

Taming the Modeling Monster

Starring:

- Ellen Greenberg
- Scott McCarey
- Jim Charlier

Audience Poll, part 1

- ✓ Elected Officials
- ✓ Board Members
- ✓ Public Staff
- ✓ Consultants
- ✓ Journalists
- ✓ Other

Audience Poll, part 2

- ✓ Modeling experts
- ✓ Know enough to be dangerous
- ✓ What's a model?

What We Will Not Do Today:

- Get Technical
- Provide Answers



Session Outline

- Framing the issue (Charlier)
- Problems with monsters (Greenberg)
- Technical alternatives (McCarey)
- Alternative approaches (Greenberg)
- Group Q & A
- Audience examples
- Break out work sessions

Framing the Issue

Framing the Issue

- Transportation 101
- Things You May Have Wondered About



Transportation 101

- Balanced mobility
- Overemphasis on travel capacity
- Modern urban trends



“Mobility”

(Balanced)

Anthropologists: one of the defining characteristics of the human species is a need to be mobile.

we are human = we need mobility



Mobility Elements

Travel – Moving over distances

Circulation – Moving within areas

Access – Getting in the door

Built for...



Seattle



Redmond

...travel

Built for...



Denver



Boulder

...travel

Built for...



Flagstaff



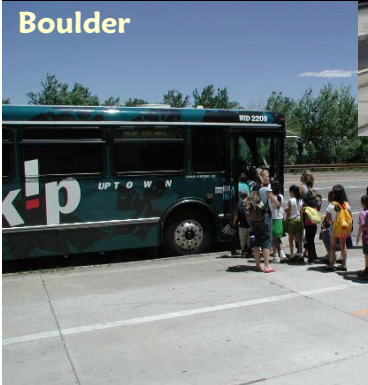
Redmond

...circulation

Built for...



Portland



Boulder

...circulation

Built for...



Winter Park, FL



Minneapolis

...access

Over-Emphasis on Capacity

1. Travel-biased programs
2. Facility-oriented planning
3. Congestion management

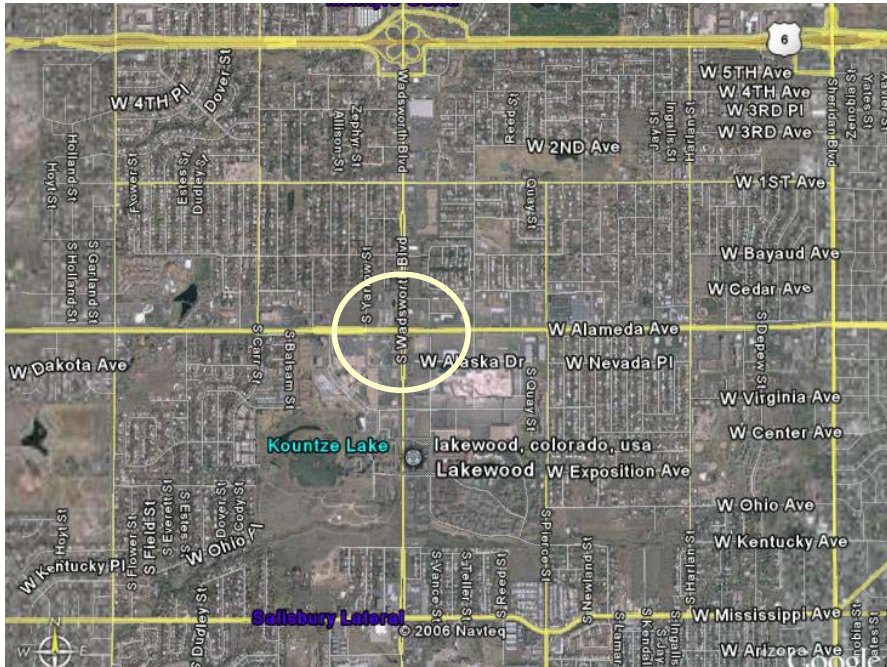
Travel-Biased Programs

...build only in support of
travel
and fail to provide for
circulation and access



Facility-Oriented Planning

...is focused on
facilities
rather than
networks



Congestion Management

...the fruitless attempt to reduce peak hour congestion or build our way past congested arterial corridors



Credit: Dan Burden

“Induced Traffic”

Def.

The additional traffic that results directly and indirectly from transportation capacity or travel time improvements – traffic that would not otherwise have occurred at that location.

Types of Induced Traffic

Changes in travel route Immediate

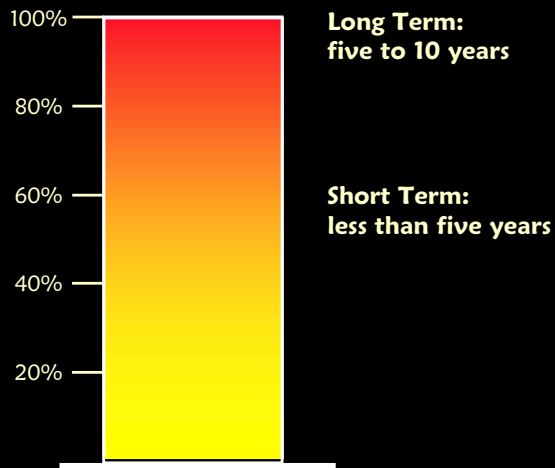
Changes in mode of travel < 6 months

Changes in time of travel < 6 months

Changes in amount of travel < 6 months

Changes in origins & destinations < 10 years

% of new capacity consumed by induced traffic...

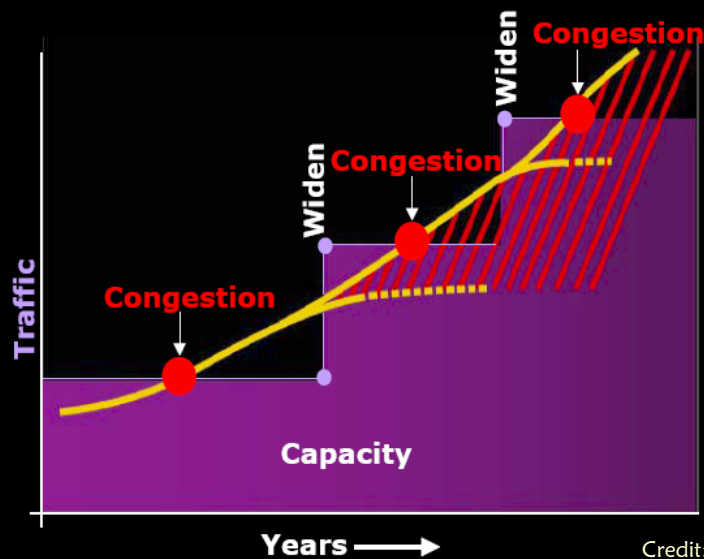


If you build it . . .
. . . they will come



If you build it . . .
. . . they will come

Road Size, Not Congestion is the Choice



How did traffic flow, congestion relief and road capacity get to be more important than other community objectives?

Common Community Objectives

- Community character
- Green environment
- Family-oriented place
- Sustainability
- Pedestrian “friendly”
- Economic vitality
- Great streets
- Healthy neighborhoods

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Common Community Objectives

- Community character
- Green environment
- **Level of service objectives**
- **Traffic capacity**
- **Congestion relief**
- Great streets
- Healthy neighborhoods

Things You May Have
Wondered About

Traffic Models

Things You May Have Wondered About

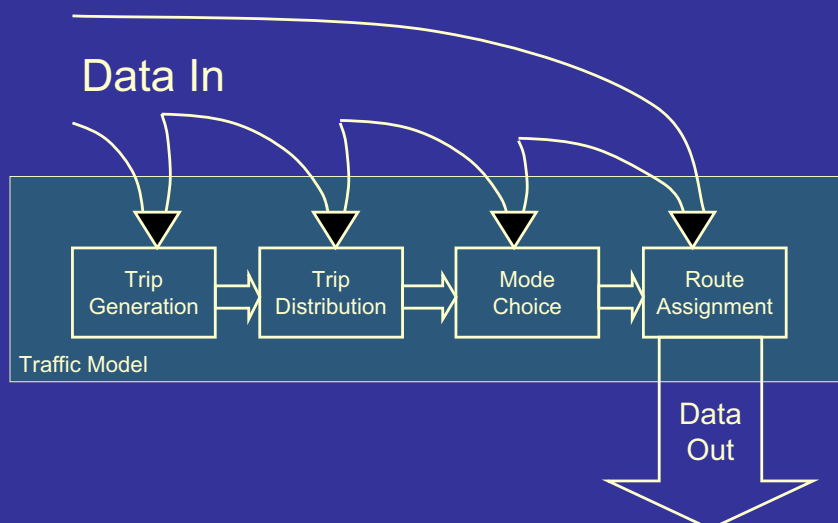
- What is a traffic model?
- What is included and not included?
- How are they used?
- How accurate are they?
- How good are models at what they are designed to do?



What is a Traffic Model?

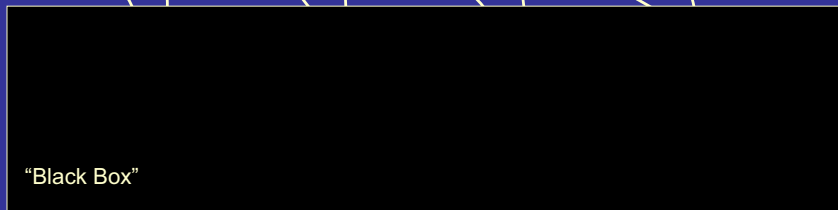
Things You May Have Wondered About

What is a Traffic Model?



What is a Traffic Model?

Data In



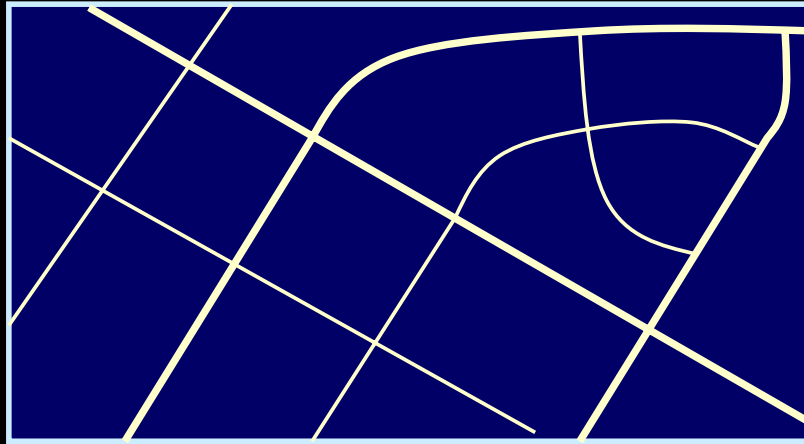
What Is Included and Not Included?

Things You May Have Wondered About

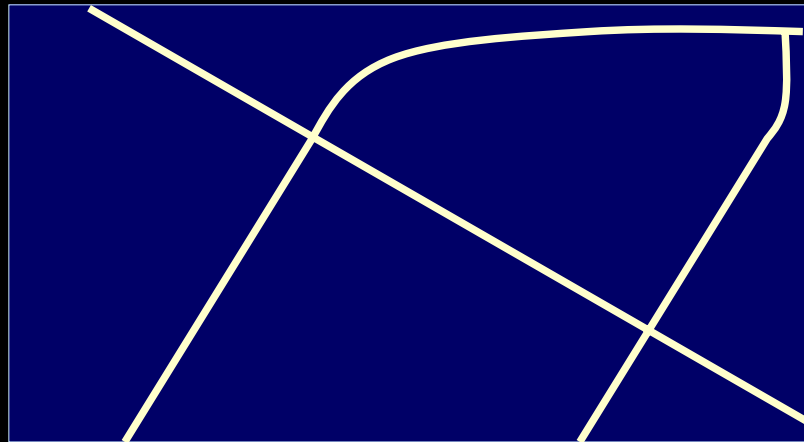
Not All Streets are Included in Model Networks



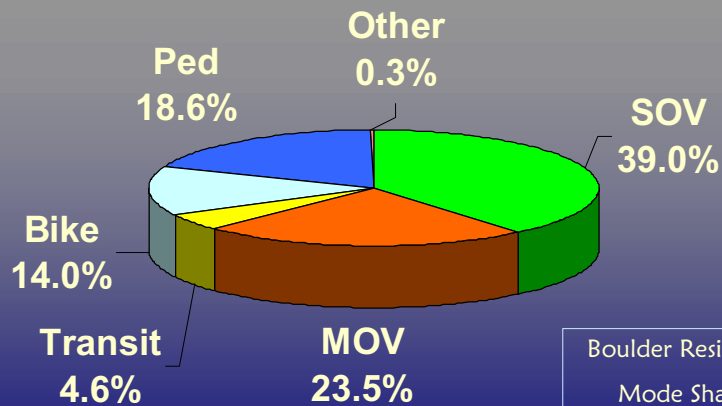
No Local Streets or Internal Drive Aisles Are Modeled



No Collectors – Only Arterials are Modeled



Multimodal Travel, Circulation and Access



Boulder Residents
Mode Share
2003

How Are Models Used?

Things You May Have Wondered About

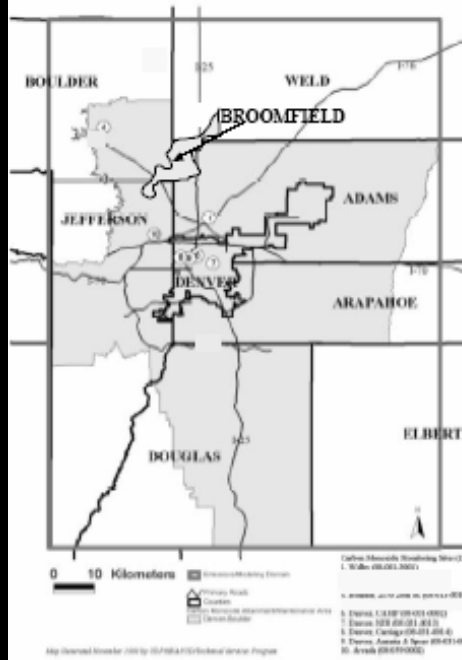
Common Uses of Models

- Plan & prioritize street networks (TIPs, etc)
- Evaluate proposed rail projects (AA/EIS)
- Basis for traffic impact studies (TIRs, EIRs)
- Growth management systems
 - Impact fees
 - Concurrency management systems (LOS)
- Air quality management (mobile sources)
- Environmental impact analysis (EIS, etc.)
- Provide data for detailed intersection and corridor planning

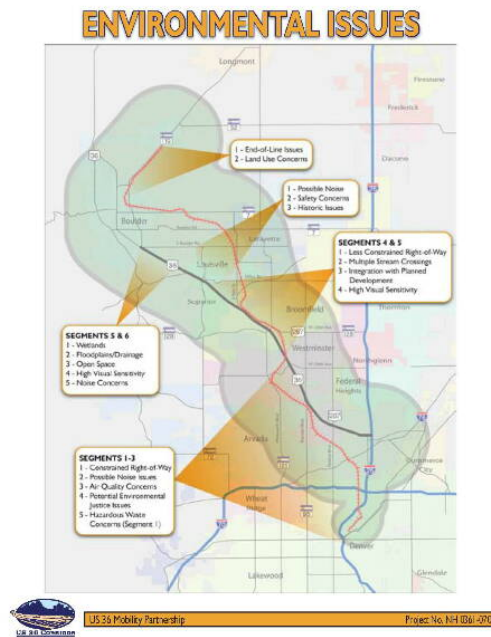
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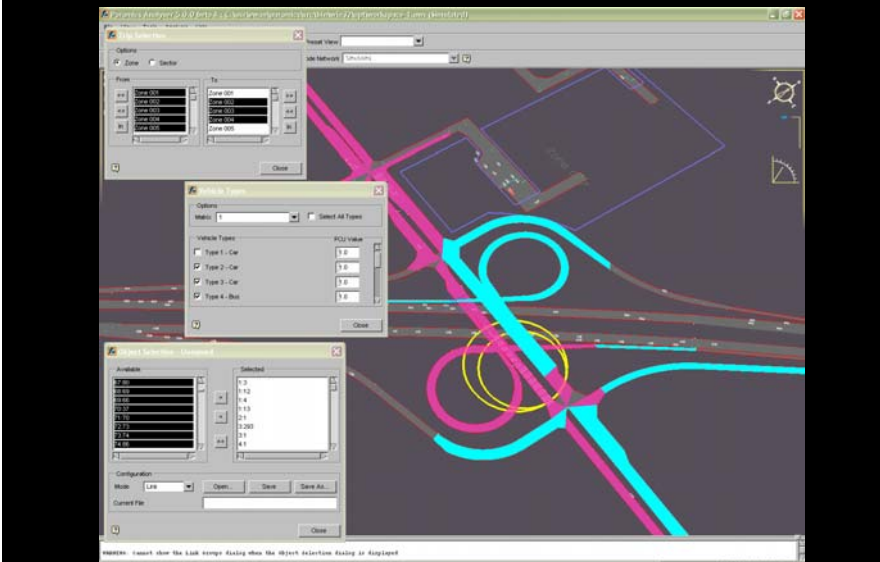
Common Uses of Models Air Quality Management



Common Uses of Models Environmental Impact Analysis



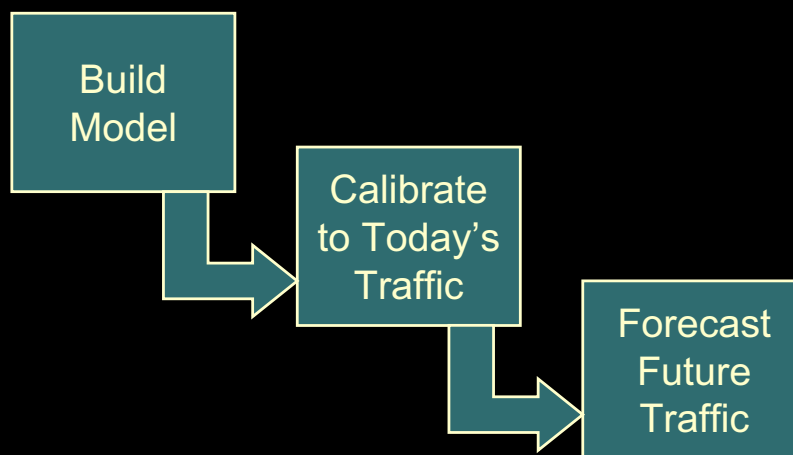
Common Uses of Models Intersection & Corridor Studies



How Accurate are Models?

Things You May Have Wondered About

Modeling Process

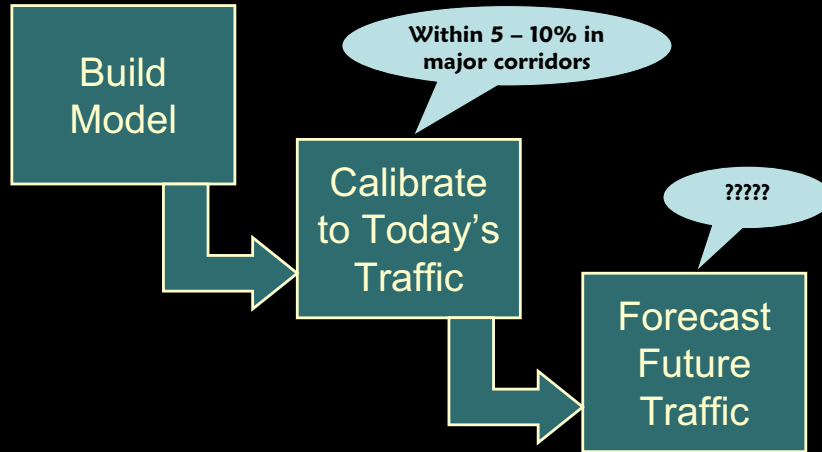


“Acceptable” Error - Calibration

- Traditional: + or - one lane
- Common: 5% - 10% error in key corridors

Note: calibration measures how well the model output matches actual traffic levels today

Modeling Process - Accuracy



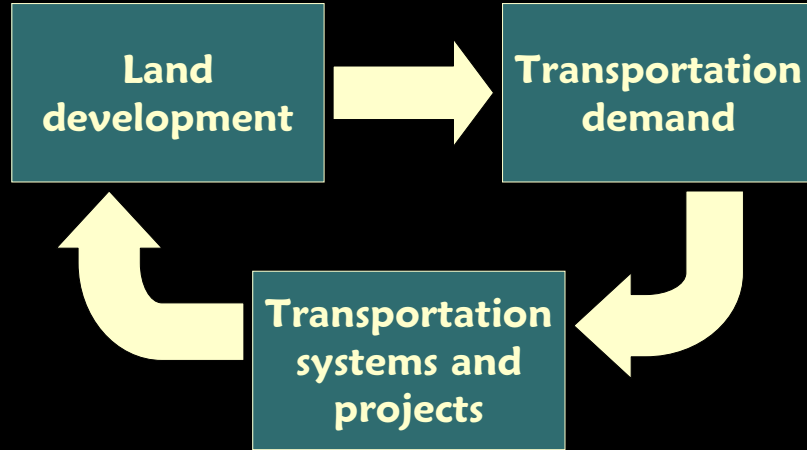
How Good Are Models At What They Are Designed To Do?

Things You May Have Wondered About

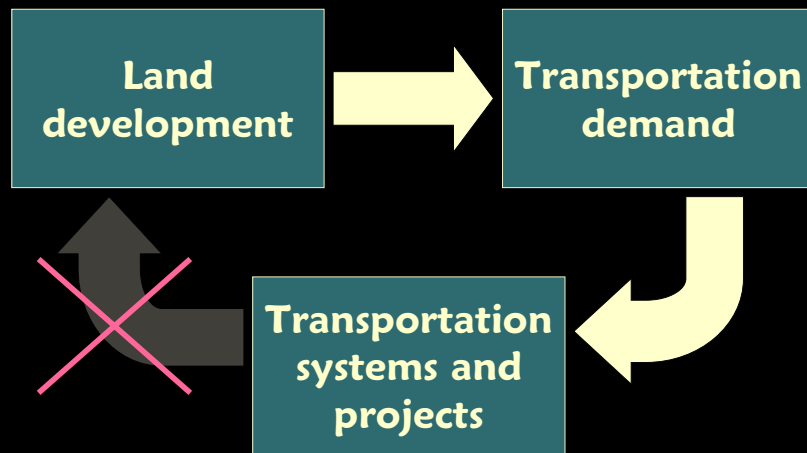
How Good Are They?

- Iterative relationships between transportation investment & land use
- Understanding dense networks
- Leading causes of congestion
- Missing independent variables

Iterative Relationships



Iterative Relationships



Models & Induced Travel

How well do models predict:

-
- Changes in travel route well
 - Changes in mode of travel fairly well
 - Changes in time of travel no
 - Changes in amount of travel no
 - Changes in origins & destinations no

Understanding Dense Networks



Understanding Dense Networks



Leading Causes of Congestion

Peak Period Travel



Weather



Accidents/Incidents



Missing Independent Variables

- Fuel prices
- Development pattern – mixed use, etc.
- Perceptions – driver behavior
- Social factors, trends

Review

- Traffic models do some things well within the constraints of input data
- Traffic models do not give “accurate” forecasts of conditions in 25 years
- Traffic models ignore many important community objectives

Concluding Questions



Concluding Questions

- How did traffic congestion/capacity become pre-eminent anyway?
- What are some alternative criteria for planning transportation systems?

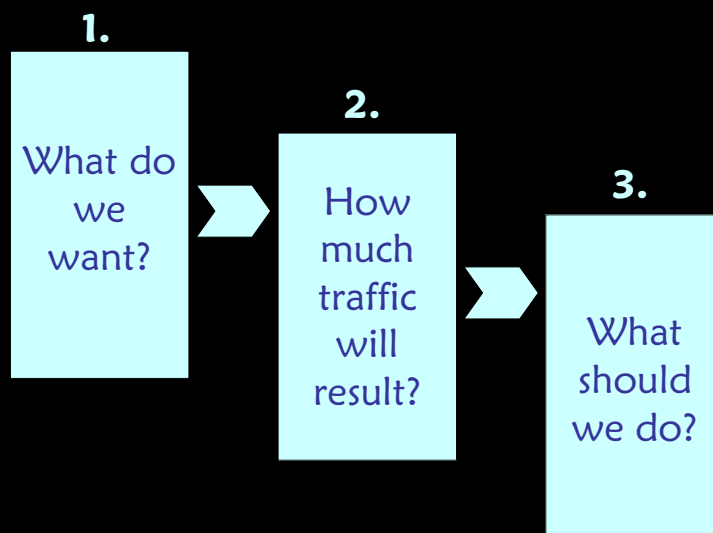
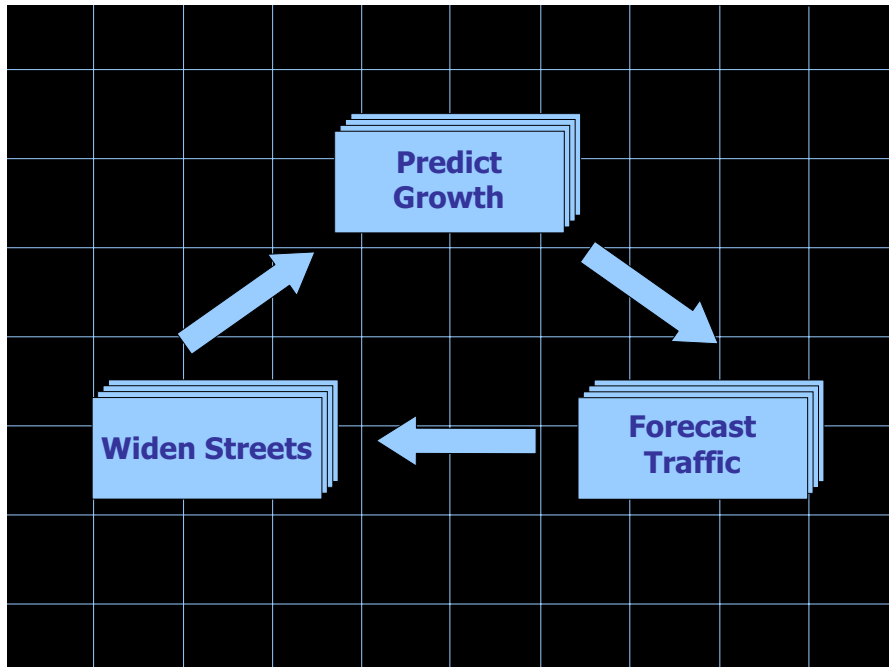
Selective Focus – The Doctrine of Apparent Precision

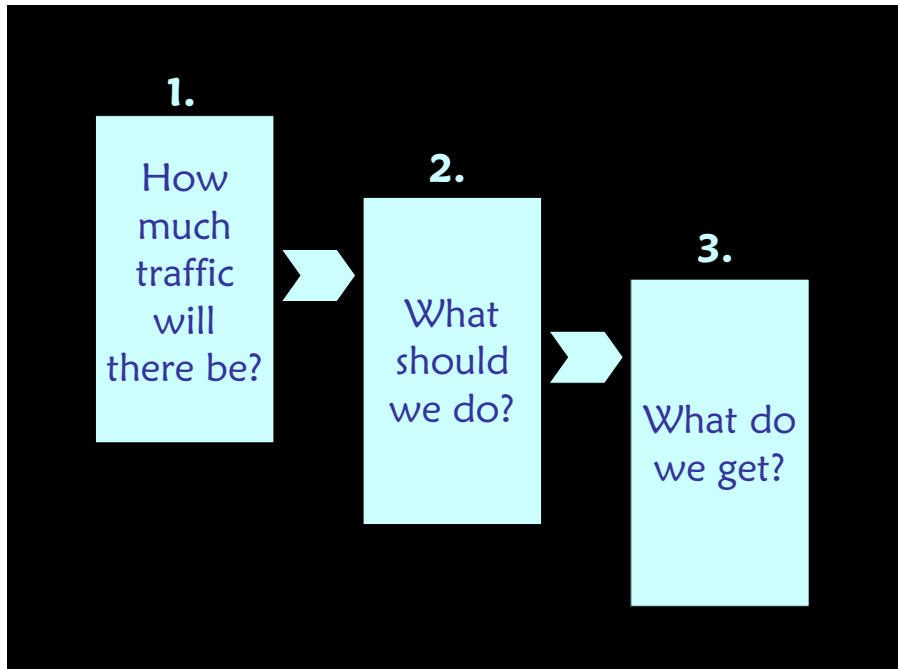
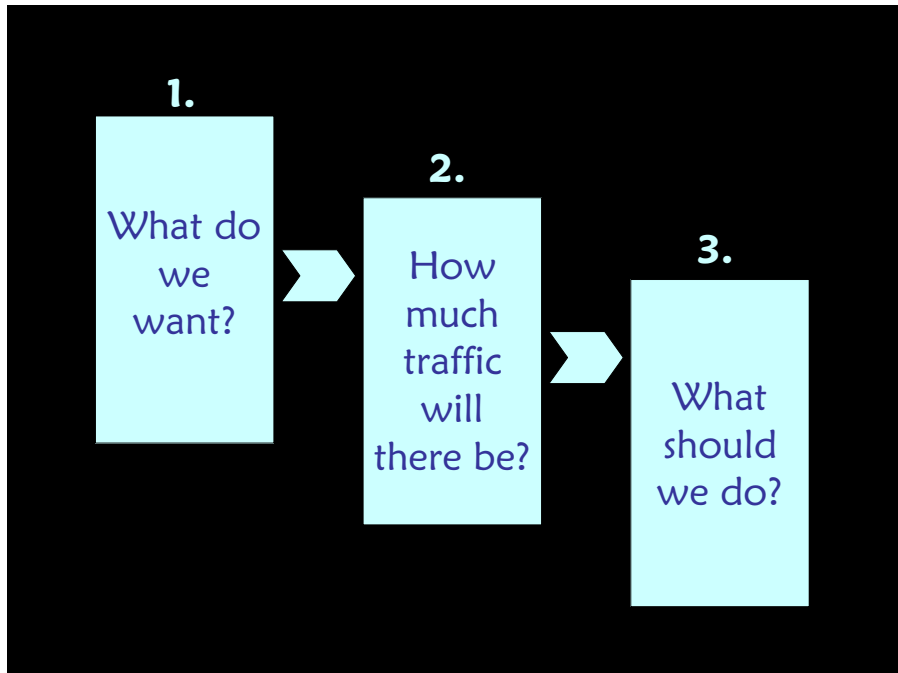
<u>Criterion</u>	<u>Definition</u>	<u>Data</u>
#1	fuzzy	none
#2	vague	weak
#3	specific	lots
#4	vague	none
#5	fuzzy	none
#6	none	weak

Selective Focus – The Doctrine of Apparent Precision

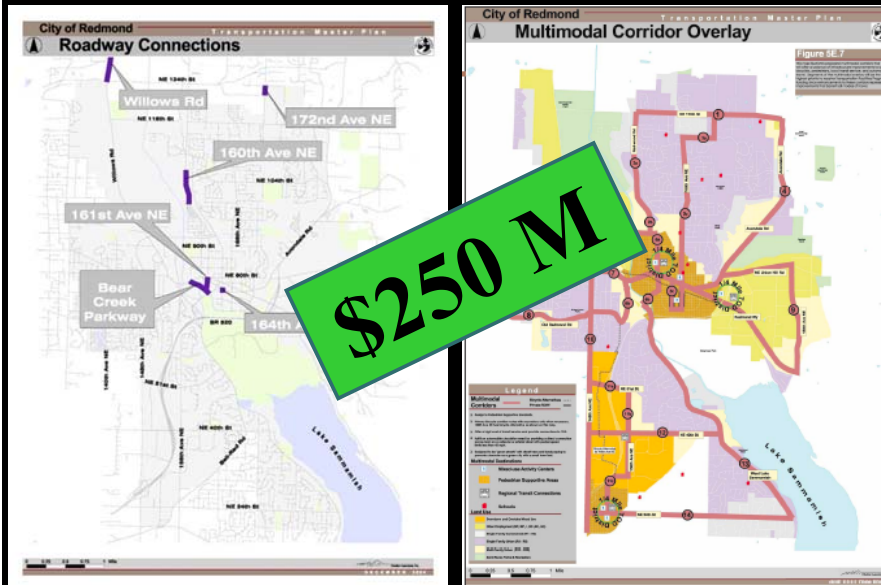
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Traffic Forecasting \neq Planning





Redmond, WA



Technical Alternatives

Starring:

- Scott McCarey

Two Types of Improvements

- Modify existing 4-step modeling process
 - Include more variables
- Use GIS-based visualization software

URBEMIS Approach

- Uses traditional 4-step model as a baseline for traffic forecasts
- Adjusts traffic forecasts by incorporating additional variables:
 - Density, mix of uses, transit service, TDM programs
- Trip reductions can be as high as 90% residential and 35% non-residential

URBEMIS effectiveness

- Advised by *Trip Generation*:
 - “At specific sites, the user may wish to modify trip generation rates presented in this document to reflect the presence of public transportation, ridesharing or other TDM measures...or other special characteristics of the site or surrounding area.”
- However, adjusting a potentially seriously flawed baseline forecast

INDEX 5D Model

- Uses regional transportation demand models for baseline travel inputs
- Evaluates change in VT and VMT based on:
 - Density, Diversity, Design, Destinations and Distance (to rail transit)

INDEX limitations

- Forecasts are not absolute- relative to base case provided by regional model
- Accuracy dependent upon the regional model's baseline data
- Analysis must be performed at the TAZ level

Reference Class Forecasting

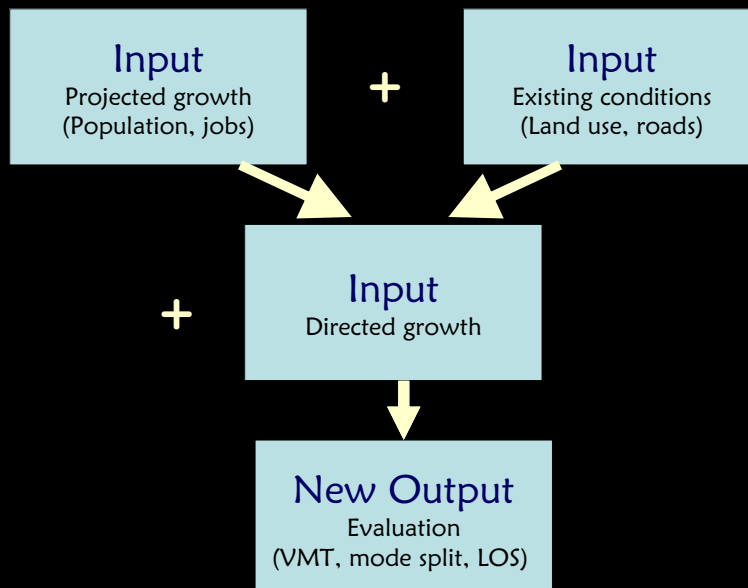
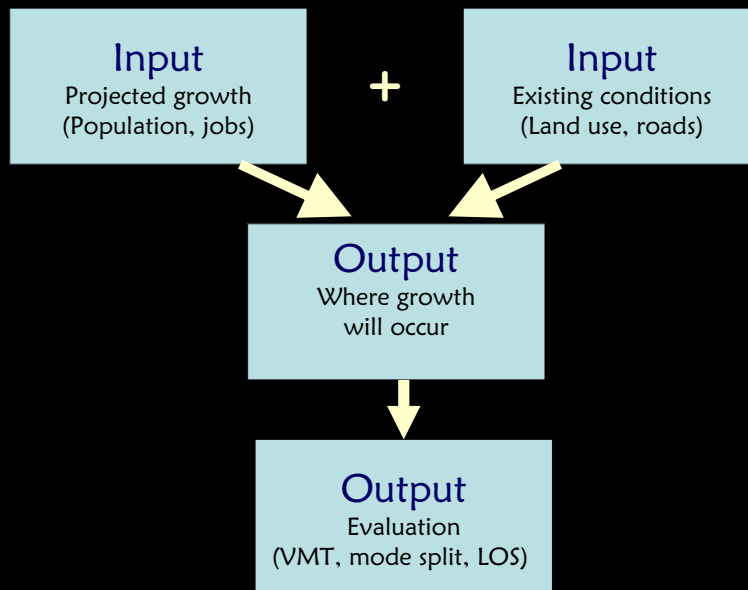
- Empirical inventory of hundreds of past projects
 - Each project recoded dozens of characteristics: density, proximity to transit, cost of parking, current congestion levels, mode shares
 - Reference projects with similar attributes to current study

Empirical Case Studies?

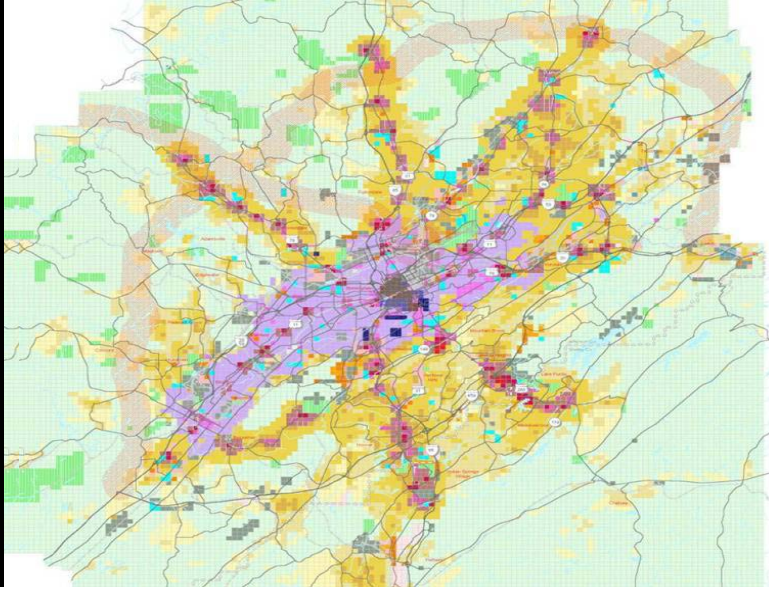
- Essentially what ITE Trip Generation does
 - with one variable
- Consider enough projects to be
 1. statistically meaningful, but
 2. similar to current project

GIS based software

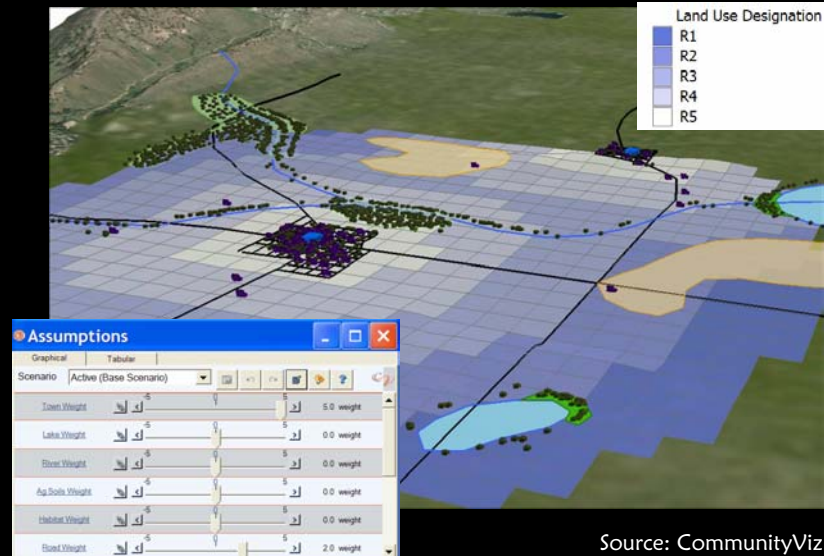
Programs now provide the ability to
visualize
and
evaluate
development scenarios



CorPlan- Renaissance Planning Group

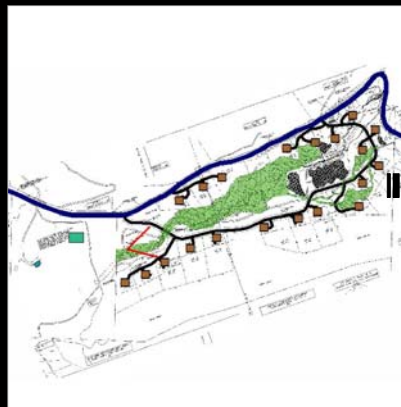


CommunityViz



Source: CommunityViz

2D Maps into Interactive 3D Scenes



Source: CommunityViz

Paint the Region



Source: Criterion Planners

SketchUp- Visual Modeling

