

Lesson 11

Analytical Tools Methods



Learning Outcomes

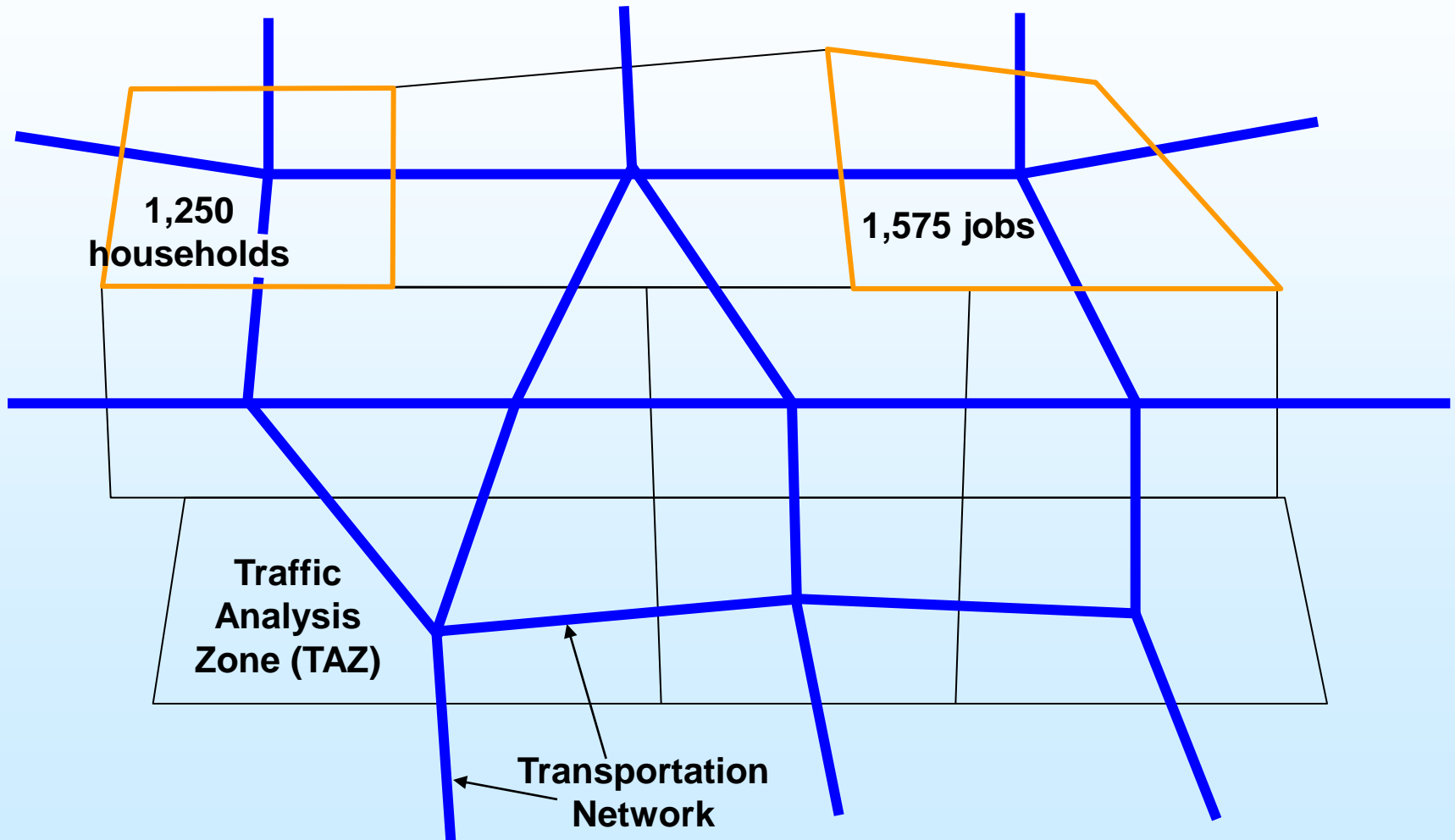
- ▶ Identify analytical tools and methods that are available to support the coordination of transportation and land use
- ▶ Compare the strengths and limitations of the various tools and methods
- ▶ Critique the assumptions underlying the methods
- ▶ Match planning activities with appropriate analytical tools

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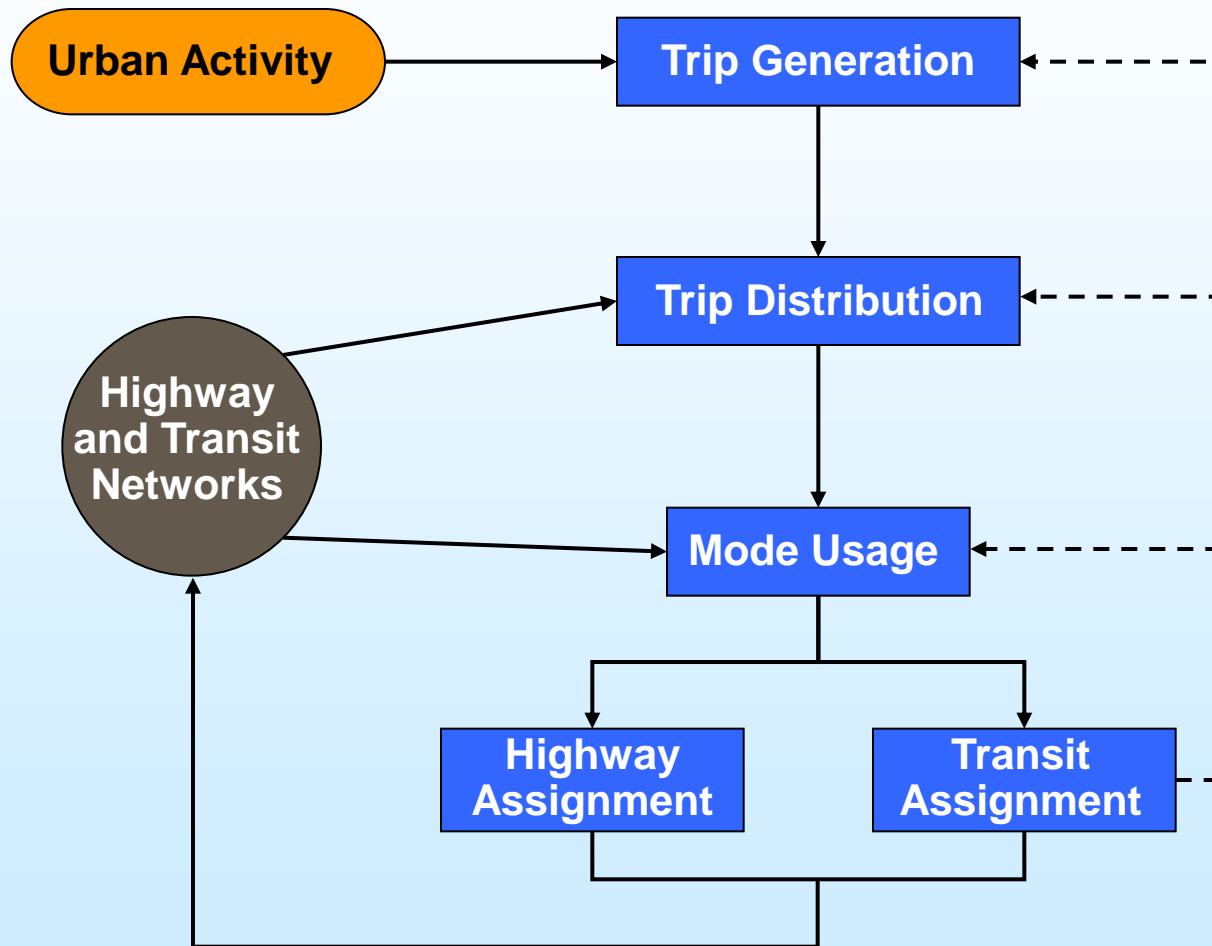
Analytical Tools *§* **Methods**

- ▶ **11.1 Travel Demand Forecasting Models**
- ▶ 11.2 Land Use Allocation Models and Methods
- ▶ 11.3 Scenario Planning Tools
- ▶ 11.4 Other Tools and Methods

Travel Demand Forecasting Models



Basic Modeling Steps



Models in Common Practice

- ▶ CUBE Voyager (Citilabs) – also TP+/VIPER, TRANPLAN
- ▶ EMME/2 (INRO)
- ▶ TransCAD (Caliper)
- ▶ VISUM (PTV America)

Micro-Scale Modeling

- ▶ More detailed model structure (subarea modeling)
- ▶ Walk and bike modes in mode choice model
- ▶ “Pedestrian Environment Factor” (Portland)
 - Extent of sidewalks
 - Ease of street crossings
 - Connectivity of street/sidewalk system
 - Terrain

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Range of Land Use Allocation Methods

- ▶ Qualitative methods
 - Delphi/expert panel approach
- ▶ Simplified and rules-based quantitative models
 - Accessibility-based
 - Proximity-based
- ▶ Complex land use models and integrated models

Expert Panel

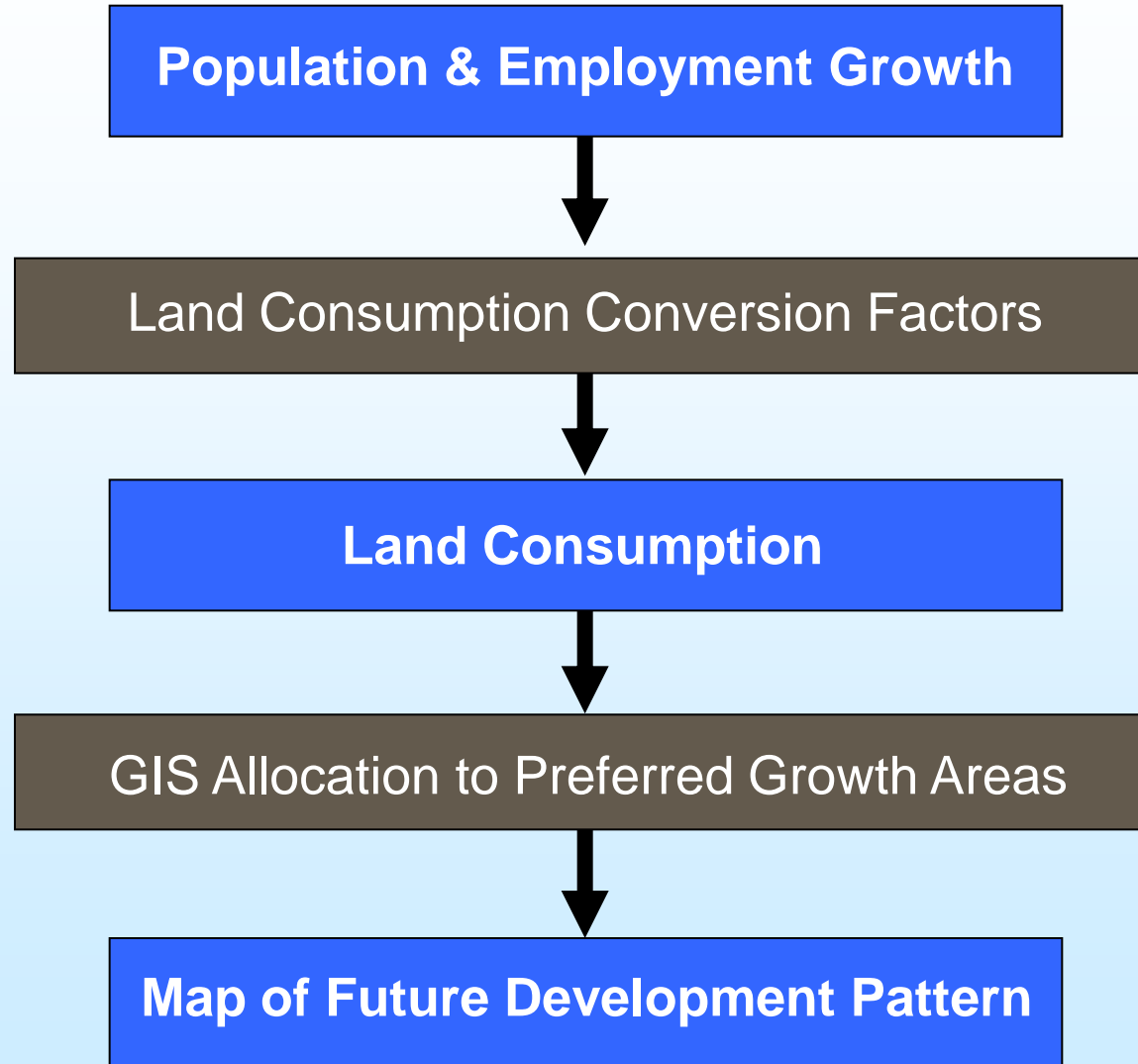
and “Delphi” Techniques

- ▶ Qualitative approach based on expert judgment
 - Local planners and economic development officials
 - Local developers and real estate analysts
 - Academics
- ▶ Multi-step feedback
 - Start with independent assessments
 - Allow panel to comment on forecasts and revise their own based on others' input

Rules-Based Models

- ▶ Allocate land uses based on factors such as transportation accessibility or proximity, available land, and other measures of development suitability and attractiveness
- ▶ Examples
 - UPLAN
 - What-If
 - Treasure Valley

Rules-Based Method



Complex Land Use Models

- ▶ Operate at regional level
- ▶ Designed to interface with travel demand model
- ▶ Commonly used for baseline projections
 - Example – DRAM-EMPAL & successors
 - Generally incorporate transportation accessibility
- ▶ More sophisticated models
 - Examples – UrbanSim, MEPLAN, PECAS
 - May incorporate additional land use policy variables, economic underpinning, disaggregate behavior

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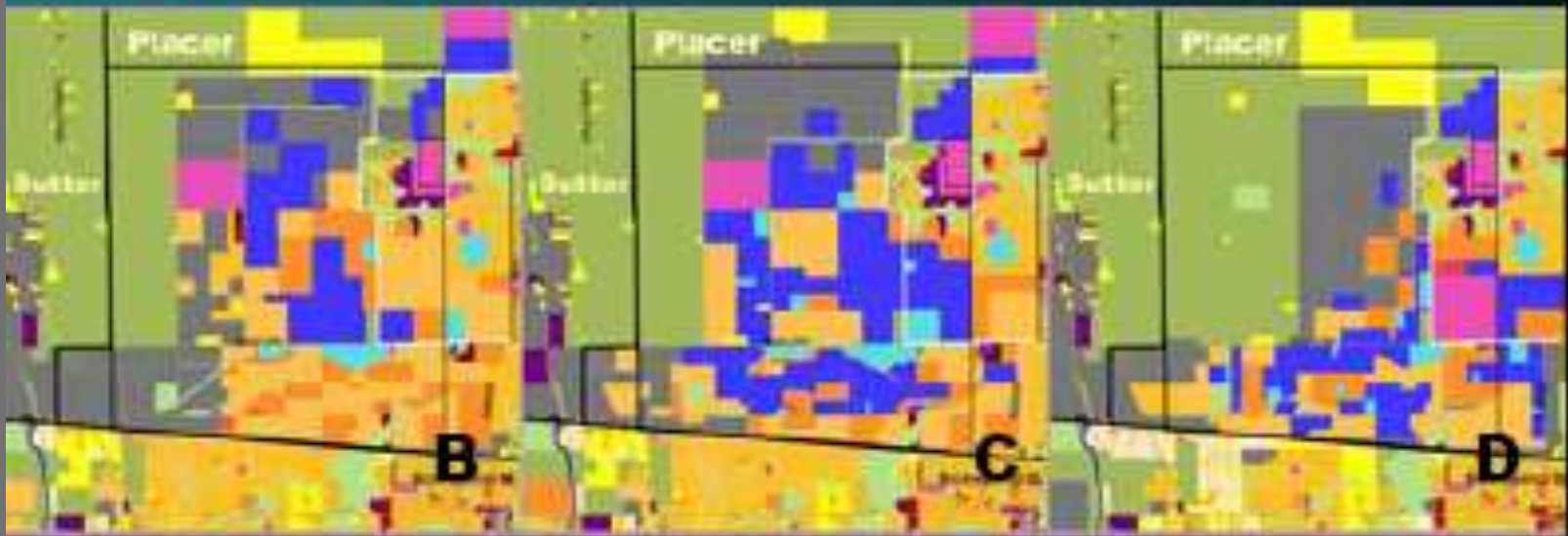
Scenario Planning Tools – Uses

- ▶ Develop indicators of the impact of development patterns
 - Community
 - Environment
 - Transportation
- ▶ Facilitate land use scenario development
- ▶ Visualize development patterns

Scenario Development

Sacramento, CA (PLACE3S model)

Local Differences — SW Placer



- B – 40,000 new dwellings, new proposed University
- C – 54,000 new dwellings, new proposed University
- D – 32,000 new dwellings, new University closer in

Commonly-Used

Scenario Planning Tools

Model	Community Impact Indicators	Land Use Scenario Development	Visualization
INDEX	◆		Mapping
Smart Growth INDEX	◆		Mapping
Paint the Town/ Paint the Region	◆	◆	Photos/ simulations
PLACE3S	◆		Photos/ simulations
CommunityViz	◆	◆	3-D/Dynamic
CorPlan	◆	◆	Photos/ simulations
MetroQuest	◆		Photos/ simulations
What-If?	◆		Mapping

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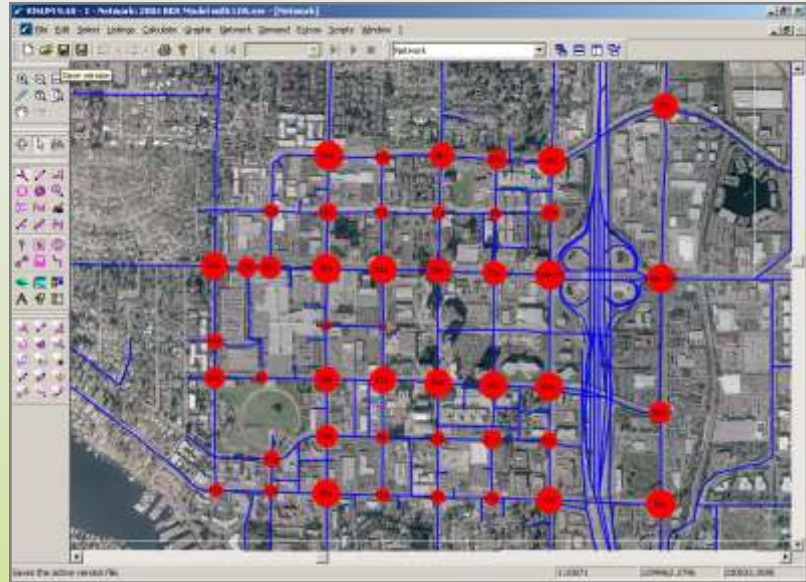
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Other Tools and Methods

- ▶ Traffic simulation models
- ▶ Visualization techniques
- ▶ Economic analysis
- ▶ Fiscal impact analysis
- ▶ Infrastructure cost models
- ▶ Environmental models

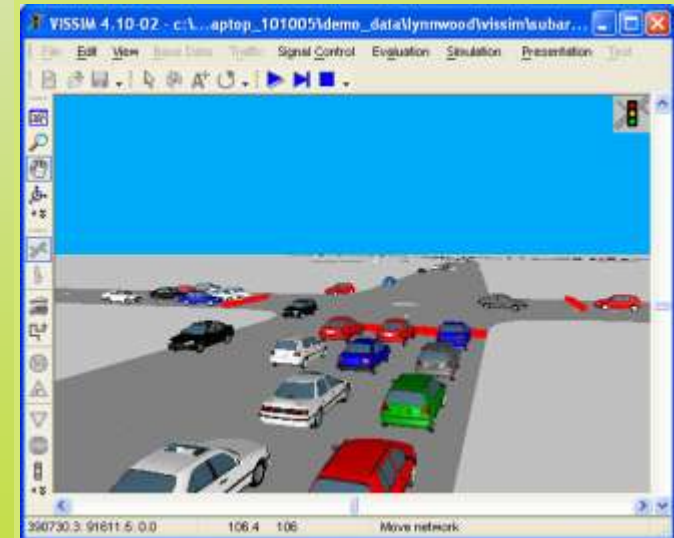
Traffic Simulation Models - Uses

- ▶ Measure localized impacts of development on traffic congestion
- ▶ Test alternative intersection, corridor, and subarea network designs



Traffic Simulation Models - Uses

- ▶ Can test movements that cannot be analyzed using regional 4-step models
- ▶ 3D animation of movements and queue lengths



Visualization Tools

Methods

- ▶ Photo-simulation
- ▶ 3-D visualization (static and dynamic)
- ▶ Visual preference surveys

Software

- ▶ Photoshop
- ▶ Sketch-Up
- ▶ VRML/X3D
- ▶ Quick Time
- ▶ ArcView 3D Analyst
- ▶ Site Builder 3D
- ▶ Scenario 360

Traditional Artist Rendering



Source: Glattig Jackson

Digital Rendering



Data-Driven Rendering



Source: McCormick Taylor

3-D Visualization and Animation

- ▶ 3-D models driven by 2-D maps



Additional NHI Training

NHI-137022 CORSIM Traffic Simulation Model Training



Review

- ▶ Which are conventional travel demand models better suited for – analyzing the distribution of regional growth, or analyzing the effects of micro-scale design policies such as the 3Ds?
- ▶ List two ways of better incorporating land use factors into conventional travel demand models
- ▶ List two factors that might make an expert panel an appropriate land use forecasting method
- ▶ What is the primary weakness of most scenario planning tools for forecasting transportation impacts?