Modeling Guidelines and Procedures for Medium-Sized Urban Areas in North Carolina

North Carolina Model Users Group Meeting
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Background

- **North Carolina Profile**

  - 17 MPOs, 10 with population < 250,000

  - 20 Rural Planning Organizations

  - 1959 GS 136-66.2

  - 2001 revisions were made to GS 136-66.2

Current Challenges

- Changing workforce

- Changes in scope and responsibility

- Loss of experienced, knowledgeable staff leading to an erosion of modeling skills and loss of institutional knowledge in modeling practice

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NCDOT's Efforts

- Broad scale effort to improve travel forecasting tools in NC

- Sponsored research to develop best practice guidelines for planning analysis tools (Tier 1 and 2 communities)

- Contracted with PB to develop standard modeling guidelines and procedures (Tier 3 communities)

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Outline

- North Carolina Combined Survey Database

- Model Structure

- Traditional Approach vs. Key Features of New Approach

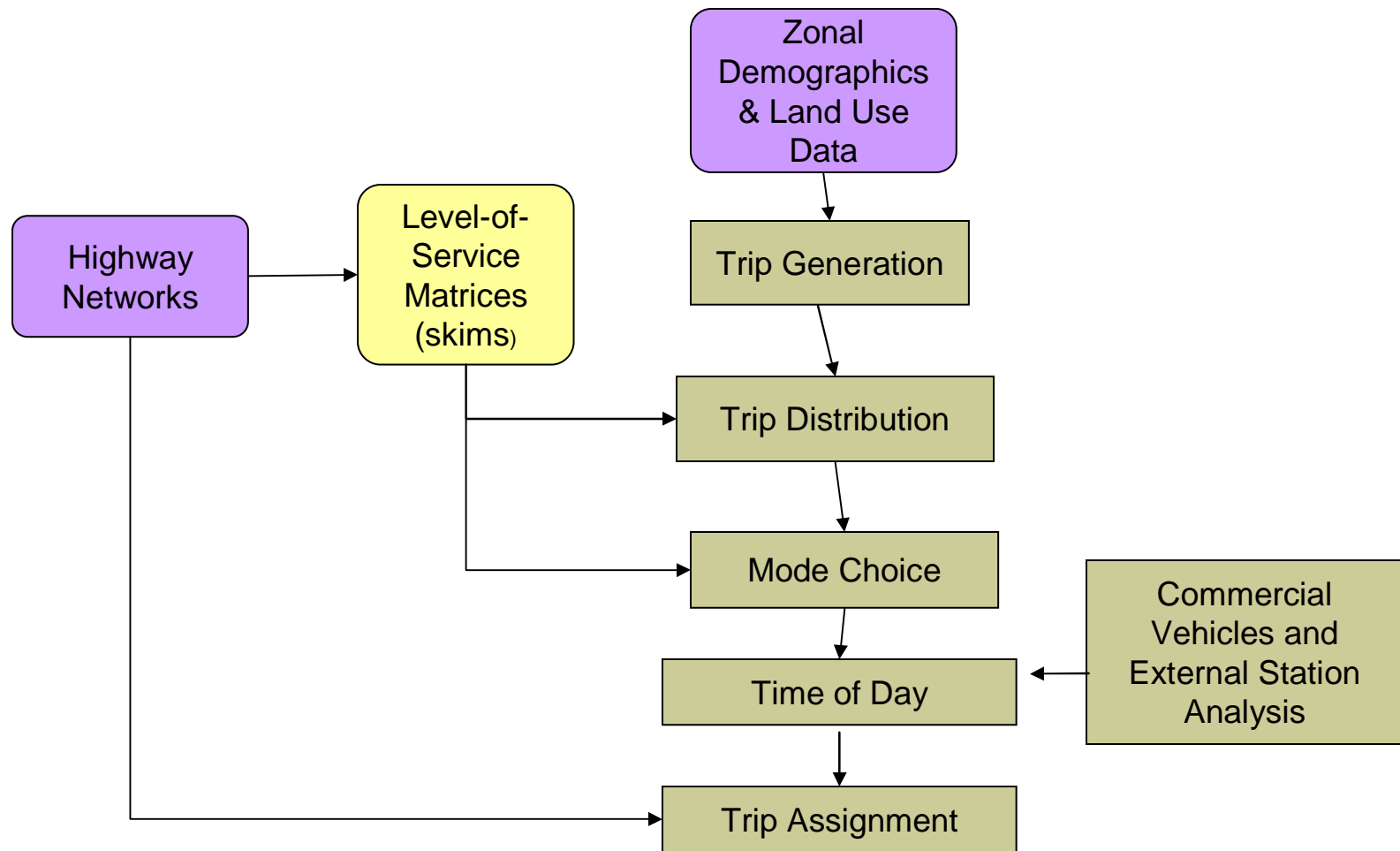- Graphical User Interface

- Benefits

Combined Survey Database

- Household travel survey data from 3 MPOs across North Carolina

- Used to develop default rates and parameters
  - Household disaggregate curves
  - Production and attraction rates
  - Initial gamma coefficients
  - Mode split factors
  - Vehicle occupancy factors
  - Time of day distribution

- Starting point for communities with no observed travel survey data

Model Structure

Traditional Approach vs. New Approach

Component	Traditional Approach	New Approach
Data Collection	▪100% field inventory	▪Census data ▪Private vendor data
Highway Network	▪No standard approach	▪Minimum required attributes
Rates and Parameters	▪Borrowed from other areas	▪Default rates derived from combined survey database
Trip generation	▪3 trip purposes ▪Productions by 5 dwelling unit classes ▪Attractions by 5 employment types ▪Vehicle trips	▪5 trip purposes ▪Productions by household size and auto ownership (20 classes) ▪Attractions by 5 employment types ▪Person trips

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Traditional Approach vs. New Approach

| Component	Traditional Approach	New Approach
Trip distribution	▪Friction factor table ▪Impedance = initial travel time	▪Gamma function ▪Impedance = generalized cost
Mode Split	▪No mode split step	▪Mode factors applied to person trip tables
Commercial vehicles	▪Trip rate applied to total commercial vehicles per zone ▪CV trips combined with NHB trips for distribution	▪Separate production and attraction equations for 3 classes of CV ▪3 classes maintained through time of day

Traditional Approach vs. New Approach

Component	Traditional Approach	New Approach
Time of day	▪Daily model	▪AM, Midday, PM, and Off Peak time periods ▪Vehicle occupancy factors
Highway assignment	▪Primarily all-or-nothing	▪Time period equilibrium assignment using a conical delay function
Validation and Reasonableness Checking	▪Primarily performed at highway assignment using screenline and coverage counts	▪Reasonableness checks at each step in the process using secondary sources of data

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Graphical User Interface
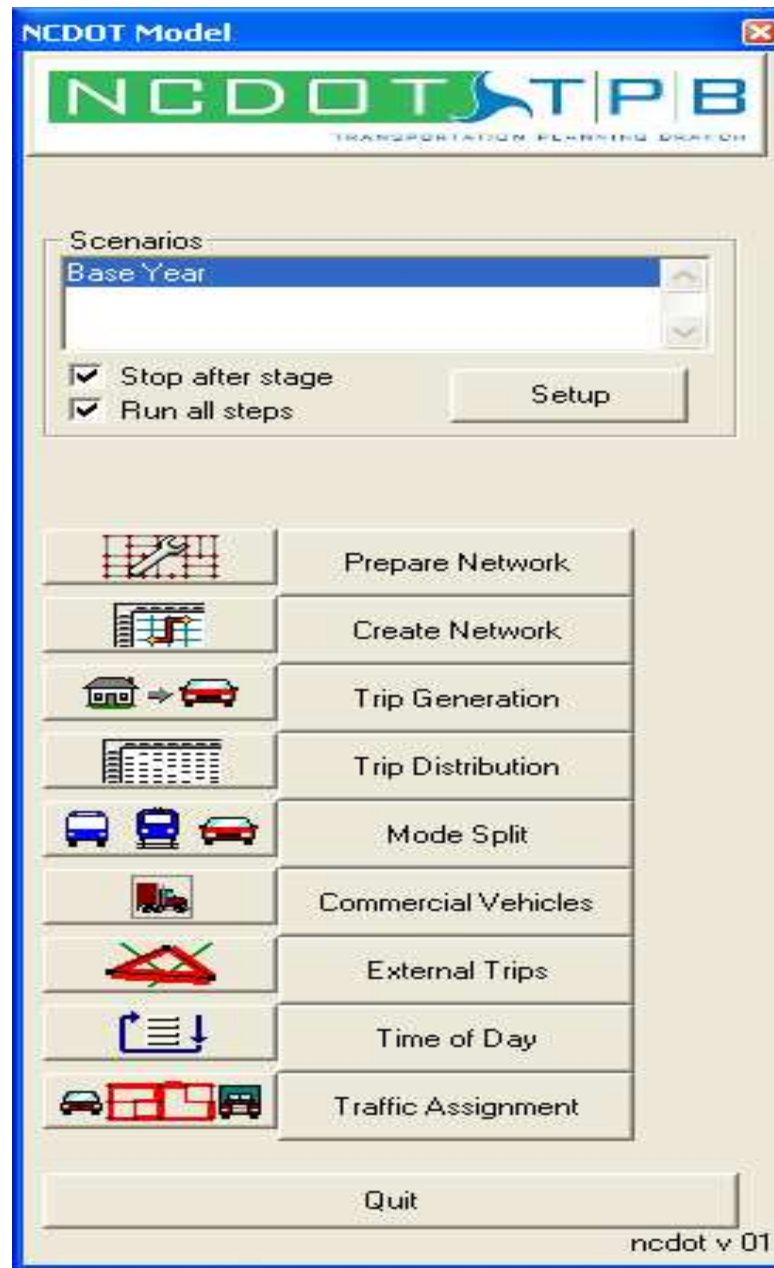
Overall benefits

- Streamlines and standardizes model development
- Moves NCDOT towards current best practice
- Provides basis for training
- Adaptable to future enhancements
- Rates and parameters based on North Carolina data