THE CRITICAL INTERSECTION OF PUBLIC HEALTH, SOCIAL EQUITY, AND PERFORMANCE-BASED PLANNING

A CASE STUDY FROM THE SAN FRANCISCO BAY AREA

Dave Vautin
METROPOLITAN TRANSPORTATION COMMISSION
DECEMBER 3, 2014 - PORTLAND, OREGON
1. Smarter Target-Setting: Integrating Public Health and Social Equity

2. Why Project Evaluation Matters: Limitations of Scenario-Level Analysis


4. Linking Performance and Policy Decisions: High-Performers and Low-Performers

5. What’s Next: Leveraging New Tools in Health/Equity Planning
1 Smarter Target-Setting: Integrating Public Health and Social Equity
**Top 20 MPOs: O&M versus Expansion Funding**

- **CMAP**: Chicago
  - O&M: 98%
  - Expansion: 74%
- **NYMTC**: New York
  - O&M: 97%
  - Expansion: 74%
- **SPC**: Pittsburgh
  - O&M: 97%
  - Expansion: 74%
- **BMPO**: Boston
  - O&M: 94%
  - Expansion: 74%
- **DVRPC**: Philadelphia
  - O&M: 92%
  - Expansion: 74%
- **EWGCOG**: St. Louis
  - O&M: 89%
  - Expansion: 74%
- **NJTPA**: Newark
  - O&M: 88%
  - Expansion: 74%
- **MTC**: San Francisco
  - O&M: 87%
  - Expansion: 74%
- **SEMCOG**: Detroit
  - O&M: 87%
  - Expansion: 74%
- **ARC**: Atlanta
  - O&M: 98%
  - Expansion: 74%
- **MWCOG**: Washington
  - O&M: 70%
  - Expansion: 74%
- **SCAG**: Los Angeles
  - O&M: 60%
  - Expansion: 74%
- **PSRC**: Seattle
  - O&M: 57%
  - Expansion: 74%
- **SANDAG**: San Diego
  - O&M: 55%
  - Expansion: 74%
- **H-GAC**: Houston
  - O&M: 55%
  - Expansion: 74%
- **MAG**: Phoenix
  - O&M: 53%
  - Expansion: 74%
- **DRCOG**: Denver
  - O&M: 50%
  - Expansion: 74%
- **NCTCOG**: Dallas
  - O&M: 40%
  - Expansion: 74%
- **BMC**: Baltimore
  - Insufficient data provided by MPO
- **MC**: Minneapolis
  - Insufficient data provided by MPO
A. Establish Performance Targets
B. Assess Project Performance
C. Assess Scenario Performance
D. Assess Plan/EIR Performance
E. Monitor Performance of Adopted Plan
## Brief History of Performance Assessment at MTC

<table>
<thead>
<tr>
<th>Year</th>
<th>2001</th>
<th>2005</th>
<th>2009</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scenario Planning</strong></td>
<td>2001 Regional Transportation Plan</td>
<td>Transportation investment packages</td>
<td>Transportation investment packages</td>
<td>Transportation investment packages</td>
</tr>
<tr>
<td><strong>Performance Targets</strong></td>
<td>Transportation targets</td>
<td>Transportation targets</td>
<td>Transportation targets</td>
<td>Integrated transportation &amp; land use scenarios</td>
</tr>
<tr>
<td><strong>Qualitative Project Assessment</strong></td>
<td>None</td>
<td>Goals-based</td>
<td>Goals-based</td>
<td>Targets-based</td>
</tr>
<tr>
<td><strong>Quantitative Project Assessment</strong></td>
<td>None</td>
<td>None</td>
<td>Limited benefit-cost analysis</td>
<td>Rigorous benefit-cost analysis</td>
</tr>
<tr>
<td><strong>Number of Projects Analyzed</strong></td>
<td>0</td>
<td>400</td>
<td>700</td>
<td>900</td>
</tr>
</tbody>
</table>
• First regional plan to integrate transportation, land use, and housing

• Sustainable Communities Strategy initiated by California Senate Bill 375
A COLLABORATIVE TARGET-SETTING PROCESS

- Engaged stakeholders from the region’s 9 counties, 101 cities, 26 transit operators, and numerous advocacy organizations
- 6-month process to define performance measures & targets
- 8-month process to establish project evaluation framework
- Result: broad support for rigorous performance assessment from key stakeholders, executive leadership, and policymakers
CHOOSING A PUBLIC HEALTH TARGET

Infrastructure-Oriented

- Increase sidewalk-miles and bicycle lane-miles by X%

Customer-Oriented

- Increase average daily time spent walking or biking by X%

Objective-Oriented

- Decrease life-year impact of mortality or morbidity due to insufficient physical activity by X%
CHOOSING AN EQUITY TARGET

Infrastructural-Oriented

Invest X% of regional transportation dollars into disadvantaged communities

Customer-Oriented

Increase middle-class jobs within X minutes by transit by Y%

Objective-Oriented

Decrease housing and transportation costs as a share of low-income household budgets by X%
Choosing an Air Quality Target

Infrastructure-Oriented

- OR -

Customer-Oriented

- OR -

Objective-Oriented
Reduce per-capita greenhouse gas emissions from cars and light-duty trucks

Direct all non-agricultural development within the urban footprint

House all of the region’s projected housing growth

Reduce premature deaths from exposure to particulate emissions

Reduce injuries and fatalities from collisions

Increase average daily time spent walking or biking

Decrease housing and transportation costs as a share of low-income household budgets

Increase non-auto mode share and reduce VMT per capita

Maintain the transportation system
Equity Analysis Technical Measures
Comparing “Communities of Concern” with Remainder of Bay Area

1. Housing + Transportation Affordability
2. Displacement Risk
3. Vehicle Miles Traveled Density
4. Average Commute Travel Time
5. Average Non-Commute Travel Time
Impetus for Project-Level Assessment: Limitations of Scenario-Level Analysis
## Performance-Based Planning Framework

<table>
<thead>
<tr>
<th>Planning Framework</th>
<th>Performance Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCENARIO</td>
<td>SCENARIO-LEVEL TARGETS ASSESSMENT</td>
</tr>
<tr>
<td></td>
<td>SCENARIO-LEVEL EQUITY ASSESSMENT</td>
</tr>
<tr>
<td>LAND USE PATTERN</td>
<td>PROJECT-LEVEL TARGETS ASSESSMENT</td>
</tr>
<tr>
<td>TRANSPORTATION PROJECTS</td>
<td>PROJECT-LEVEL EQUITY ASSESSMENT</td>
</tr>
<tr>
<td></td>
<td>PROJECT-LEVEL BENEFIT-COST ASSESSMENT</td>
</tr>
</tbody>
</table>
### SCENARIO PERFORMANCE ASSESSMENT
Comparing Forecasted Outcomes to Regional Targets

<table>
<thead>
<tr>
<th>Target</th>
<th>Goal</th>
<th>No Project</th>
<th>Preferred</th>
<th>Transit Priority Focus</th>
<th>Network of Communities</th>
<th>Equity, Environment &amp; Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Reduce per-capita CO₂ emissions from cars and light-duty trucks</td>
<td>-15%</td>
<td>-8%</td>
<td>-18%</td>
<td>-16%</td>
<td>-16%</td>
<td>-17%</td>
</tr>
<tr>
<td>2 House the region’s projected growth</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>118%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>3a Reduce premature deaths from exposure to fine particulates (PM₂.₅)</td>
<td>-10%</td>
<td>-71%</td>
<td>-71%</td>
<td>-72%</td>
<td>-69%</td>
<td>-72%</td>
</tr>
<tr>
<td>3b Reduce coarse particulate emissions (PM₁₀)</td>
<td>-30%</td>
<td>-16%</td>
<td>-17%</td>
<td>-17%</td>
<td>-14%</td>
<td>-18%</td>
</tr>
<tr>
<td>3c Achieve greater particulate emission reductions in highly impacted areas</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>4 Reduce the number of injuries and fatalities from all collisions</td>
<td>-50%</td>
<td>+18%</td>
<td>+18%</td>
<td>+17%</td>
<td>+23%</td>
<td>+16%</td>
</tr>
<tr>
<td>5 Increase the average daily time walking or biking per person for transportation</td>
<td>+70%</td>
<td>+12%</td>
<td>+17%</td>
<td>+18%</td>
<td>+13%</td>
<td>+20%</td>
</tr>
</tbody>
</table>
# Scenario Performance Assessment
Comparing Forecasted Outcomes to Regional Targets

<table>
<thead>
<tr>
<th>Scenario ID</th>
<th>Description</th>
<th>Target</th>
<th>Actual 1</th>
<th>Actual 2</th>
<th>Actual 3</th>
<th>Actual 4</th>
<th>Actual 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Direct all non-agricultural development within the year 2010 urban footprint</td>
<td>100%</td>
<td>53%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>7</td>
<td>Decrease the share of low-income and lower-middle income residents’ household income consumed by transportation and housing</td>
<td>-10%</td>
<td>+8%</td>
<td>+3%</td>
<td>+5%</td>
<td>+3%</td>
<td>+2%</td>
</tr>
<tr>
<td>8</td>
<td>Increase gross regional product (GRP)</td>
<td>+110%</td>
<td>+118%</td>
<td>+119%</td>
<td>+118%</td>
<td>+123%</td>
<td>+118%</td>
</tr>
<tr>
<td>9a</td>
<td>Increase non-auto mode share</td>
<td>26%</td>
<td>19%</td>
<td>20%</td>
<td>20%</td>
<td>19%</td>
<td>21%</td>
</tr>
<tr>
<td>9b</td>
<td>Decrease automobile vehicle miles traveled (VMT) per capita</td>
<td>-10%</td>
<td>-5%</td>
<td>-9%</td>
<td>-8%</td>
<td>-9%</td>
<td>-9%</td>
</tr>
<tr>
<td>10a</td>
<td>Increase local road pavement condition index (PCI)</td>
<td>75</td>
<td>50</td>
<td>68</td>
<td>68</td>
<td>68</td>
<td>71</td>
</tr>
<tr>
<td>10b</td>
<td>Decrease share of distressed lane–miles of state highways</td>
<td>10%</td>
<td>44%</td>
<td>44%</td>
<td>44%</td>
<td>30%</td>
<td>41%</td>
</tr>
<tr>
<td>10c</td>
<td>Reduce share of transit assets exceeding useful life</td>
<td>0%</td>
<td>36%</td>
<td>24%</td>
<td>24%</td>
<td>24%</td>
<td>24%</td>
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<tr>
<td>Measure</td>
<td>Community</td>
<td>2010</td>
<td>2040 No Project</td>
<td>2040 Preferred</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>---------------------------------</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing + Transportation Affordability</td>
<td>Low-Income</td>
<td>72%</td>
<td>80%</td>
<td>74%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rest of Region</td>
<td>41%</td>
<td>44%</td>
<td>43%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Displacement Risk</td>
<td>COC</td>
<td>n/a</td>
<td>21%</td>
<td>36%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rest of Region</td>
<td>n/a</td>
<td>5%</td>
<td>8%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VMT Density</td>
<td>COC</td>
<td>9,737</td>
<td>11,447</td>
<td>11,693</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rest of Region</td>
<td>9,861</td>
<td>11,717</td>
<td>11,895</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commute Travel Time</td>
<td>COC</td>
<td>25</td>
<td>26</td>
<td>26</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rest of Region</td>
<td>27</td>
<td>29</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Non-Commute Travel Time</td>
<td>COC</td>
<td>12</td>
<td>13</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rest of Region</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Quantifying Benefits: Framework for Evaluating Hundreds of Projects
**Determining How to Evaluate Projects - and Which Projects Should Be Evaluated**

**Number of Projects**
- Qualitative only (by project type): 700
- Quantitative & qualitative: 100
- Committed: 200

**Cost of Projects (in billions of $)**
- Qualitative only: 150
- Quantitative only (by project type): 30
- Qualitative only: 20
- Committed: 10

Number and cost of projects are approximated for simplicity.
TARGETS ASSESSMENT

Determine impact on targets adopted by MTC and ABAG

Analyzed all 900 uncommitted projects

BENEFIT-COST ASSESSMENT

Compare benefits & costs

Analyzed most significant projects (approximately 100 in total)
Targets Assessment

Assessed qualitatively using target scores (max score of +10).

1. Climate Protection
2. Adequate Housing
3. Particulate Matter
4. Collisions
5. Active Transportation
6. Open Space
7. Equitable Access
8. Economic Vitality
9. Non-Auto Mode Share/VMT
10. State of Good Repair

Benefit-Cost Assessment

Assessed quantitatively using MTC Travel Model One.

**BENEFITS**
- Travel time (including recurring & non-recurring delay)
- Travel cost (auto operating/ownership, parking)
- Emissions (CO₂, PM₂.₅, ROG, NOₓ)
- Collisions (fatalities, injuries, property damage)
- Health impacts due to active transport
- Noise

**COSTS**
- Capital costs
- Net operating and maintenance (O&M) costs
Project Performance Assessment: All Road Projects

Bubble size represents the project benefits.

Road Project

Silicon Valley Express Lanes Network
MTC Express Lanes Network
SR-239 Expressway (Brentwood to Tracy)
SR-84/I-680 Interchange Improvements and Widening
New SR-152 Alignment
SR-4 Bypass Completion
Fremont/Union City East-West Connector
I-680/SR-4 Interchange Improvements and Widening
SR-85 Auxiliary Lanes
US-101 HOV Lanes (Whipple to Cesar Chavez)
I-80 Auxiliary Lanes (Airbase Parkway to I-680)
SR-29 HOV Lanes and BRT
Bay Bridge Contraflow Lane
Treasure Island Congestion Pricing
Congestion Pricing Pilot
Freeway Performance Initiative
ITS Improvements in Santa Clara and San Mateo Counties

Adverse Impact on Targets
Supports Targets
Project Performance Assessment: Selected Transit Projects

Bubbles labeled for projects with greater than $15 million in annual benefits. Bubble size represents the project benefits.

- Transit Project

Adverse Impact on Targets

Supports Targets
Project Performance Assessment: Results by Project Type

Bubble size represents the total annual benefits for all projects of that type.

- **Road Project**
- **Transit Project**
- **Regional Program**

- Congestion Pricing
- Freeway Performance Initiative
- Road Efficiency
- Express Lane Network
- Highway Expansion
- BRT and Infill Transit Stations
- Maintenance
- Climate Program
- Transit Frequency Improvements (North Bay Area)
- Rail Expansion
- Transportation for Liveable Communities
- Bike Network
- Lifeline and New Freedom
- Transit Frequency Improvements (Central Bay Area)
### Top 3 Most Cost-Effective Projects for Active Transportation

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Annual Project Cost</th>
<th>Δ Active Individuals</th>
<th>Cost-Effectiveness (Δ/$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BART Metro Program</td>
<td>-$18.5 million</td>
<td>2,735 people</td>
<td>infinite</td>
</tr>
<tr>
<td>Cordon Pricing</td>
<td>$5.1 million</td>
<td>11,899 people</td>
<td>2,338</td>
</tr>
<tr>
<td>Treasure Island Pricing</td>
<td>$1.2 million</td>
<td>2,483 people</td>
<td>2,108</td>
</tr>
</tbody>
</table>

### Top 3 Least Cost-Effective Projects for Active Transportation

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Annual Project Cost</th>
<th>Δ Active Individuals</th>
<th>Cost-Effectiveness (Δ/$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muni TEP</td>
<td>$7.8 million</td>
<td>-3,811 people</td>
<td>-486</td>
</tr>
<tr>
<td>I-80 Auxiliary Lanes</td>
<td>$3.5 million</td>
<td>-399 people</td>
<td>-112</td>
</tr>
<tr>
<td>Alameda-Oakland BRT</td>
<td>$2.1 million</td>
<td>-200 people</td>
<td>-96</td>
</tr>
</tbody>
</table>

Image Source: https://www.flickr.com/photos/dpworks/6277780935
Example Project
Equity Map:
San Francisco County
Linking Performance and Policy Decisions: High-Performers and Low-Performers
**Sample High-Performing Projects**

**Prioritized for Regional Funding**

- BART Metro
- Urban BRT Systems

**Freeway Performance Initiative**

**Sample Moderate-Performing Projects**

- Caltrain Downtown Extension
- Urban Bus Frequency Improvements

**Express Lane Network**

"Nothing to See Here, Move Along"

**Sample Low-Performing Projects**

- SMART Expansion
- Dumbarton Rail

**Freeway Widening (US-101 & SR-239)**

**Sample Required Compelling Case for Inclusion in Plan**
**COMPELLING CASE CRITERIA**

**Category 1: Modeling Limitations**

*must prove limitations directly resulted in a B/C ratio less than 1*

1. Interregional or recreational corridor
2. Access to international airports
3. Benefit accrual from non-modelable effects such as weaving reduction, transit crowding reduction, etc.
4. Synergies with other fully funded investments

**Category 2: Federal Requirements**

1. Cost-effective in reducing CO$_2$, PM, or ozone precursors
2. Improves mobility or air quality in communities of concern
IMPLICATIONS OF COMPELLING CASE REQUIREMENT FOR LOW-PERFORMING PROJECTS

Projects withdrawn by sponsors:
- 12

Compelling cases approved:
- 6 Communities of Concern
- 1 Air quality
- 1 Recreational trips
- 8

Projects re-scoped:
- 7 Environmental phase only
- 5 Sponsor agreed to fully fund project locally
- 1 Down-scoped to achieve B/C ratio greater than 1

Case slated for rejection; “settled out of court”
What's Next: Leveraging New Tools in Health/Equity Planning
Expectations for performance assessment have grown significantly in the past decade.

Yet there remains no national mandate to incorporate health & equity measures. It is up to MPOs and state DOTs to lead the way.
INTEGRATED TRANSPORT AND HEALTH IMPACTS MODEL (ITHIM)

- Developed in 2011; now being leveraged by MPOs across California
- Calculates health impacts (mortality and morbidity) related to air quality, physical activity, and collisions
- Integrates with travel demand model & GIS databases (Excel-based tool)

**Policy Strategy Analysis Example**

- Change in Disability-Adjusted Life-Years per Million
- Active Transport Strategy
- Low Emission Vehicles Strategy
- Physical Activity
- Air Pollution
- Injuries
CONCLUDING THOUGHTS

• Integrating health and equity measures into regional and state performance frameworks is a critical step to support livability and sustainability objectives.

• Focusing on outcomes - rather than proxies - leads to more meaningful results that support smarter policy decisions.

• It is essential to move beyond scenarios to quantify a suite of project-level benefits in the long-range planning process.

• New tools and methodologies make incorporating health benefits easier than in years past.
Questions?

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