Performance Measures for Transportation Planning
Part 1

Flint, MI
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FHWA Resource Center
Overview

Performance Measurement in Transportation Planning
Module Outcomes

Describe performance measurement and its benefits
Relate transportation performance measures to goals and objectives
Identify the difference between outputs and outcomes
Describe quantitative and qualitative outcomes and their use in developing performance targets
What is Performance Measurement?

Use of statistical evidence to determine progress toward specific defined organizational objectives.
Benefits

Align long range transportation plans, transportation improvement programs with strategic direction
Integrate intermodal system plans
Communicate, cooperate & build consensus
Demonstrate program value
Why System Performance Measurement?
“Federal Transportation programs have no performance metrics”.

“The Surface Transportation Act of 2009 will require States and local governments to establish transportation plans with specific performance standards, measure their progress annually in meeting these standards; and periodically adjust their plans as necessary to achieve specific objectives”.
What Others are saying............

AASHTO: “Back to Basics – Accountability for Results” report
http://www.transportation1.org/policy_reform/intro.html

3. Plan and Select Projects Based on a State-Driven Performance Management Approach

To align project selection with the national objectives, AASHTO supports the development of a state-driven performance management process in which each state DOT, and its MPOs, would focus federal funding on meeting national performance goals. Each state would adopt performance targets relating to the national goals in their long-range planning process.
Emerging Federal Perspective

• A small set of national goals or performance areas, likely set by Congress;
• National performance measures established by U.S. DOT, in consultation with partners;
• National performance targets for some, or all, of the national goals;
• State set performance targets for all of the national goal areas;
• Regular reporting of results by DOTs and MPOs; and
• Use of performance-based planning to support DOT and MPO decision-making.
Florida DOT says:

Why We Need Mobility Performance Measures

- Mobility performance measures are "yardsticks" that transportation agencies use to measure their operating results and assess investment options.
- Historically, the Florida Department of Transportation (FDOT) has used highway level of service (LOS) as the primary tool for assessing transportation system performance.
Start with Goals and Objectives

Goals: Generalized statements which broadly relate the physical environment to values
Objectives: Specific, measurable statements related to the attainment of goals
Develop Goals which:

- Embody the vision for the region
- Establish a foundation in the Plan
- Link to the Congestion Management Process and the Transportation Improvement Program
- Allow for a tracking mechanism
Examples of Goals include:

<table>
<thead>
<tr>
<th>Accessibility</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobility</td>
<td>Safety</td>
</tr>
<tr>
<td>Economic Development</td>
<td>Operational Efficiency</td>
</tr>
<tr>
<td>Quality of Life</td>
<td>System Condition</td>
</tr>
</tbody>
</table>
Putting Them To Use...

Performance Measurement

- Visioning & Goals
- Plan Objectives
- Problem Identification
- Alternatives
- Plan Approval
- Analysis & Evaluation
- Monitoring
- Project Development & Operation
- Program Development
- Regional Agencies
- State
- Cities and Counties
- Special Interests
- Tribal Government
- Federal Agencies
- Private Sector
- Transit Providers

Agencies and Providers:
- State
- Cities and Counties
- Special Interests
- Federal Agencies
- Private Sector
- Transit Providers

Governments and Interests:
- Tribal Government
- State
- Cities and Counties
- Special Interests
- Federal Agencies
- Private Sector
- Transit Providers

Sectoral Groups:
- State
- Cities and Counties
- Special Interests
- Federal Agencies
- Private Sector
- Transit Providers

Program Development and Operations:
- Project Development & Operation
- Program Development

Resource Center:
- Caltrans
- Federal Highway Administration
Goal: Improve *the operation* of the transportation systems and services to enhance emergency response, minimize travel times and maximize service quality of all modes.....

Objectives:

- Maintain commercial vehicle and auto per capita travel times at 2005 levels.
- Increase the number of transit routes with a headway of 60 minutes or less by 15%

Source: Pikes Peak Area COG 2011
Objectives need performance measures.
They reveal the extent to which alternative actions or plans will lead to the attainment of an objective.

Add the Performance Measures

Goal C

Objectives C1-C3

PM C1
PM C2
PM C3

Build a Hierarchy
## Examples of Performance Measures

<table>
<thead>
<tr>
<th><strong>Objective 1:</strong></th>
<th>Reduce accident exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measure:</strong></td>
<td>Percent of passenger miles on facilities with lowest accident exposure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Objective 2:</strong></th>
<th>Minimize energy consumed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measure:</strong></td>
<td>Gallons of fuel consumed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Objective 3:</strong></th>
<th>Facilitate linked trip making</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measure:</strong></td>
<td>Average wait time at transit stops</td>
</tr>
</tbody>
</table>
Characteristics of Performance Measures

Measure the Extent of an Action
Evaluate Strategy Effectiveness
Establish in a Cooperative Fashion
When Selecting Measures....

Be measurable and provide for cost-effective data collection
Have a clear and intuitive meaning
Be comparable across time and geographical areas (facilities, corridors, subareas)
Have a relationship to actual system operations
# Types of Measures

<table>
<thead>
<tr>
<th>Output</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reflect scale or scope of activities</td>
<td>• Reflect an agency’s success in meeting goals/objectives</td>
</tr>
<tr>
<td>• Reflect efficiency in creating a product</td>
<td>• Reflect a focus on benefits/beneficiaries</td>
</tr>
<tr>
<td>• Reflect quantity of resources used</td>
<td></td>
</tr>
</tbody>
</table>
Example: Output and Outcome Measures for Safety Goal

<table>
<thead>
<tr>
<th>Output</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tons of salt applied</td>
<td>1. Number of ice-related crashes</td>
</tr>
<tr>
<td>2. Money spent on alcohol education programs</td>
<td>2. Percent of crashes that are alcohol-related</td>
</tr>
</tbody>
</table>
Vision
A safe, convenient and seamless multi-modal passenger and freight system that is sufficient in its capacity, attractive and affordable to its users, accessible and equitable for all citizens and visitors to locations throughout the region and incorporating sound growth management, urban revitalization, environmental and economic development planning principles.

Goals
Improve Safety
Reduce Congestion
Improve Mobility
Enhance the Environment
Rebuild the Infrastructure
Link Transportation Investments to Long Range Plan Goals

Source: Delaware Valley Regional Planning Commission
Example Measures to support an Accessibility Goal

• Mode Split by facility or route
• Percent of users with option of more than one modal choice
• Average trip length
• Average travel time to destination by mode
• Percent of population within ‘X’ miles of employment
• Number of counties in State with countywide transit systems
Example Measures to support a Mobility Goal

• Percent of VMT which occurs on facilities with V/C greater than ‘X’
• Origin-destination travel times by mode
• Number and percent of lane miles congested
• VMT per capita
• On-time performance of transit
• Number of commuters using park-and-ride lots
• Bicycles per boarding
Example Measures to support a System Preservation Goal

- Percent of lane-miles by pavement condition
- Percentage of bridges rated good or better
- Age distribution of transit fleet
- Percentage of state truck highway system rated good or better
- Percent of VMT on roads with deficient ride quality
- Percent of contracts planned for letting that were actually let
Performance Measurement and the Congestion Management Process

Examples (relating to operations)
- Customer satisfaction
- Extent of congestion
- Delay – non-recurring
- Delay – recurring
- Incident duration
- Reliability
- Speed
- Throughput – person, vehicle
- Travel time – trip, reliability

CMP Guidebook will be available at:
http://www.fhwa.dot.gov/planning/
Objectives-driven Planning for the Congestion Management Process

Objectives = specific, measurable statements relating to the attainment of system performance

Examples (all relating to a goal of congestion reduction):

- Over the next 3 – 5 years, reduce the clearance time of traffic incidents on freeways and major arteries in the region from a current average of X minutes to an average of Y minutes.
- Over the next 3 – 5 years, reduce the variability in travel time on freeways and major arteries in the region such that 95% of trips (19 out of 20) have travel times no more than 1.5 times the average travel time for a specific time of day.
- By 2012, enhance connectivity among transit services so that transfers between transit modes (rail, bus) and operators are seamless and can occur with one “smart card”
Examples of Operations Performance Measures

Develop Key Outcome Measures

- Travel time index
- Extent of congestion
- Buffer index

Uses

- Tracking national trends; performance measures for FHWA Performance Plans
- Educating state and local governments on use of performance measures
Examples of Performance Measure Variations

Travel Time

• Average Travel Time (LOS, contours, etc.)
• Average Peak Period Travel Time by Functional Class
• Average Travel Speed
• Origin/Destination Travel Time
• Percent of Time Average Speed Below
Example of Traffic Operations Hierarchy

Goal

Improve Regional Traffic Operations On Arterials

Performance Objective

Effective and Efficient Traffic Signal Operations

Performance Measure

Travel Time from Origin to Destination
Output: (% reduction in Travel Time)

Delay at Signalized Intersections
Output: (% reduction in delay)

Initiative

Traffic Signal Retiming Program
Output: (% corridors optimized)

Traffic Signal Maintenance Program
Output: (% signals fully operational)

Other

National Traffic Operations Council
Examples of Transit Operational Measures

Passengers/revenue vehicle mile
Passenger/revenue vehicle hour
Peak Passengers/seat
Average vehicle speed/travel time per mile
Percentage of on-time arrivals
Noteworthy Practices

Metropolitan Planning
North Jersey Transportation Planning Authority
Newark, NJ
www.njtpa.org

Metropolitan Transportation Commission
San Francisco, CA
www.mtc.ca.gov
<table>
<thead>
<tr>
<th>Accessibility</th>
<th>Highway Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>Transit Mobility</td>
</tr>
<tr>
<td>Sustainability</td>
<td>Walk/Bike Mobility</td>
</tr>
<tr>
<td>Intermodality</td>
<td>Freight Mobility</td>
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</tbody>
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North Jersey Transportation Planning Authority (NJTPA) Eight Goal Categories

North Jersey Transportation Planning Authority
Performance Objectives – Draft 2035 Plan
Metropolitan Transportation Commission – San Francisco

• Improve Maintenance
• Reduce Collisions and Fatalities
• Reduce Congestion
• Reduce Vehicle Miles-of-Travel
• Reduce Emissions
• Improve Affordability of Transportation for Low-Income Households
Examples of Quantitative Performance Measures

- Reduction in recurrent delay
- Reduction in non-recurrent delay
- Reduction in vehicle miles-of-travel
- Reduction in emissions (e.g., carbon dioxide, particulate matter)
- Cost per low income household served (transit)

Source: Metropolitan Transportation Commission Draft 2035 Plan
Public Participation

Imagine
- GIS
- Visualization tools

Meet
- Lunch ‘n Learn
- Celebrations
- Workshops
- Classes

Learn
- About ourselves and our Neighbors
- Our Cultures and Values
- How things work
- Planning and Design

Create
- Citizen Participation
- Collaborative Design
- Project Management and Financing
- Sustainability

Key Partners

Public Participants
Statewide Planning Examples

Maryland Department of Transportation

- Annual Attainment Report on Transportation System Performance
  - [http://www.mdot.maryland.gov/Planning/Index.html](http://www.mdot.maryland.gov/Planning/Index.html)

Washington Department of Transportation

- Annual Performance Report
  - [www.wsdot.wa.gov/accountability](http://www.wsdot.wa.gov/accountability)
Maryland Department of Transportation Annual Reporting

Why Are We Here?

- Legislative requirements
- Department of Budget and Management (DBM)
- Prepare for data audits
- Reduce redundant efforts
- Ensure transfer of data
- Minimize variation in submissions across modes / Authority
Annual Performance Report to Washington State Transportation Commission

Number and Type of Incident Responses

Incidents Lasting 15 to 90 Min

Incidents > 90 min to Clear

Case Study / Economic Analysis

Response Types
April to June 2003

Total Incident Responses = 9,501
- 951 Collisions
- 8,550 Non-Collisions*

<table>
<thead>
<tr>
<th></th>
<th>April</th>
<th>May</th>
<th>June</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatality Collisions</td>
<td>8</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>Injury Collisions</td>
<td>94</td>
<td>102</td>
<td>108</td>
</tr>
<tr>
<td>Non-injury Collisions</td>
<td>192</td>
<td>200</td>
<td>227</td>
</tr>
<tr>
<td>Disabled Vehicles</td>
<td>1,590</td>
<td>1,798</td>
<td>1,766</td>
</tr>
<tr>
<td>Abandoned Vehicles</td>
<td>528</td>
<td>524</td>
<td>607</td>
</tr>
<tr>
<td>Debris</td>
<td>331</td>
<td>421</td>
<td>422</td>
</tr>
<tr>
<td>Fire</td>
<td>3</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>Hazardous Materials</td>
<td>2</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Other</td>
<td>154</td>
<td>174</td>
<td>190</td>
</tr>
</tbody>
</table>

Some non-collisions fall into more than one of the above categories.

Service Actions for Non-Collision Responses

Service Actions Taken for Non-Collision Responses
April to June 2003

<table>
<thead>
<tr>
<th></th>
<th>April</th>
<th>May</th>
<th>June</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic Control</td>
<td>202</td>
<td>279</td>
<td>263</td>
</tr>
<tr>
<td>Provided Fuel</td>
<td>247</td>
<td>235</td>
<td>199</td>
</tr>
<tr>
<td>Changed Flat Tire</td>
<td>199</td>
<td>206</td>
<td>211</td>
</tr>
<tr>
<td>Minor Repair</td>
<td>97</td>
<td>135</td>
<td>104</td>
</tr>
<tr>
<td>Pushed Vehicle</td>
<td>91</td>
<td>101</td>
<td>160</td>
</tr>
<tr>
<td>Towed Vehicle</td>
<td>25</td>
<td>23</td>
<td>31</td>
</tr>
<tr>
<td>Cleared Debris</td>
<td>299</td>
<td>377</td>
<td>353</td>
</tr>
</tbody>
</table>

Resources

FHWA Operations Performance Measurement
http://ops.fhwa.dot.gov/perf_measurement/index.htm

TRB – Technical Guidance for Deploying National Level Performance Measures
http://trid.trb.org/view.aspx?id=1101991

TRB Performance Measurement Committee
http://www.trb-performancemeasurement.org/

FHWA Resource Center – Brian Betlyon  410-962-0086
QUESTIONS??