Lesson 11

Analytical Tools & Methods

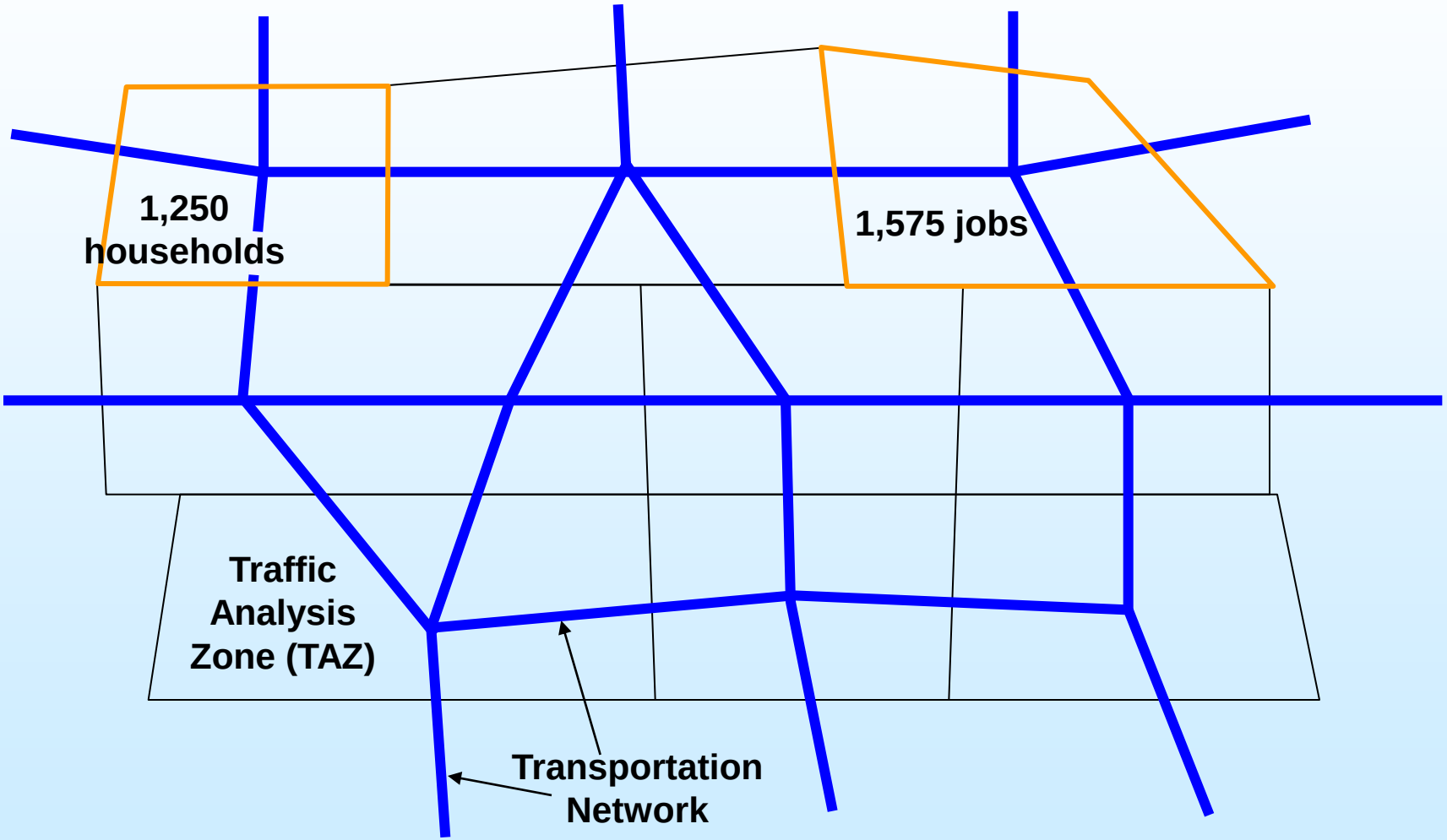
Learning Outcomes

- 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

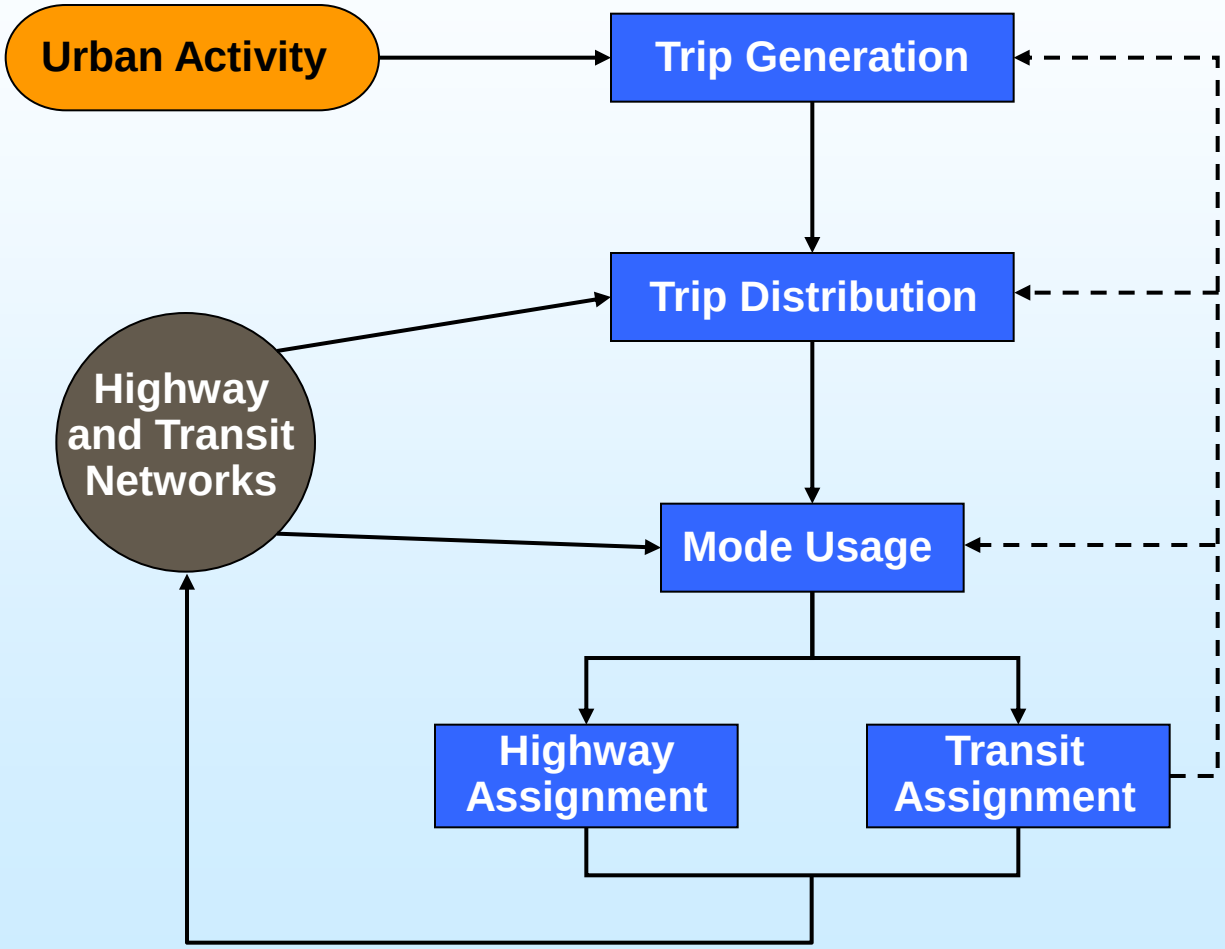
Lesson 11:
Analytical Tools & Methods

- **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

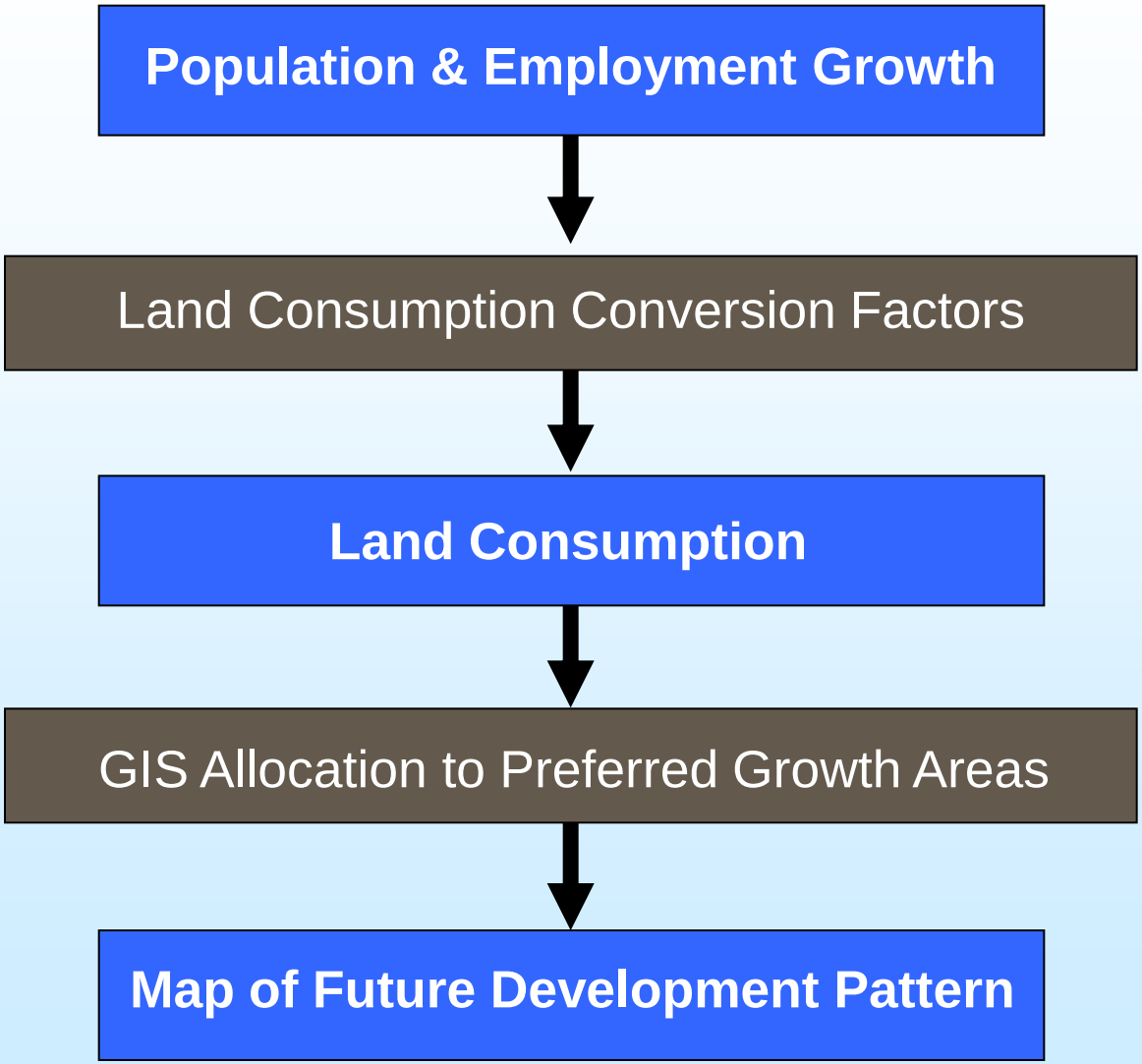
Expert Panel and "Delphi" Techniques

- 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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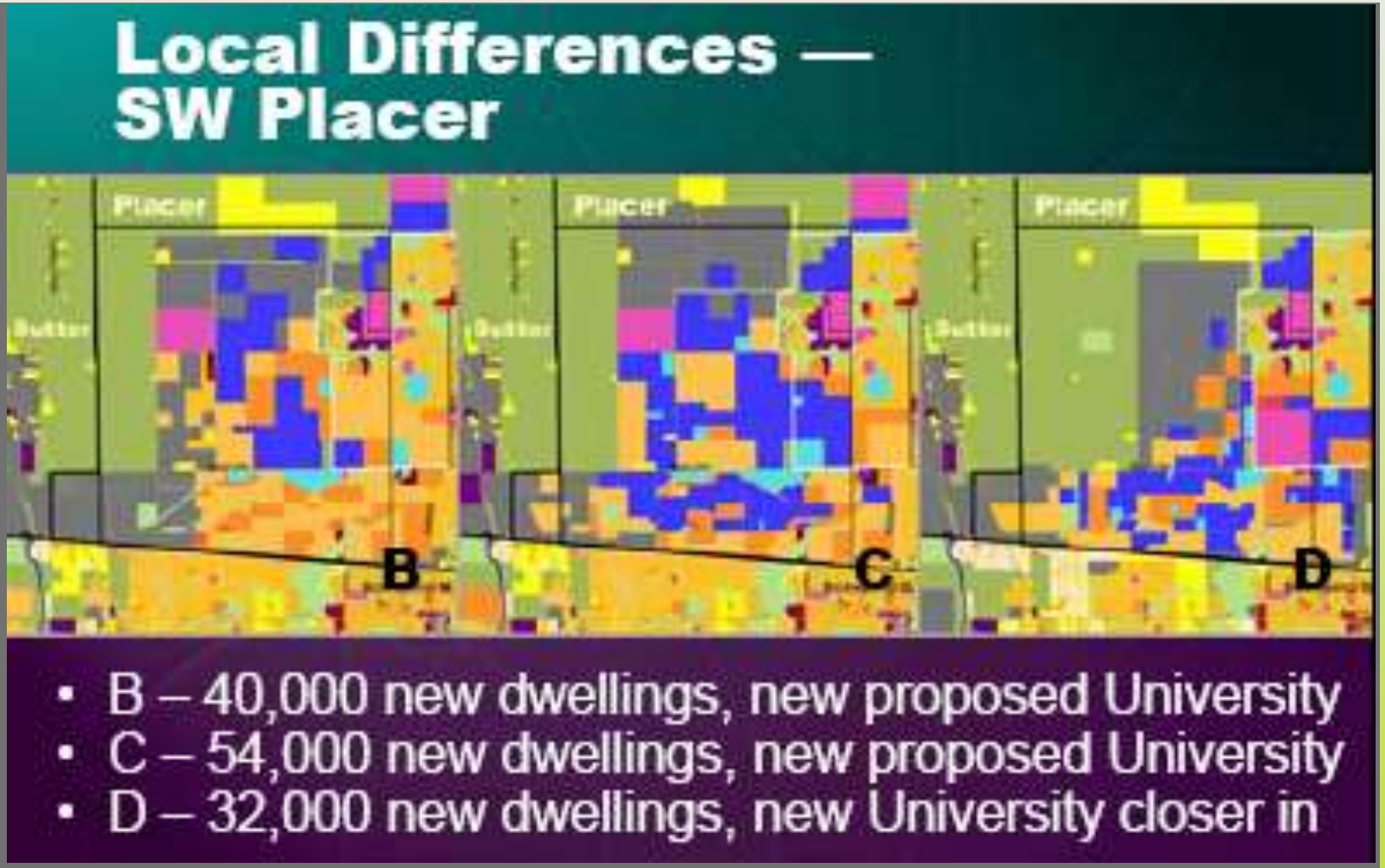
Scenario Planning Tools – Uses

- 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)



Source: Sacramento Area Council of Governments

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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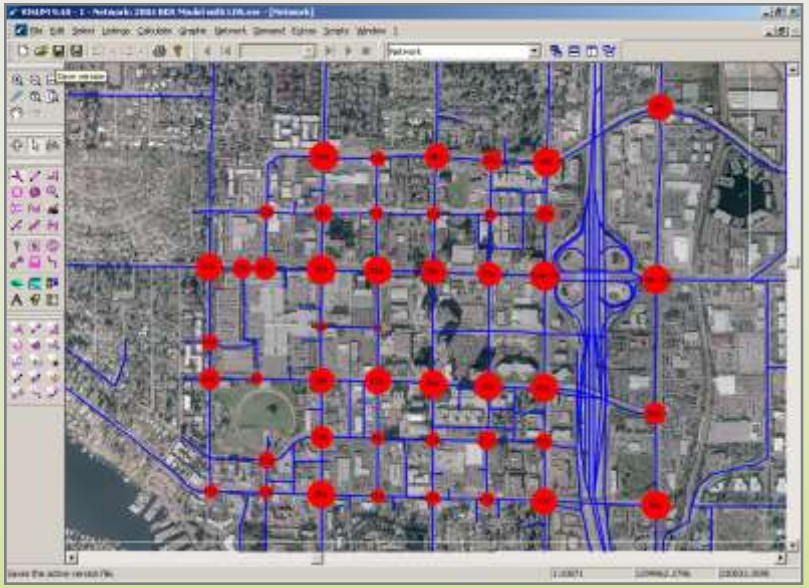
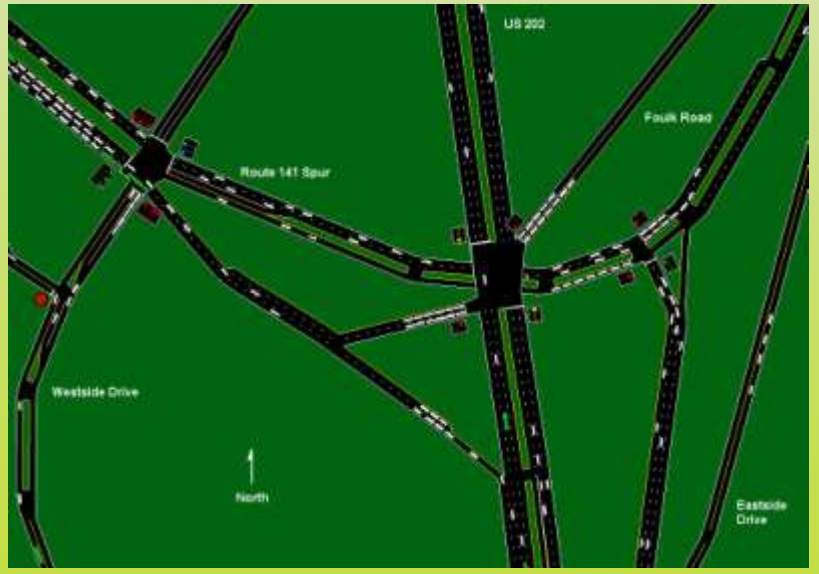
Other Tools and Methods

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

Traffic Simulation Models - Uses

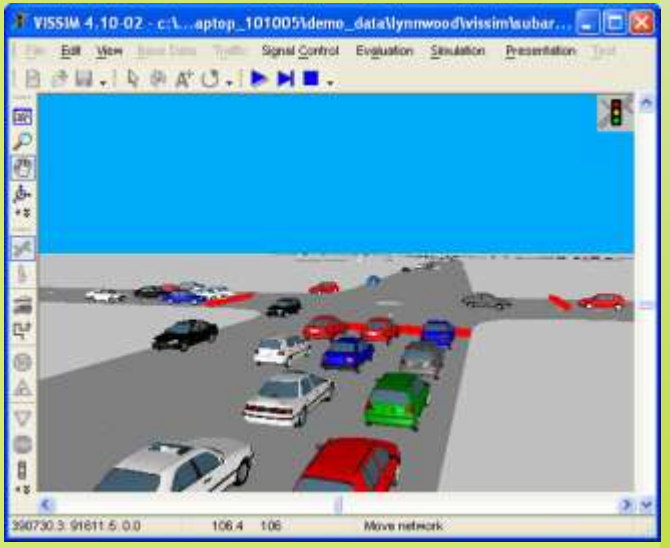
- Measure localized impacts of development on traffic congestion
- Test alternative intersection, corridor, and subarea network designs





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: Glatting Jackson

Digital Rendering

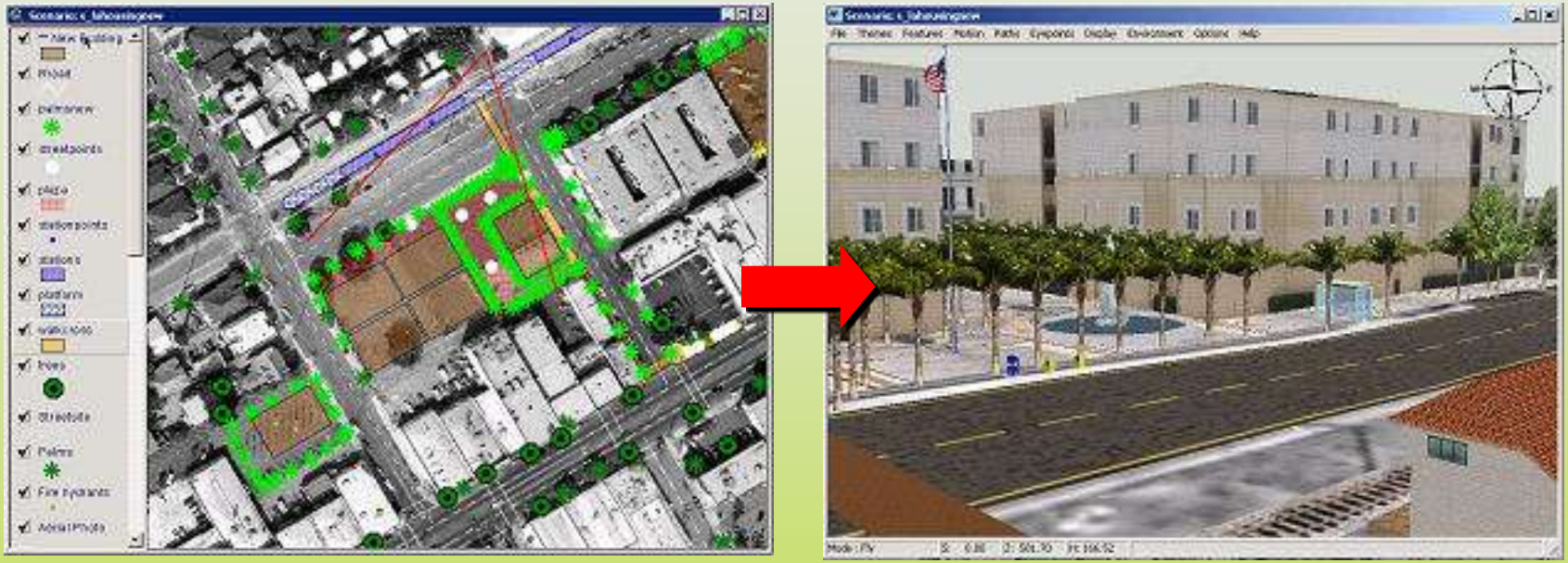
Source: McCormick Taylor

Data-Driven Rendering

Source: McCormick Taylor

3-D Visualization and Animation

- 3-D models driven by 2-D maps



Source: Orton Family Foundation

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?