Access to Destinations: Methods, Findings, and Implications

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Accessibility

- A measure that relates the transportation network to the pattern of activities that comprise land use.
- It measures the ease of reaching valued destinations.
- Accessibility “is perhaps the most important concept in defining and explaining regional form and function.” (Wachs and Kumagai 1973)
Access to Destinations

- To improve understanding of travel on the current transportation infrastructure

- To develop measures of accessibility using travel and land use data, showing how accessibility has changed from 1995 to 2005

- Using these new tools and information, to assess how our existing transportation and land use system meets alternative policy goals
Colleagues

- Bernadette Marion
- Shu Hong
- Jason Junge

Sponsors

- MnDOT
- Hennepin County

David Levinson

Kevin Krizek

Gary Davis

Kate Sanderson

Hui Xiong

John Hourdos

Ted Morris

Chen-fu Liao

Ahmed El-Geneidy
Generalizing Accessibility

• More modes
• More destinations/opportunities
• Measurement vs. models
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<thead>
<tr>
<th></th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
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Accessibility as a performance measure

Ref: Levinson and Krizek (2007) Planning for Place and Plexus
"Cumulative Opportunities"

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<td>~7</td>
<td>4</td>
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Gravity-based Measure
The Nuts and Bolts
Data Sources

- Travel time information
- Number of resident workers
- Number of jobs
- Origin and destination matrix
Modeling accessibility is straight-forward, given a model.

Measuring accessibility on the other hand ...
Making Sausage
Freeways
Available Freeway Data

source: Taek Kwon

Generation of Travel Time Data for Metro Freeway Network
Arterials & Collectors
Arterial Travel Time Estimation

Assign OD Matrix using SUE assignment

Correct Flows According to Observed Automatic Traffic Recording (ATR) station counts, where available

Apply correction based on covariance of links without ATR station to links with ATR.

Use link performance function to estimate travel time based on corrected flows.
In the future, travel speed will be easier to obtain.
Temporally: Is Accessibility Increasing or Decreasing Over Time?
Change in Number of Jobs Accessible from Origin Traffic Analysis Zone (TAZ) between Years 1995 and 2005: Travel Time within 10 Minutes by Auto during AM Peak Twin Cities, Minnesota

Zone Structure Displayed: Traffic Analysis Zone Boundaries
Primary Data Sources: MNDOT, Twin Cities Metropolitan Council, US Census Bureau - 1990 & 2000 CTPP and SF1 Files; 2005 LEHD Files
Change in Number of Jobs Accessible from Origin Traffic Analysis Zone (TAZ) between Years 1995 and 2005: Travel Time within 20 Minutes by Auto during AM Peak
Twin Cities, Minnesota

Zone Structure Displayed: Traffic Analysis Zone Boundaries
Primary Data Sources: MnDOT, Twin Cities Metropolitan Council,
US Census Bureau - 1990 & 2000 CTPP and SF1 Files; 2005 LEHD Files
Change in Number of Jobs Accessible from Origin Traffic Analysis Zone (TAZ) between Years 1995 and 2005: Travel Time within 30 Minutes by Auto during AM Peak
Twin Cities, Minnesota

Zone Structure Displayed: Traffic Analysis Zone Boundaries
Primary Data Sources: MnDOT, Twin Cities Metropolitan Council, US Census Bureau - 1990 & 2000 CTPP and SF1 Files; 2005 LEHD Files
Temporally: Is Accessibility Increasing or Decreasing Over Time?

Yes! - For short trips it may be decreasing (congestion is more important than land use), but for longer trips it is definitely increasing (land use outweighs congestion).
Modally: How does auto compare with transit

Notice the colors and values here and compare with the next slide
2005 Access to Jobs

2005 Accessibility to Jobs
Within 20 Minutes of Travel Time

- Walk: 4157
- Bike: 41067
- Transit (7:30 AM): 37374
- Transit (4:15 PM): 27664
Policy implications
Accessibility versus Congestion

- TTI Twin Cities estimated Delay per passenger during AM peak
  - 19 hours (1990)
  - 43 hours (2000)
- Yet, accessibility to residents from downtown Minneapolis up about 15% between 1990 and 2000.
Some alternative goals:

• Maximizing overall regional accessibility.
• Maximizing accessibility for those who are least advantaged.
• Ensuring choices.
• Other ...
Access is a publicly (or socially) provided benefit to private landowners

• Can this value be captured to finance infrastructure which creates access?
Access to Destinations research project

• More information
  http://cts.umn.edu/access-study
  http://nexus.umn.edu
  dlevinson@umn.edu
  krizek@colorado.edu
Questions / Comments?