How *Does* the Rubber Meet the Road? Evaluating the Investment Outcomes of Transportation Studies

Laurence Audenaerd, Ph. D.
Presentation for Transport Chicago - June 7, 2013
Case Studies by Mode

- Highway
  Effects of Flooding
- Transit
  State of Good Repair
- Aviation
  Capacity Expansion
Case #1: Traffic Impacts of Des Plaines Watershed Flooding

- **Sponsor:**
  US Army Corps of Engineers (USACE)

- **Purpose:**
  - Determine Roadway Network Links with Highest Impact Due to varying Flood Severity Levels:
    - 1-year, 2, 5, 10, 25, 50, 100, 500 and Current and Future Scenarios

- **Methodology:**
  - Simulate Severed “Flooded” Network Links in a Mesoscopic Dynamic Traffic Assignment Model (VISTA)
Study Characteristics

• Fixed Inputs Constraints
• Fixed problem/Fixed Result
• Indirect Connection with Policy Maker

Study Outcomes

• Priority List of Impacted Links Under All Scenarios
Case #1 Traffic Impacts of Des Plaines Watershed Flood

- Based on these results, USACE–Chicago District proposed road/bridge modification plan to USACE Headquarters (Wash, DC)
- Current proposal denied, but in appeals
State of Good Repair (SGR)

Source: L. Audenaerd (1996)
Case #2: Bus Maintenance Standardization Study

• Sponsor:
  MTA of New York

• Purpose:
  Provide Negotiation Mediation between Management and Union Representatives on Determining Standard Repair Times for 26 Tasks

• Methodology:
  Mediate Negotiations between Union/Mgmt Subject Matter Experts; Conduct Time-and-Motion Studies as needed.
Study Outcome

• Created Standard Organization-wide Maintenance Task Times
• Enabled Forecasting of Maintenance Budgets
• Published Journal Article
Policy Impact

Case #2 MTA Bus Maintenance Standardization Study

• Initial Results Prompted Follow on Study for 34 Additional Task Standardization
• Estimated $11 Million in Maintenance Cost Savings
Tending to Transit: The Benefits and Costs of Bringing Public Transport in the Chicago Region into Good Repair

Joseph Schwieterman, Ph. D. Laurence Audenaerd, Ph. D. Marisa Schulz

December 10, 2012

Source: L. Audenaerd (2012)
Case #3: Economic Analysis of SGR of Chicago Transit

• Sponsor:
  IL Chamber of Commerce

• Purpose:
  Develop an Economic Argument for Creating a State of Good Repair for Transit in the Chicago Region

• Methodology:
  Merge Existing Complex Model Results with Supplementary Analyses to Develop Arguments

Source: L. Audenaerd (2012)
Study Outcome

• Presented a strong argument for funding SGR based
  – Estimated Return on Investment, Need, Public Response, Funding

• Public/Media Release to Broad Audience
  – Newspaper, Television, Online and Public Forums

• Direct Discussion with Members of IL General Assembly
Tending to Transit: The Benefits and Costs of Bringing Public Transport in the Chicago Region into Good Repair

Chaddick Institute for Metropolitan Development
DePaul University

December 10, 2012
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Economic Perspectives on Benefits and Costs of the CTA Red and Purple Modernization Project
Joseph P. Schwieterman and Laurence F. Audenaerd*

DePaul University
Chaddick Institute Technical Briefing
May 1, 2013

This paper provides a research perspective on the Red and Purple Modernization (RPM) Project under consideration by the Chicago Transit Authority (CTA). The paper is based on recent literature on the likely benefits and costs of capital investments in transit projects within the Chicago region. The objective is to present an initial assessment of the economic ramifications associated with the proposed improvements to the 9.6-mile Red/Purple Line segment between the Belmont and Linden stations. While additional analyses are needed to understand the full range of benefits and costs of the project, the strong performance and apparent growth potential of this corridor suggests that investments would generate significant benefits.
Policy Impact

Case #3
Economic Analysis of SGR for Chicago Transit

- Further research work to support the CTA Red/Purple Line Modernization Project decision-making
- Alerted Members of IL General Assembly toward transportation funding needs
Case #4:
Aircraft Wake Separation Re-categorization (RECAT)

- **Sponsor:**
  Federal Aviation Administration
- **Purpose:**
  Perform benefits analysis amidst a diverse organizational team to develop new separation standards
- **Methodology:**
  Merge existing complex model results with supplementary analyses to develop arguments

Courtesy of Photographer, Steve Morris
Project Purpose

- Airport capacity is constrained by wake separation rules
- This is one attempt (of many) to reduce this effect

**FAA In-Trail Wake Turbulence Separations**

*Heavy to Heavy*

- Leading aircraft
- Trailing aircraft
- This is Safe
- B747
- B767
- 4 NM
- Separation

*Upper Heavy to Lower Heavy*

- Leading aircraft
- Trailing aircraft
- This is Safe
- B747
- B767
- 4 NM

*Lower Heavy to Upper Heavy*

- Leading aircraft
- Trailing aircraft
- This is Equally Safe
- B747
- B767
- 2.5 NM
- Separation

A consequence of category breadth

Source: FedEx. Recategorization of ICAO Wake Turbulence Standards “RECAT Phase I”
103 ICAO Aircraft Designators to Make Up 99% Movement in 87 Airports Globally – 2010 Data

Source: US DOT – Volpe Center

Static Pair-Wise Separation Table

Optimized Separation Table can be customized for any Airport/Fleet Mix
Policy Impact

Case #4
Aircraft Wake Separation Re-Categorization

- Phase 1 has already shown significant impact to airport capacity in early implementation
- Phase 2 provides flexibility to individual airports to customize separation standards to changing needs
## Evaluation

### Complexity: Ease of Analysis or Computation

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<thead>
<tr>
<th></th>
<th>Road Flood Impacts</th>
<th>Bus Maint. Stds</th>
<th>Economic Analysis for Transit SGR</th>
<th>Aircraft Separation Recat</th>
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</thead>
<tbody>
<tr>
<td>Project Complexity</td>
<td>High</td>
<td>Low</td>
<td>Mod</td>
<td>High</td>
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<tr>
<td>Investment Level</td>
<td>High</td>
<td>Mod</td>
<td>Low</td>
<td>High</td>
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</table>

### Investment Level: Project Costs or Staffing

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<tbody>
<tr>
<td>Flexibility of Results</td>
<td>Low</td>
<td>Low</td>
<td>Mod</td>
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### Flexibility of Results: Single or Multi-purpose Outcome

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<tbody>
<tr>
<td>Direct Involvement of Policy Maker</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
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</table>

### Flexibility of Research Question: Rigidity of Project Outcome Needs

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<tr>
<td>Initial Policy Effect</td>
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<td>Mod</td>
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<tr>
<td>Downstream Potential</td>
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<td>High</td>
<td>Mod</td>
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Conclusions

Flexibility in the hands of the modeler is good; in the hands of the policy maker is better.

Study process closer to the ultimate policy maker provides greater outcome success.

Impact is higher when policy is involved early in the process.
Questions?

To Chicago and beyond...

Source: L. Audenaerd (2012)