CE 486

Lec. 1

Introduction

Dr. Mahmoud Owais

Course Content

Unit 1: Introduction

Unit 2: Travel Demand Forecasting

- 2.1. Trip Generation
- 2.2. Trip Distribution
- 2.3. Modal Split
- 2.4.Shortest Path
- 2.5 Traffic Assignment

Unit 3: Transportation Statistics

Unit 4: Vehicle Characteristics

Unit 5: Traffic Variables

- 5.1. Traffic Variables Estimation
- 5.2. Traffic Variables Relationships

Unit 6: Traffic Studies

Unit 7: Traffic Management and Control

- 7.1. Traffic signs, signals and Marking
- 7.2. Intersections
- 7.3. Traffic Light Design

Unit 8: Parking Studies

Module Aim

To enable students to familiarize with the characteristics of urban travel and the process of urban transport system planning, and to provide them with the necessary engineering tools to formulate and calibrate transport models.

Outcomes

- Acquire knowledge of investigation and sampling techniques in urban transport travel demand analysis.
- Describe the concept of regression statistics and assignment techniques to forecast ridership/trips for the private and the public urban transport modes.

Textbooks and References

Meyer & Miller, " Urban Transport Planning", McGraw-Hill, (Latest edition).

J. D. Ortuzar & L. G. Willumsen, "Modeling Transport", Wiley, (Latest edition).

Research Interest Areas

- ✓ Public Transportation
- ✓ Combinatorial Optimization
- ✓ Heuristics and Meta-heuristics
- ✓ Transportation data modeling and simulation
- ✓ Traffic Engineering Operation Management & Control
- ✓ Traffic Micro-Simulation
- ✓ Statistics and theory of probability

Introduction to Transportation Planning

- Definition of Science: Transportation planning is a part of science which deals with ***Transport Systems*** considering their design, plan and evaluation.

- ***Transport System*** is any system used in transporting individuals or goods from an Origin to a Destination.

Transport System

- Examples




- Components:
  - Vehicle
  - Route
  - Operating System
  - Maintenance

You are Transport System user, but now you will be a planar

What problem does Transportation planning solve ?

Congestion

Delays

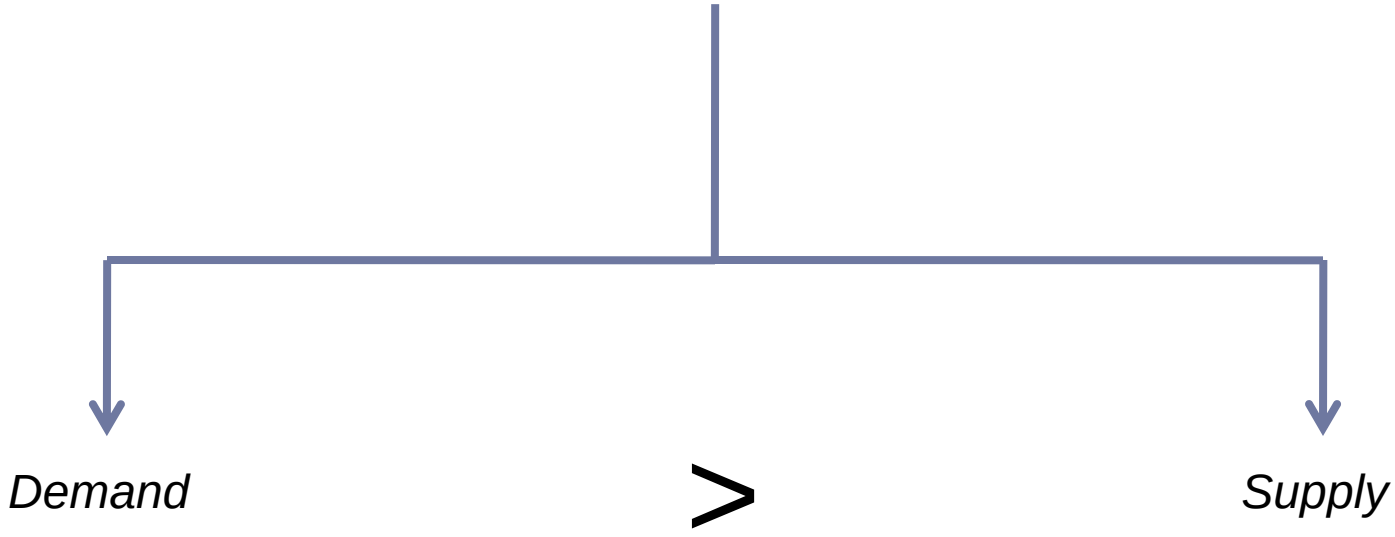
Pollution

Noise

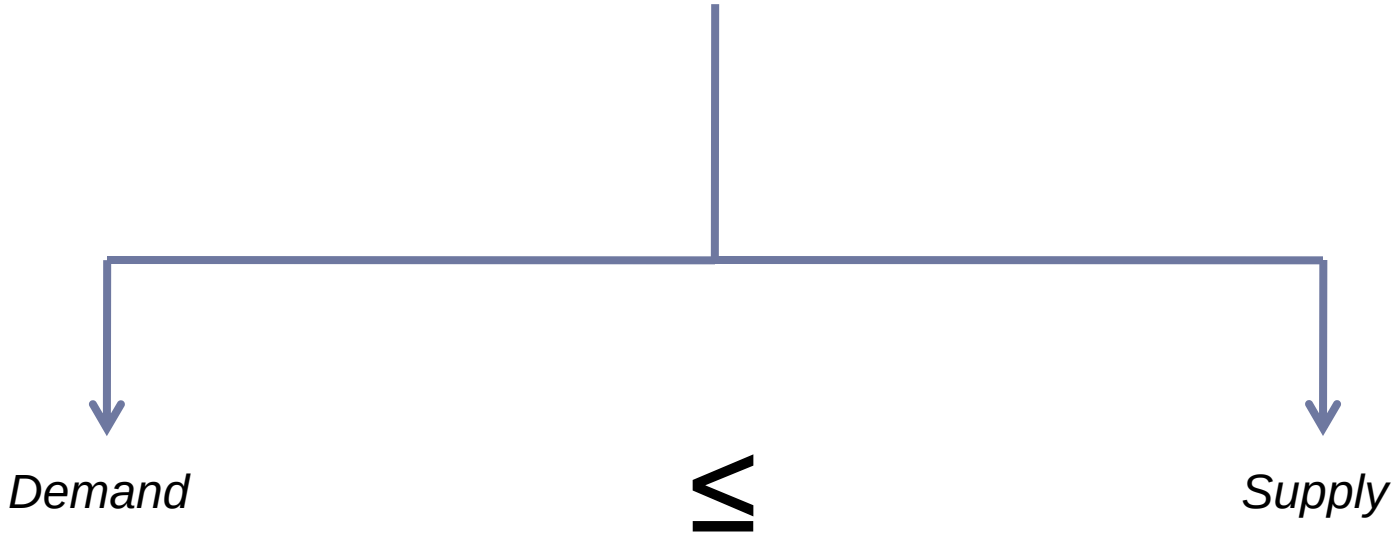
Fuel consumption

Safety problems

Transportation Planning role



Transportation Planning role



Examples of Supply

Present Demand

Predicting demand is a hard task

Future Demand

Unpredictable human behavior

Different trip purposes

Land-use in future

Use complex mathematics

Using many models

Very difficult to predict

Predicting demand is a hard task

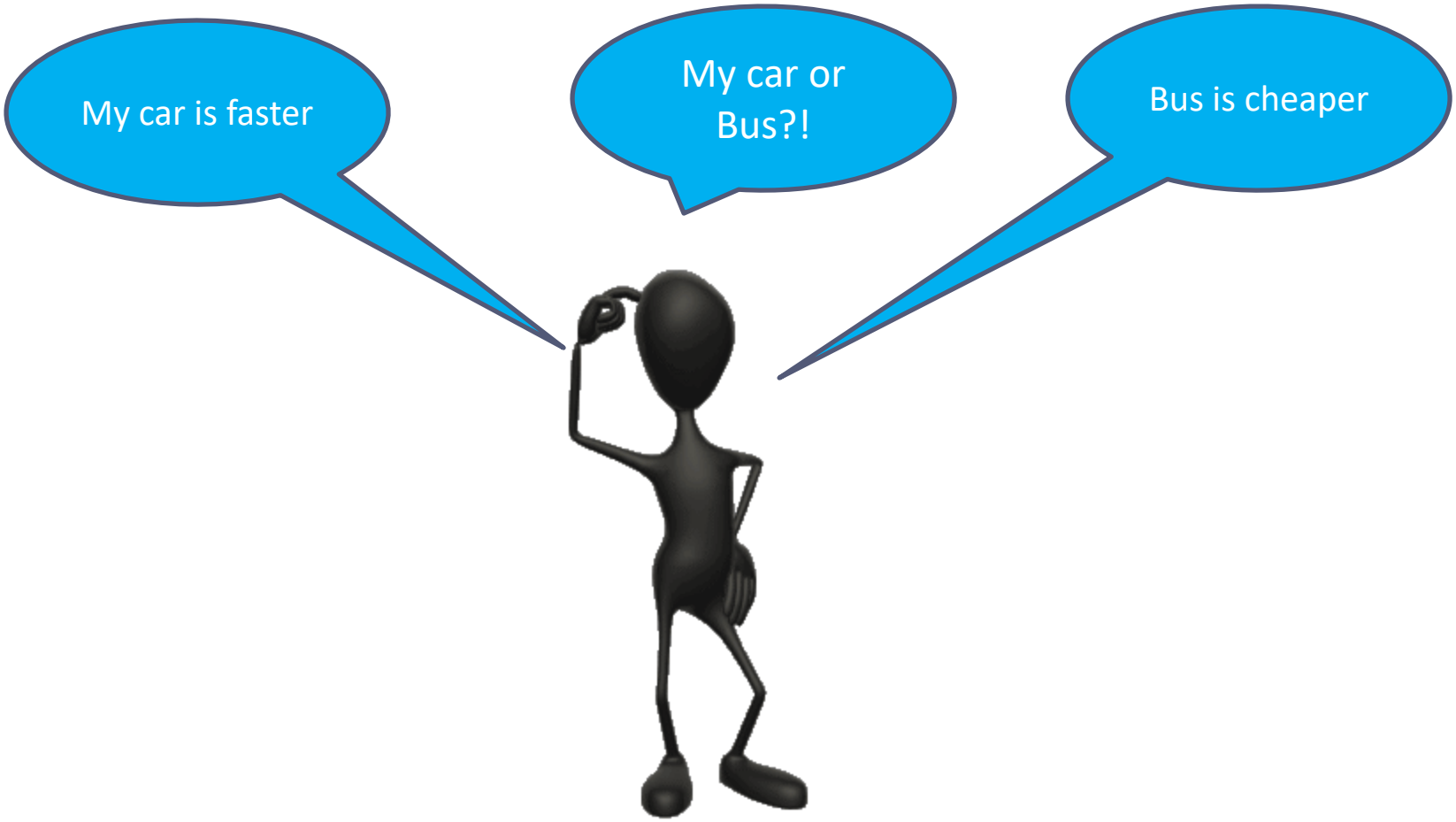
Four Basic Questions

How many people are willing to go?

Four Basic Questions

Where would they go?

Four Basic Questions

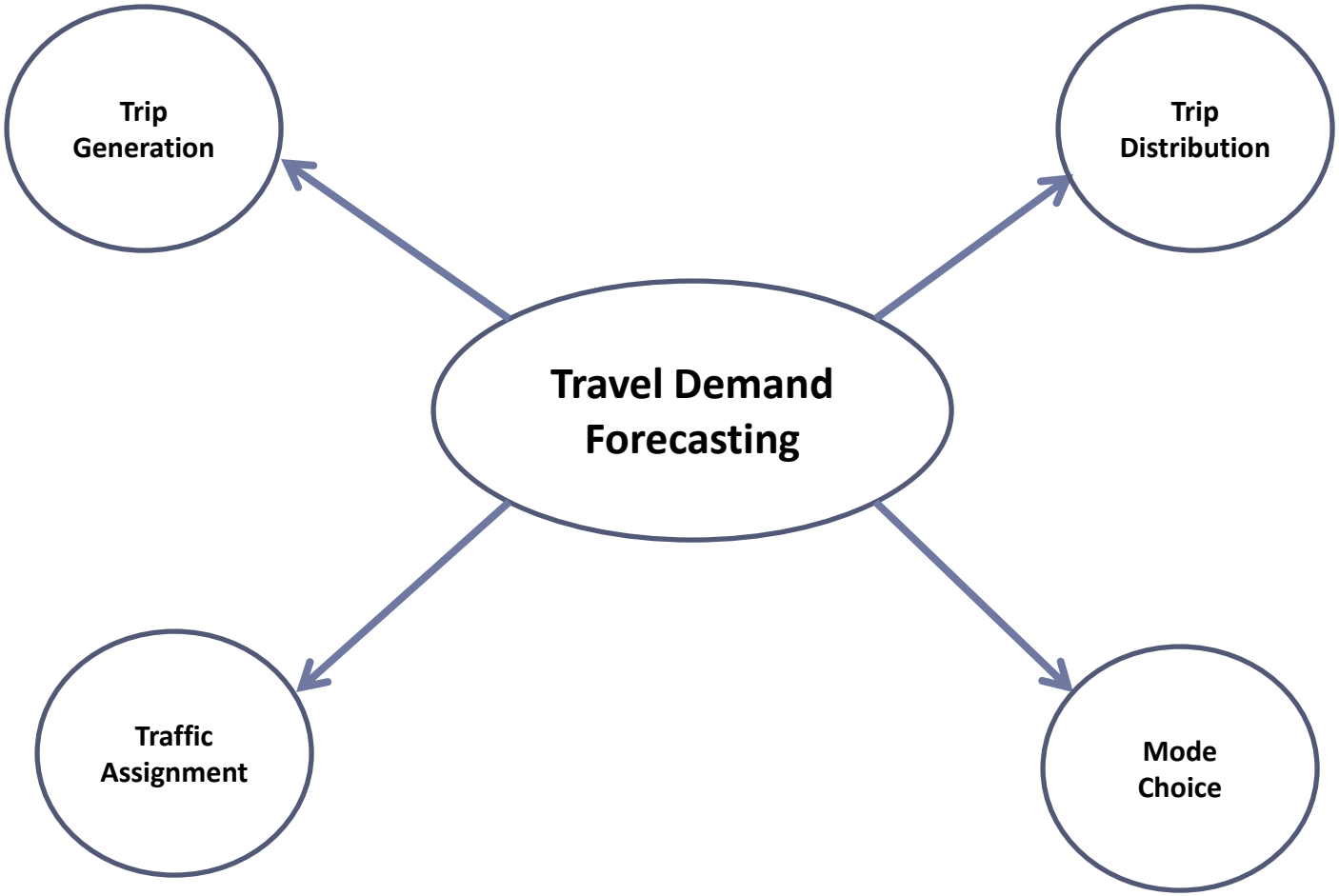


Which mode would they use?

Four Basic Questions

They lied to me that all routes lead to Rome

Which route would they use?


Trip Generation
Trip Distribution
Travel Demand Forecasting
Traffic Assignment
Mode Choice

Purpose of Travel Demand Model

- This process is important to be in transportation planning for:
  - provide new transportation system
  - improve the existing system
  - build highways, transit systems and other

- to determine the number of trips that will use the existing transportation system. trips taken in the form private vehicles and public transport

TRANSPORTATION PLANNING PERIOD

Long Term (≥ 5 years)

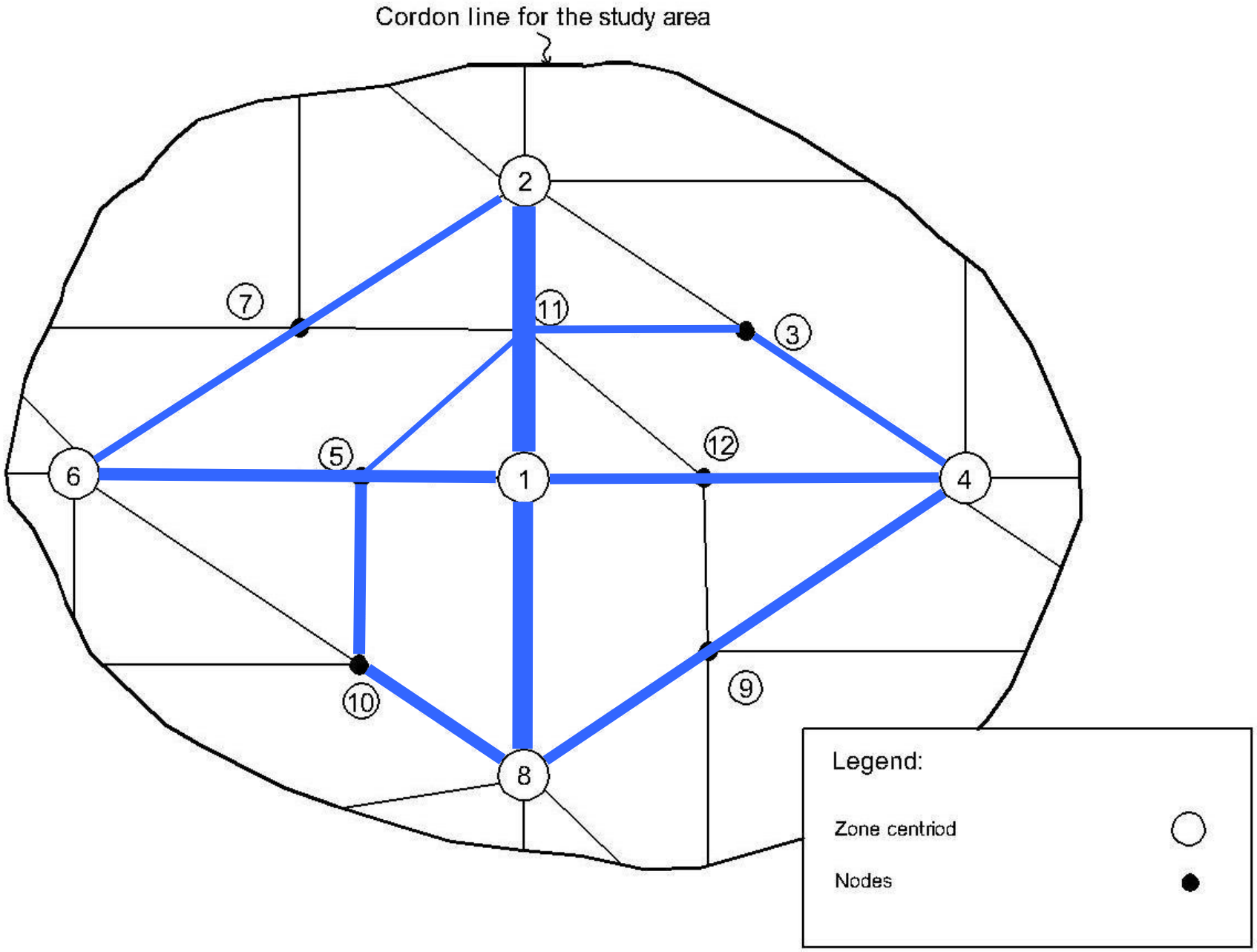
- This type of planning is more structured and complicated and it must be designed better than short term planning
- urban transportation planning process involves planning the next 20 to 25 year

PLANNING PROCESS

- Problem definition
- Surveying
- Design and Solution
- Evaluation of alternative
- Choice of project
- Specification and construction
- Feed Back

Study Area

- Clearly define the area under consideration
  - Where does one entity end?
  - May be defined by county boundaries or, town centers


Cordon line for the study area
2
7
11
3
6
5
12
1
4
10
9
8
Legend:
Zone centriod
Nodes

Study Area

- Links and nodes
- Simple representation of the geometry of the transportation systems (usually major roads or transportation routes)
- Links: sections of roadway (or railway)
- Nodes: intersection of 2+ links
- Centroids: center of TAZs
- Centroid connectors: centroid to roadway network where trips load onto the network

Travel Analysis Zones (TAZs)

- Homogenous urban activities (generate same types of trips)
    - Residential
    - Commercial
    - Industrial
- May be as small as one city block or as large as 10 sq. miles
- Natural boundaries --- major roads, rivers, airport boundaries
- Sized so only 10-15% of trips are intrazonal

Household Based

- Trips based on “households” rather than individual
- Individual too complex
- Theory assumes households with similar characteristics have similar trip making characteristics
- However
  - Concept of what constitutes a “household” (i.e. 2-parent family, kids) has changed dramatically
    - Domestic partnerships
    - Extended family arrangements
    - Single parents
    - Singles
    - roommates

Trip Purpose

- Trips are estimated by purpose (categories)
  - Work
  - School
  - Shopping
  - Social or recreational
  - Others (medical)
- Travel behavior of trip-makers depends somewhat on trip purpose
  - Work trips
    - regular
    - Often during peak periods
    - Usually same origin/destination
  - School trips
    - Regular
    - Same origin/destination
  - Shopping recreational
    - Highly variable by origin and destination, number, and time of day