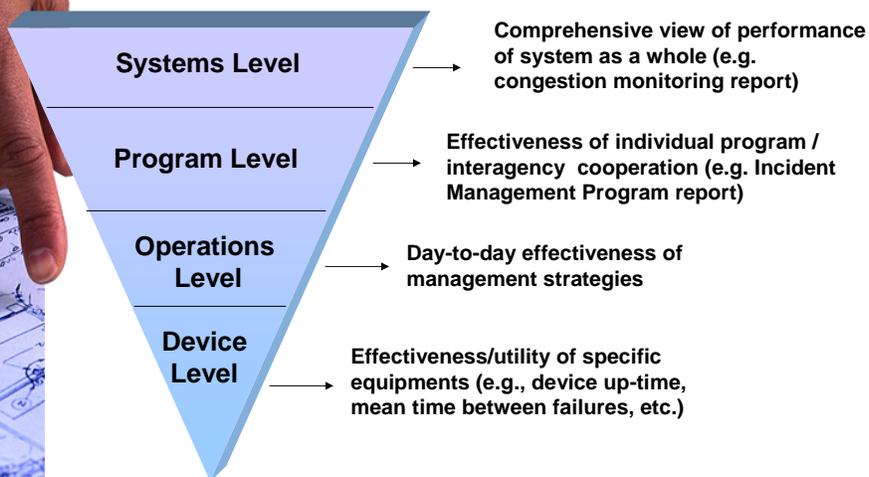
## Benchmarking

- Critical element of performance measurement and monitor
- Serves as the basis for evaluation or comparison

### Cabinet Strategic Plan Goal: Reducing Average Duration (Clearance Time) of Incidents Lasting 90 Minutes or Longer On Nine Key Highway Segments<sup>1</sup>

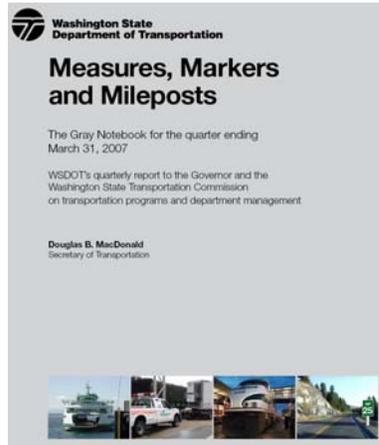


## What are some applications of performance measures?



## Washington State's *Measures, Markers, and Mileposts* Report

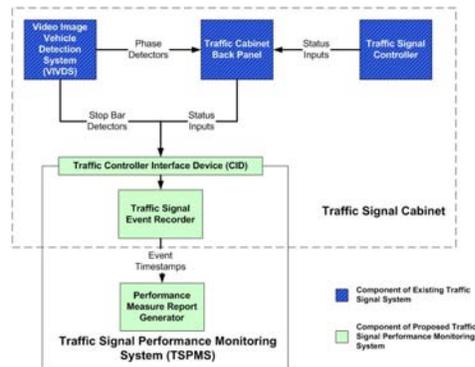
- Also called “Gray Notebook”
- Produced quarterly
- In-depth reports on agency and transportation system performance
- Provide direct accountability to legislative and commission mandates



Source: <http://www.wsdot.wa.gov/accountability/GrayNotebook.pdf>

## Systems to Support Traffic Signal Operations

- TxDOT Project 0-4422: Measuring Performance of Traffic Signal Systems Using Existing Detector Technology
  - Examined types of performance measures that could be derived for signal operations
  - Develop prototype system
  - Project Completed: May 2005





## Types of Signal Timing Related Measures

- Tapped into controller bit stream to record “on/off” times
- Computed measures
  - Average cycle time
  - Time to service
  - Queue service time
  - Interval durations
  - Number of vehicle entering in each interval
  - Yellow and all-red violation rates
  - Phase failures
- Agency can use information to assess effectiveness of controller settings



## Systems to Support Freeway Management Systems

- TxDOT Research Project 0-5292: Using Operations-Oriented Performance Measures to Support Freeway Management Systems
  - Examining how performance measures can be used to assist in improving operations decision-making
  - Computing NTOC performance measures using real-time data from freeway management system
  - Determine if performance effects can be measured after operator makes change in operations
  - Using hardware-in-the-loop simulation to examine sensitively of measures to operational changes
- Expected completion: August 2007

## National Transportation Operations Coalition (NTOC) Measures

- Customer satisfaction
- Extent of congestion
  - Spatial
  - Temporal
- Incident duration
- Non-recurring delay
- Recurring delay
- Speed
- Throughput
  - Person
  - Vehicle
- Travel time
  - Link
  - Trip
  - Reliability



## Systems to Support Incident Management

- TxDOT Project 0-5485: Incorporating Historical Incident Data into Incident Detection and Performance Measures at TMCs.
  - Examining how to produce consistent incident-related performance reports for Texas
  - Establishing list of desired measures
  - Identifying and assessing data requirements
  - Developing methodologies and procedures for calculating measures
- Expected Completion:
  - Methodology development – August 2007
  - Prototype development – August 2008



## Issues and Recommendations (at least so far)

- Issues
  - Inconsistent application of data between agencies
  - Data needs rarely considered in design of systems
  - Sensitivity of measures to operational changes
  - Requires agencies to have a “new way of thinking”
- Recommendations
  - “Standards” needed to ensure consistent measures
  - Design data collection needs at beginning of project
  - Examine appropriateness of measures
  - Increase awareness / training on use of performance measures

## Questions/Comments

