Using System Performance Measures in the Development of a Long-Range State Transportation Plan: An Iowa DOT Case Study

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November, 2005
Presentation Overview

- Past Iowa DOT performance measurement activity
- Iowa State government performance measures requirements
- State Long-Range Transportation Plan update process
Presentation Overview

- How planning performance measures were developed and selected
- Resulting performance measures matrix
- Examples for illustration
- Overall impressions from results
  - Notable performance trends
  - Financial outlook varies widely by mode
- Future activity
  - This activity is a work in progress
Past Iowa DOT Performance Measurement Activity

Iowa DOT already uses performance measures, mainly in ongoing operations

Highway maintenance
- District-based system

Pavement management system
- Statewide, GIS-based system

Bridge management system
- Using PONTIS customized for Iowa

Aviation system planning
- Newly adopted plan with extensive performance measures

Pilot surveys of highway customer satisfaction
“Results Iowa” Initiative Sets Selected Performance Measures By Department

Transportation

Mark Wandro, Director

Mission Statement:
The Department of Transportation advocates and delivers transportation services that support the economic, environmental and social vitality of Iowa.

Measures:
- Miles of new paved shoulders on the primary highway system
- Acres of rural roadside area seeded with native grasses and wildflowers (A)
- Right of way parcels returned to private, commercial, or other public uses (%)
- Highway miles that meet or exceed a sufficiency rating of tolerable or above (%)

Department Priority Miles of Newly Paved Shoulder

More Department Performance
- Performance Plan - How we measure our progress
- Strategic Plan - How we plan for progress
- Performance Report - How we report our progress
- Department Home Page - Learn more about this department
An update of “Iowa in Motion”, Iowa’s statewide multimodal transportation plan is underway.

- This is a 20 year plan with a 2025 plan horizon.
- One element of the plan is the development of a limited number of system performance measures.
- The plan update is a work in progress with expected completion in early 2006.
The Three Plan Guiding Principles

Safety
- How safe is the transportation system?
- Iowa has recently been a top five state in improving highway safety performance for the past decade

Efficiency
- How well are limited resources being used?
- This includes “traditional” measures of pavement, bridge, and other infrastructure condition

Quality of life
- How well is mobility being maintained or improved?
- This includes a new statewide system of interregional trails
The Five Modes

- Aviation
- Highways and bridges
- Pedestrian/bicycle
- Public transportation
- Railroads

- Performance measures were not developed for inland waterways, because Iowa DOT has no direct role in planning or funding.
Plan Performance Measures
Development

- Establish a set of “high level” system performance measures
  - Limit the number of measures to about 30
- Performance matrix dimensions
  - Measures by plan guiding principle
  - Measures by transportation mode
Performance Measures Input

- Ideas from plan input meetings and mode-specific focus groups held around the state early in the plan update process
- Ideas from key internal stakeholders from Iowa DOT modal offices and transportation safety office
- Ideas university transportation faculty and staff
Performance Measurement Process

- Used internal Iowa DOT data where possible (most current)
- Adjusted safety measures for exposure where possible
- Used time series data where available
- Used spatial data where appropriate
  - To indicate access or coverage
- Kept performance measures where data was insufficient for “future development”
<table>
<thead>
<tr>
<th>Performance Goals</th>
<th>Aviation</th>
<th>Highways/Bridges</th>
<th>Pedestrian/Bike</th>
<th>Public Transit</th>
<th>Railroads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>1. Percentage of airports with clear landing zones</td>
<td>1. Overall crash rate</td>
<td>1. Bicycle and pedestrian fatalities and injuries</td>
<td>1. Percent of public transit fleet with two-way communications on board</td>
<td>1. Total crashes at rail highway crossings</td>
</tr>
<tr>
<td></td>
<td>2. Number of runway incursions at towered airports</td>
<td>2. Fatal and injury crash rate</td>
<td>2. Public transit crash rate per vehicle-mile</td>
<td>2. Derailments per million ton-miles</td>
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<td></td>
<td>3. Number of accidents and fatalities</td>
<td>3. Crash rate for large trucks (combination vehicles)</td>
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<tr>
<td>Efficiency</td>
<td>1. Airports with a pavement condition index (PCI) value of 70 percent or above on their paved runways</td>
<td>1. Percent of pavements with good or excellent and poor ride quality</td>
<td>1. Percentage of off-road trails that are paved</td>
<td>1. Percent of public transit systems with in-house maintenance capabilities</td>
<td>1. Average rail operating revenue per ton-mile</td>
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<td></td>
<td>2. Percent of communities that have a land use plan in place surrounding their airport</td>
<td>2. Percentage of bridges that are Functionally Obsolete or Structurally Deficient</td>
<td>2. Percentage of on-road trails that meet AASHTO standards</td>
<td>2. Percentage of public transit fleet operating beyond its normal useful life</td>
<td>2. Percentage of Iowa rail carriers that are earning a reasonable return on investment</td>
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<td>3. Average age of off-road trails</td>
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<td>Quality of Life</td>
<td>1. Population within a two hour drive of commercial air service</td>
<td>1. Percent of system operating at traffic LOS &quot;C&quot; or better (separate for urban and rural)</td>
<td>1. Miles of off-road trails</td>
<td>1. Population in communities with public transit services sufficient to support independent living and employment</td>
<td>1. Percent of track-miles able to handle 286,000 pound cars</td>
</tr>
<tr>
<td></td>
<td>2. Percent of communities within 30 minutes of a general aviation or commercial service airport</td>
<td>2. Approximate travel times to major external markets in the Midwest region</td>
<td>2. Miles of rideable highway routes based on bicycle level of service (BLOS)</td>
<td>2. Total jobs within 1/4 mile of a fixed route transit system</td>
<td>2. Percentage of track-miles able to operate at 30 miles per hour or more</td>
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<td>3. Rail fuel use per ton-mile</td>
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</table>
Examples: Highway Safety

Time Series

Overall Crash Rate Per Million Vehicle Miles

Year

Crashes Per Million Miles


Fatal and Injury Crash Rate Per Million Vehicle Miles

Year

Fatal + Injury Per Million Vehicle Miles

Example: Railroad Safety

Time Series

Rail Derailment Trend

Derailments Per Million Ton-Miles

Year

1985 1987 1989 1991 1993 1995 1997 1999 2001 2003
Example: Ped/Bike Safety Time Series

Bicycle and Pedestrian Fatalities and Injuries

- Pedestrian
- Bicycle
- Pedestrian + Bicycle

Year

Fatalities Plus Injuries
0 200 400 600 800 1000 1200 1400 1600

Issue: no exposure data.
Highway Efficiency Classification Comparison

Interstate Highway Ride Quality
- Poor: 7%
- Good or Excellent: 91%
- Fair: 2%

Commercial & Industrial Network Ride Quality
- Poor: 12%
- Good or Excellent: 84%
- Fair: 4%

Ride Quality for Other Primary Routes
- Poor: 8%
- Good or Excellent: 67%
- Fair: 25%
Example: Public Transportation
Single Data Point Charts

Safety

- With Two-Way Communication: 24%
- Without Two-Way Communication: 76%

Efficiency

- Under FTA Age Threshold: 72%
- Over FTA Age Threshold: 28%
Example: Aviation QOL
Spatial Data
Example: Railroad Spatial Data
Uses of the Planning System

Performance Measures

- Identify data gaps
- Identify critical trends and gaps to be addressed in the plan
- Identify potential action items or needs to be evaluated for inclusion in the plan
  - Example: railroad upgrading finance package
- Explain action items in the plan to Decision-Makers and Stakeholders
  - Transportation Commission very supportive of this approach
- Develop a feedback loop for the plan in future years as performance continues to be measured
Financial Outlooks Vary

Aviation, Public Transportation
- Funding forecasts largely meet identified actions

Highways, Railroads
- Funding gap developing over the next 20 years; effects improvements and preservation

Pedestrian/Bicycle
- Insufficient funding for identified improvements
General Conclusions/Impressions

- Safety is improving across the board
  - The highway/bridge system is being preserved, but there are emerging capacity and “bottleneck” issues, especially for freight
    - I-80 in eastern Iowa
    - Urban Interstates
    - Expensive major structures
  - After Year 15 of the plan, resources for preservation will likely be tight and resources for “beyond preservation” will not exist
  - The aviation system is being preserved and some financial capacity exists to support selected expansions and new facilities
- The freight railroad system is at a crossroads
  - Considerable new capital is needed to modernize selected mainlines and branch lines
  - Carrier ROI is too low for recapitalization to occur
- The public transportation system is largely being maintained
  - Exception: rural bus system fleet needs renewal
- There is insufficient data to measure the pedestrian/bike system
  - The system extent is being expanded quickly
  - Usage data do not exist