

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

Presented at the Summer Meeting of TexITE
Amarillo, Texas
June 16th, 2007

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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



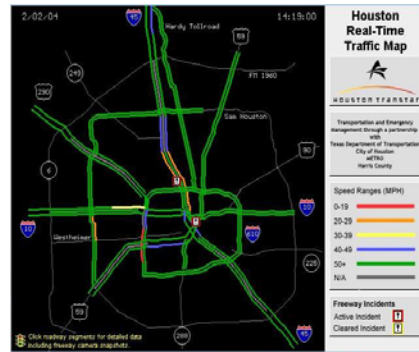
What is Performance Measurement?

- 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



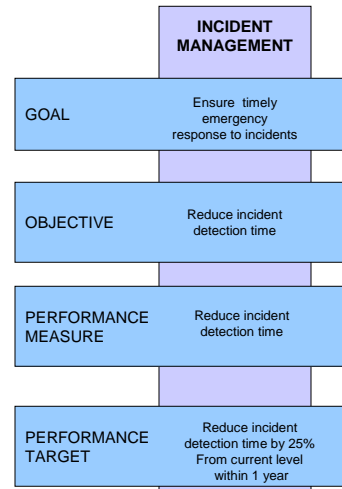
Why should we be interested?

- 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



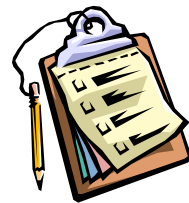
How do I derive a Performance Measure?

- 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?

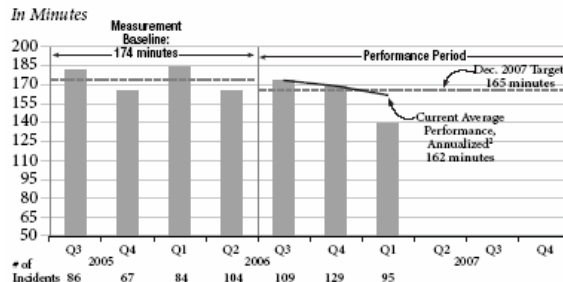
- Limited number of measures
- Easy to measure
- Simple and understandable
- Must be collected over appropriate time frame
- Appropriate level of sensitivity
- Geographically appropriate



Benchmarking

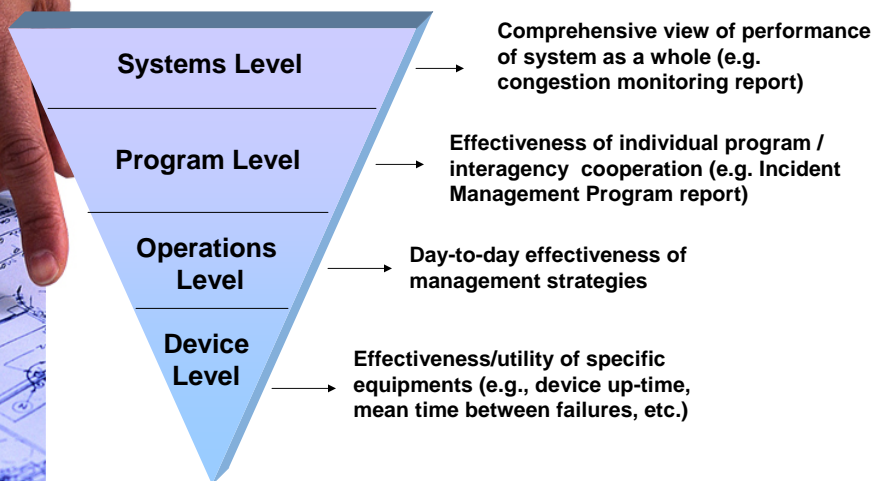
- Critical element of performance measurement and monitor
- Serves as the basis for evaluation or comparison

Cabinet Strategic Plan Goal: Reducing Average Duration (Clearance Time) of Incidents Lasting 90 Minutes or Longer On Nine Key Highway Segments¹



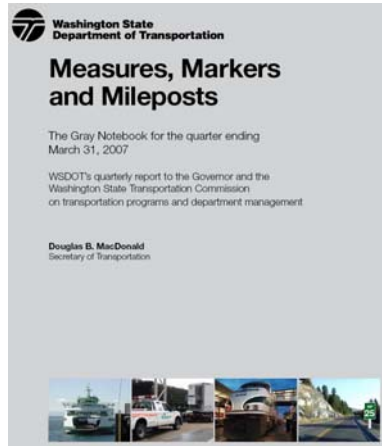
Source: Washington State's Gray Notebook, March 2007

What are some applications of performance measures?



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

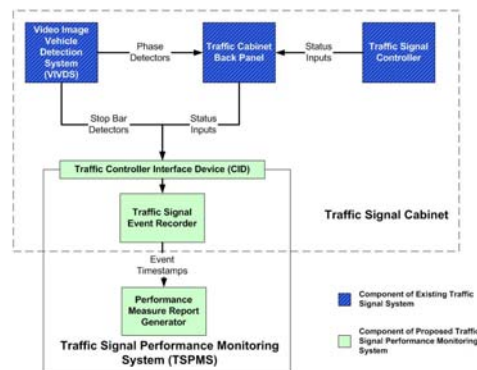
- Also called "Gray Notebook"
- Produced quarterly
- In-depth reports on agency and transportation system performance
- Provide direct accountability to legislative and commission mandates



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 sensitivity 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

