Triangle Regional Model *Generation 2*

Introduction

The Triangle Regional Model Generation 2 (TRMG2) is a **new travel forecasting model** that supports regional transportation planning.

What is the Triangle Regional Model?

The TRM is a mathematical computer model used by transportation planning agencies in the region to develop and evaluate strategies that support mobility, access, economic health and quality of life.

Area Covered by TRM

3,533 square miles

- Includes **40** jurisdictions
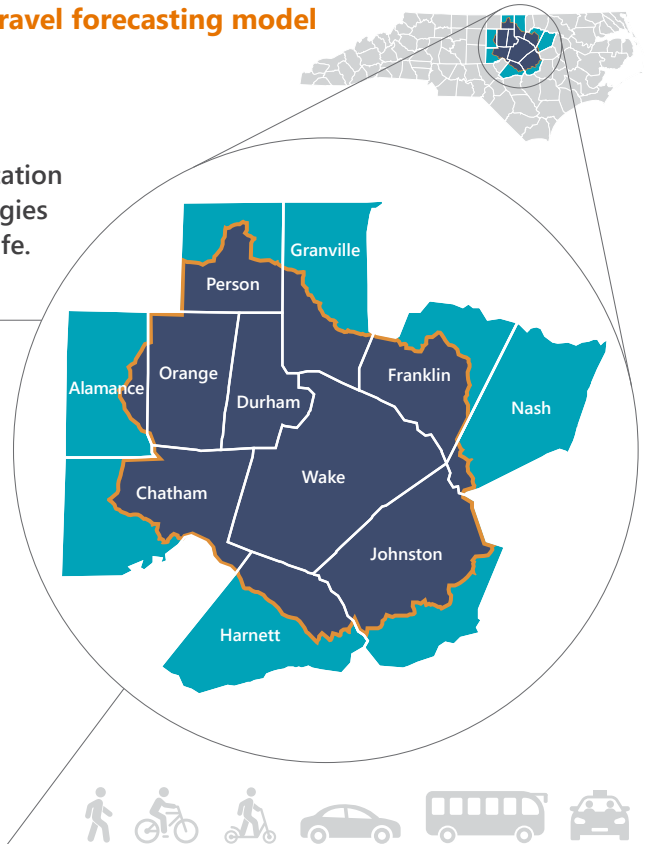- **2,965** analysis zones include:

1,057,590 jobs

2,001,649 people

16,368 miles of roadway

121 transit routes

79,228 university students

10 transit agencies

Map labels: Person, Granville, Alamance, Orange, Durham, Franklin, Nash, Chatham, Wake, Johnston, Harnett

What makes this a best practice model?

The design **better captures individual, household, and neighborhood characteristics** that influence travel choices and the way people make trips, including by car, bus, rail, bike or walk. These advances lead to improved decision making for regional transportation investments which ensures a more efficient and well-connected future.

The new model considers...

Family Characteristics
Children, workers, and seniors

Neighborhood Characteristics
Walkability, mix of land uses

Trip Connectivity
Trips are modeled not as individual segments, but as connections to anchor activities such as work.

The Triangle Region Characteristics
The Triangle region is complex with many large and small city centers.

Cost and Availability of Parking

Mobility Services

...to better represent:

Auto Ownership
The number of autos owned by a family influences their choice of mode and number of trips they make.

Walk and Bike Trips
An important planning factor for Triangle communities

How People Travel

🏠 → ☕ → 💼 → 🛒 → 🏠 **36%** work tour trips

🏠 → 🏕 → 🍴 → 🛍 → 🏠 **64%** non-work tour trips

People tend to favor destinations within their own community.

People's Choices
Parking constraints influence people's choice of mode and destination. The model also forecasts mobility services such as Uber and Lyft.

Triangle Regional Model *Generation 2*
Advanced Components

Explainable Artificial Intelligence (XAI)

The **number of trips** made by residents in the region is estimated using explainable artificial intelligence (XAI) that fully utilizes Triangle Travel Survey data and allows for a greater number of variables such as age, access, income, worker status, vehicle ownership and household composition.

Nested Destination Choice Model

The destinations that residents **travel to** is estimated using a nested destination choice model that is first informed by the activities available to them in their own community/city, and then to the broad array of activities available throughout the region.

The Influence of Parking Cost and Availability

The **choice of mode** for travel in the Triangle is influenced by parking cost and availability and includes the option of traveling by Uber or Lyft in addition to the traditional auto and transit modes.

Mode and Destination Consistency

Resident trips that start and end at locations other than home are informed by the destination of the original home-based trip and the travel mode used to reach that destination.

Synthetic Population

A synthetic population of over 1.8 million people is generated in roughly two minutes. Household level data includes household size, number of workers and income. Person level data includes age groups for children, adults and seniors.

Accessibility

Zonal socioeconomic data and network travel times are used together to calculate several accessibility variables for roadway, transit and non-motorized modes. These accessibilities are used to capture sensitivity to behavioral responses to development patterns, area type, and proximity of attractions nearby.

Time of Day

Individual level home-based trips are apportioned to four time-of-day periods (AM: 7:00 AM – 9:00 AM, MD: 9:00 AM – 3:30 PM, PM: 3:30 PM – 6:15 PM, NT: 6:15 PM – 7:00 AM) based on fixed factors from the survey for each trip type. The choice of trip mode and destination use these same time periods providing better representation of the travel choices people actually experience over the course of a day.

Run Time

The 2020 model takes **2.5 hours** to run.*

The 2050 model takes **10 hours** to run.*

Using recommended computer specs

NC STATE UNIVERSITY
ITRE
Institute for Transportation Research and Education

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DCHC
Metropolitan Planning Organization
Planning Tomorrow Today

CAMPO
NC Capital Area Metropolitan Planning Organization

GO Triangle

Caliper
Mapping & Transportation Software Solutions

The model was developed by Caliper Corporation and is maintained by ITRE@NCSU and four stakeholders: NC Department of Transportation, Durham-Chapel Hill-Carrboro Metropolitan Planning Organization, Capital Area Metropolitan Planning Organization, and GoTriangle.