Modeling and performance measurement data needs for large metropolitan planning organizations:

*Amendments to Data Collection and Data Management programs in light of MAP-21 requirements*

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Presentation motivation:

• Identify issues and approaches to data collection and data management program in light of the upcoming performance measurement rule making and performance targets establishment

• Approaches to deal with current uncertainty about specific measures and targets

• Build on the tools presented at 2012 AMPO annual conference
Status I recommended measures are complete and its elements are in place to issue Notice to Proposed Rule Making (NPRM), Status II measures have a recommended measure but additional work is needed to develop supporting elements needed for NPRM, and Status III measure indicated that a measure still being considered.
# MAP-21: Putting Performance into Action

## Transportation Performance Management Process

1. National Goals
2. Measures
3. Targets
4. Plan
5. Reports
6. Accountability and Transparency


### Planning
- Metropolitan and Statewide Planning Rule
  - Establish a performance-based planning process at metropolitan and state levels.
  - Define coordination in the selection of targets, goals, planning and programming to performance targets.

### Highway Safety
- Safety Performance Measure Rule
  - Propose and define fatalities and serious injuries measures, along with minimum condition standards, target establishment, progress assessment, and reporting requirements.
- Highway Safety Improvement Program (HSIP) Rule
  - Integration of performance measures, targets, and reporting requirements into the HSIP.
- Strategic Highway Safety Plan updates.
- Highway Safety Program Grants Rule
  - State target establishment and reporting requirements.
  - Highway safety plan content, reporting requirements, and approval.
  - *Final Rule issued by FHWA in January 2013*

### Highway Conditions
- Pavement and Bridge Performance Measure Rule
  - Propose and define pavement and bridge condition measures, along with minimum condition standards, target establishment, progress assessment, and reporting requirements.
- Asset Management Plan Rule
  - Contents and development process for asset management plans.
  - Minimum standards for pavement and bridge management systems.

### Congestion/System Performance
- System Performance Measure Rule
  - Define performance of the interstate system, non-interstate national highway system, and freight movement on the interstate system.
  - Finalize interpretation of scope of MAP-21 performance requirements, including congestion and environmental source emissions.
  - Summarize MAP-21 highway performance measure rules.

### Transit Performance
- Transit State of Good Repair Rule
  - Define state of good repair and establish measures.
- Transit System Management Plan Content, Target Establishment, and Reporting Requirements Rule
  - Transit system management plan content, target establishment, and reporting requirements.
- Transit Safety Plan Rule
  - Define transit safety standards.
  - Transit safety plan content and reporting requirements.

## Timeline
- **2013**: Q4
- **2014**: Q1, Q2, Q3, Q4
- **2015**: Q1, Q2, Q3, Q4

*Indicates the amendment period*

**Anticipated Coordinated Performance Measure Effective Date**

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Source: FHWA

October 22-25, 2013 2013 AMPO Annual Conference. Portland, OR
New Data Sources and New Data Management Tools – Great Impact on Performance Measurement and Modeling

2011 Nokia/NAVTEQ Historical Speed Data

- Average speed data on segment level (TMC: Travel Message Channel)
- Temporal: Average speed available for each month (12) and day-of-week (7)
- Spatial: Speed data covers about 98% of modeling network (freeway and arterial)
New Data Sources Affect Not Only Data Collection But Whole MPO Business Processes

Contractual and Procurement Work  Data Collection  Data Processing

Speed Data – Old Process
- Probs., In-house Travel Time and Speed Studies
- Manual Processing
- Archived
- Application in Models and Performance Management Reports

Speed Data – New Process
- Commercial Speed Data
- Streamed
- Real Time Dashboards
- QC/Analysis
- Archived
- Analysis, Application, Performance measurements

Dashboard with Streamed Data
- Archived Data Delivery

Regional Speed Data Set Costs

See also Vladimir Livshits, Ph.D. Data Collection Program Development for an MPO: Dealing with Uncertainty, Budget Cuts and New Modeling Needs. 2012 AMPO Annual Conference. Saratoga Springs, NY
Data Integration Matrix:
Integrating Data Collection in the Overall MPO Business Processes in a Systematic Way

<table>
<thead>
<tr>
<th>Functions and Business Processes</th>
<th>Socio-Economic and Land Use Forecast</th>
<th>Transportation System Analysis</th>
<th>Planning Model and Forecast</th>
<th>Transportation Programming</th>
<th>Regional Plans TIP, RTP</th>
<th>Air Quality Model and Analysis</th>
<th>Performance Measurement</th>
<th>Traffic and Operations Model and Forecast</th>
<th>Regional Coordination</th>
<th>Federal Coordination, Certifications, and Compliance</th>
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See also V. Livshits. Setting the Stage for Understanding Urban Data Integration. TRB 91st Annual Meeting. Event W188; V. Livshits, Data Collection Program Development for an MPO: Dealing with Uncertainty, Budget Cuts and New Modeling Needs. 2012 AMPO Annual Conference. Saratoga Springs, NY
What are we measuring: Performance of the System, Performance of the Plan or Performance of the Plan Implementation?

What is the purpose? Investments prioritization? Projects ranking for RTP?

What are the penalties?

What are the measures that isolate plan contribution to the system performance? How we make sure we don’t substitute performance measurement with forecast or model validation?
Six Main Transportation Planning Data Sets and Models

- **Socio-Economic data** (Pop, Empl, Enrollment, ...)
- **Land-Use Data** (Future developments, Industrial, Retail, ...)
- **Traffic Data** (counts, speed, travel time, ...) – DTA, Microsimulation
- **Travel Data** (trips, households, vehicles ...) – ABM, Special Generators, 4-step
- **Transportation Infrastructure Data** (roads, parking, transit, ...) – Network Models, GIS-T
- **Environmental Data** (air quality, water, ...)
Traffic Data - describes observed network flow of vehicles or passengers – by network type, network links and nodes, volume, speed, flow density, flow composition, time period, other temporal or spatial characteristics.

Reliability Measures
Congestion Measures
LOS Measures
### SWOT Analysis

**(Decision Matrix for Risk Management)**

<table>
<thead>
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<th>Threats – Determine the Risks</th>
<th>Opportunities</th>
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<tbody>
<tr>
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<td>e.g., unmet planning, modeling or performance measurement needs</td>
<td>e.g., new emerging data sources, lower market prices or improved quality of data products</td>
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#### Strengths

- e.g., multiple data sources, current and valid data suitable for identified planning or forecasting needs, ability to collect the data at reasonable costs

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<th>MEDIUM RISK AREA</th>
<th>LOW RISK AREA</th>
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#### Weaknesses - Assess Vulnerability

- e.g., obsolete data or absence of required data sets (quality, coverage), difficult and/or expensive data collection

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<th>HIGH RISK AREA</th>
<th>MEDIUM RISK AREA</th>
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See also Vladimir Livshits, Ph.D. *Data Collection Program Development for an MPO: Dealing with Uncertainty, Budget Cuts and New Modeling Needs*. 2012 AMPO Annual Conference. Saratoga Springs, NY
Travel Data – Do we use it for the performance measurement? GPS-based Travel Surveys; Cell Phones Data; Bluetooth Data Freight Data
Plan Implementation
Quality of the RTP
Compliance with Federal Regulations

Safety
Asset Management

Transportation Infrastructure Data – Describes Transportation Supply Part in terms of physical characteristics, capacity and capacity distribution in space and time

Urban Transportation Network Data

Accident Data

Fleet Data

Road Network

Non-motorized modes networks

Transit Network

By network element

Network Vertices

Routes

Transit Segments

P&R lots

LOV Road Network

HOV Road Network

Toll Facilities

Parking Surveys

Stop/Station Inventory

Frequencies

Speeds

Park-and-Ride/Kiss-and-Ride/ Formal/ Informal Parking Inventories

Transit GPS surveys

Fixed Route Itinerary Data
Some concluding thoughts

• Early coordination with DOTs on performance measures and targets
• Clear understanding of goals and implications of the specific measures and targets
• Clear understanding on how the performance management process fits with other MPO business processes
• Methodology of calculating performance measures, including data sources, performance indicators
• Risk Management and flexibility – new data, new methods, new measures
• Areas of applicability – system level versus project level