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

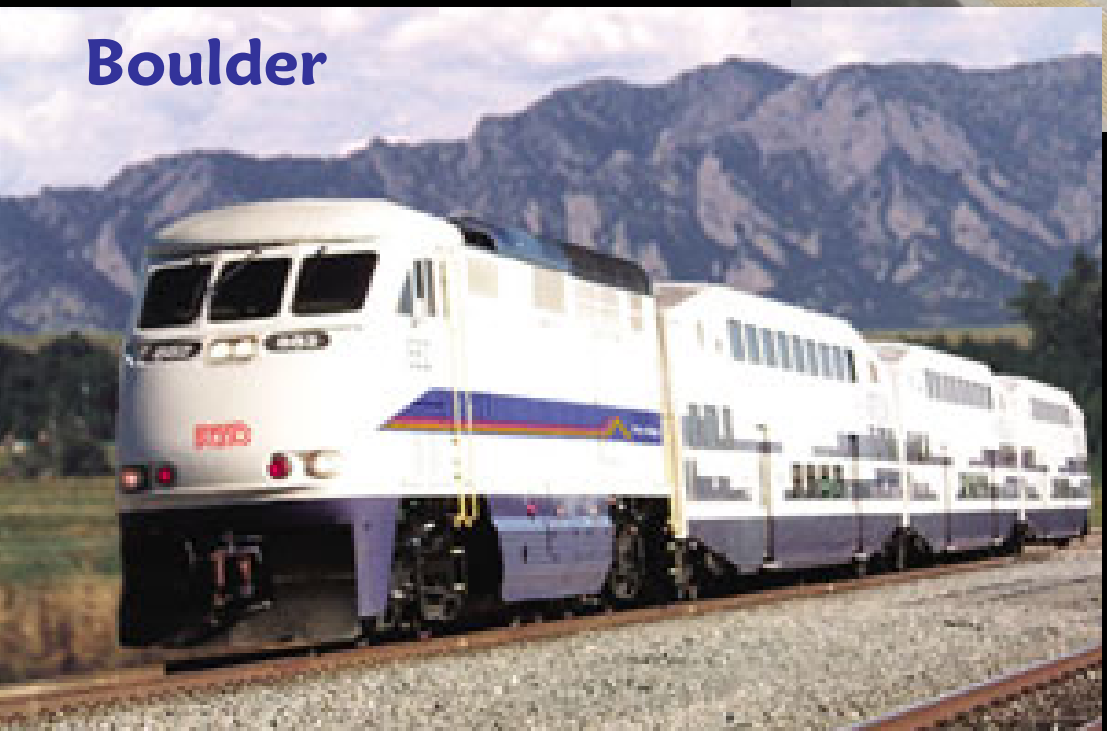
Built for...

Redmond

Seattle

...travel

Built for...



...travel

Built for...

Flagstaff

Redmond

...circulation

Built for...

...circulation

Built for...

Winter Park, Fl

Minneapolis

...access

Over-Emphasis on Capacity

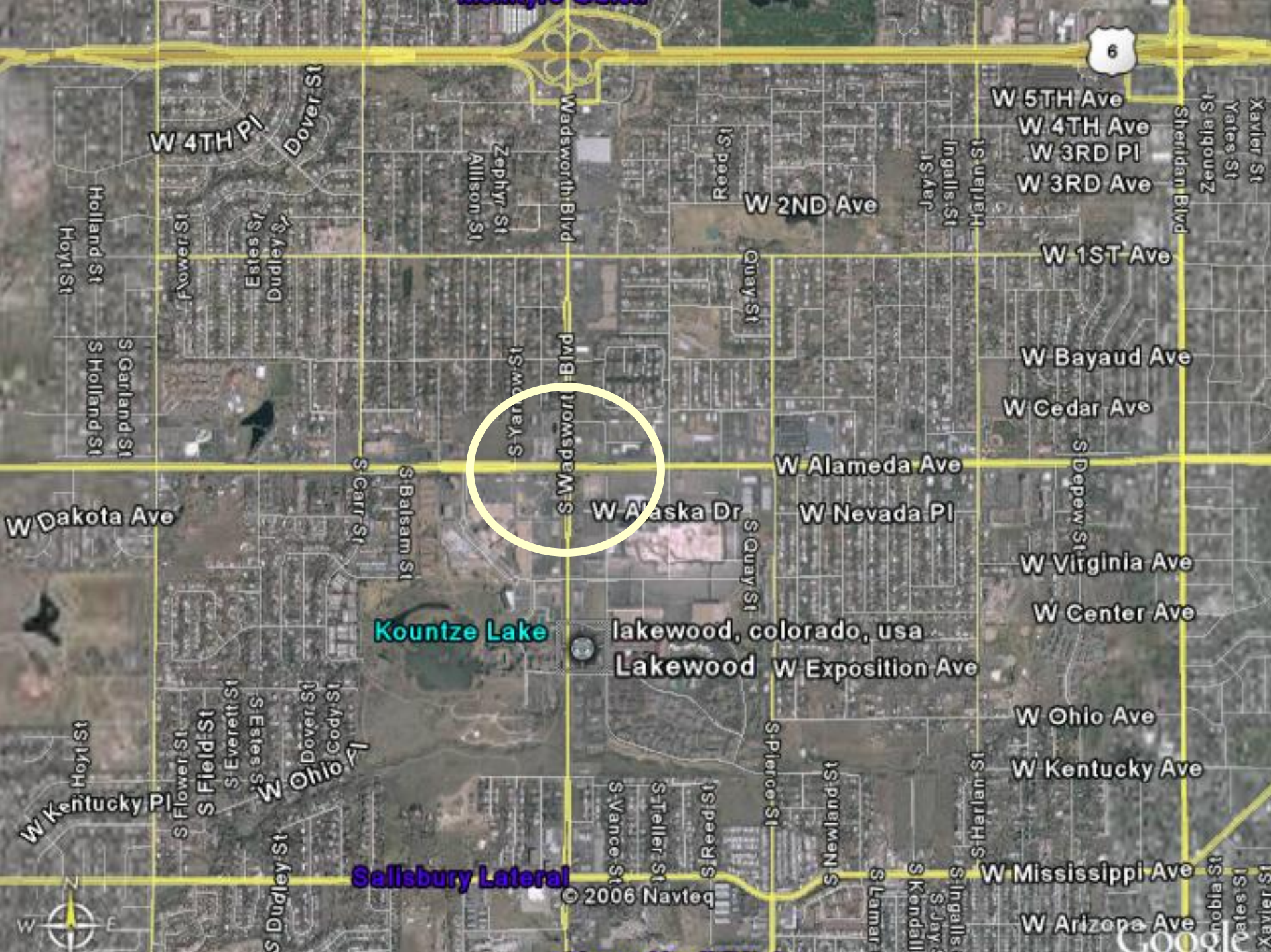
1. Travel-biased programs
2. Facility-oriented planning
3. Congestion management

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


W 4TH Pl
Dover St
Wadsworth Blvd
Zephyr St
Allison St
Reed St
W 2ND Ave
Ingalls St
Harlan St
W 5TH Ave
W 4TH Ave
W 3RD Pl
W 3RD Ave
Sheridan Blvd
Yates St
Zenobia St
Xavier St
W 1ST Ave
Quay St
Hoyt St
Holland St
Flower St
Estes St
Dudley St
S Garland St
S Holland St
S Yarrow St
S Wadsworth Blvd
W Bayaud Ave
W Cedar Ave
W Alameda Ave
S Depew St
S Carr St
S Balsam St
W Dakota Ave
W Alaska Dr
W Nevada Pl
S Quay St
W Virginia Ave
W Center Ave
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lakewood, colorado, usa
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W Exposition Ave
W Ohio Ave
W Kentucky Ave
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S Harlan St
S Field St
S Everett St
S Estes St
W Ohio Pl
Dover St
Cody St
S Flower St
W Kentucky Pl
S Vance St
S Teller St
S Reed St
W Mississippi Ave
W Arizona Ave
Salisbury Lateral
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Google

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

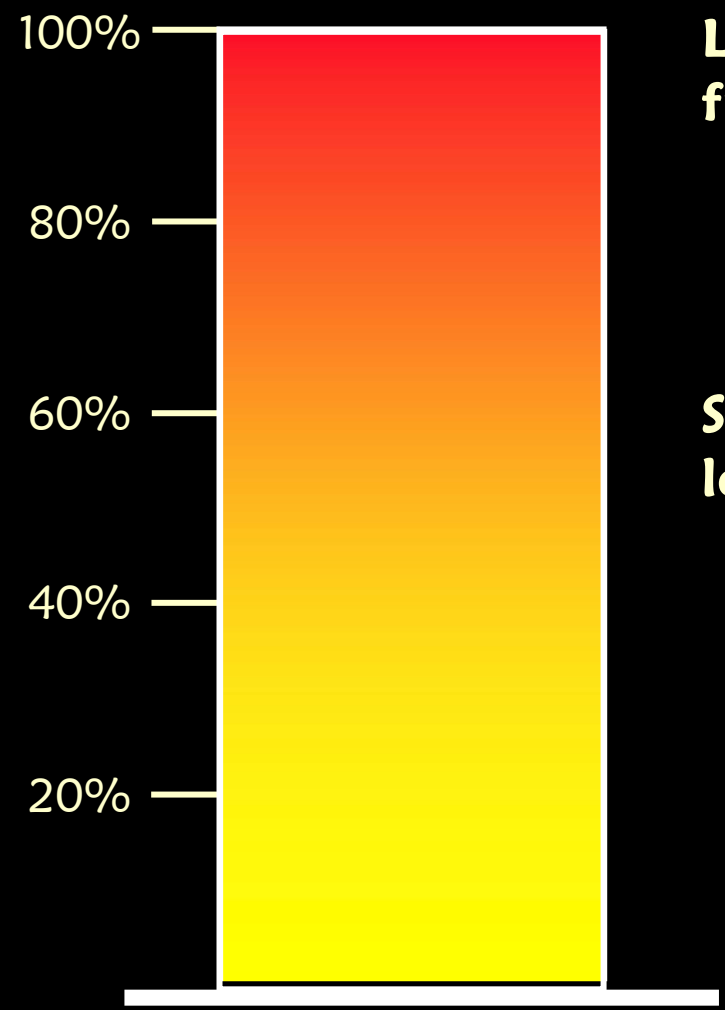
Changes in mode of travel ..... < 6 months

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...



Long Term:
five to 10 years

Short Term:
less than five years

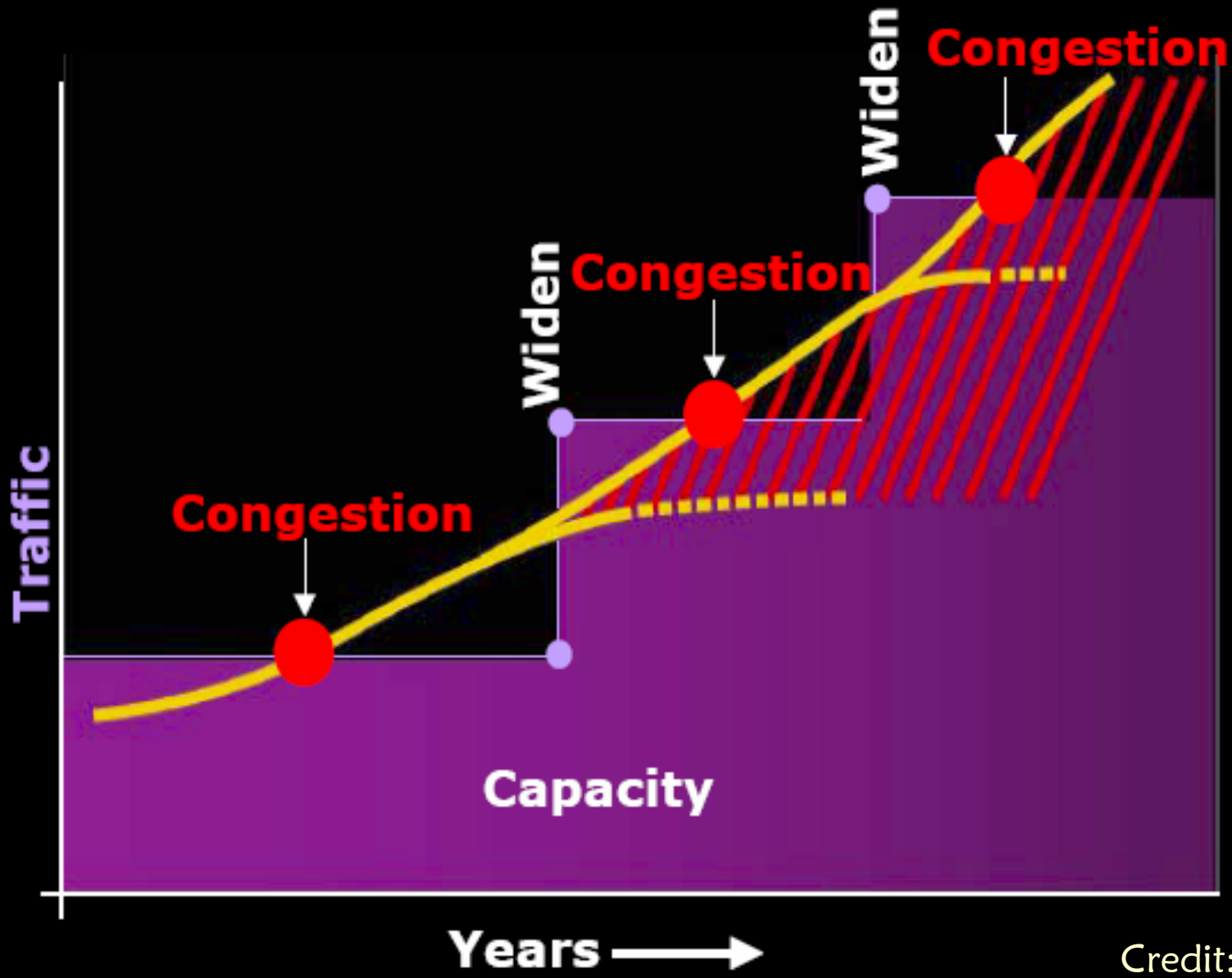
If you build it . . .

. . . they will come

If you build it . . .

. . . they will come

Road Size, Not Congestion is the Choice



Credit: Kulash

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

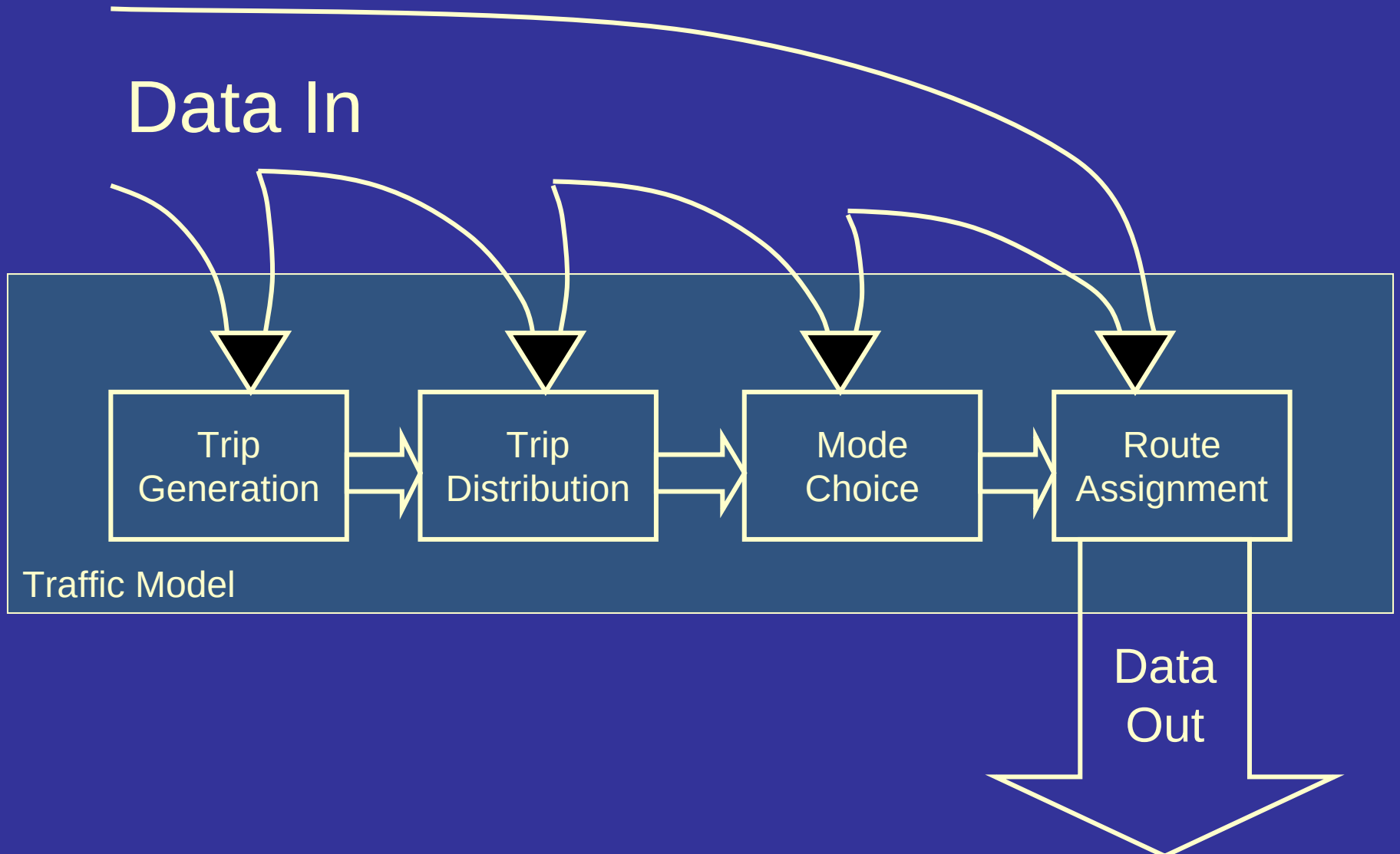
Things You May Have Wondered About

- 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?

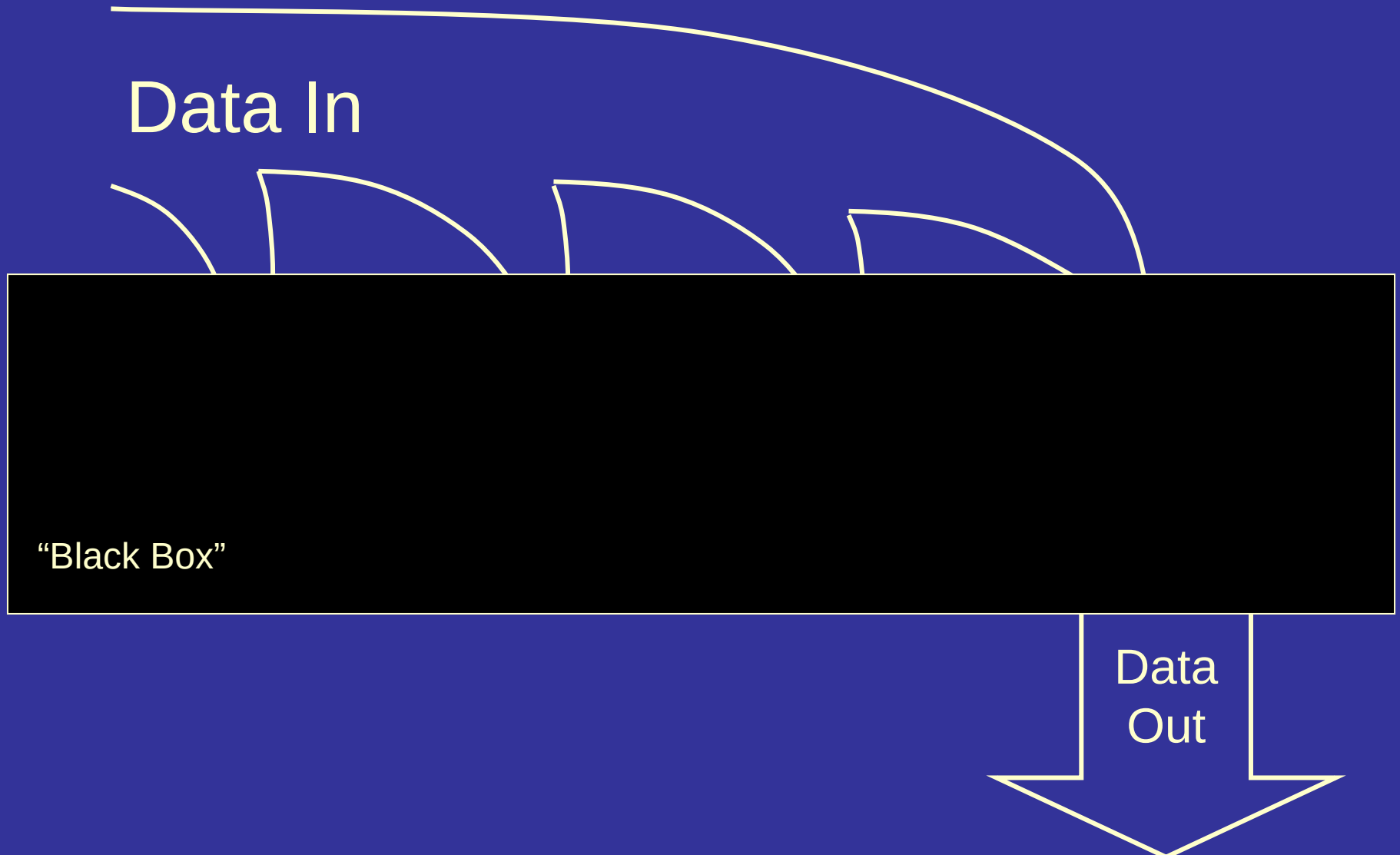
What is a Traffic Model?

Things You May Have Wondered About

What is a Traffic Model?



What is a Traffic Model?

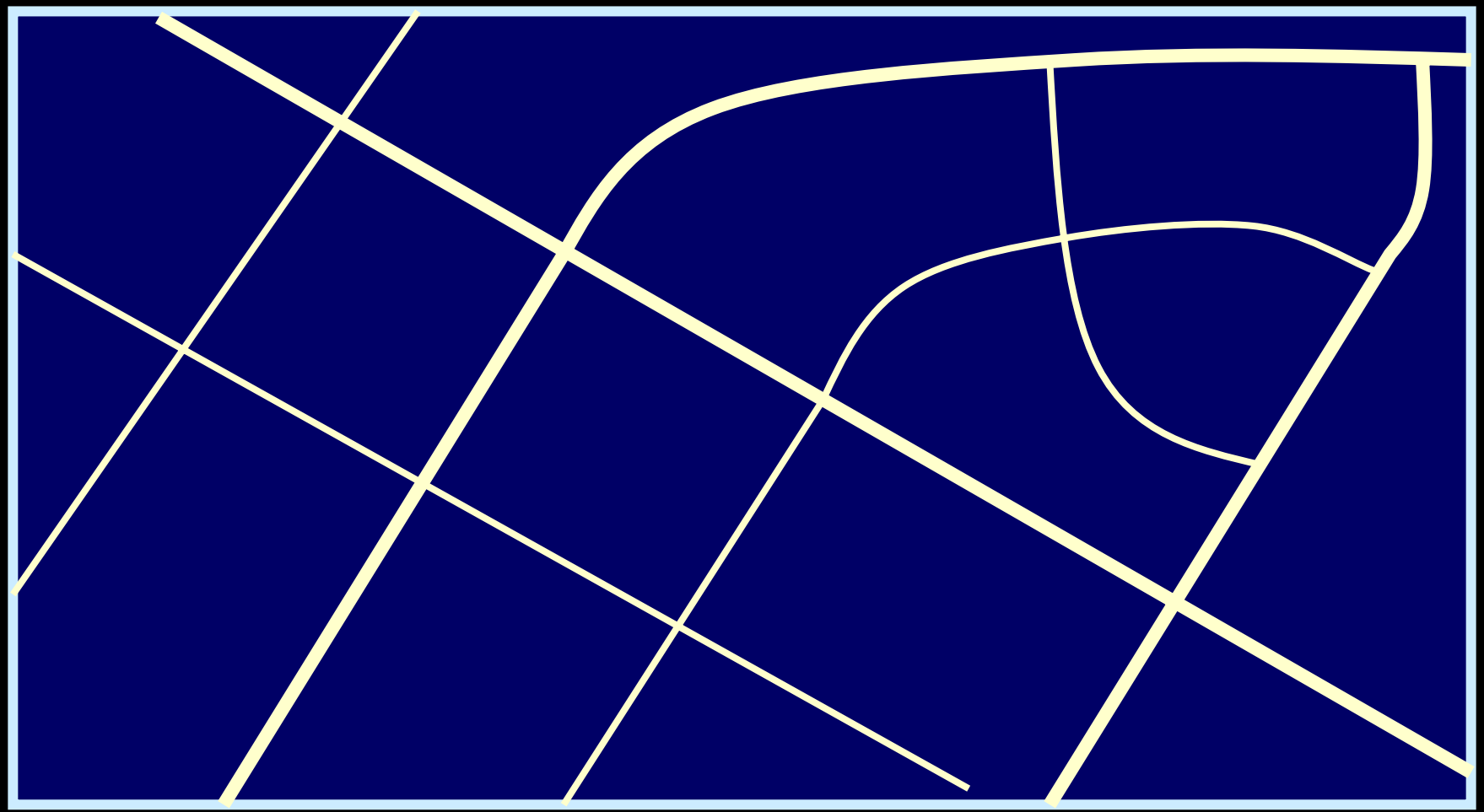


What Is Included and Not Included?

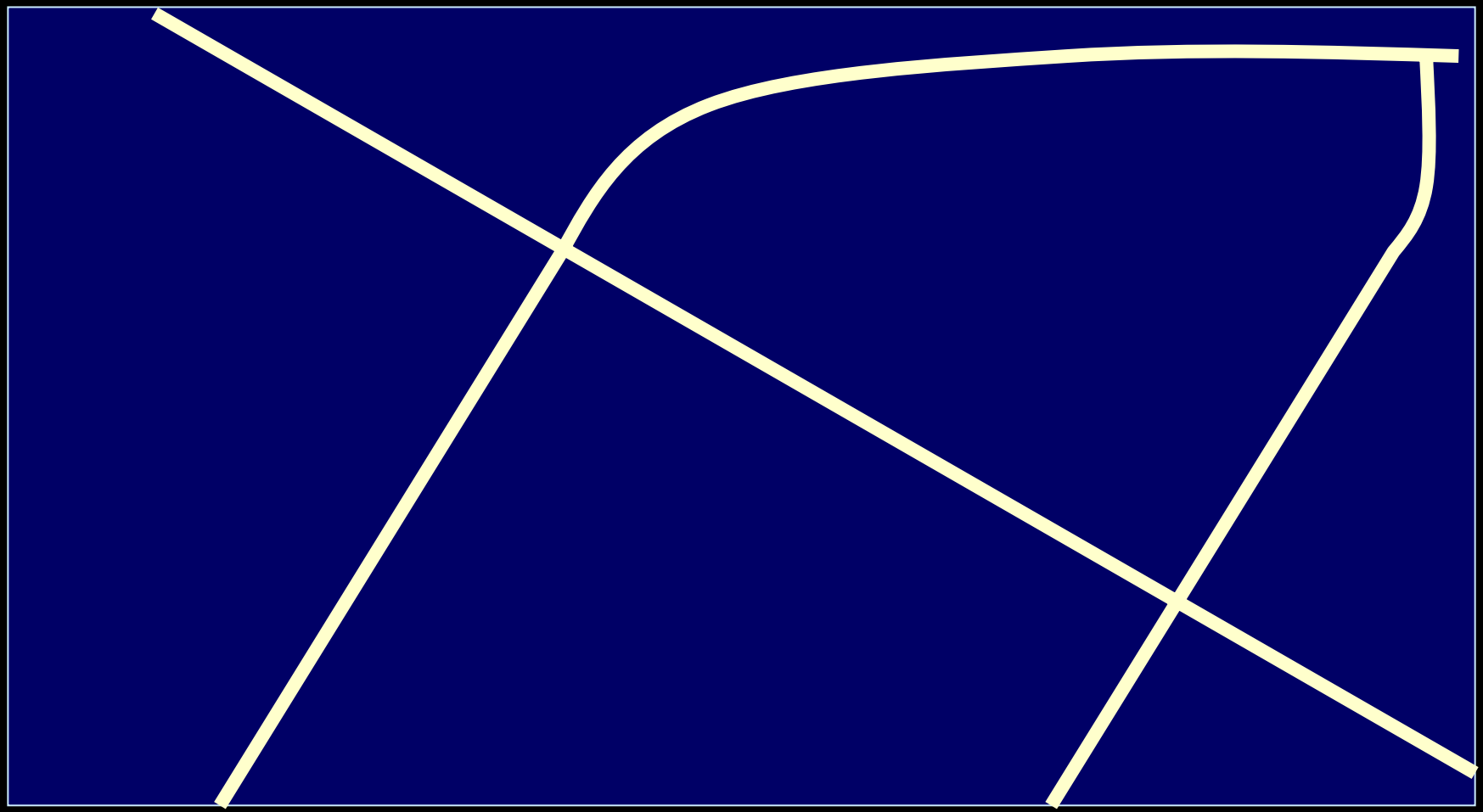
Things You May Have Wondered About

Not All Streets are Included in Model Networks

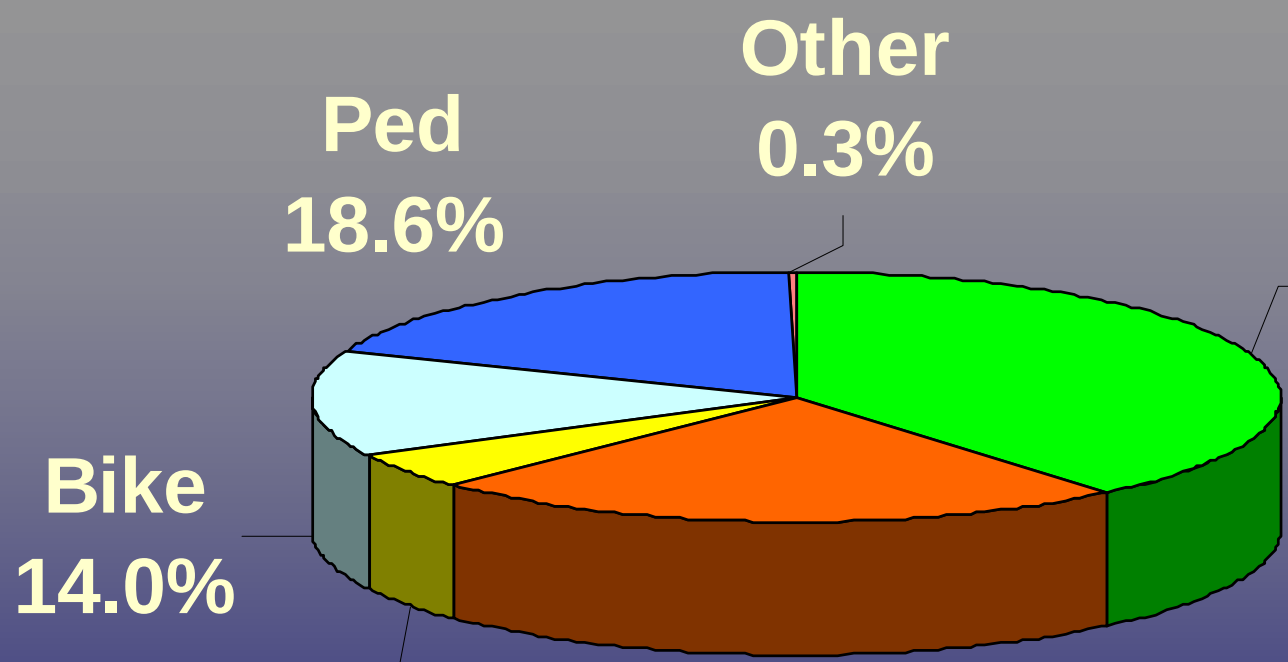
No Local Streets or Internal Drive Aisles Are Modeled



No Collectors –
Only Arterials are Modeled



Multimodal Travel, Circulation and Access



Boulder Residents
Mode Share
2003

How Are Models Used?

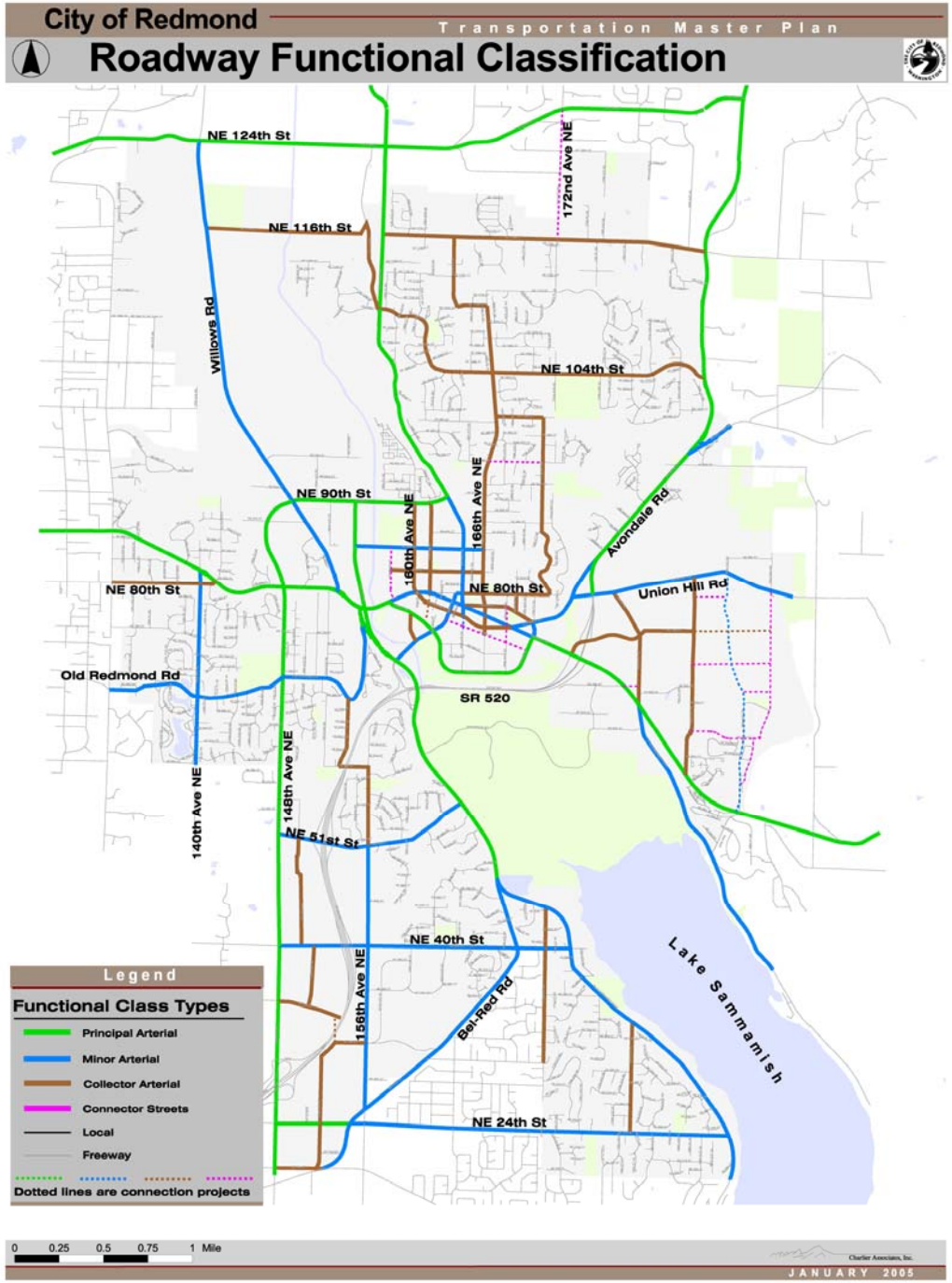
Things You May Have Wondered About

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

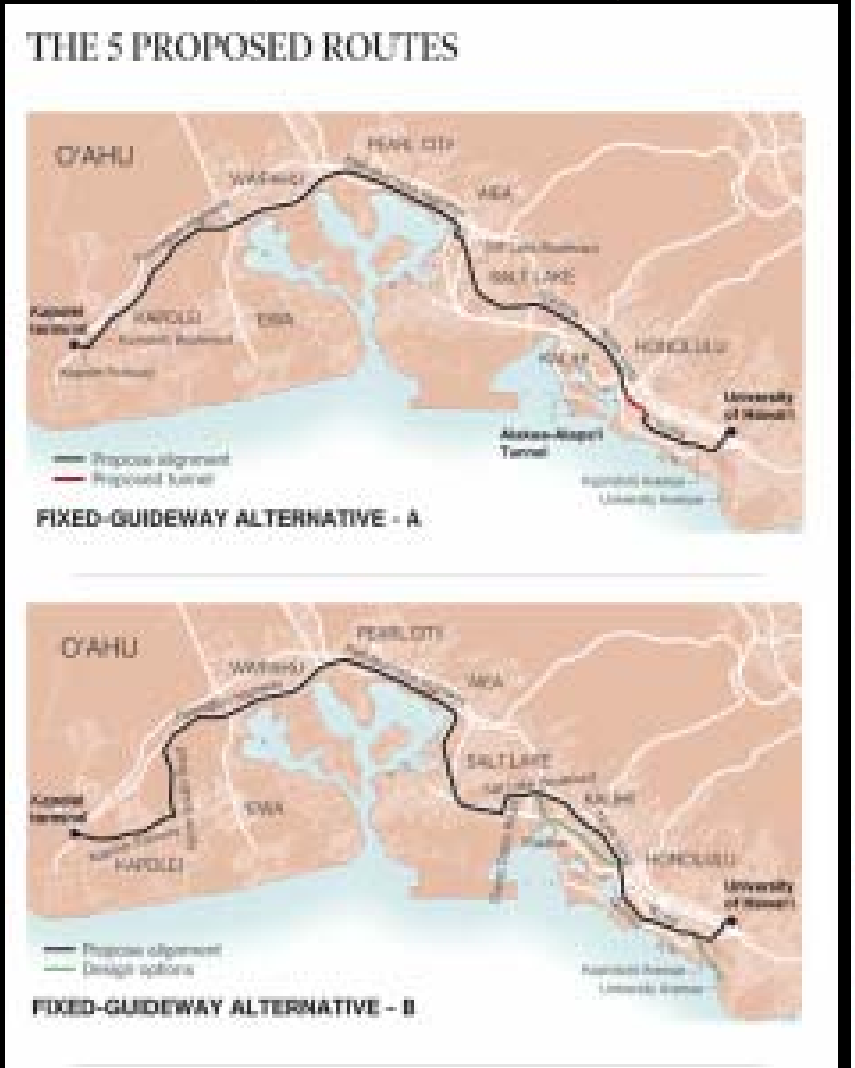
Common Uses of Models

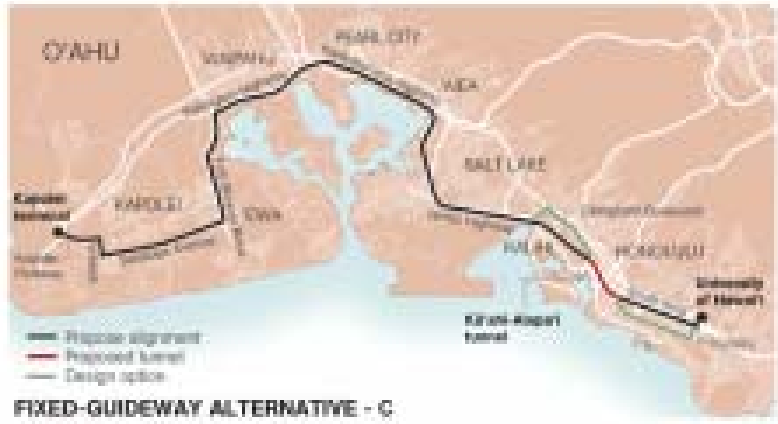
Plan & Prioritize Street Networks

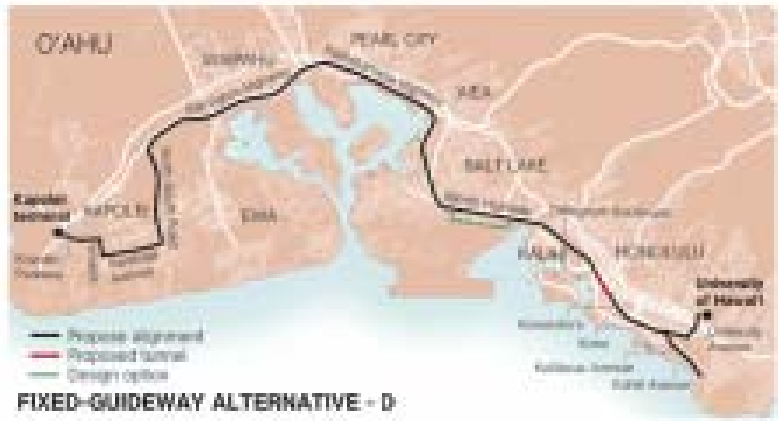


Common Uses of Models

Evaluate Rail Projects (AA/EIS)

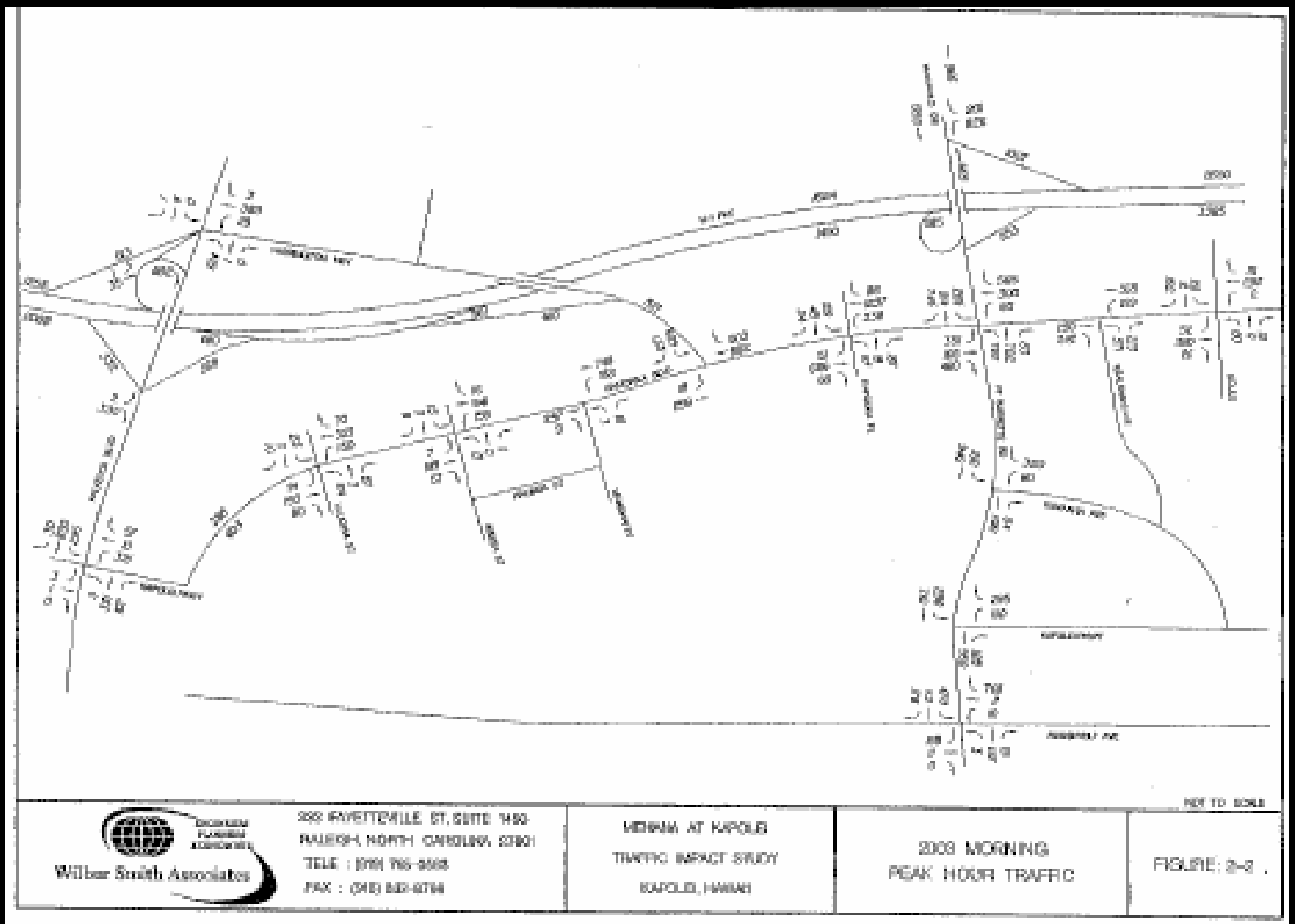






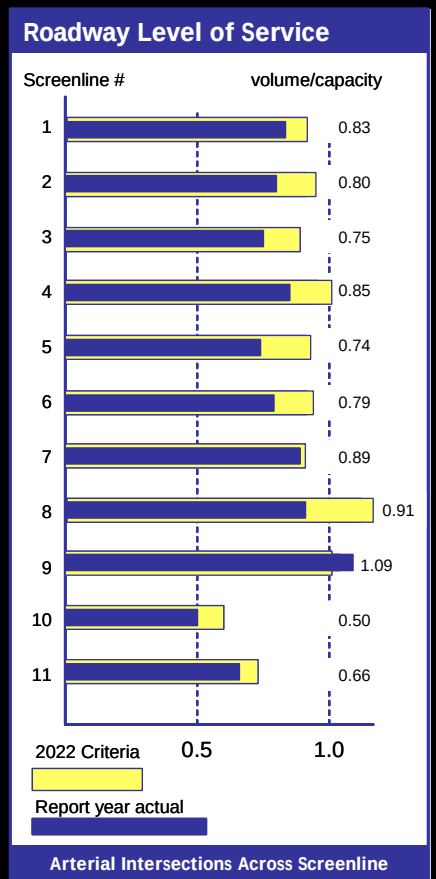
Common Uses of Models

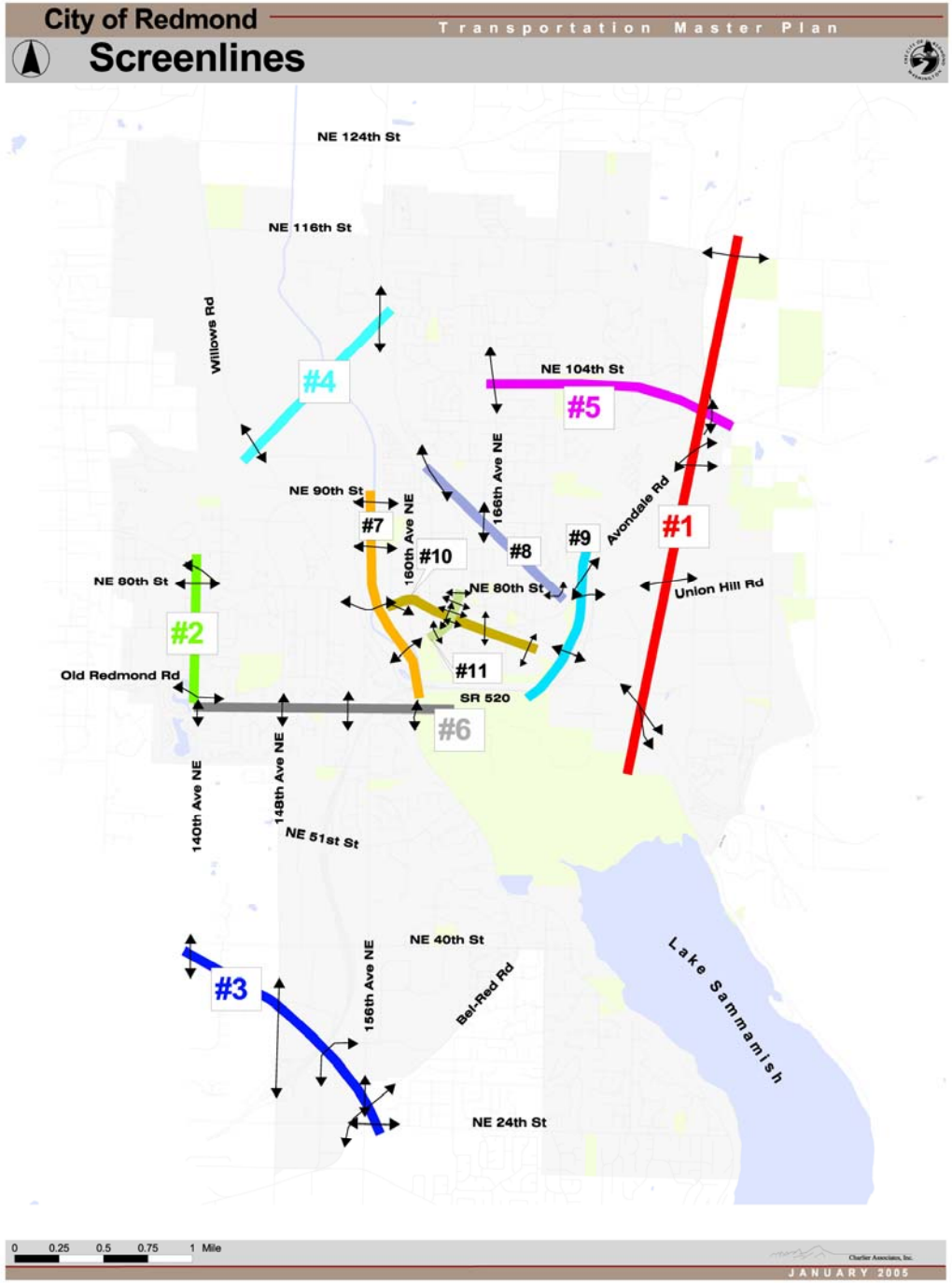
Basis for Traffic Impact Studies



Common Uses of Models

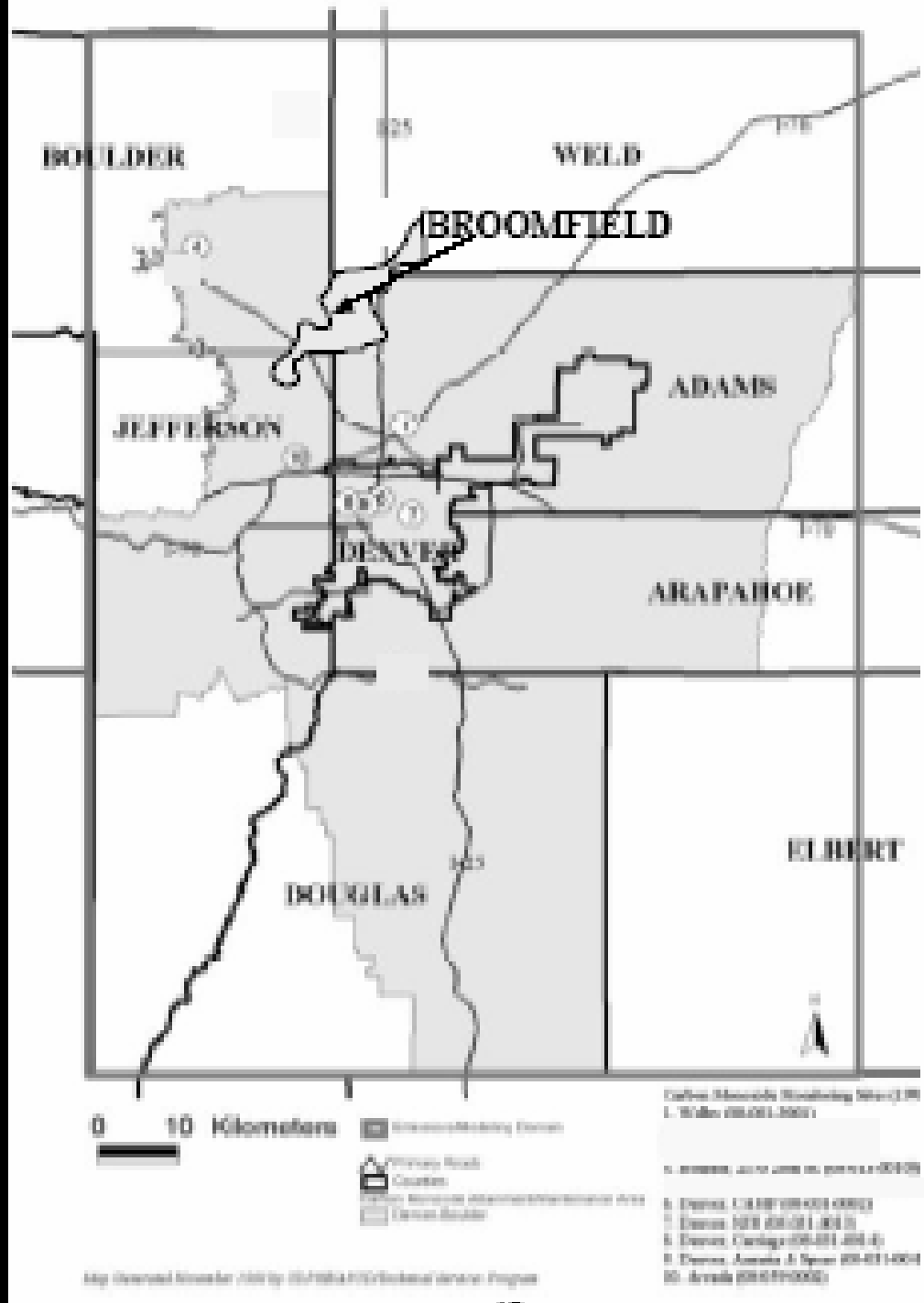
Growth Management Systems





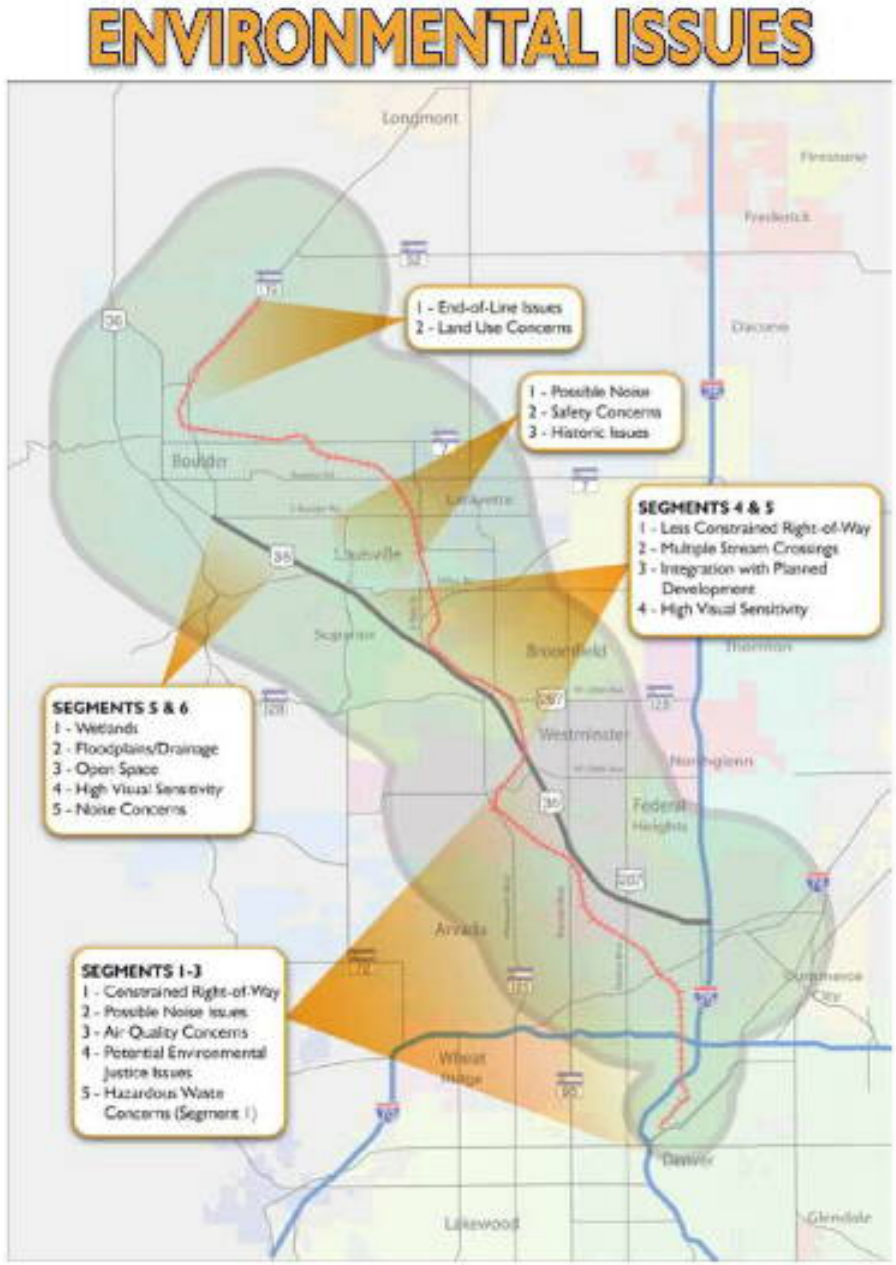
Common Uses of Models

Air Quality Management



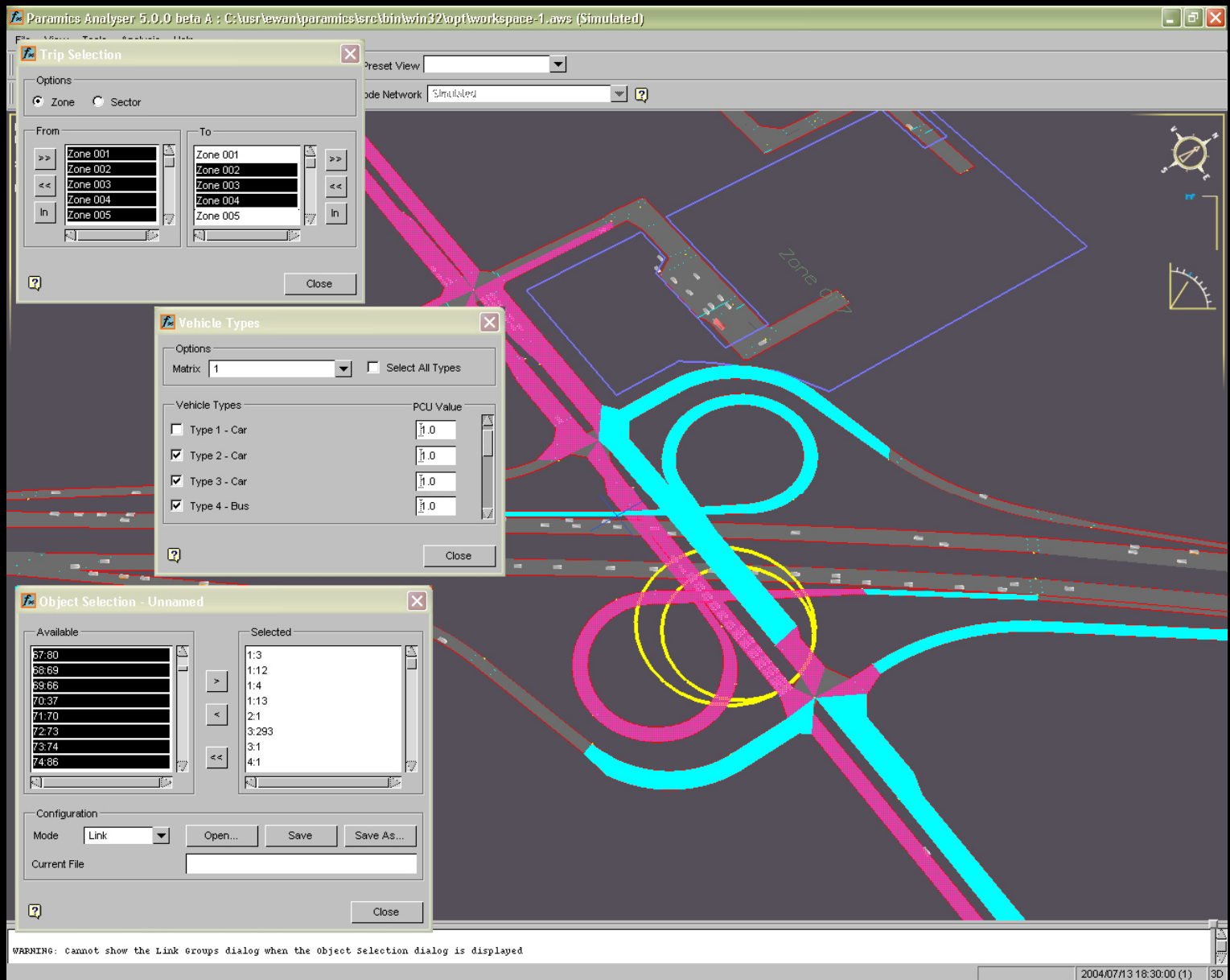
Common Uses of Models

Environmental Impact Analysis



Common Uses of Models

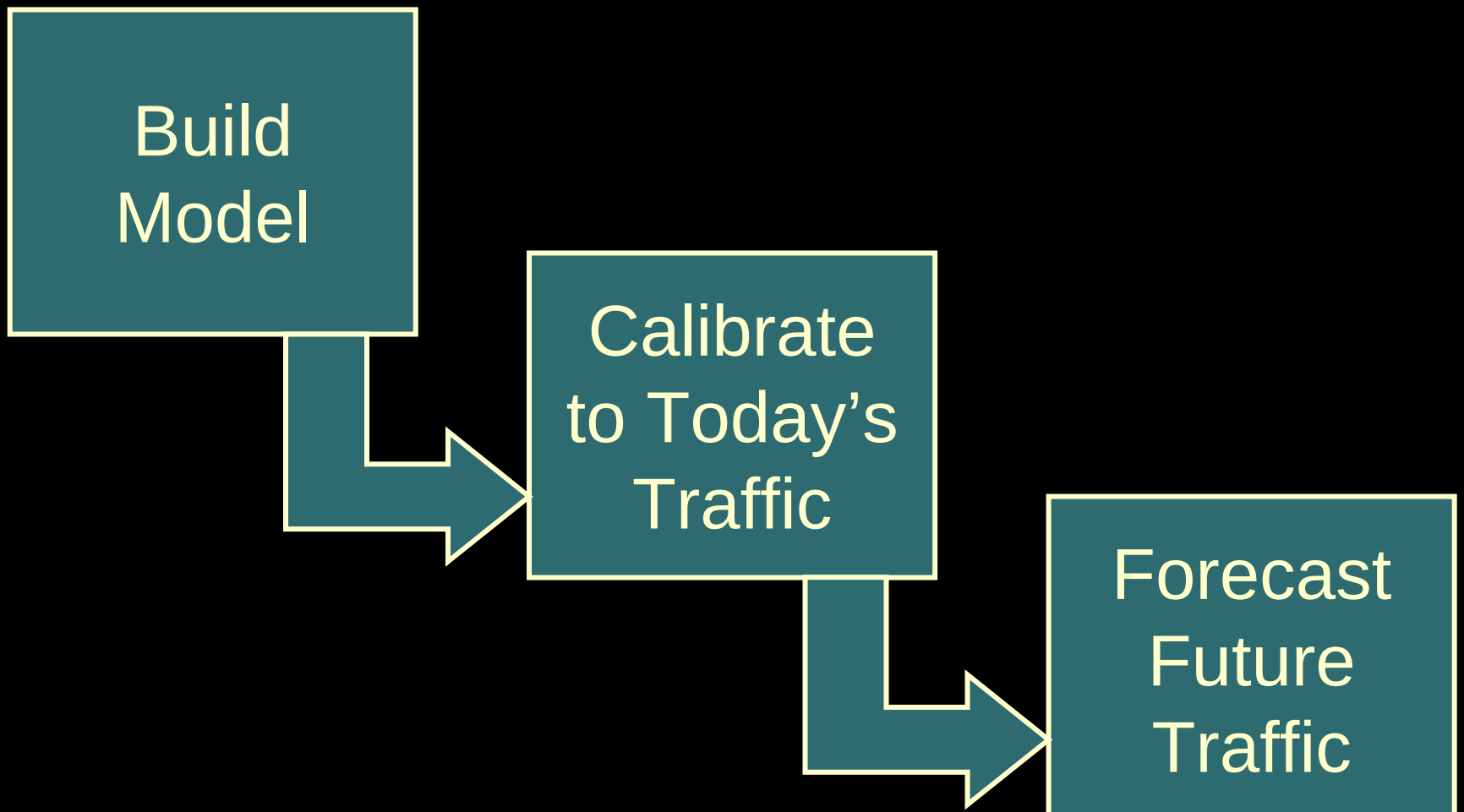
Intersection & Corridor Studies



How Accurate are Models?

Things You May Have Wondered About

Modeling Process

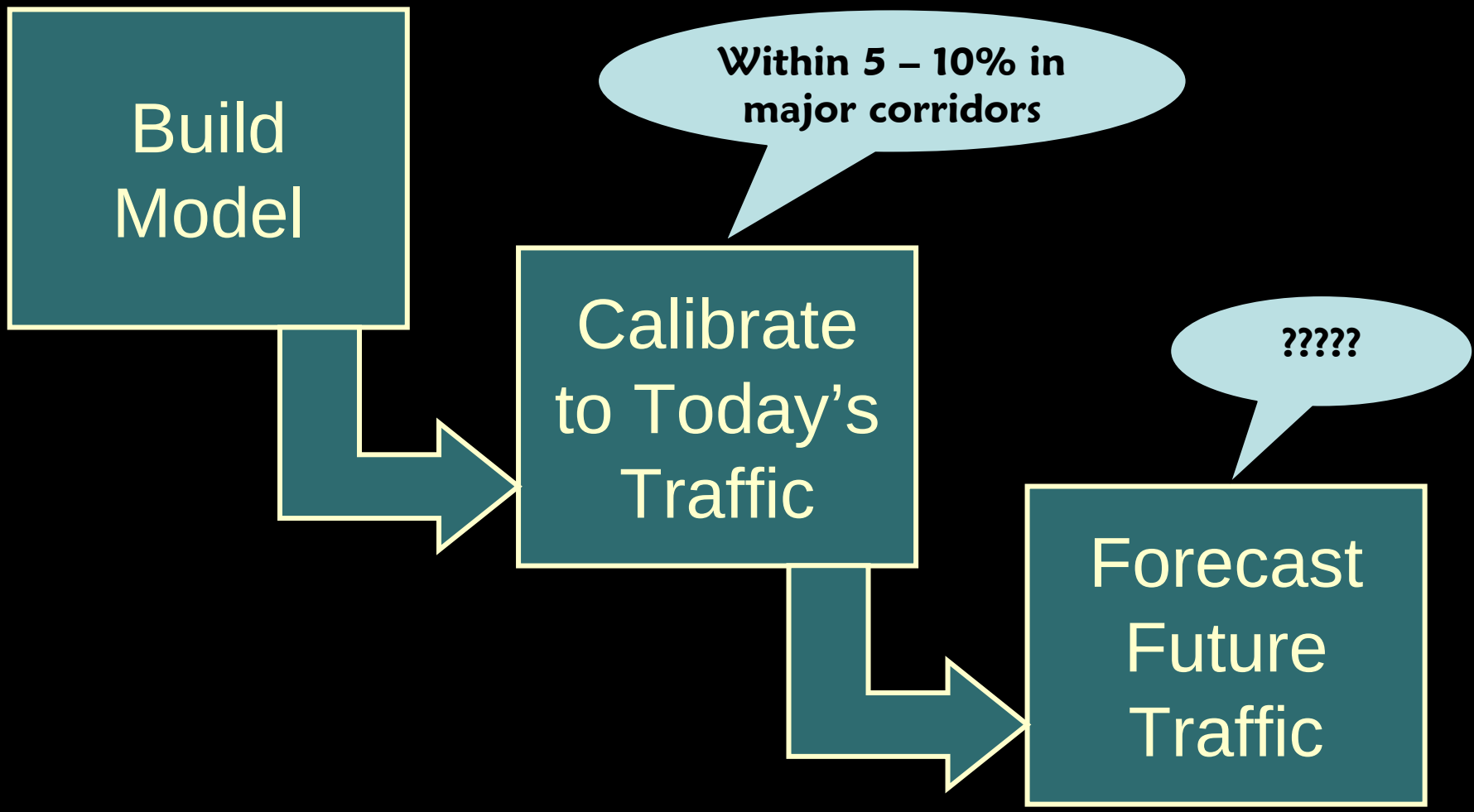


"Acceptable" Error - Calibration

- 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



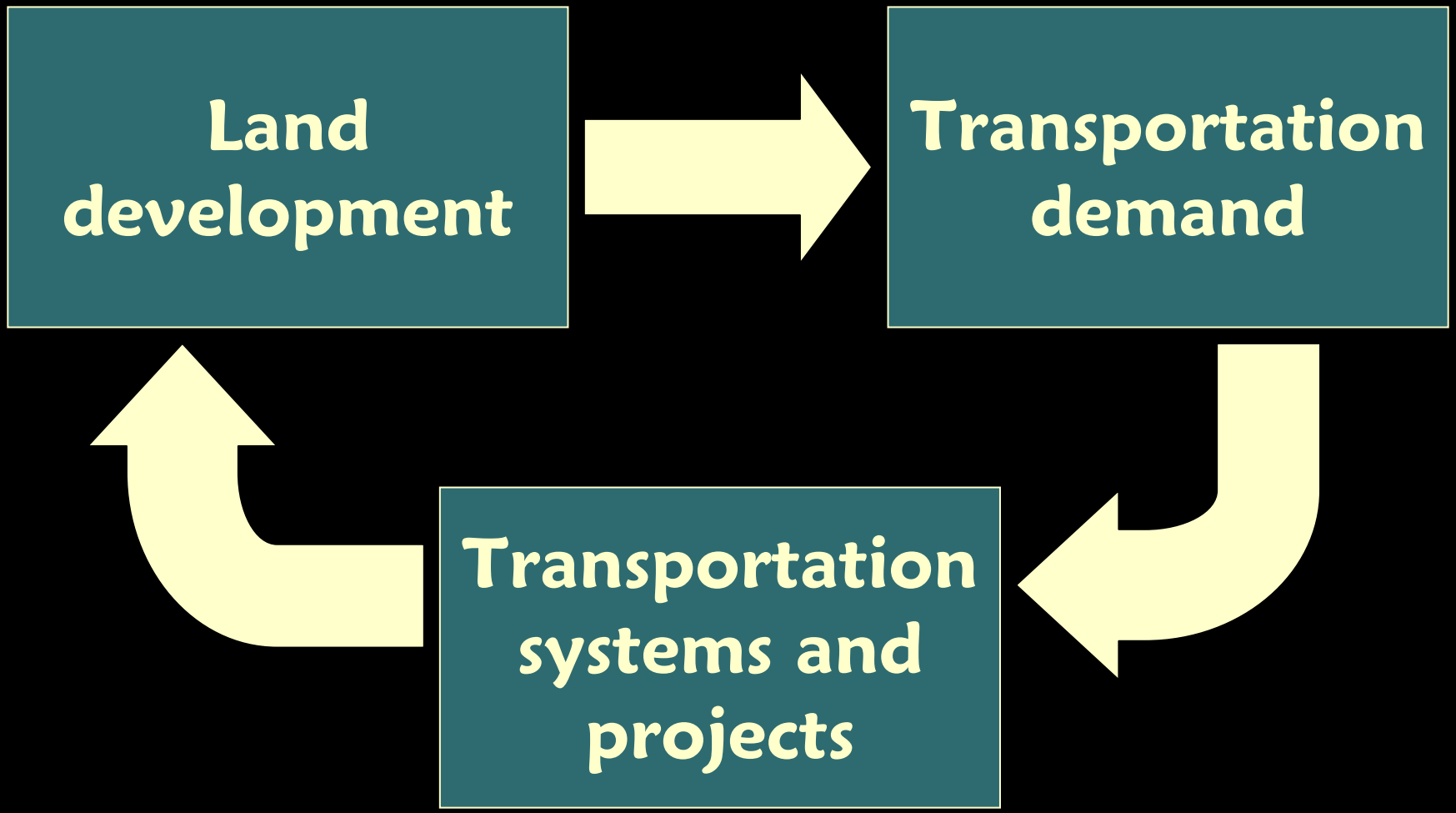
How Good Are Models At What They Are Designed To Do?

Things You May Have Wondered About

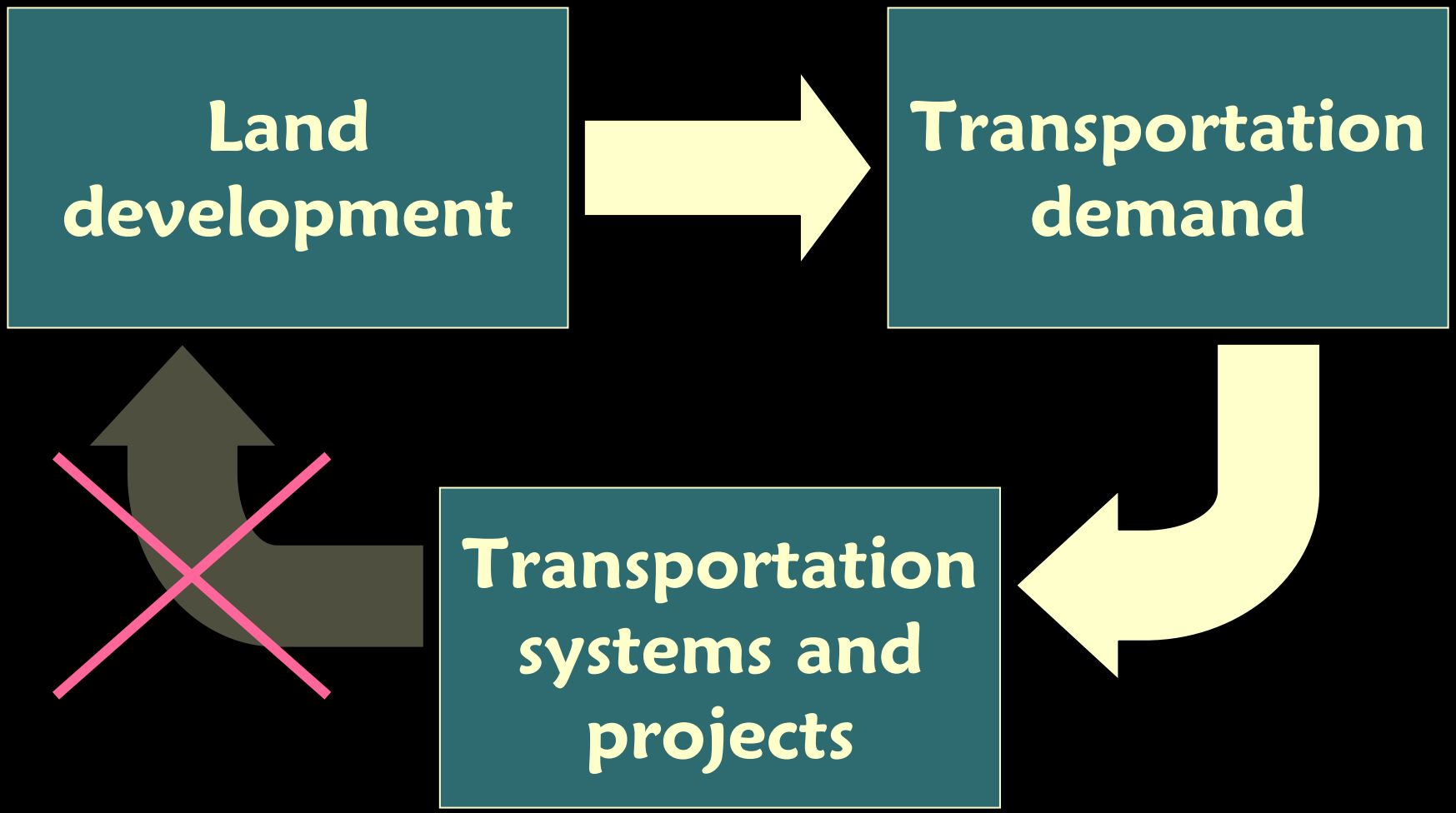
How Good Are They?

- 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

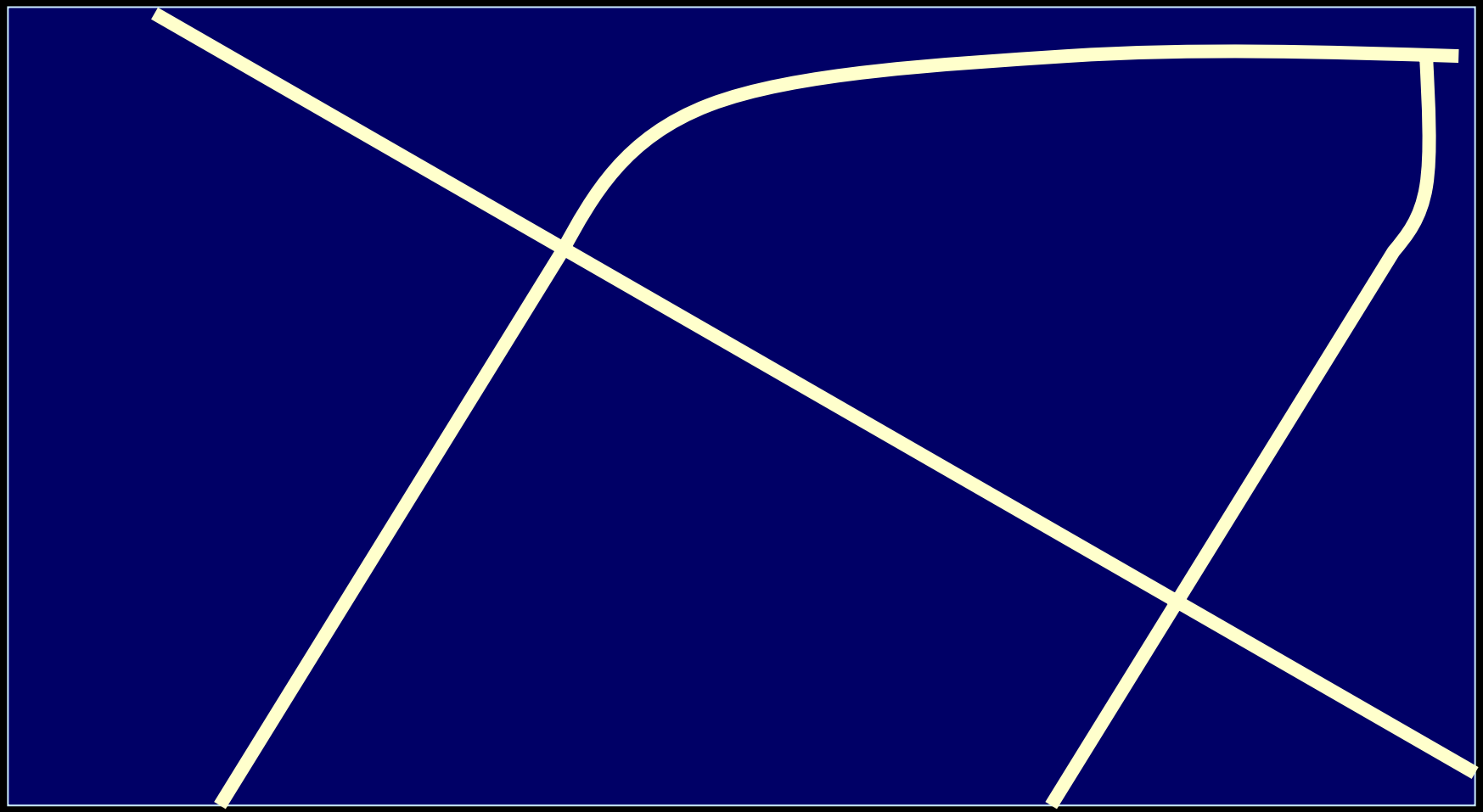
Changes in time of travel ..... no

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?

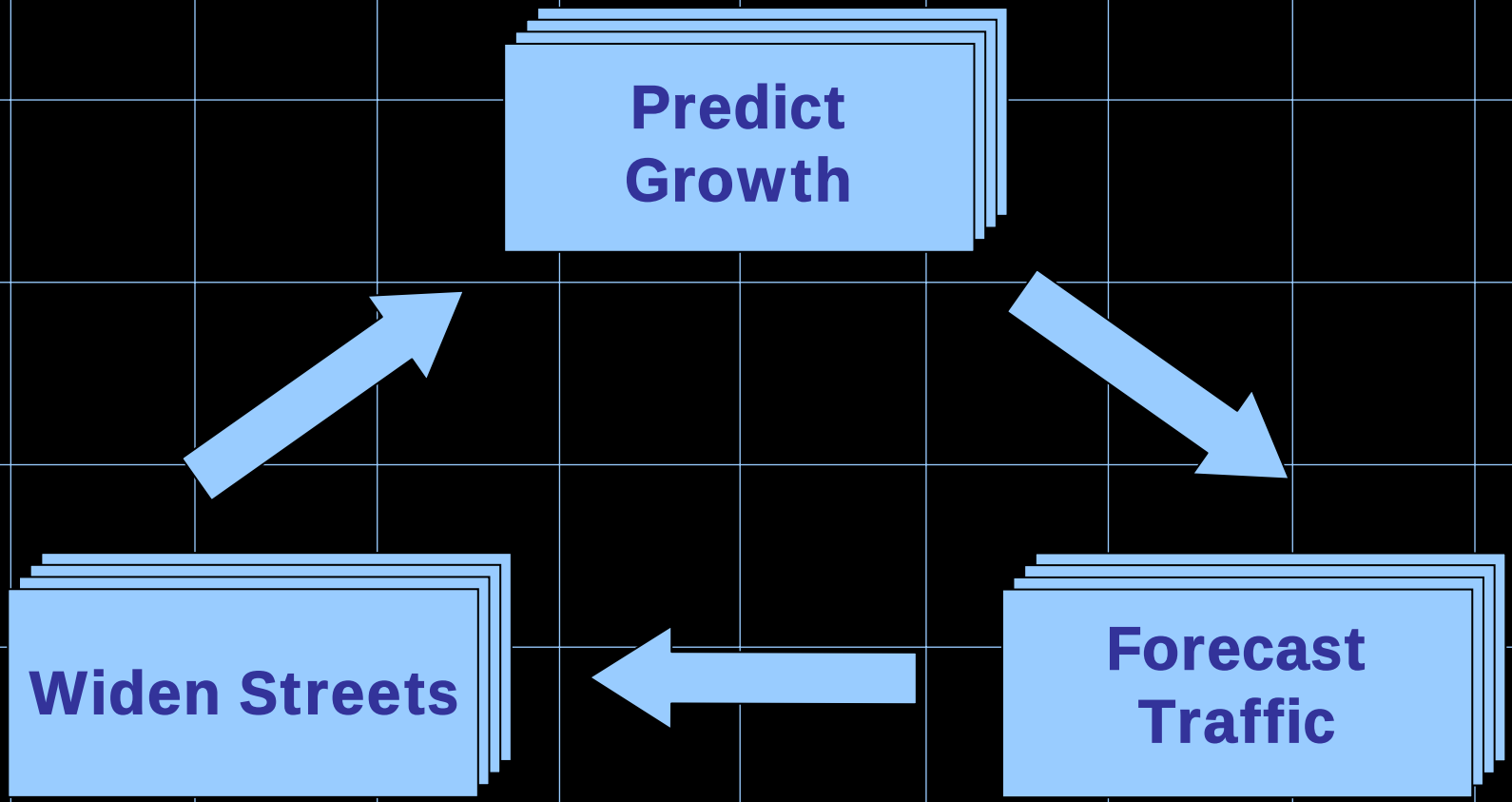
Selective Focus –
The Doctrine of Apparent Precision

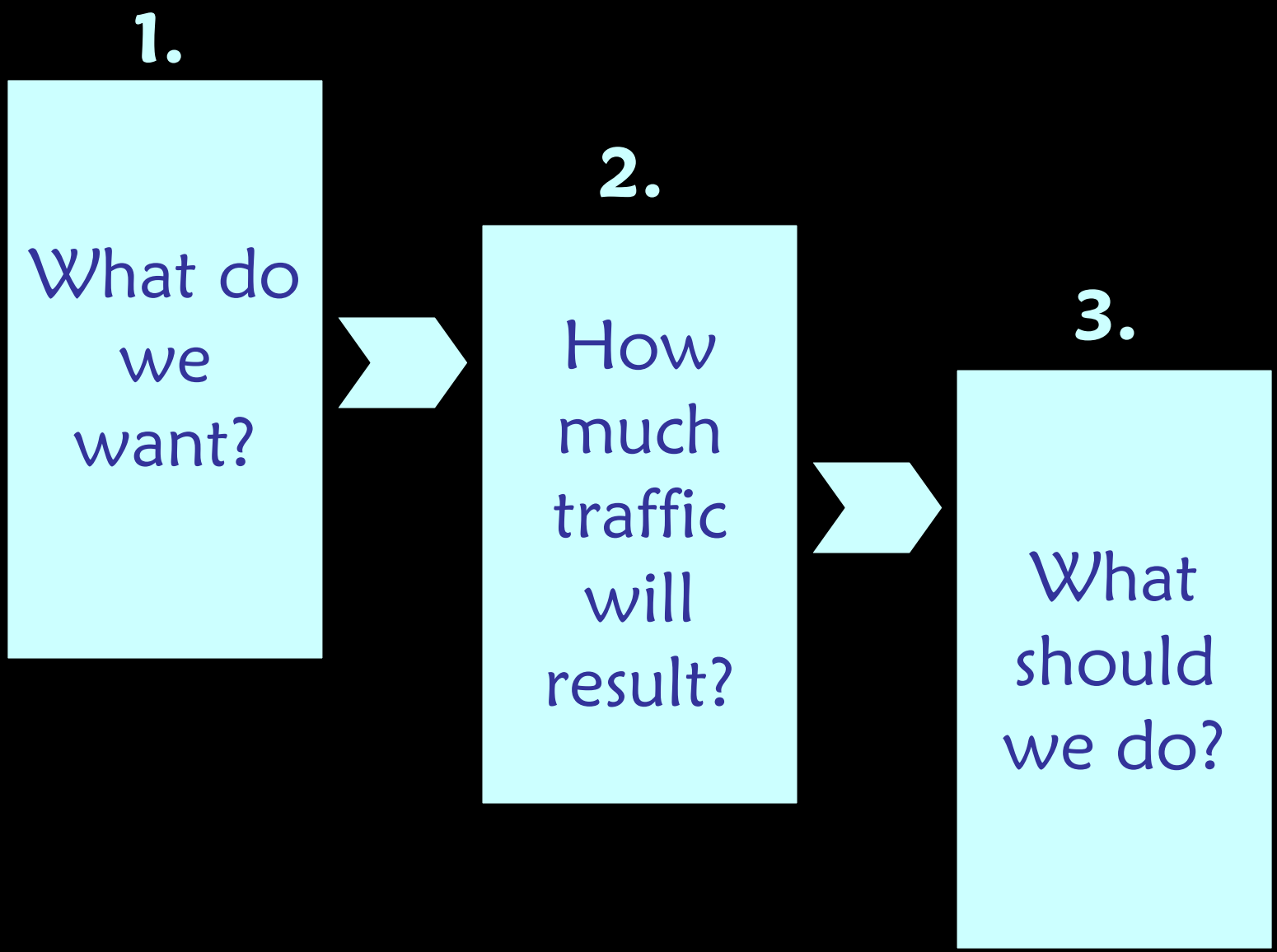
Criterion	Definition	Data
#1	fuzzy	none
#2	vague	weak
#3	specific	lots
#4	vague	none
#5	fuzzy	none
#6	none	weak

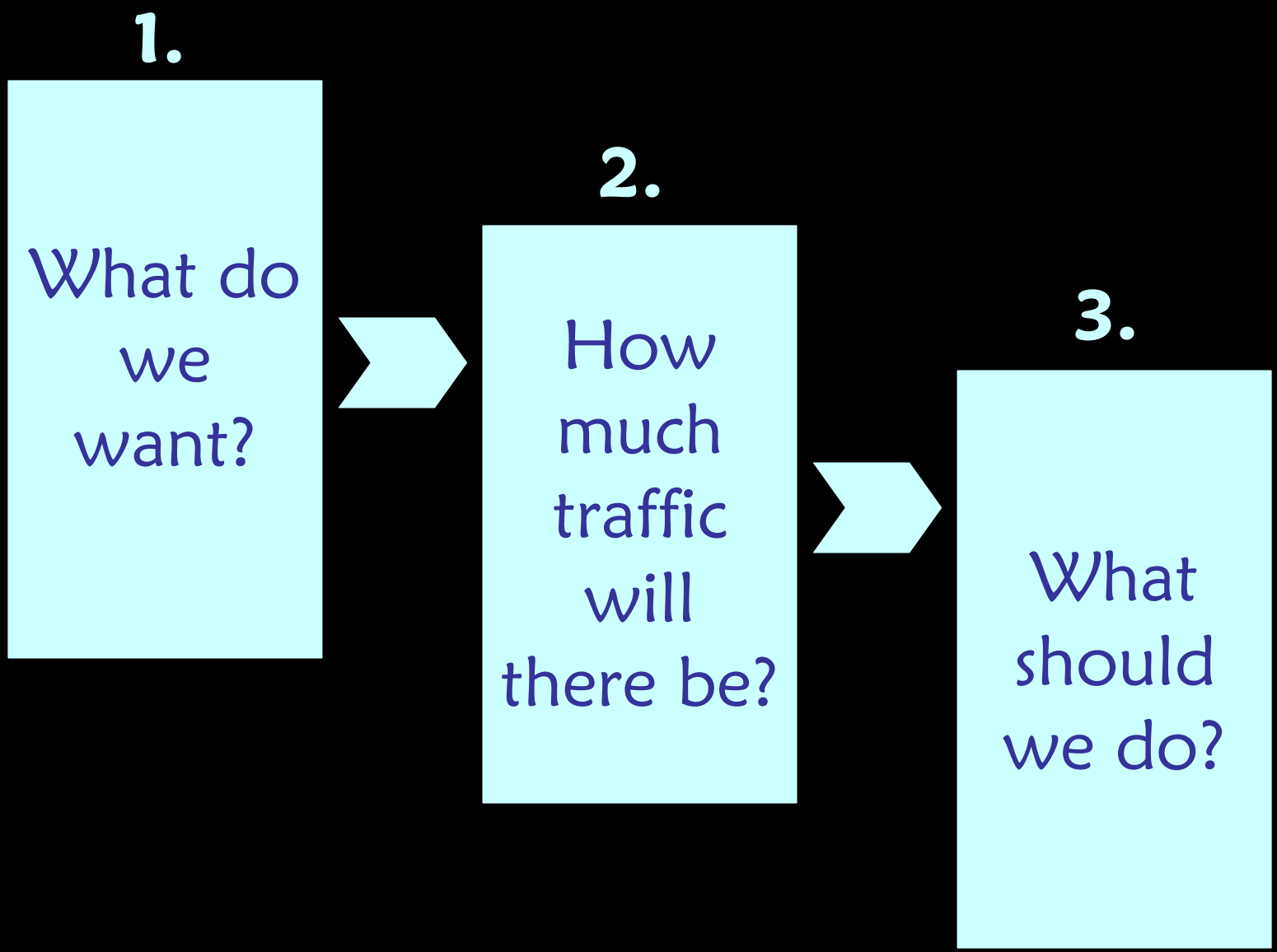
Selective Focus –
The Doctrine of Apparent Precision

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

Traffic Forecasting ≠ Planning


Predict Growth
Forecast Traffic
Widen Streets


1.
What do we want?
2.
How much traffic will result?
3.
What should we do?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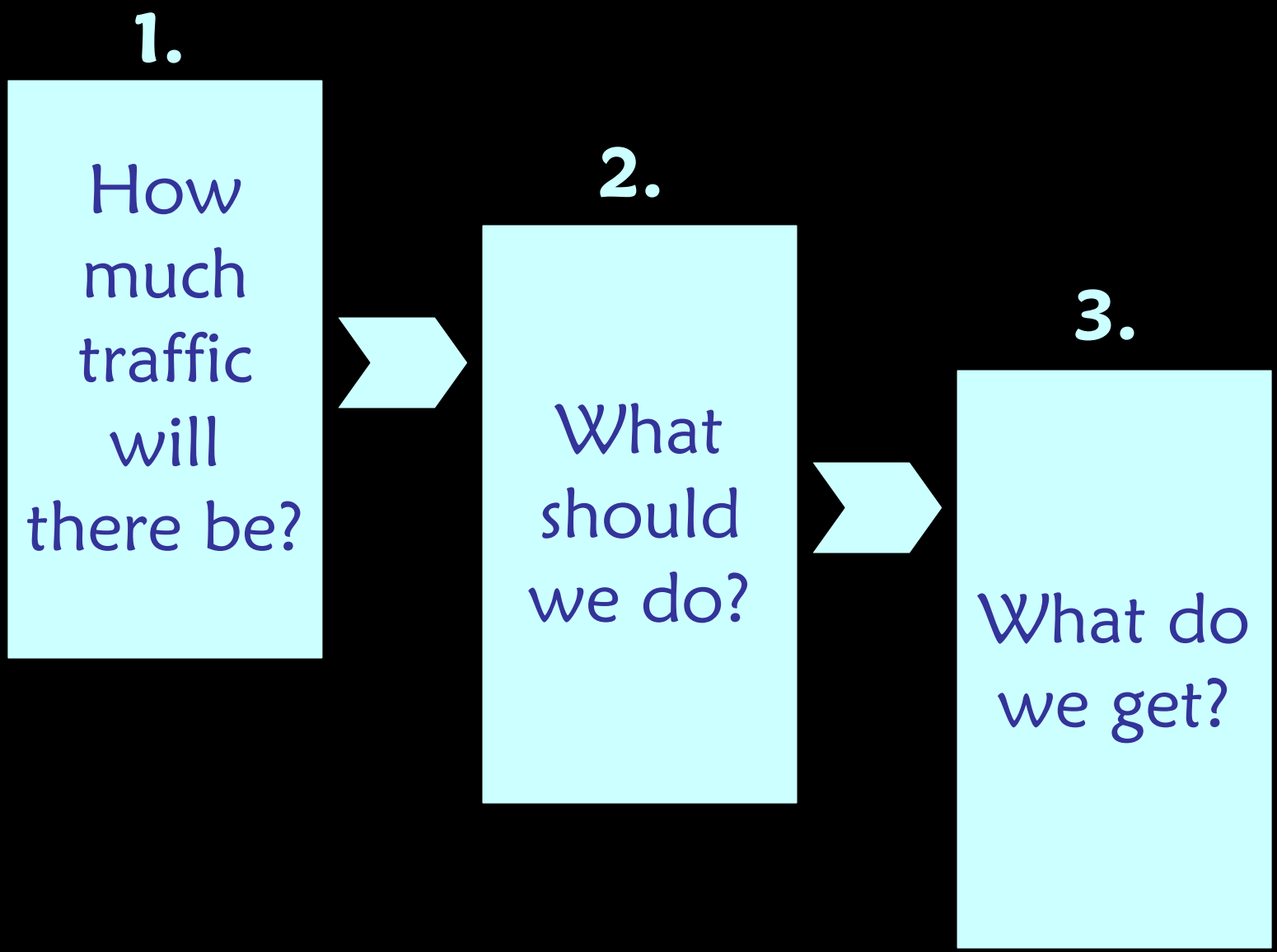
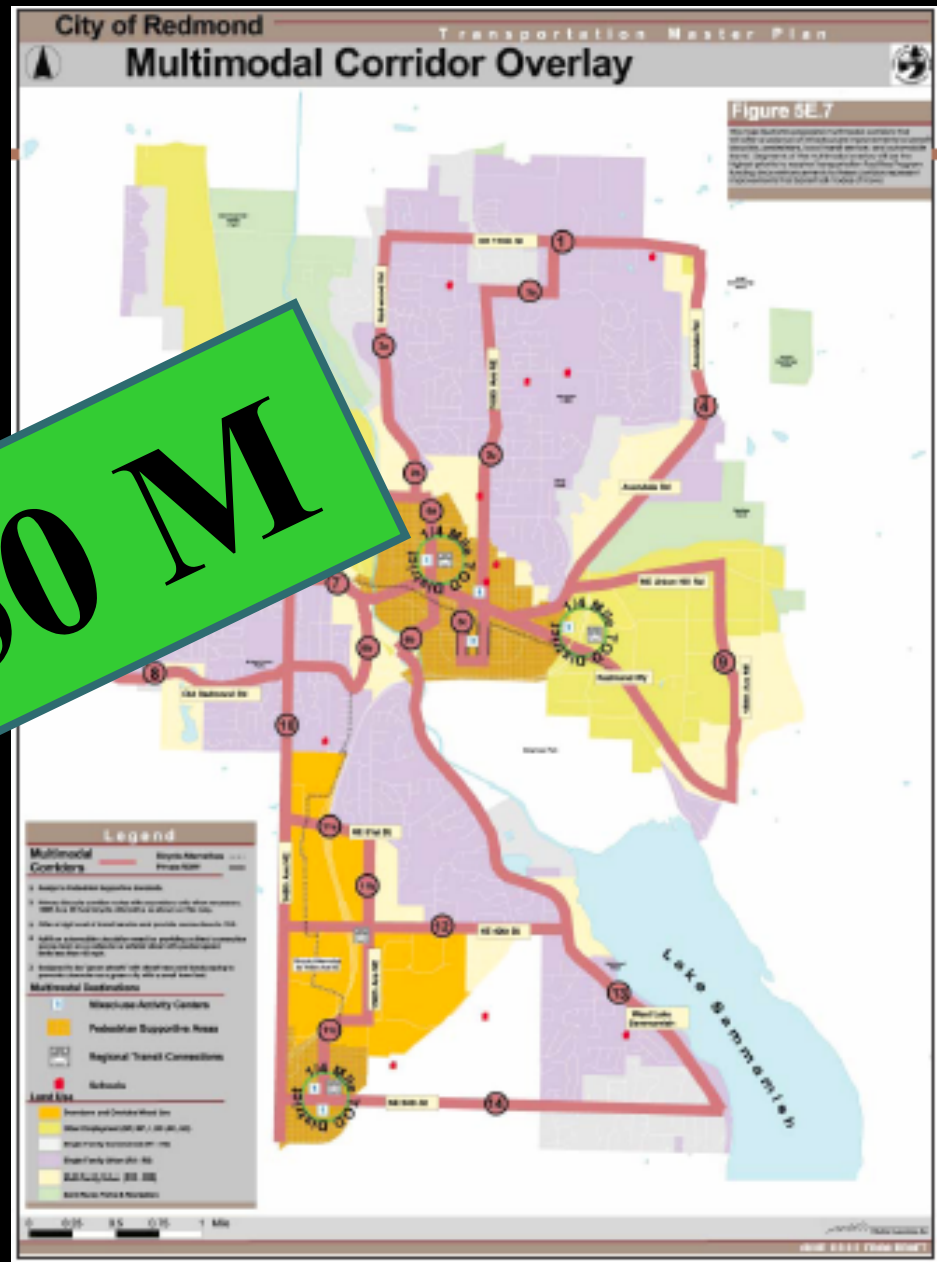

1.
How much traffic will there be?
2.
What should we do?
3.
What do we get?

Redmond, WA



$250 M

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

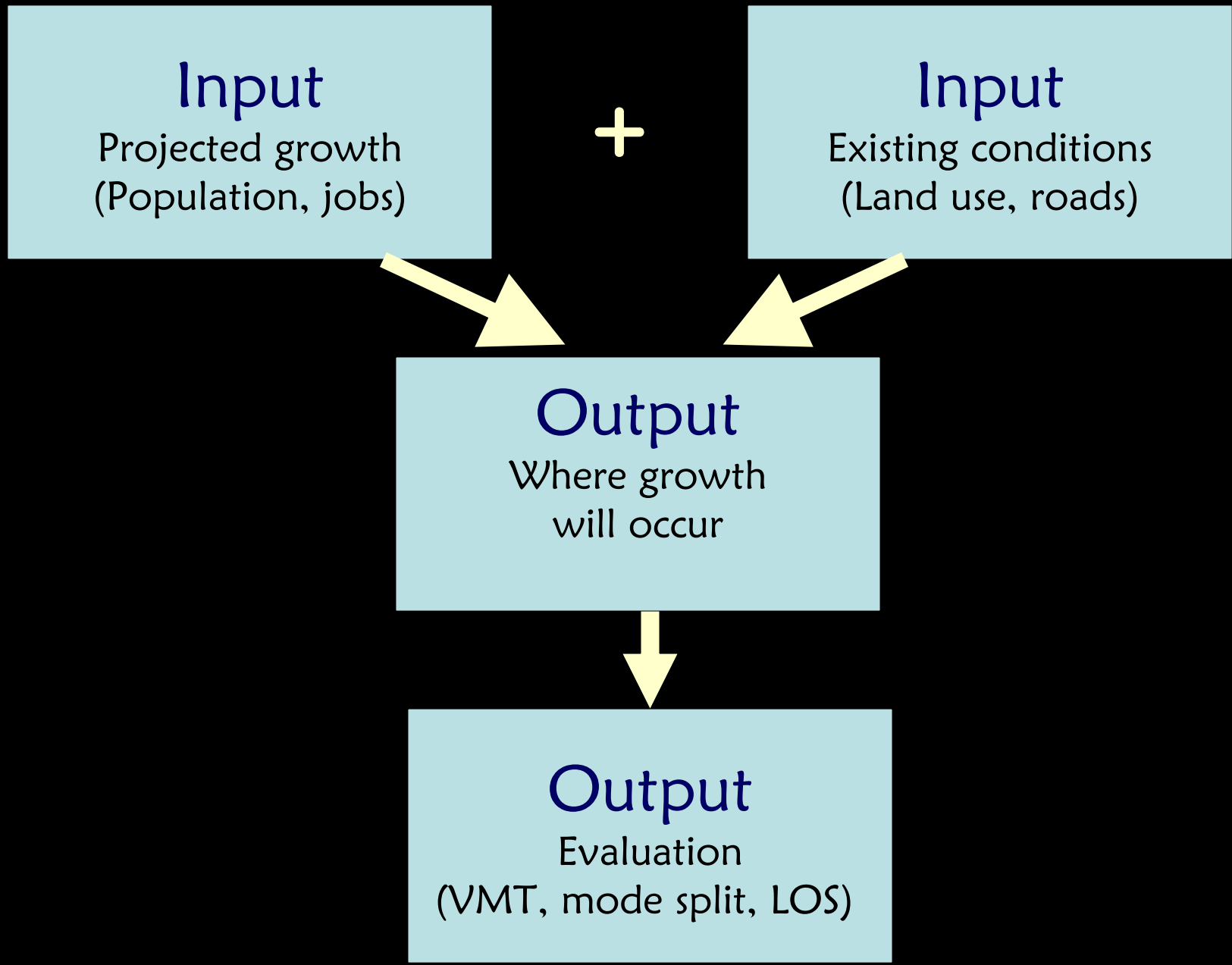
Programs now provide the ability to

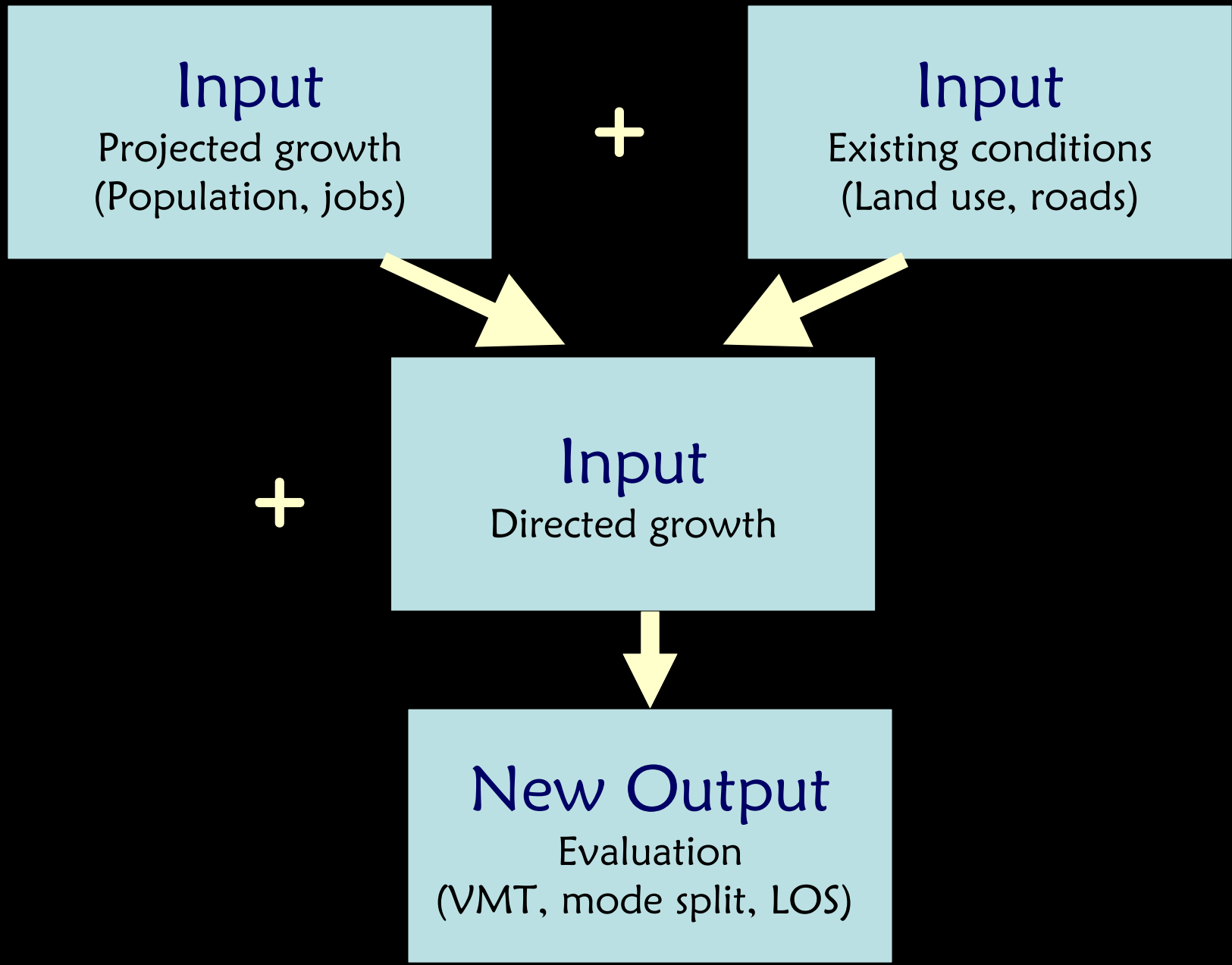
visualize

and

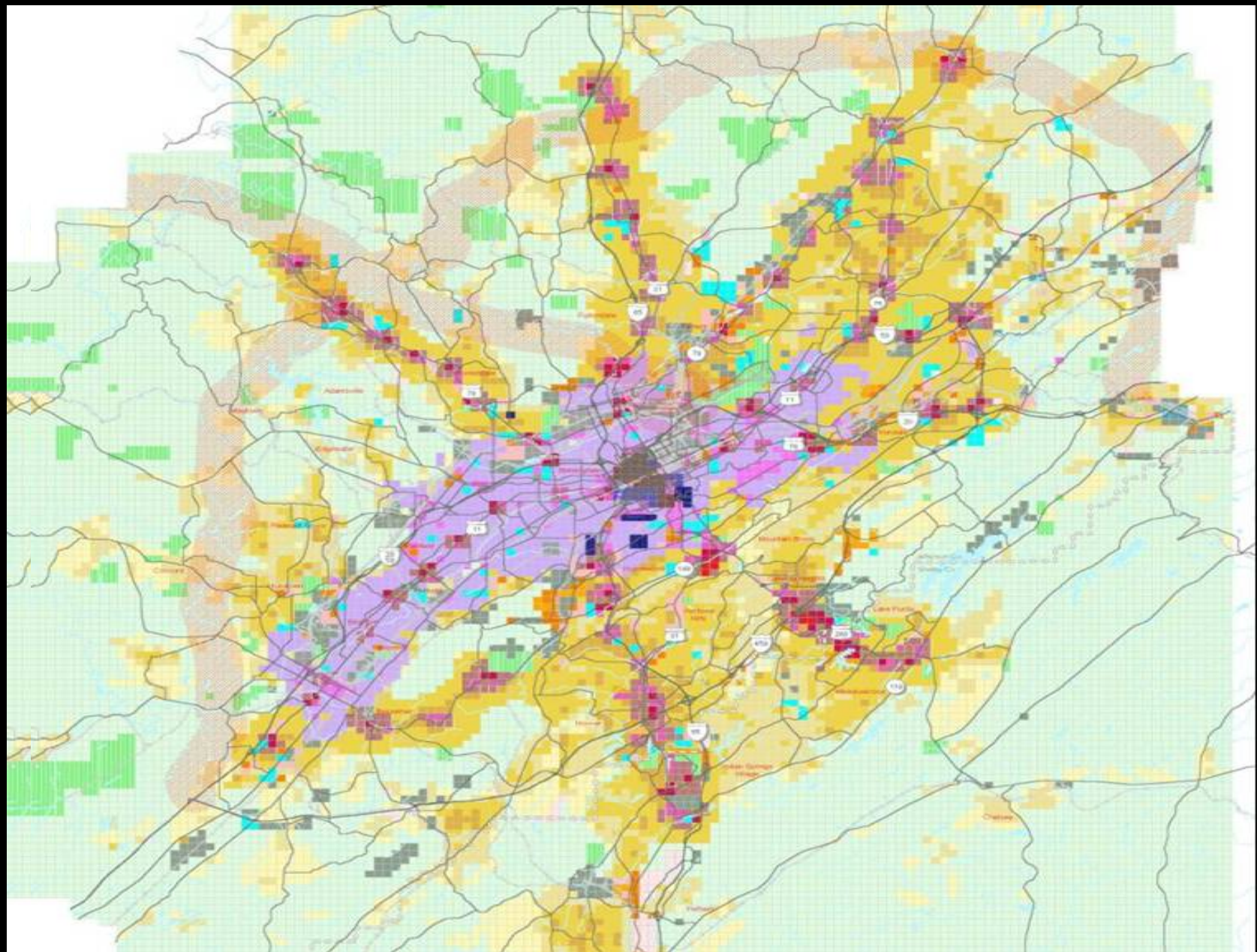
evaluate

development scenarios

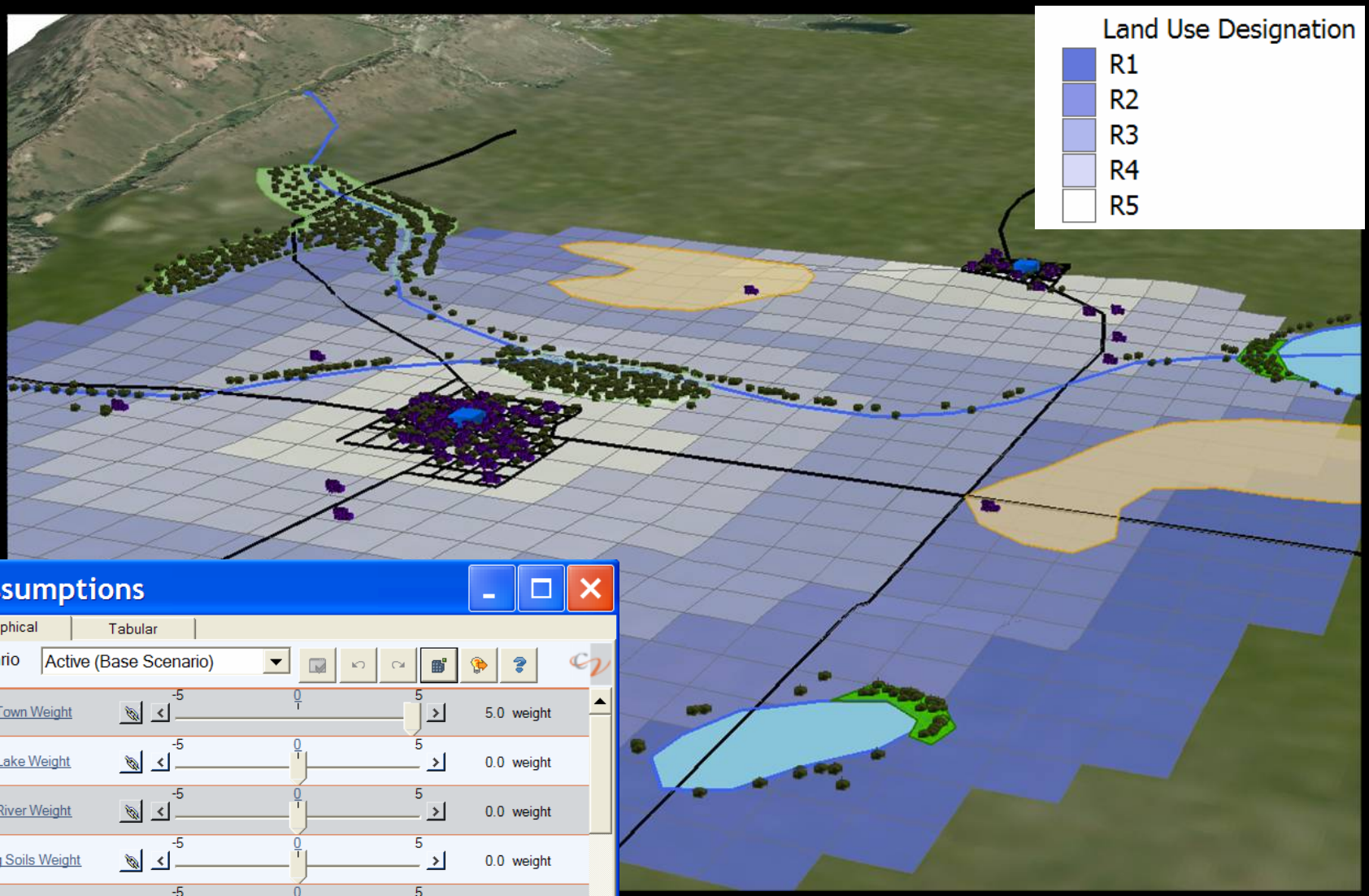

Input
Projected growth
(Population, jobs)
+
Input
Existing conditions
(Land use, roads)
Output
Where growth
will occur
Output
Evaluation
(VMT, mode split, LOS)


Input
Projected growth
(Population, jobs)
+
Input
Existing conditions
(Land use, roads)
+
Input
Directed growth
New Output
Evaluation
(VMT, mode split, LOS)

CorPlan- Renaissance Planning Group

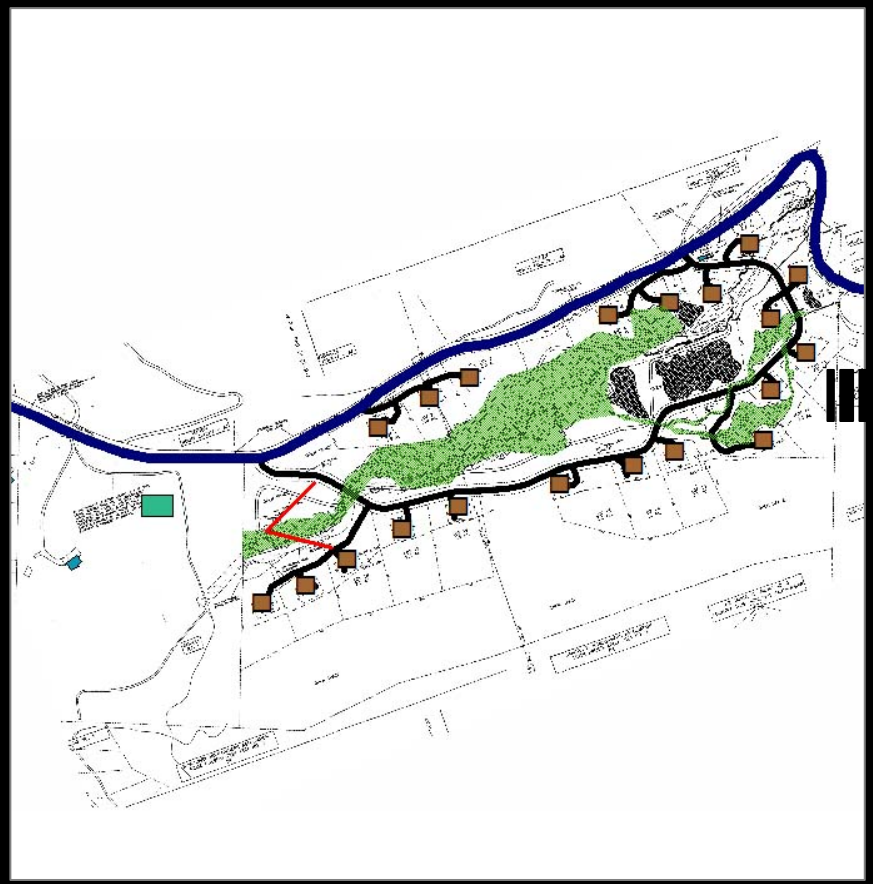


CommunityViz



Source: CommunityViz

2D Maps into Interactive 3D Scenes



Source: CommunityViz

Paint the Region

Source: Citerion Planners

SketchUp- Visual Modeling