Vector Driven Spatial Analysis

Spatial Analysis Defined

- GIS-Geography driven
- Subset of Decision-support
- Return on Investment
- Tools for Automating and Templating
  - ModelBuilder ESRI ArcGIS 9
  - CommunityViz Scenario 360

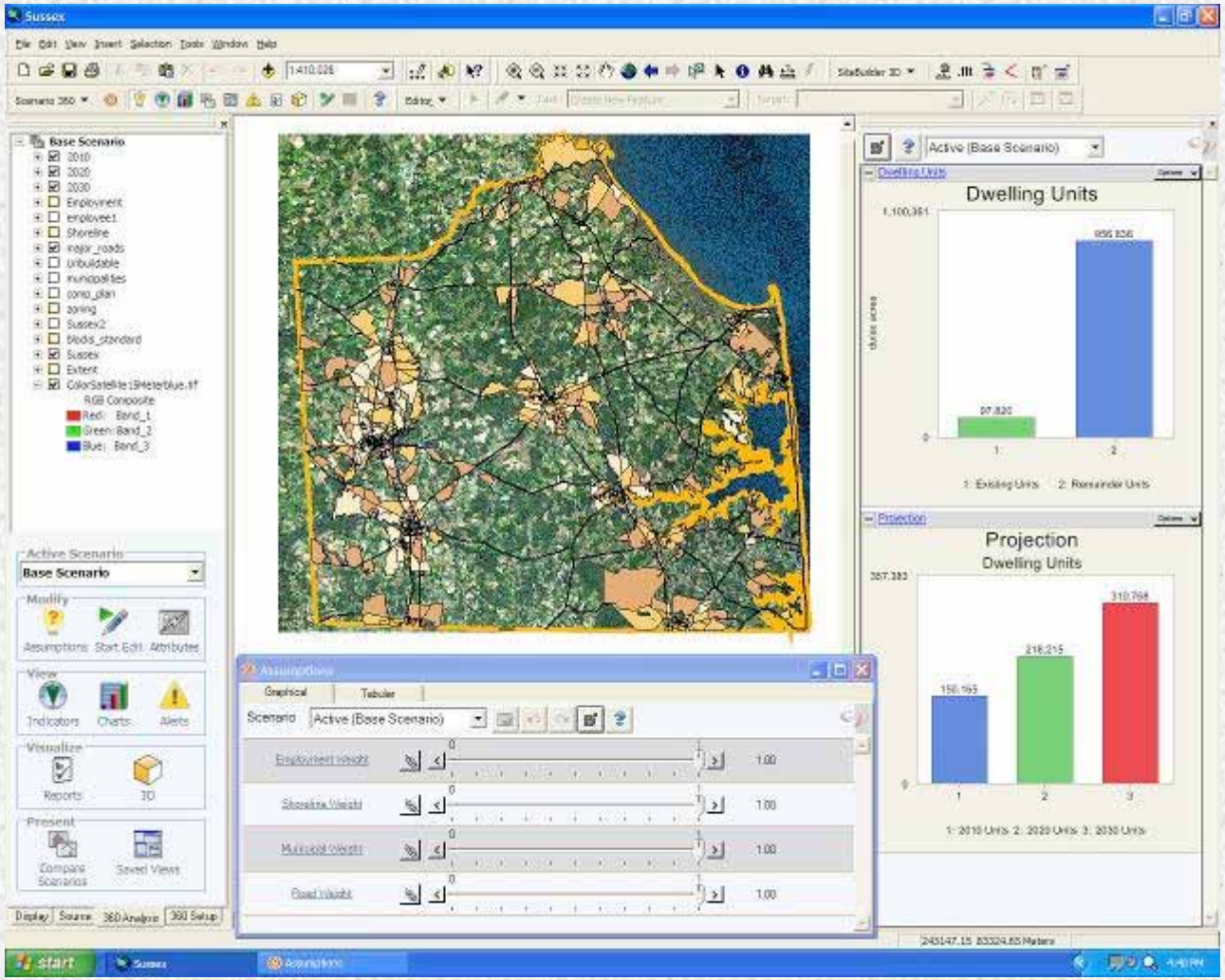
Spatial Analysis Questions

- How many dwelling units in land use plan?
- Where is the best place to build a highway?
- How much land protected as wetlands?
- When will a new park be needed?
- Will more retail balance the budget?
- How much will the proposed tree thinning cost?
- Will this transit stop serve enough riders?

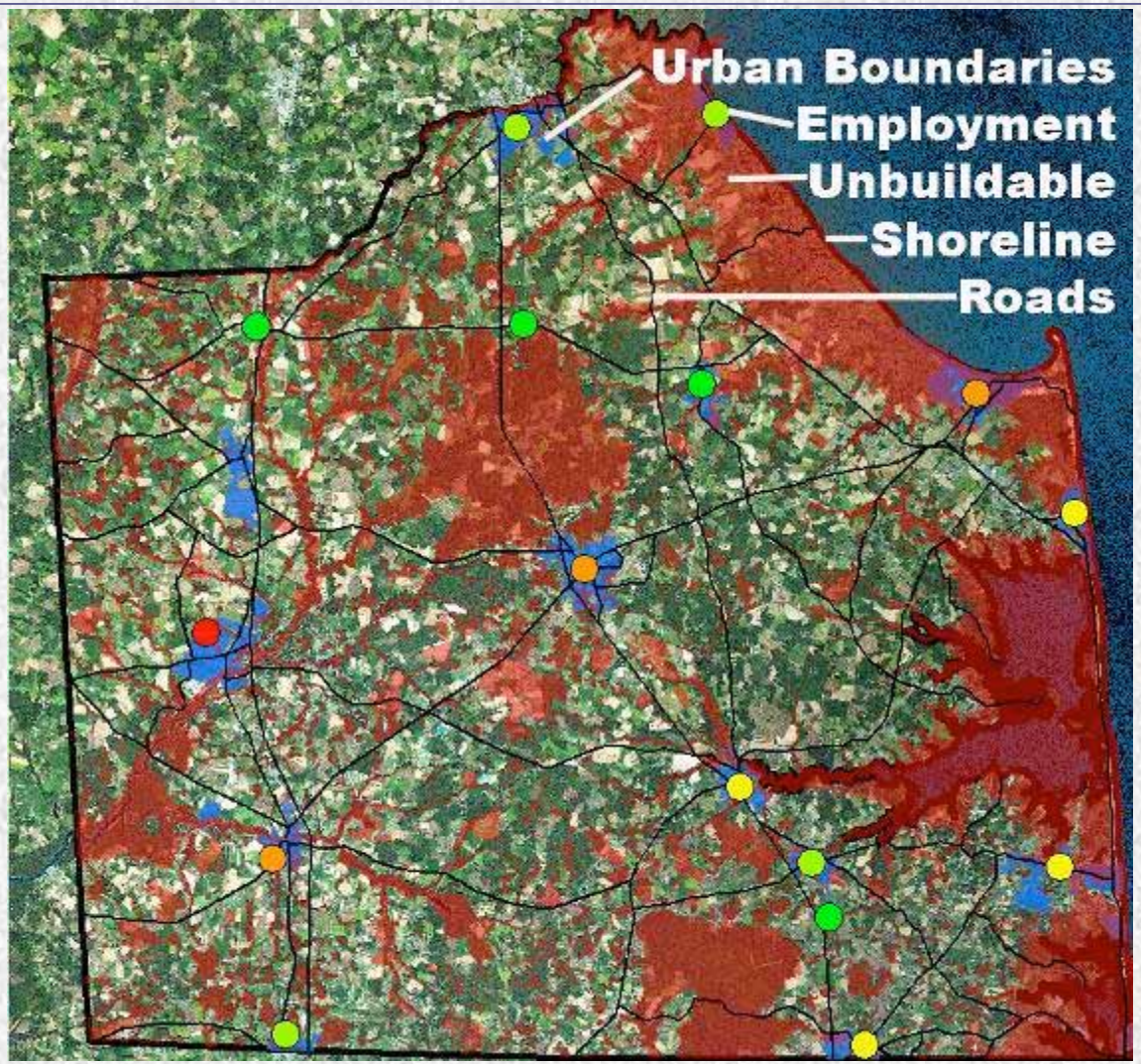
Spatial Analysis Topics

- Vector versus Grid
- Basis of Analysis
- Diagrams
- Changing assumptions
- Dynamic revisions
- Scenario planning

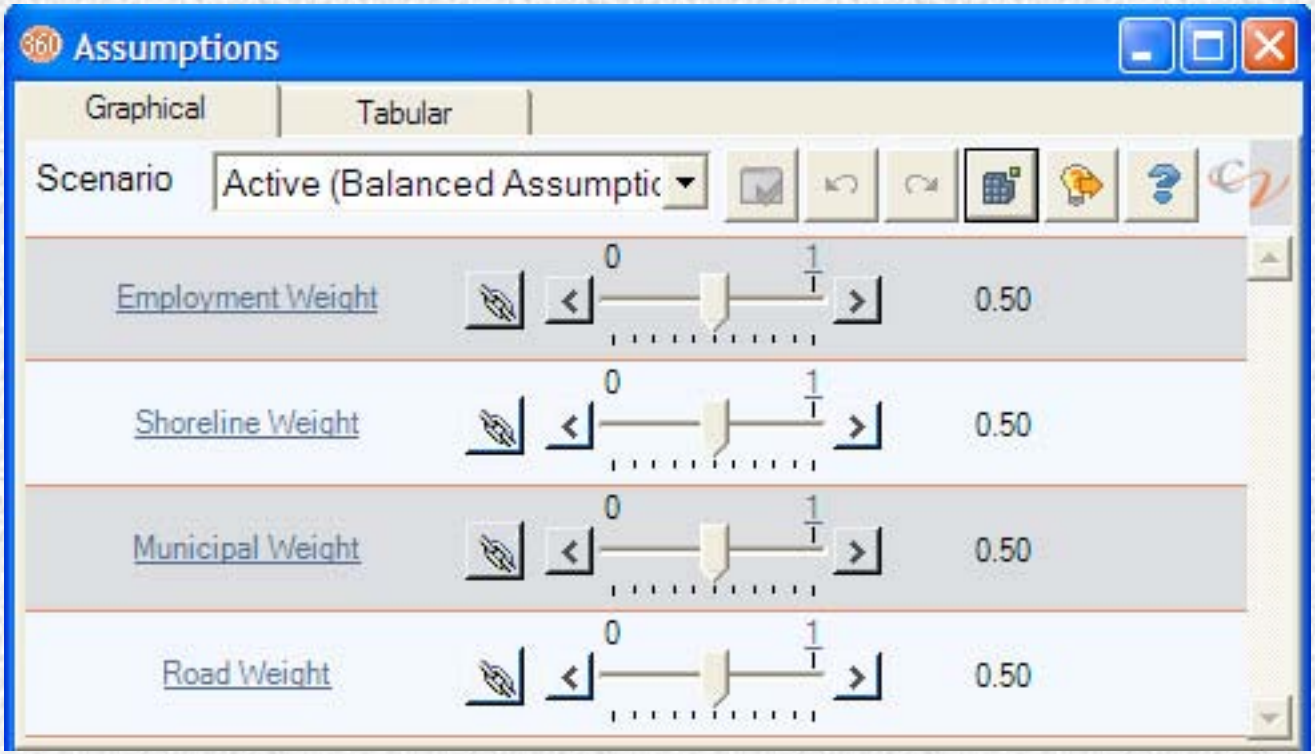
Sussex, DE-Forecast



Sussex-Growth Factors

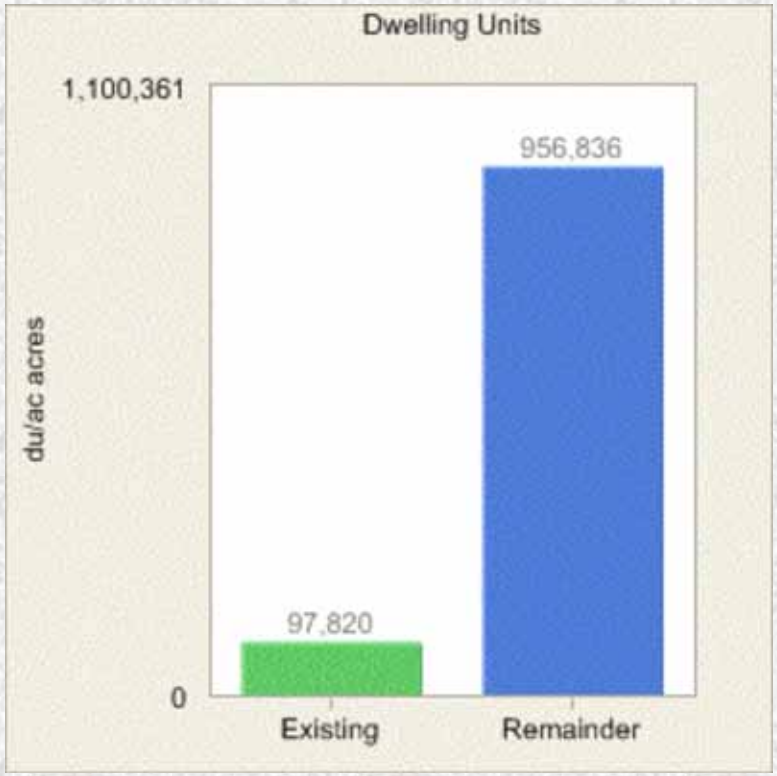


Sussex-Assumptions

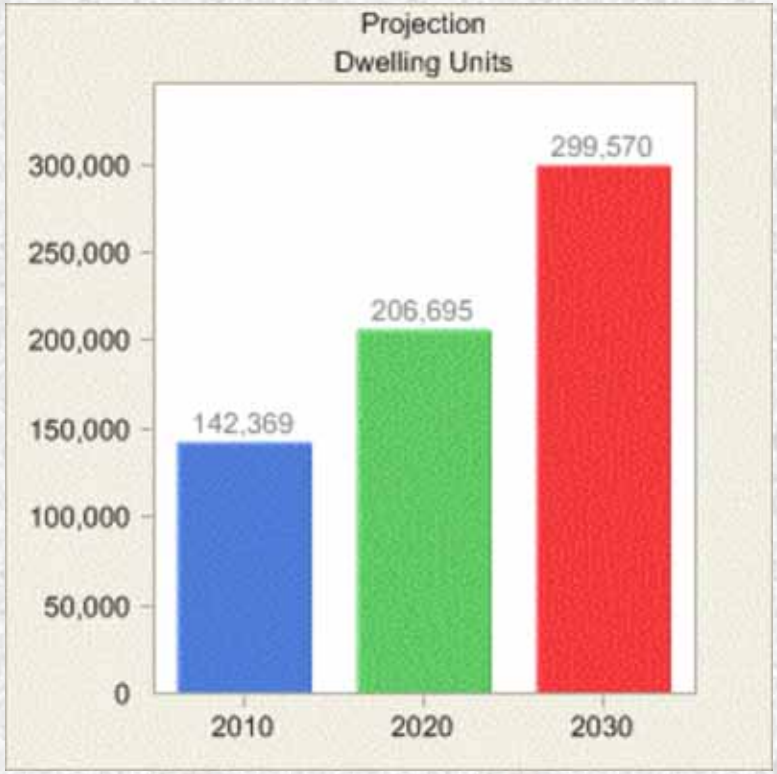


Sussex-Results

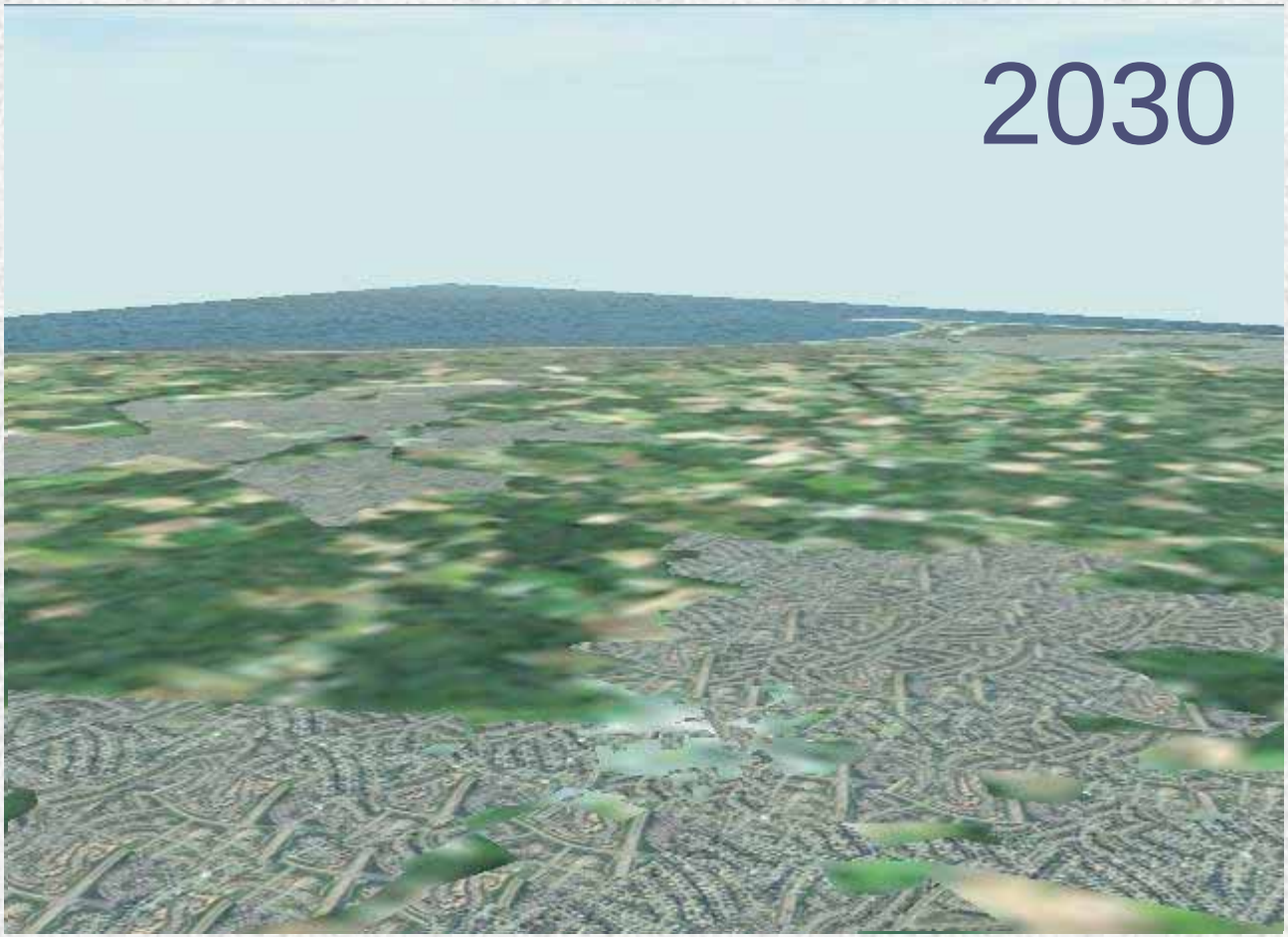
- Build-out



- Forecast



Sussex-Visualization



C:\CVFiles\Sussex\Reports

Sussex-Techniques

- Basis of Analysis-Census Block Groups
  - Covers entire county
  - Characteristics-2000 population, age, income
- Weighted Proximity-No Buffers
  - Roads
  - Shoreline
  - Employment
- No New Datasets-Unions or Buffers

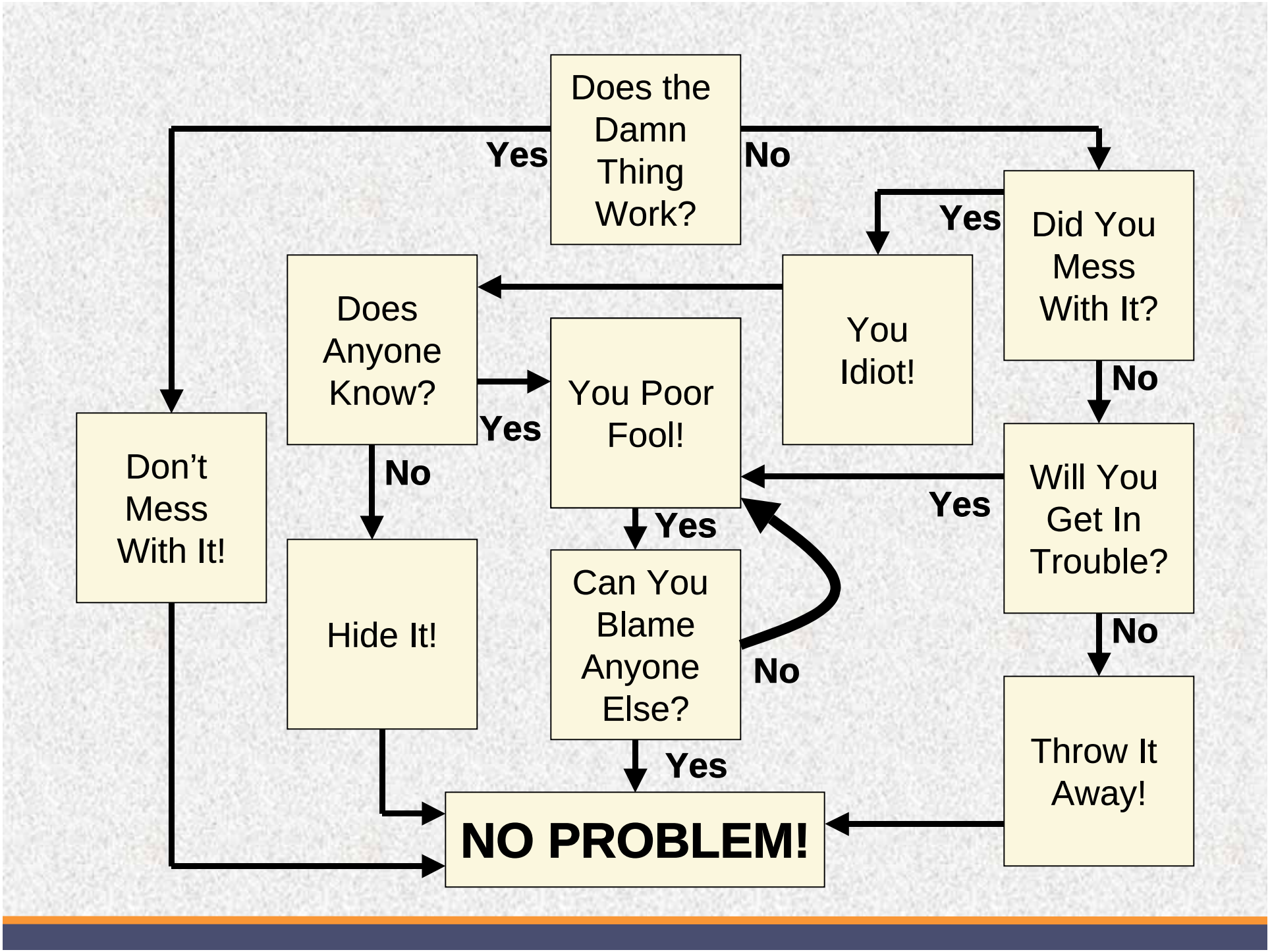
Diagrams

Create models in object oriented environment,

- Select icons to emulate system components.
- Components=inputs, process and output.
- Establish relationships between objects by graphically drawing connections.
- Adjust values (assumptions) of model.

Fast, transparent, understandable, expandable.

ArcGIS=ModelBuilder CommunityViz=Diagrams


Does the Damn Thing Work?
Yes
No
Don't Mess With It!
Did You Mess With It?
Yes
You Idiot!
No
Does Anyone Know?
Yes
You Poor Fool!
No
Hide It!
Will You Get In Trouble?
Yes
No
Can You Blame Anyone Else?
Yes
No
Throw It Away!
Yes
NO PROBLEM!

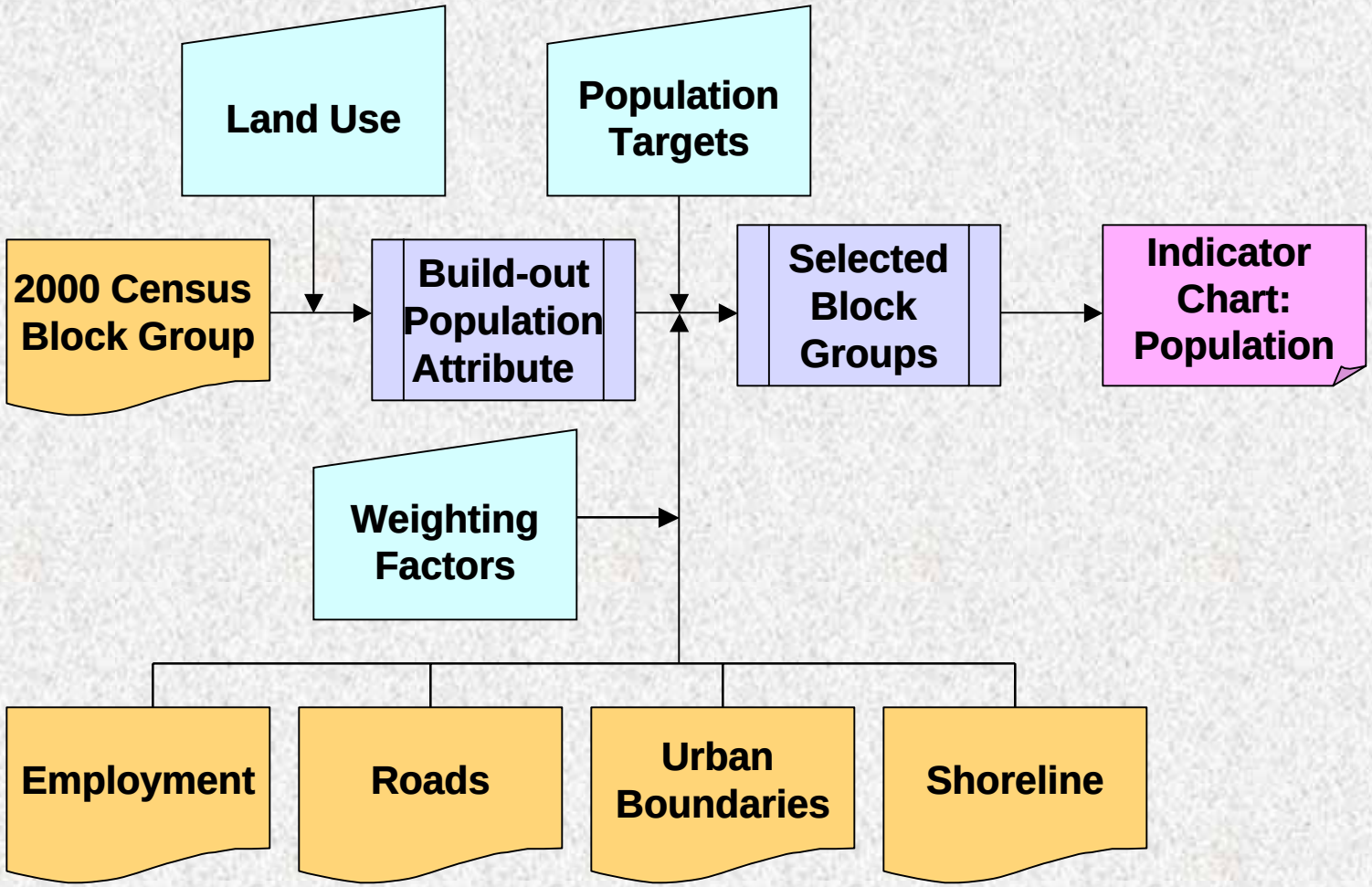
Sussex, DE-Methodology

Task-Small area forecasts using regional projection and proximity to growth factors

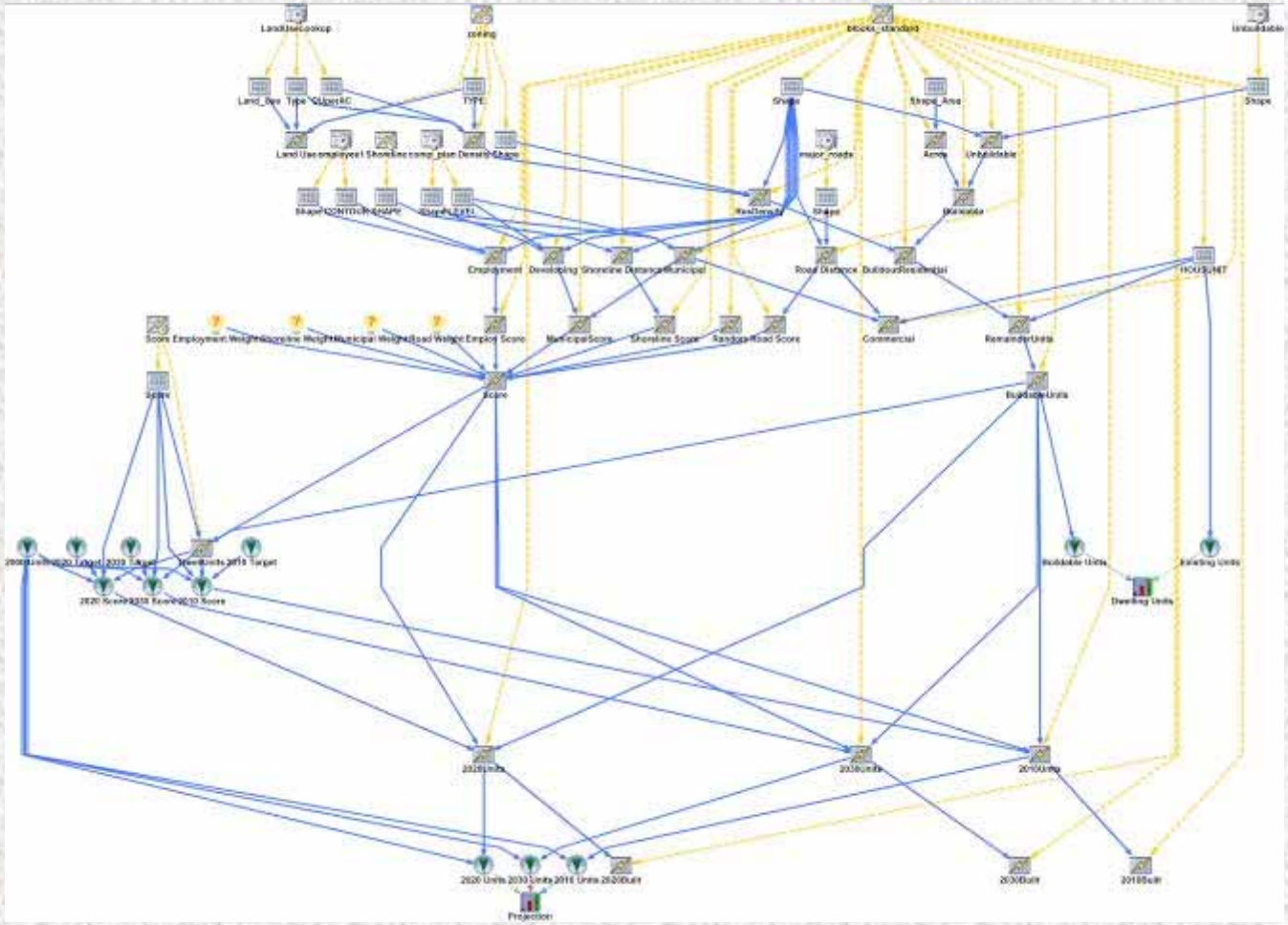
Steps

- Estimate Build-out
- Establish regional projection target
- Identify and weight growth factors
- Select areas most likely to grow until match regional forecast

Sussex-Conceptual



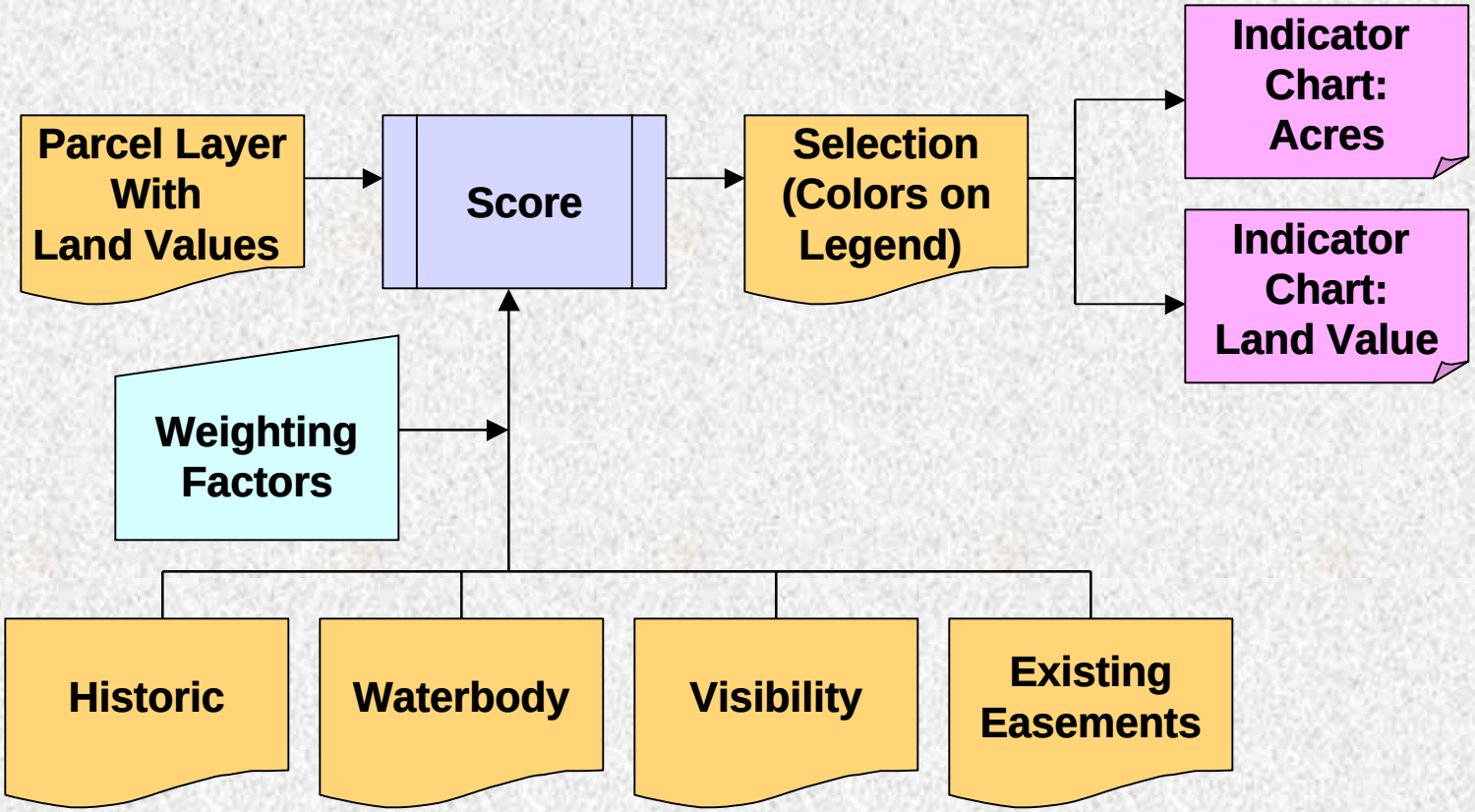
Sussex-Diagram



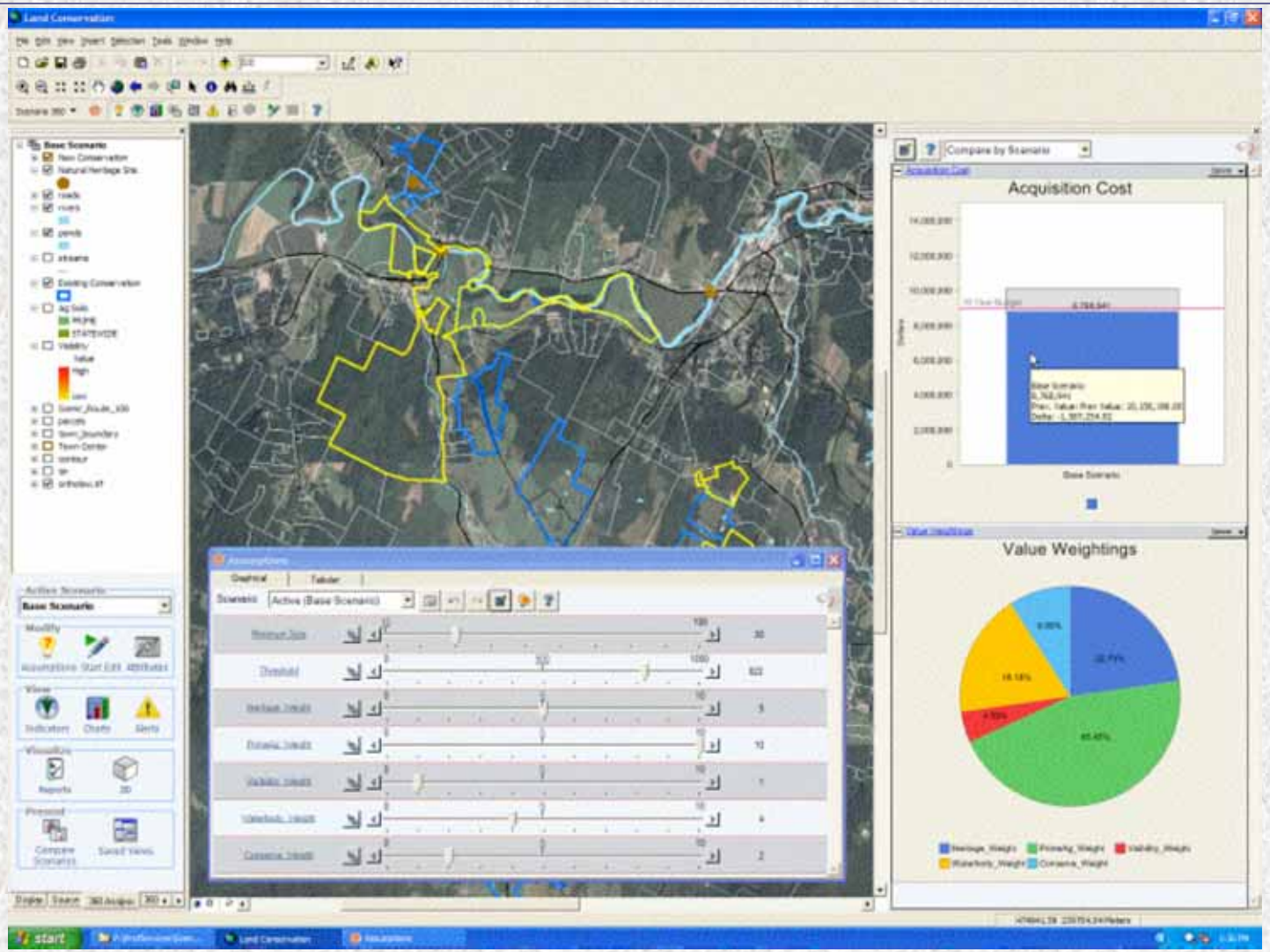
Technique: Site Selection

- Evaluate the appropriateness of an activity for **all** locations in study area.
- Issues typically weighted according to importance and preference.
- The initial step in identifying appropriate locations for a proposed activity.
- Basis of Analysis challenge-Parcels

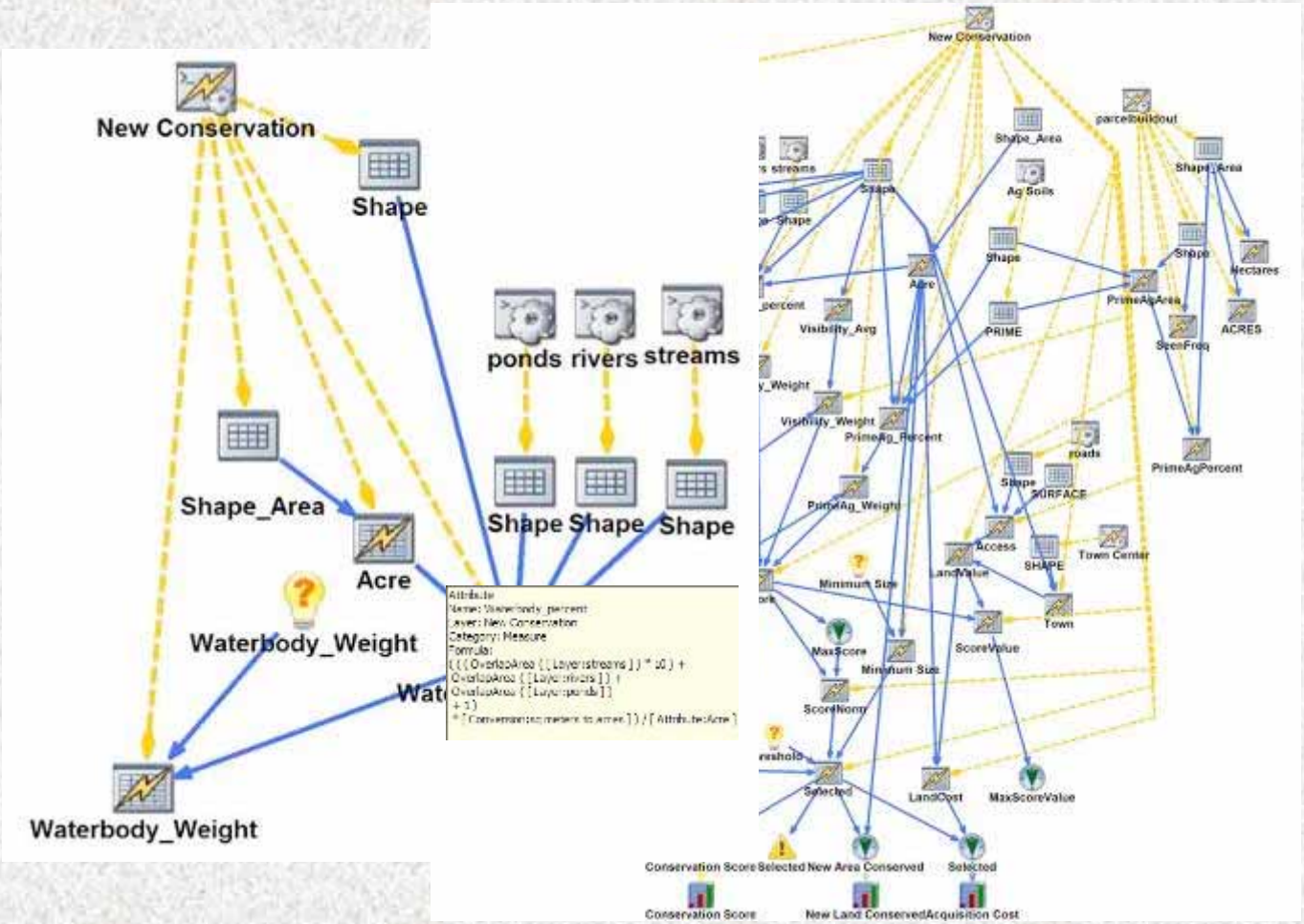
Conceptual-Site Selection



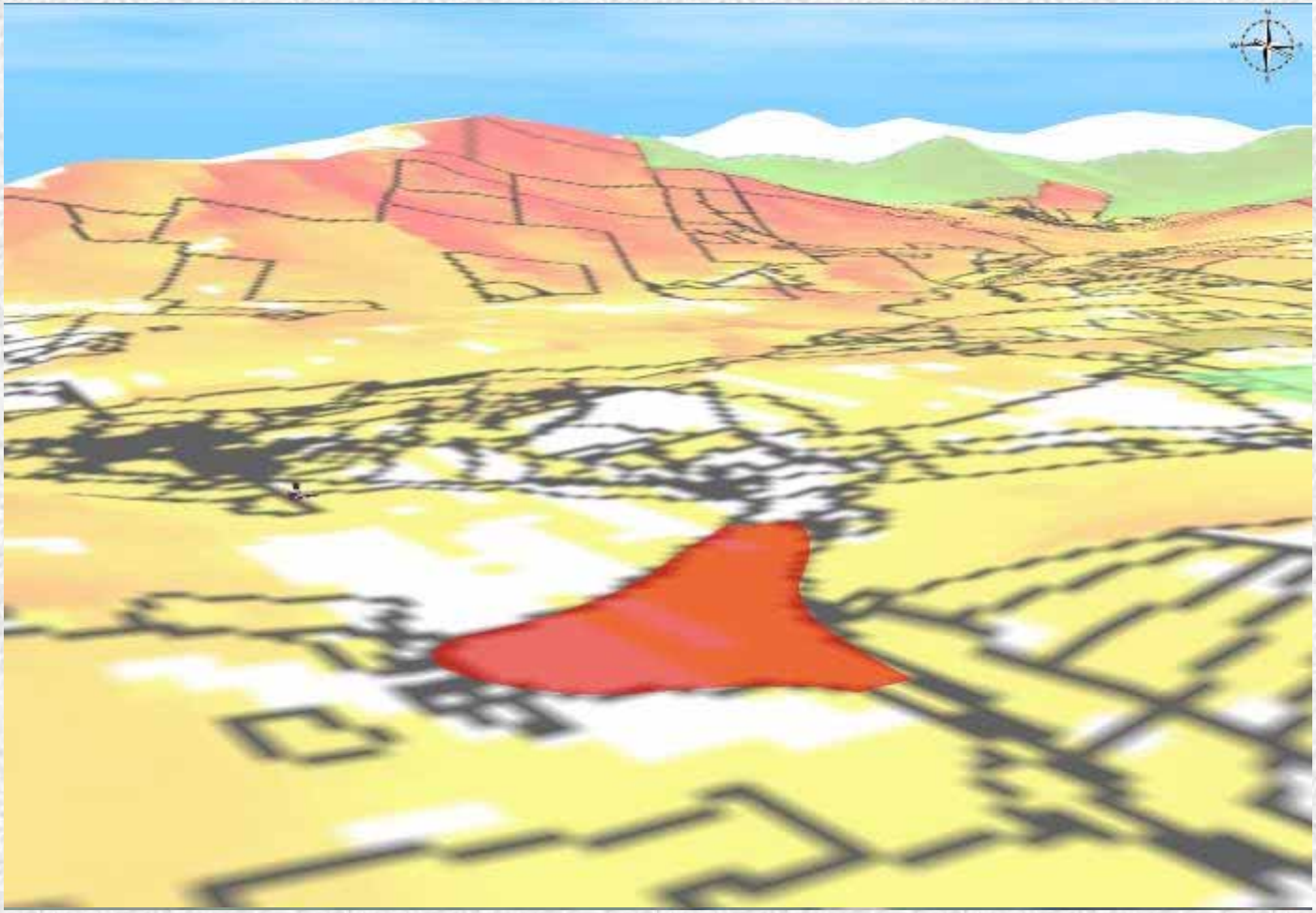
Vermont- Site Selection



Vermont-Diagram



Vermont- Site Selection

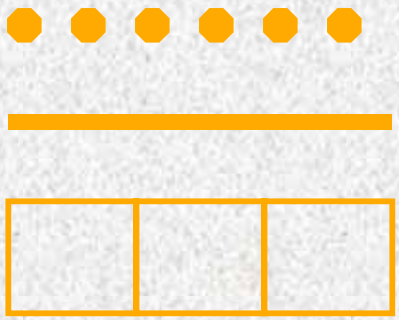


Raster Spatial Analysis

- Convert world into square pixels-grid
- Satellite Imagery-remote sensing
- Historic method of analysis
- Rectangular extents
- Defined Basis of Analysis
- Rapid calculations

Vector Spatial Analysis

- Point
- Line
- Polygon

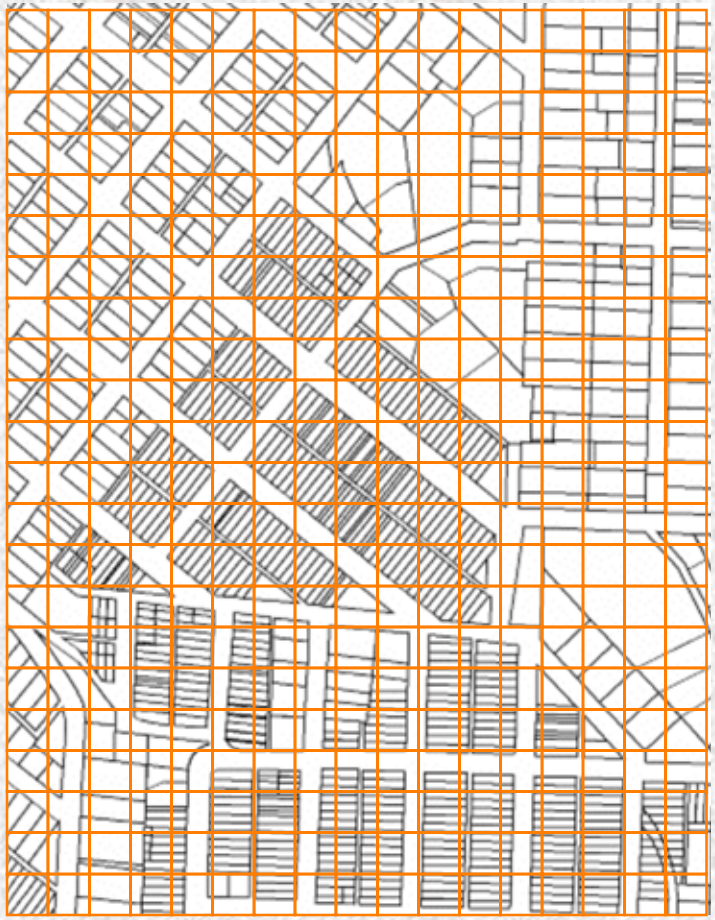


- Attributes- size, type, value (database)
- Proximity and overlap of other features…

- Create new datasets or calculate attributes

Raster and Parcels

- Parcel Size varies
- Grid fails to match parcels
- Analysis on each parcel
- Each cell stores one value- Limited attribute handling
- Grid can’t include land use, owner, value, size etc.



Keep Data in Original Format

If possible:

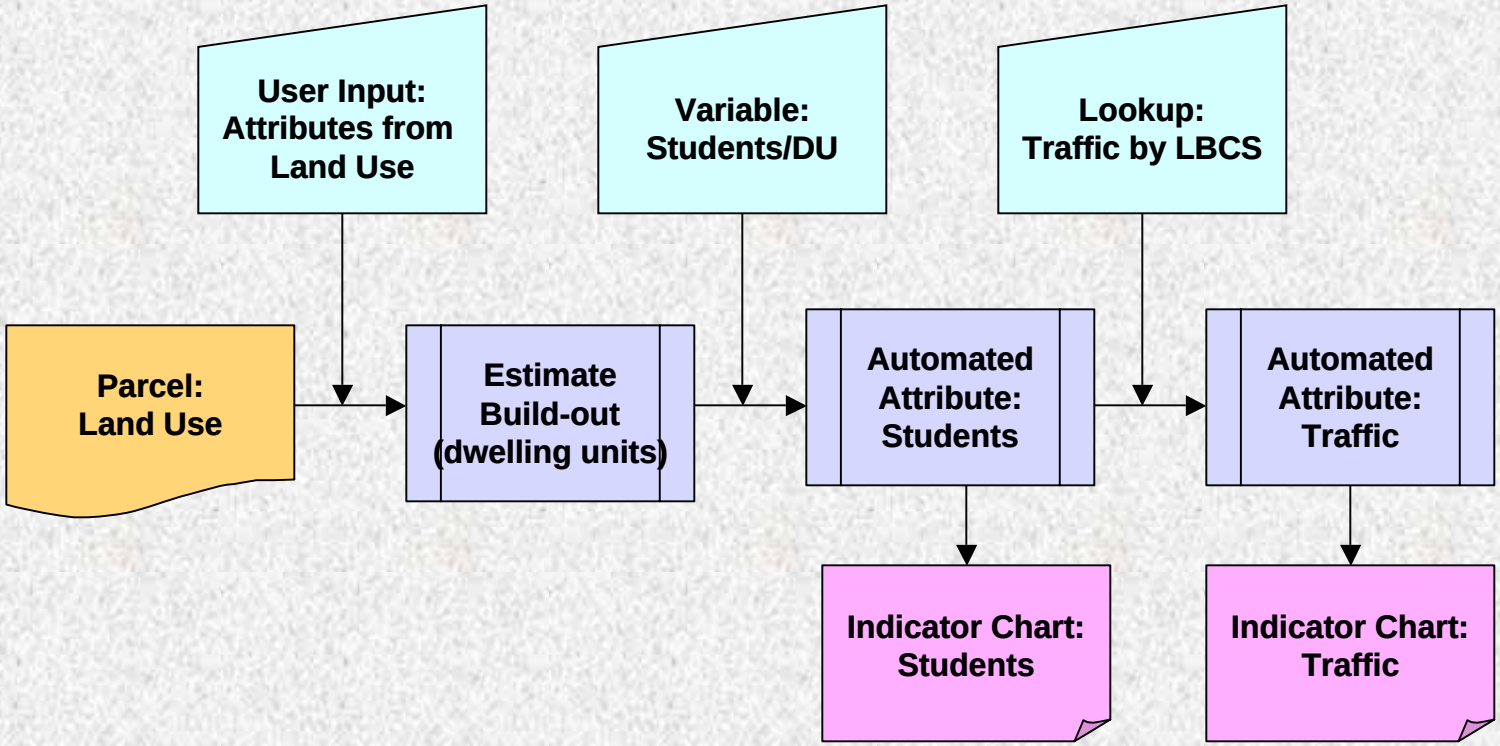
- Avoid conversion of formats: raster-vector
- Avoid buffers-offset from roads or LULUs
- Avoid unions-combining multiple layers

- Accuracy-database, spatial, slivers and voids
- Stability- combined vector data prone to errors
- Metadata-reduces documentation and mismatched spatial accuracy

Technique: Development Impacts

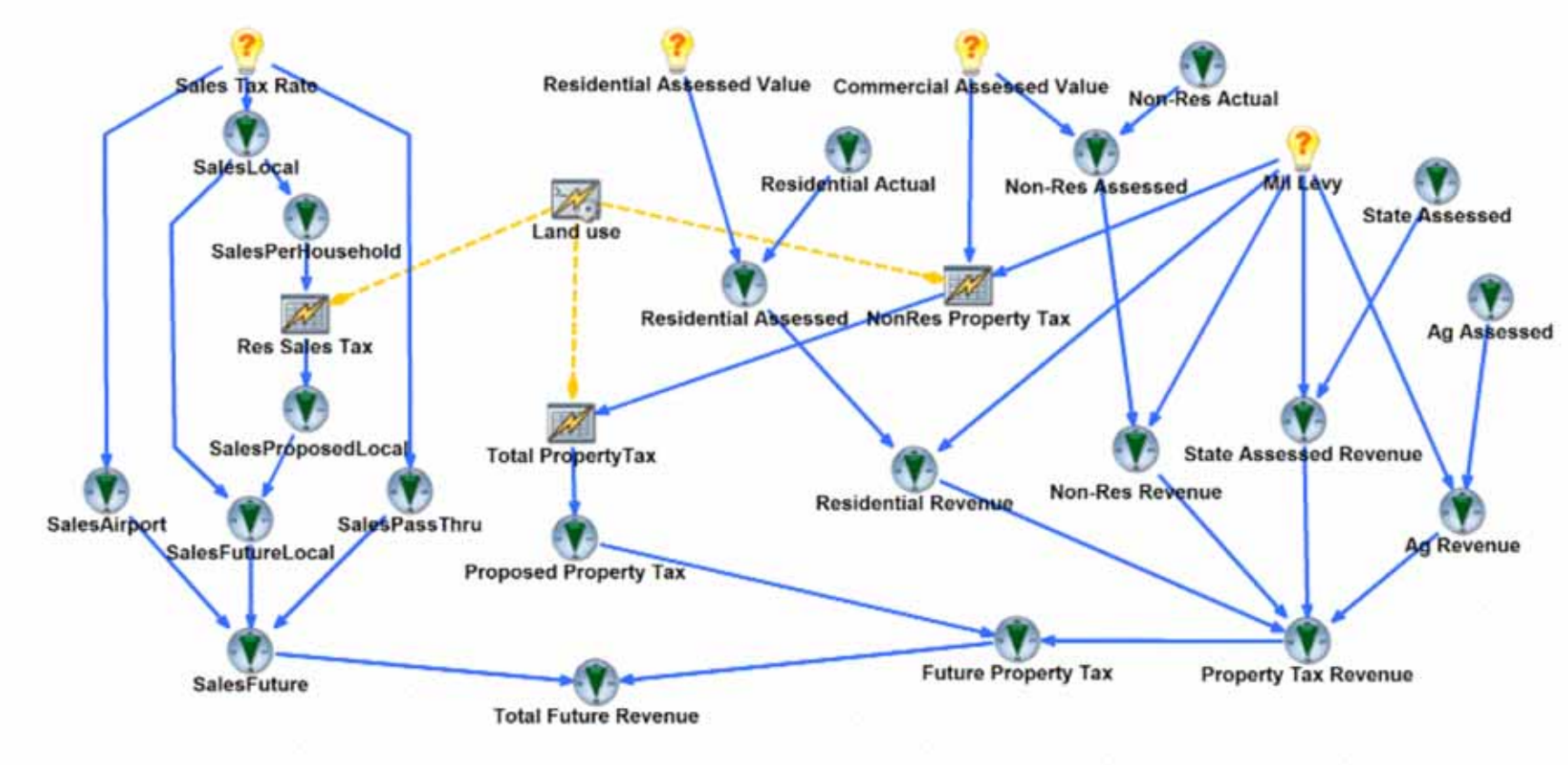
- Identify issues-concurrency
- Define extents and future uses/activities.
- Calculate impacts-set assumptions
- Generate indicators (e.g. traffic).
- Alert when thresholds are achieved.

Conceptual: Development Impacts

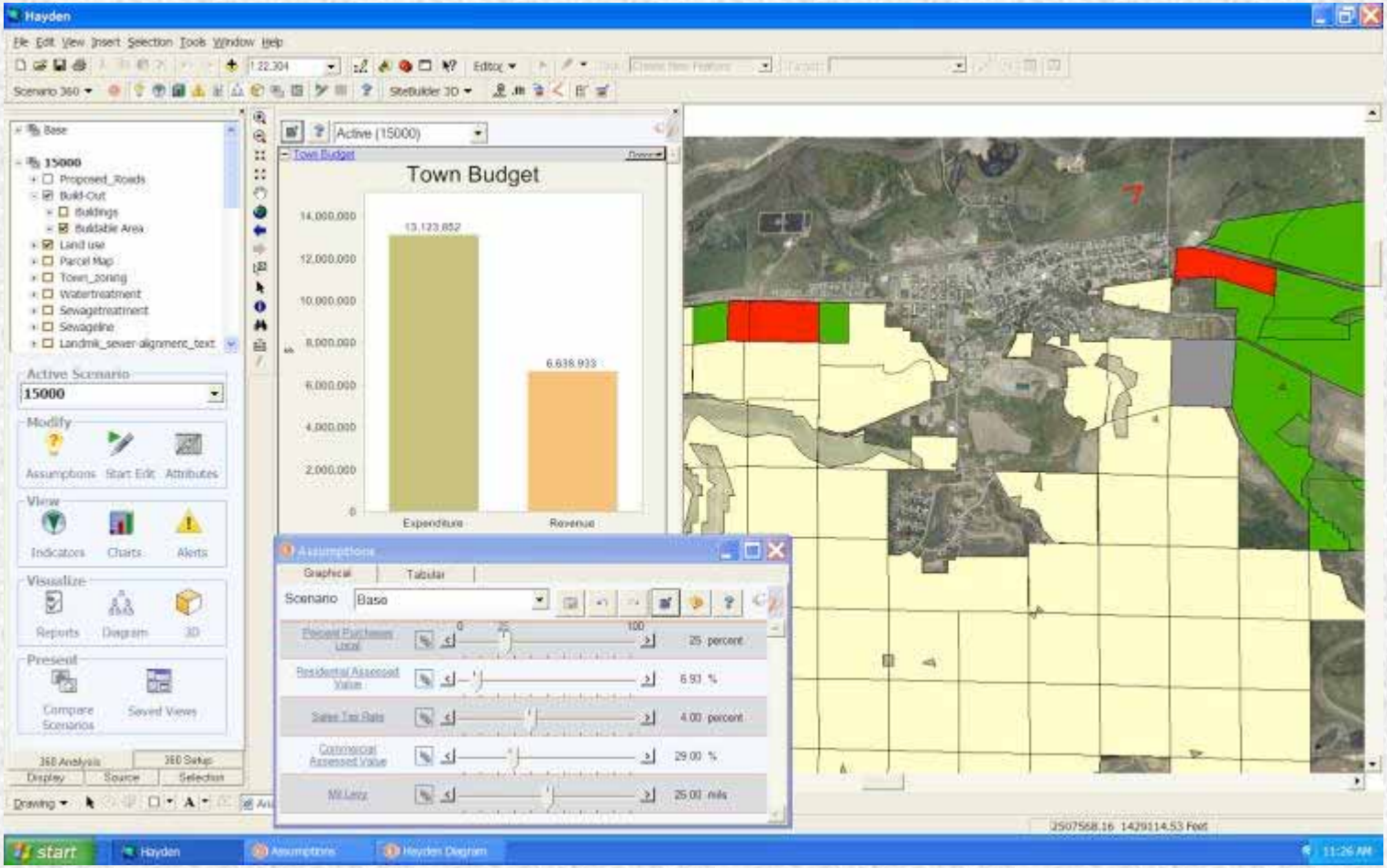


Hayden, CO

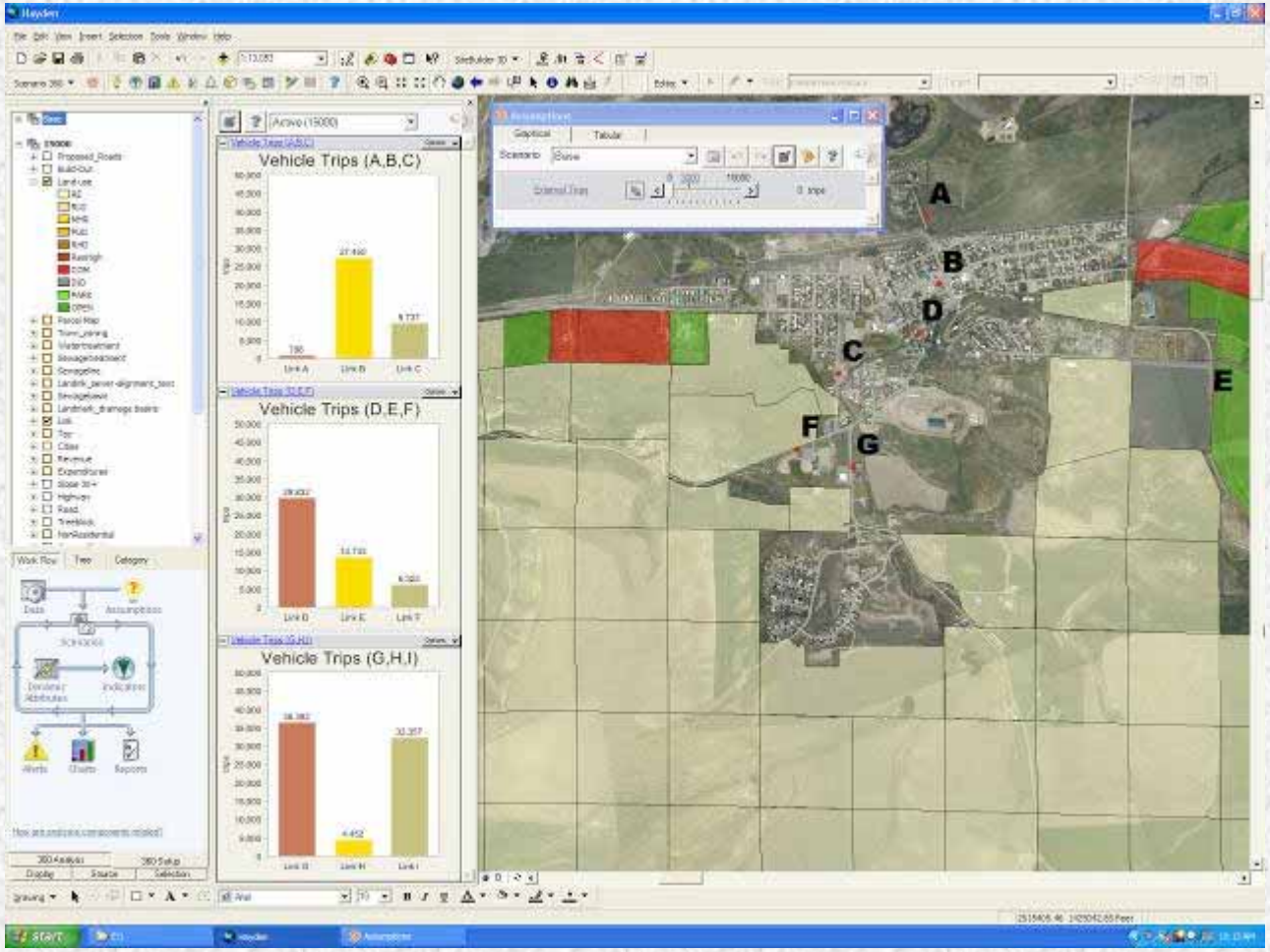
Budget-Diagram



Hayden, CO- Budget Analysis



Hayden, CO- Traffic Study



Hayden, CO Scenarios

Basis of Analysis

Vector Driven Spatial Analysis

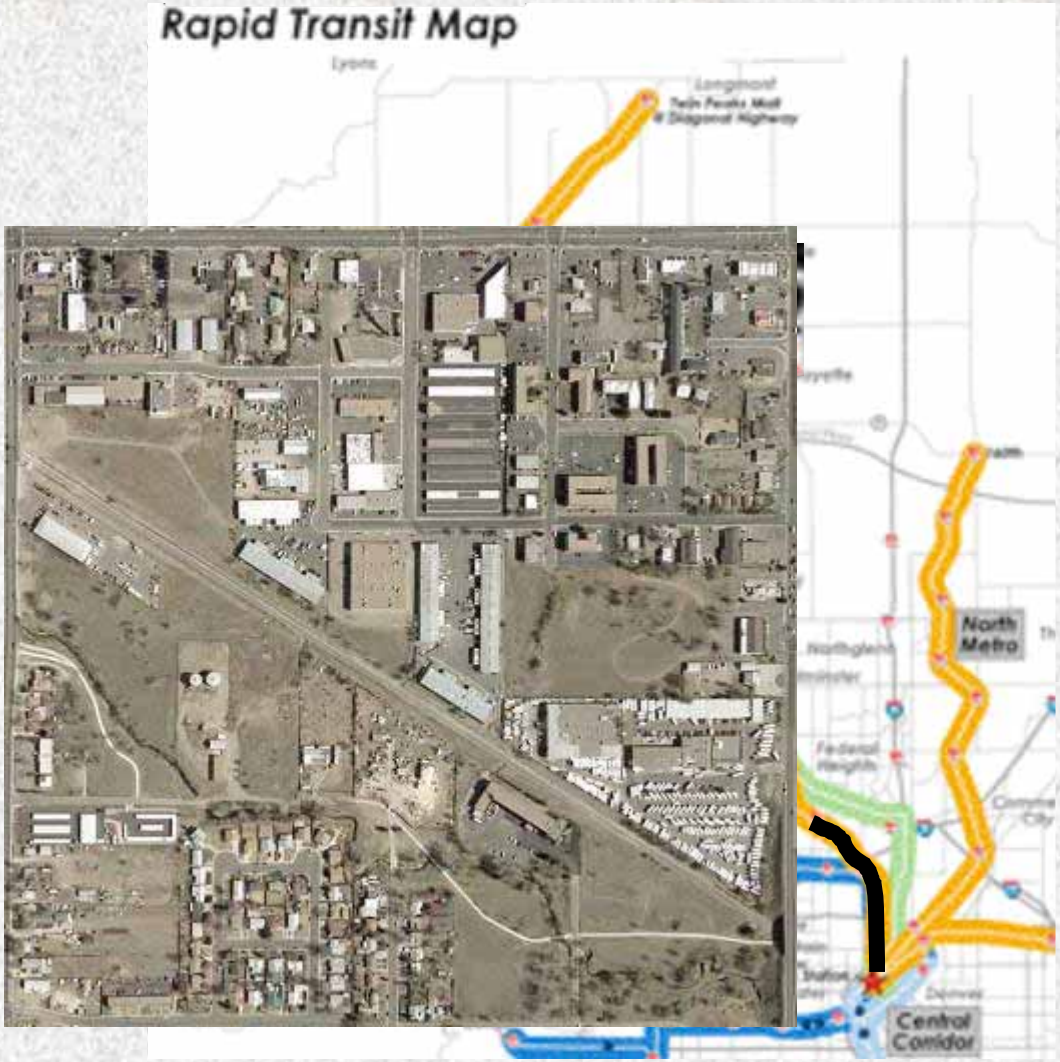
Relevant to topic of analysis

- Parcels
- Census-Block, Block Group, Tracts, County
- School Enrollment Area
- Council Districts (or Representative)
- Watershed
- Roads, Streams (other lines-break into segments?)

Basis of Analysis

- Scale
- Number of Polygons
  - 10
  - 10,000
  - 1,000,000
- Processing time
- Accuracy

Transit Oriented Development



Basis of Analysis-TOD

Primary Basis of Analysis- Blocks

Source of information

- Building Footprints- land use, area and stories
- Parking Spaces- spatial: on-street or onsite
- Lookup tables and assumptions (slider bars)

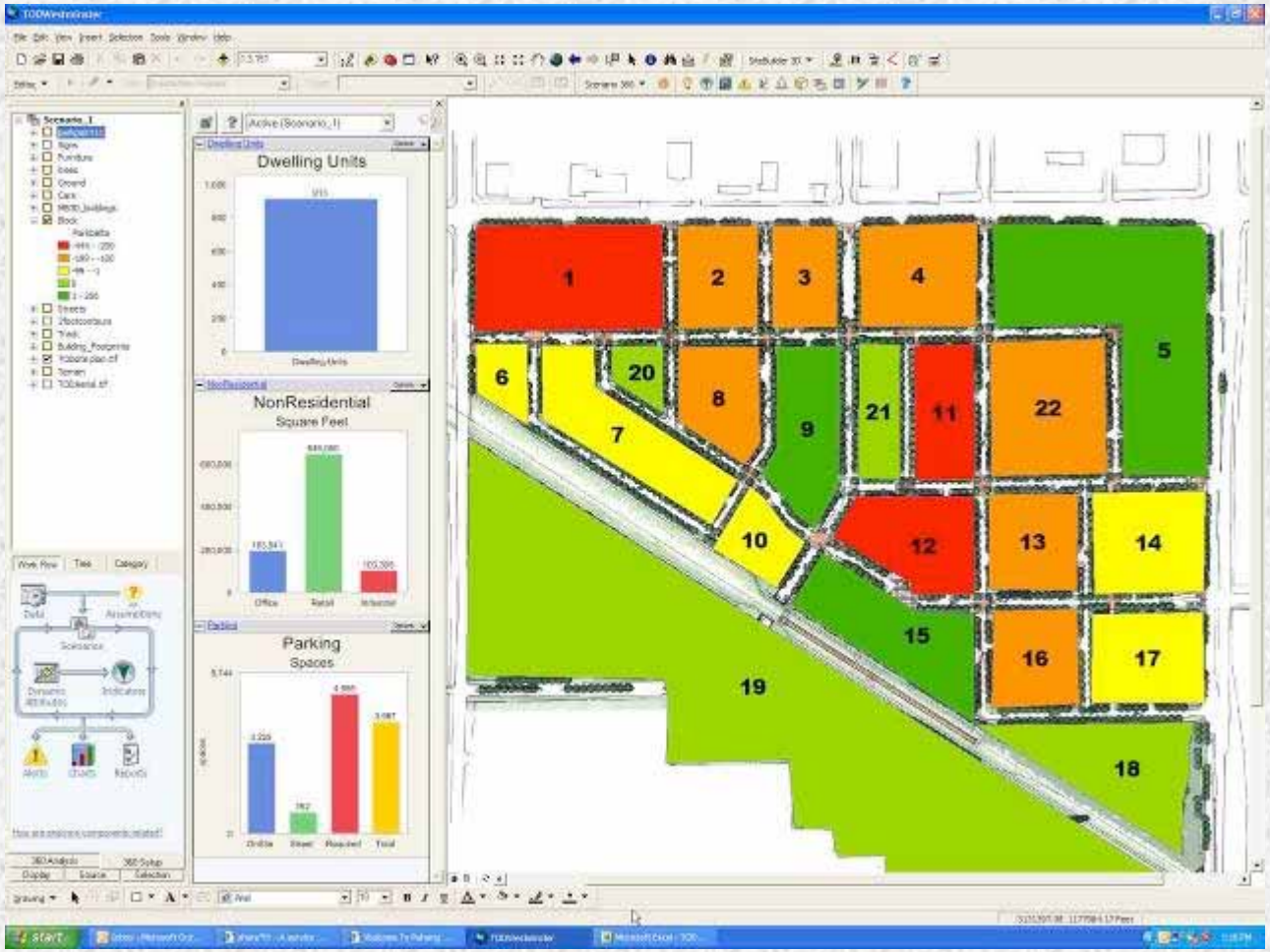
Blocks -

- Density- dwelling units and FAR.
- Parking- required, provided and delta.
- Tax Revenue-property and sales.

Indicator Charts

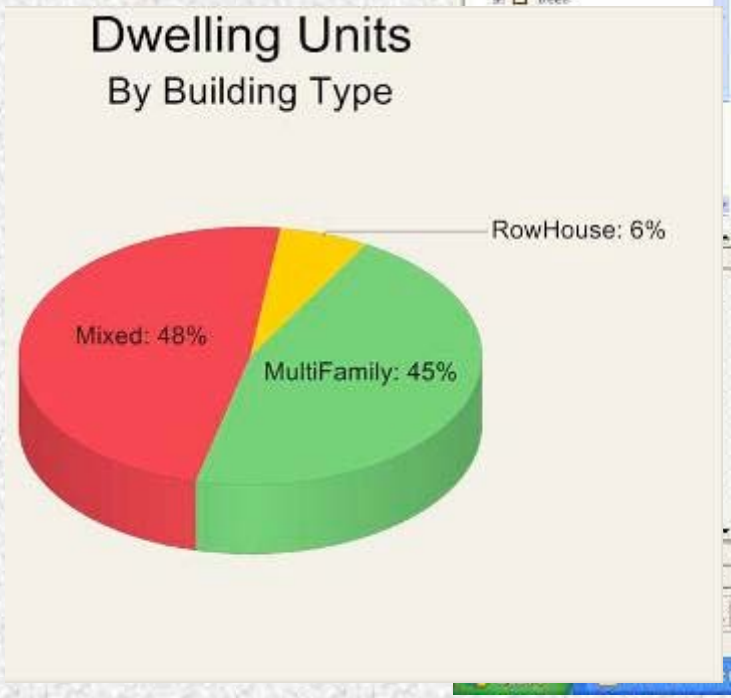
Transit Oriented Development

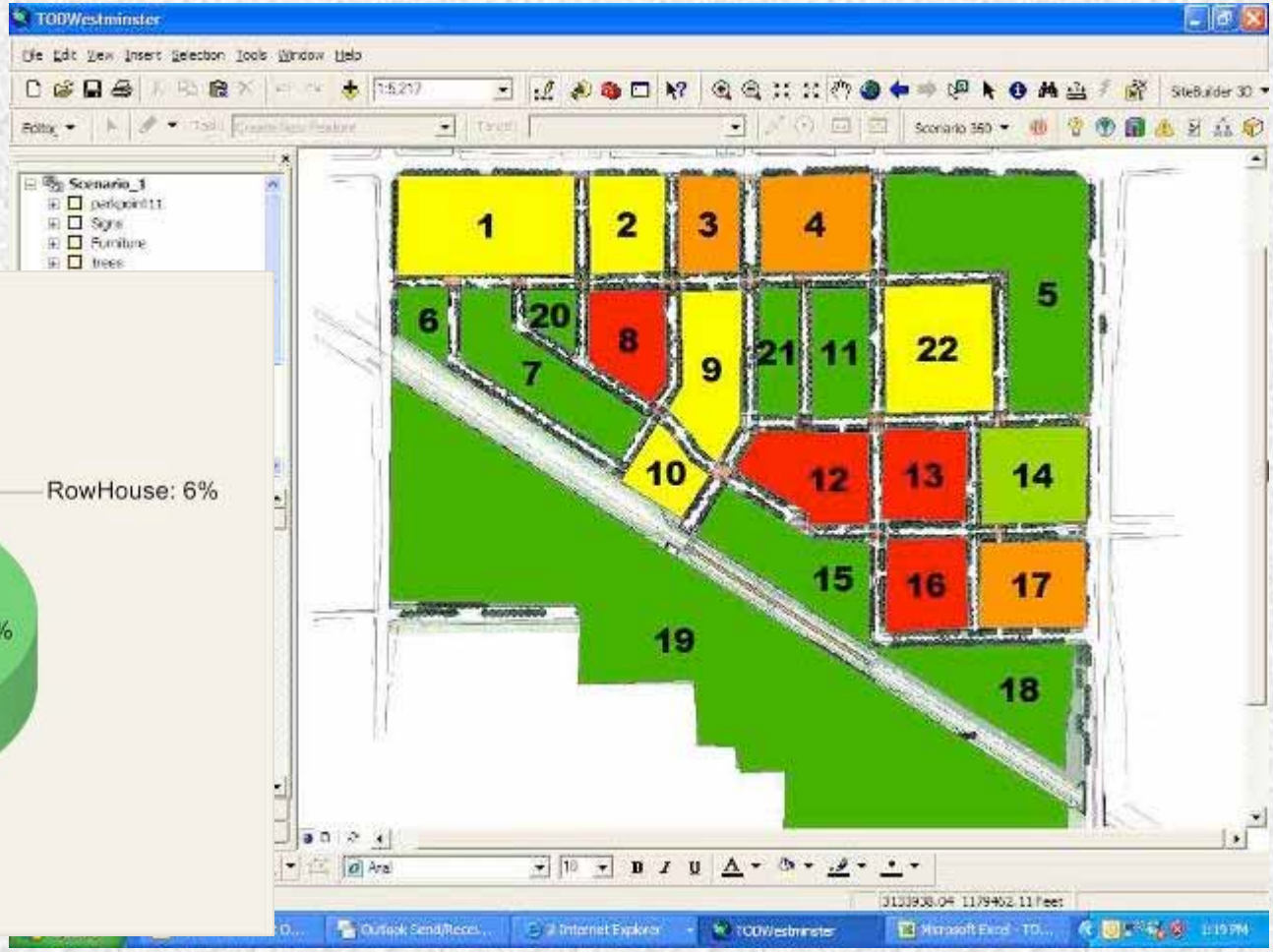
Transit Oriented Development



Transit Oriented Development

Dwelling Units





Transit Oriented Development

Retail Space

Transit Oriented Development

Parking

Tax Revenue

Transit Oriented Development

Future

Network Analyst in ArcGIS 9.1: Routing

- Walking Distance-Walkability
- Vehicle Miles Traveled

CommunityViz 2.2

- Build models in diagrams (only edit now)

Spatial Analysis Summary

- Vector versus Grid
- Basis of Analysis
- Diagrams
- Changing assumptions
- Dynamic revisions
- Scenario planning

- Visualization