Trans-Lake Washington Project

Modeling Workshop

May 23, 2001

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Purpose of Workshop

- Review overall approach/methodology for developing forecasts
- Discuss how transportation alternatives affect travel demand and modeling results
- Answer questions you have on the process and/or results

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Land Use & Transportation Models Simulate Behavior

- Models attempt to capture or “simulate” travel behavior – how people make transportation choices in their daily lives now and in future
- Choices by individuals/households include:
  - **where they live and work**
  - **how many trips they make on a daily basis and the destinations of those trips**
  - **whether they travel by car, in a carpool or by transit**
  - **what route they take**
  - **the time of day they make their trips**

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How People React to Changes in the Transportation System

- Models also try to capture how people will react to *changes* to the transportation system.
- For example, when congestion worsens or new capacity is added, people change their behavior in many ways.
- Short-term – they may change their route, the time of day they travel, or their transportation mode.
- Longer term – they may change where the live, work or own a business.

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Actual Behavior Changes Dynamically

- Transportation models tend to treat different choices as though they happen sequentially, one after another
- However, some choices may be made simultaneously (e.g., choice of mode and route)
- Transportation planners are constantly trying to improve the accuracy of the regional model

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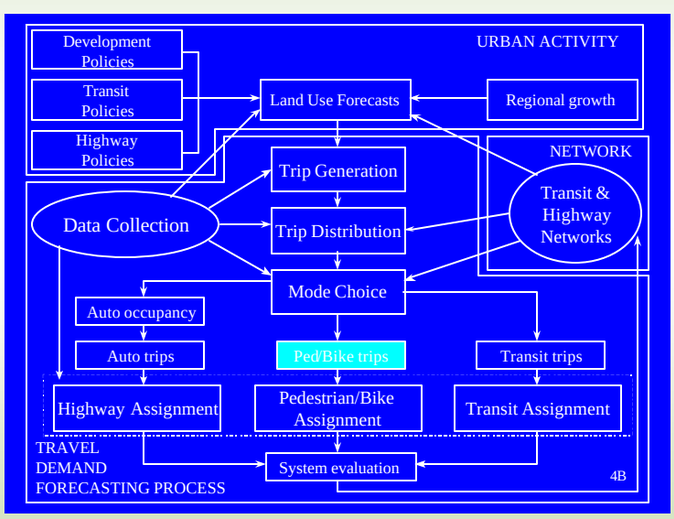
Overview of Forecasting Process

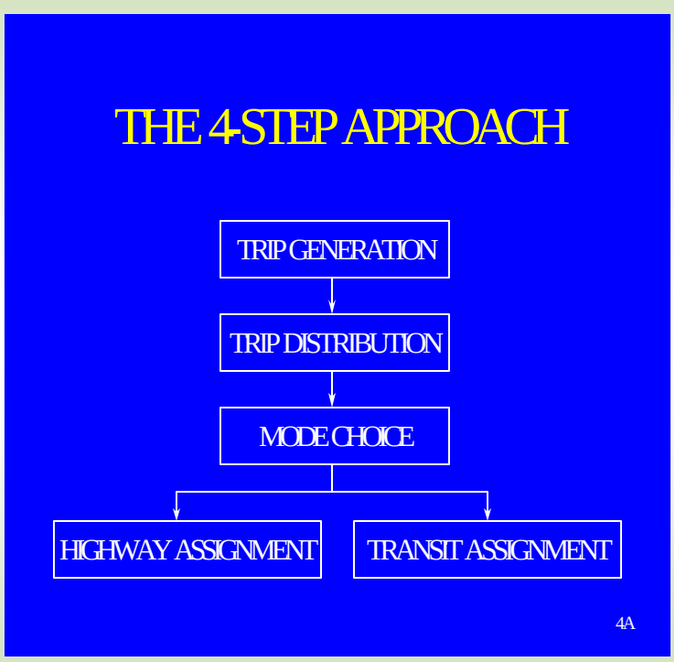


Land Use Forecasting

- National economic models predict population/ employment trends and distribute growth to states
- State-level model allots growth to regions/counties.
- Regional population model (DRAM) and employment model (EMPAL) distribute growth to zones based primarily on:

  --zoning and land capacity

  --transportation accessibility—which may change whatever you are testing!



Steps in Modeling Process

- Trip generation:
  - --households generate “trip productions;” demographics affect the number and type of trips produced
  - --businesses generate “trip attractions,” both for employees and customers; different kinds of businesses generate different numbers of trips
  - --estimated at the zonal level

Steps in Modeling Process (Cont.)

- Trip distribution:
  - --estimates number of trips between each zonal pair
  - --highway travel times (accessibility) between zones is key input
  - --current model assumes transit access does not influence how many people want to travel between any two zones

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Steps in Modeling Process (Cont.)

- Trip distribution:
  --reflects that people may be willing to travel further to work than they would be to shop or go to school;
  --if a transportation alternative changes accessibility (highway travel times), the potential trip distribution effects will be captured in the modeling process

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Steps in Modeling Process (Cont.)

- Mode choice:
  --estimates trips by mode between zonal pairs (non-HOV, HOV and transit)
  --relative travel time and cost of each mode are the critical input variables
  --mode choice is influenced by demographics (e.g., income)
  --comfort, reliability, convenience not fully reflected in model

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Steps in Modeling Process (Cont.)

- Traffic assignment:
  - --assigns trips to network through iterative "equilibrium" assignment process, taking into account congestion
  - --non-HOV, HOV 3+ assigned to highway network
  - --transit trips assigned to transit network
  - --capacity/service improvements will make different routes relatively more attractive

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Forecasting for Trans-Lake Multimodal Alternatives

- Use the Puget Sound Regional Council (PSRC) forecasting model
- Base year is 1995, future year 2020
- Multimodal model –non-HOV, HOV (3+) and transit trips
- Appropriate for comparing among multimodal alternatives

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Summary of Information Available from PSRC Model

- Trip types or purposes – work versus non-work
- Trip distribution – origins and destinations of trips
- Mode of travel ("mode split") – non-HOV, HOV 3+, transit
- Traffic assignment – levels of traffic by route

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What is the PSRC's 1995 Model Based on?

- Land use based on local comprehensive plans
- Population, employment and demographic data from Census and surveys of employers
- Census journey-to-work data
- Multi-year travel diaries (panel survey of 1,600 households)

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What is the PSRC's 1995 Model Based on (Cont.):

- On-board transit and ferry origin-destination surveys
- Traffic counts, vehicle occupancy counts and transit ridership data
- Travel speed and travel time studies
- Continuously being updated as new data become available.

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PSRC Model Validation Process

- Each step is validated (trip generation, distribution, mode choice, assignment)
- Must replicate existing travel across major screenlines (person trips, vehicle trips, vehicle occupancy) within 10-12 percent.
- Additional validation at subarea level for major corridor studies, including I-405/Trans-Lake studies.

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Alternatives Definition as Input Into Forecasting Process

- No Action Alternative includes only those projects with committed funding
- Build alternatives defined by multimodal improvements (highway, HOV and transit)
- Highway: # lanes, length and connections
- HOV: length and connections
- Transit: routes, headways, degree of grade separation

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The Model Produces All Sorts of Data

- Person trips and vehicle trips by Trans-Lake screenline and on specific routes
- Mode shares
- Travel times between activity centers
- Total vehicles miles and vehicle hours
- Total hours of delay

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Forecasting "Issues" During Corridor Analysis

- Population and employment forecasts used
- Trip distribution effects of additional highway capacity
- Transit capacity does not affect trip distribution in model
- Size of zones in study area—can limit level of detail of analysis using model
- Assessing TDM, including pricing

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How to Address Forecasting Issues

- Conduct sensitivity tests/ additional "what ifs"
- Use traffic simulation models to address more detailed operational issues
- Accept that no mathematical model can predict complex and dynamic behavior perfectly – use best tool available at time
- Understand both strengths and limitations of modeling

Summary

- PSRC model is best available tool to evaluate multimodal alternatives at corridor level
- Changes in service levels (travel time) due to corridor improvements are captured in process
- Other tools are being used for assessing detailed traffic operational issues (at neighborhood level)
- Will continued to update model and forecasts as project moves ahead