Geographic Information Systems "GIS"

"Geography Matters"

Think about "Geography"

- **What is Geography**

  The 3 *"W's"* of Geography

  - What is where
  - Why is it there
  - Why do I care

Data - Data - Data
We all 'got data'

- **Location Data**
  - How Many – What Kind – Where
- **Scale of Data**
  - Local to Global
- **Data Presentation**
  - Words, Charts, Graphs, Tables, or Maps

Exploring data using GIS turns data into information into knowledge

Geographic Information Systems

A Definition of GIS

GIS is a *System* of computer software, hardware and data, and personnel to help manipulate, analyze and present information that is tied to a spatial location –

- ***spatial location*** **–** usually a geographic location
- ***information*** **–** visualization of analysis of data
- ***system*** **–** linking software, hardware, data
- ***personnel*** **–** a thinking explorer who is key to the power of GIS

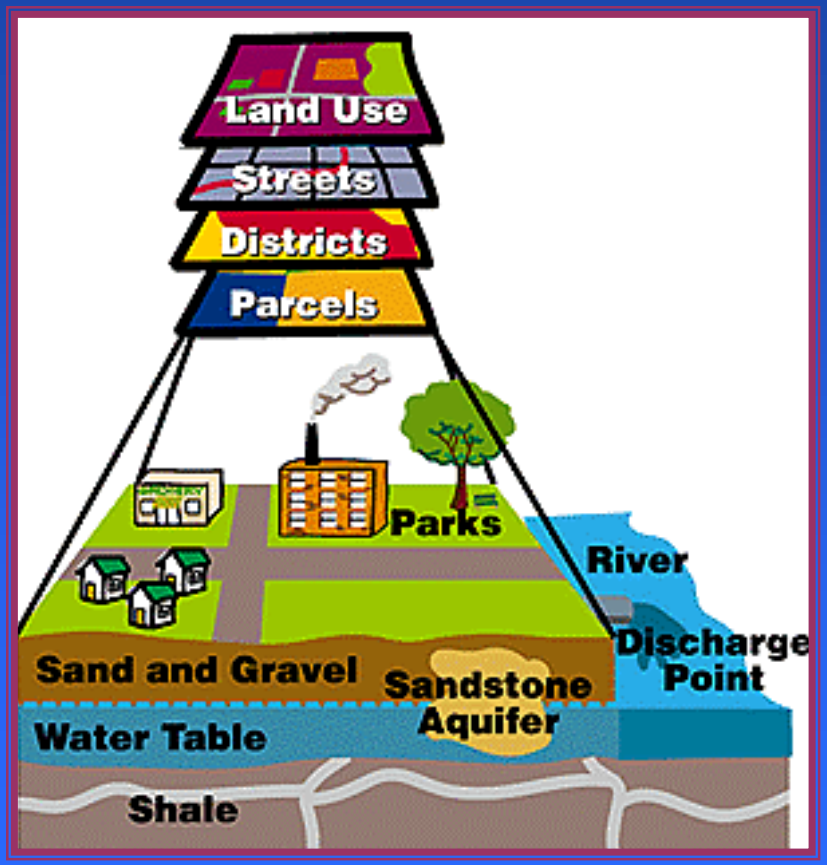
What is *Not* GIS ?

- **GPS – Global Positioning System**
- **A static map – paper or digital**
  - Maps are often a “product” of a GIS
  - A way to visualize the *analysis*
- **A software package**

Spatial Data

- **Estimates are that 80% of all data has a *spatial* component**
  - Data from most sciences can be analyzed "spatially"

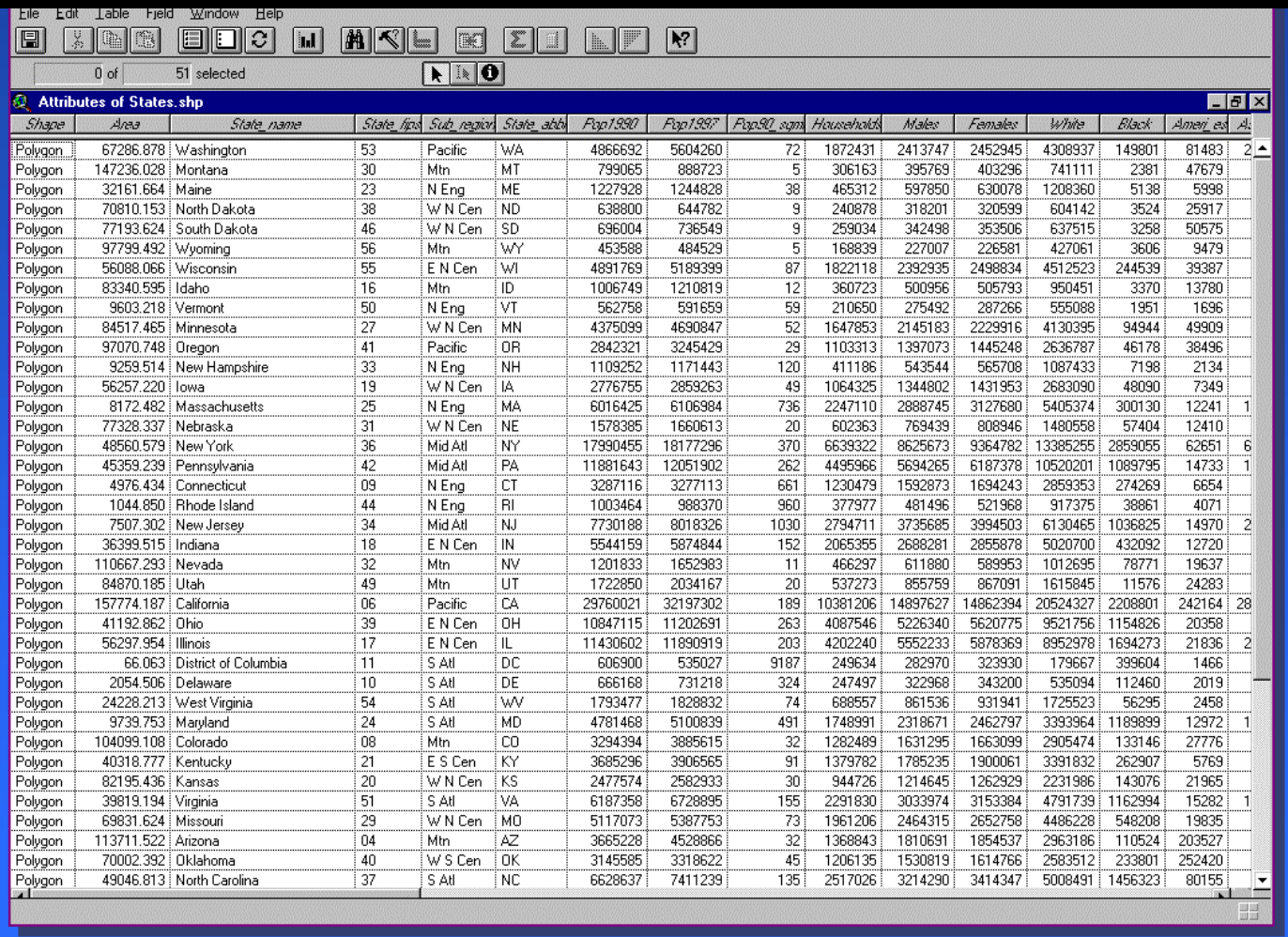
What is GIS ?



- **A method to**
  visualize, manipulate, analyze, and display spatial data
- **"Smart Maps"**
  linking a database to the map

Database

"Not Easy to Interpret"



File Edit Table Field Window Help

0 of 51 selected

Attributes of States.shp

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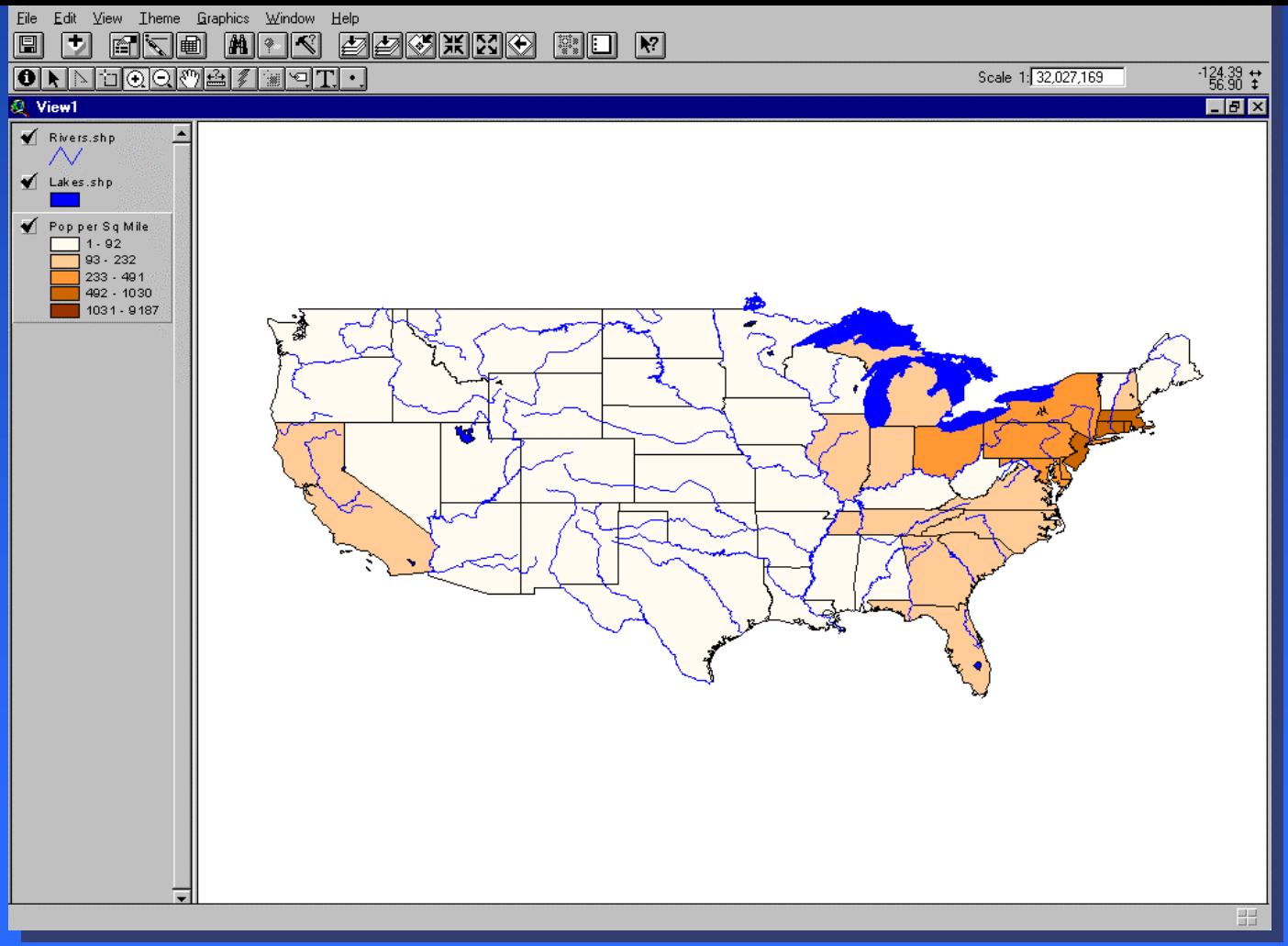
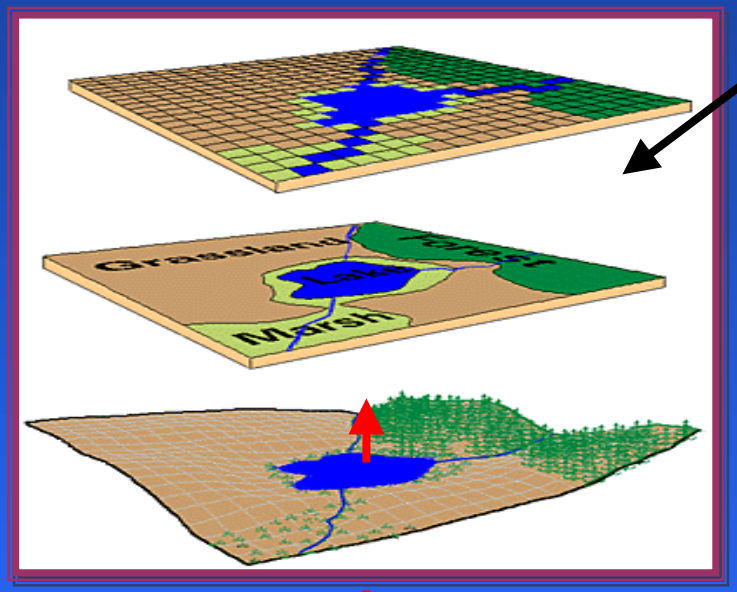
Visualization

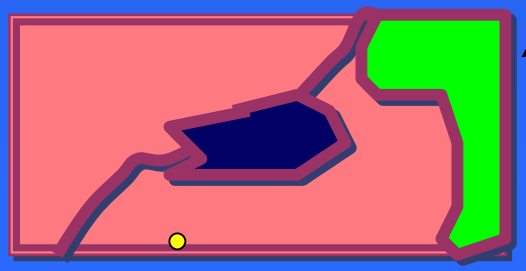
“Worth a Thousand Words”



Two Ways to Input and Visualize Data
The World in GIS



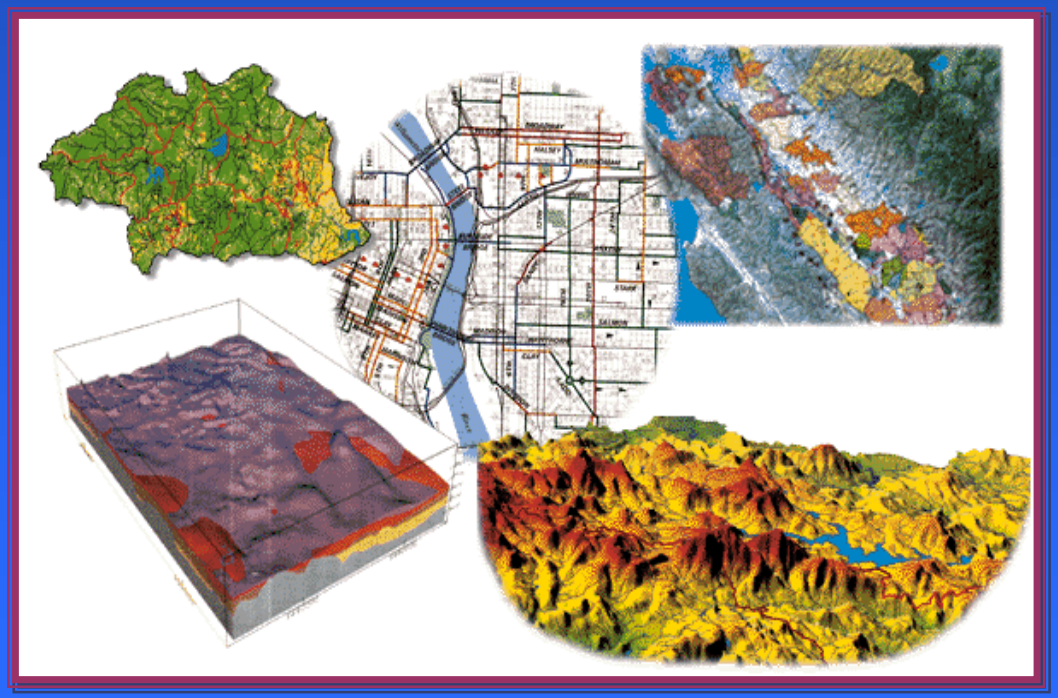
Real world



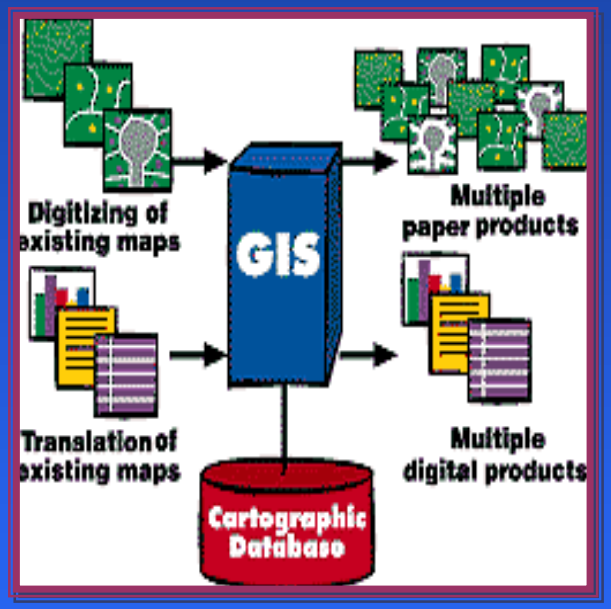
- **Raster – *Grid***
  - "pixels"
  - a location and value
  - Satellite images and aerial photos are already in this format

- **Vector – *Linear***
  - Points, lines & polygons
  - "Features" (house, lake, etc.)
    - Attributes
      - size, type, length, etc.

Combining Data From Many Sources



Data For GIS Applications

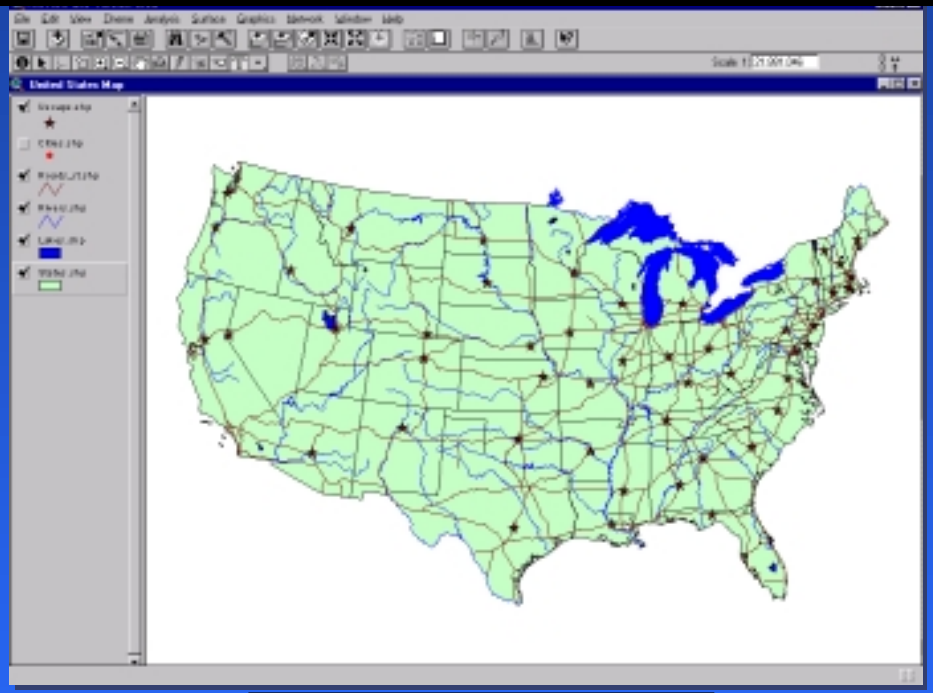


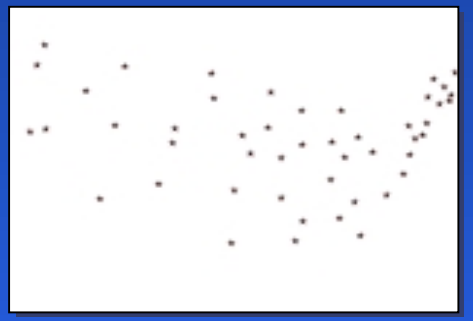
- **Digitized and Scanned Maps**
  - purchased, donated, free (Internet)
  - created by user
- **Data Bases – Tables of data**
- **GPS – Global Positioning System**
  - accurate locations
- **Field Sampling of Attributes**
- **Remote Sensing & Aerial Photography**

Five Data Layers

"Alike" Features

Rivers





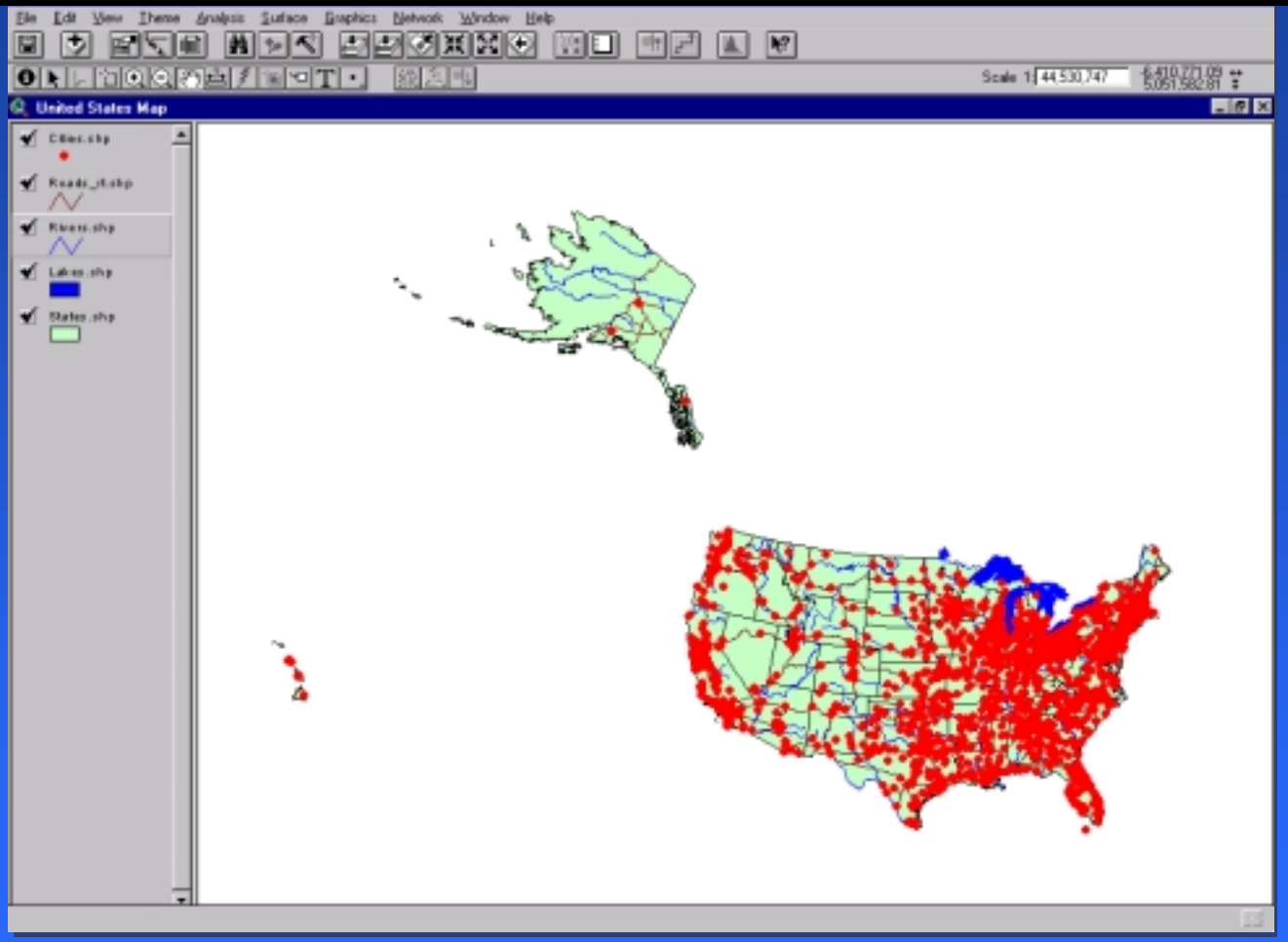
Capitals

Roads

Lakes

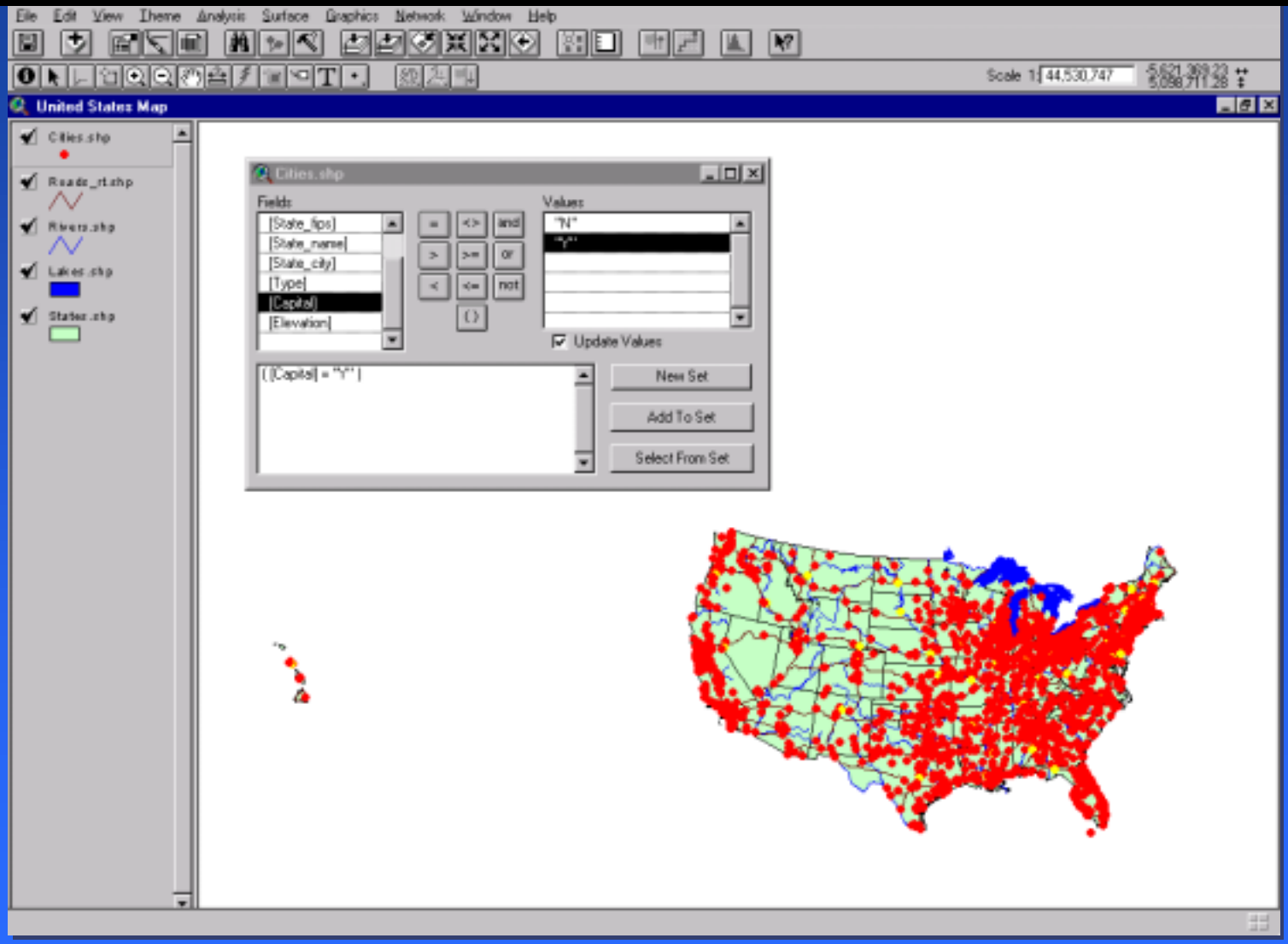
States

Turning Data Into Information

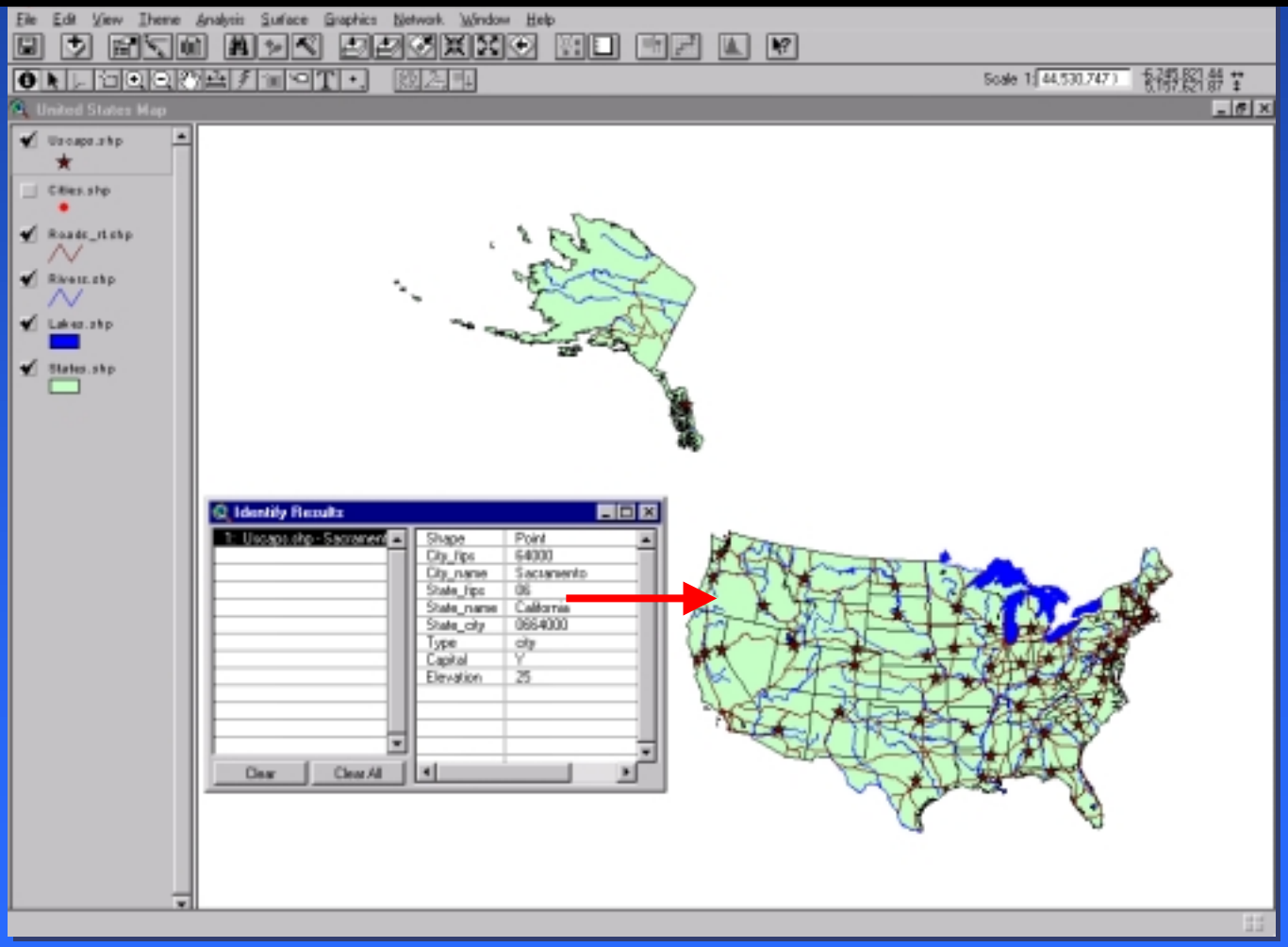


"Spatial Analysis" ***– not just a map***

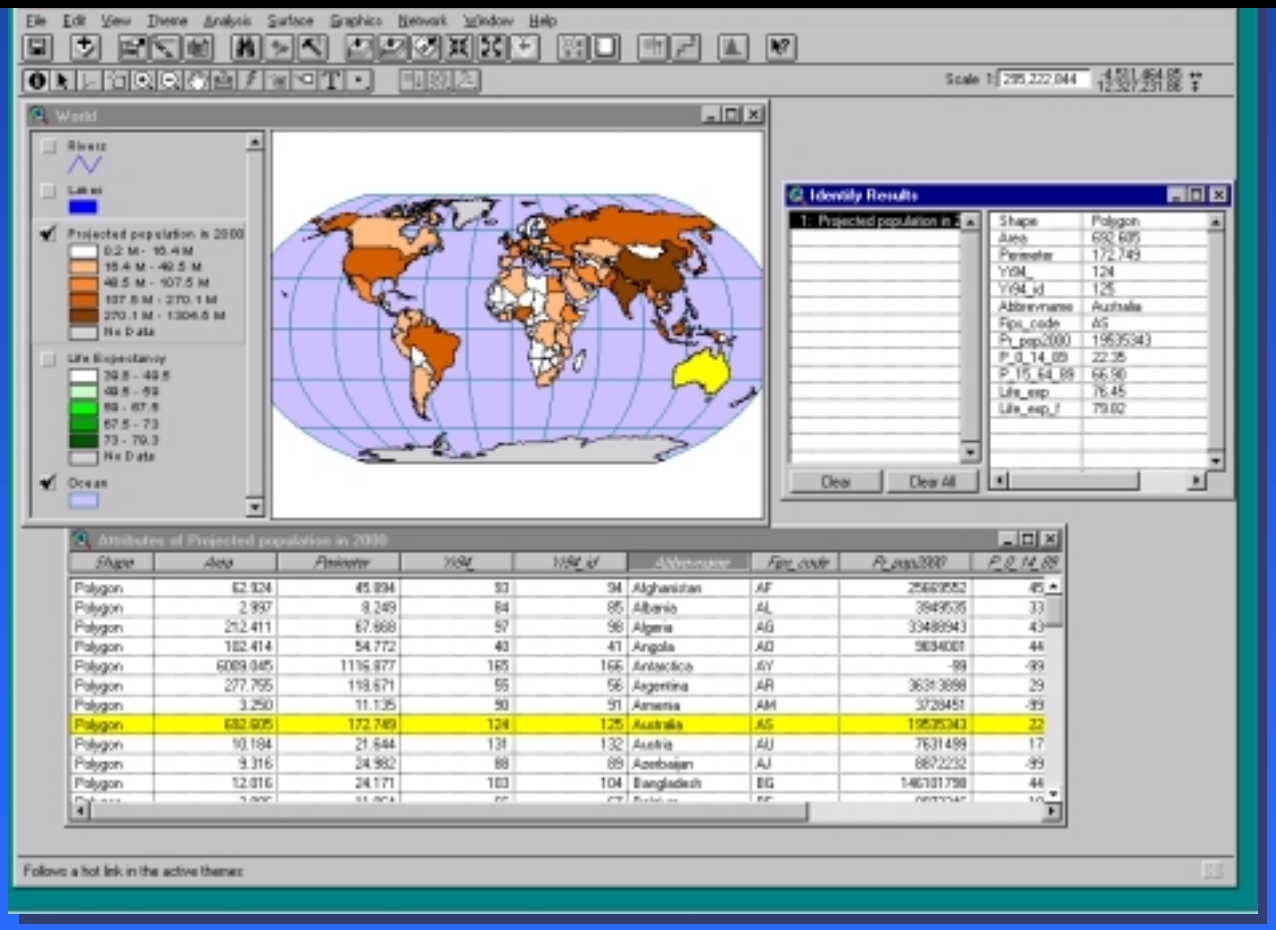
Asking A Question – Interaction



Maps and Database are "Interactive"



Multiple Databases can be Linked and Related

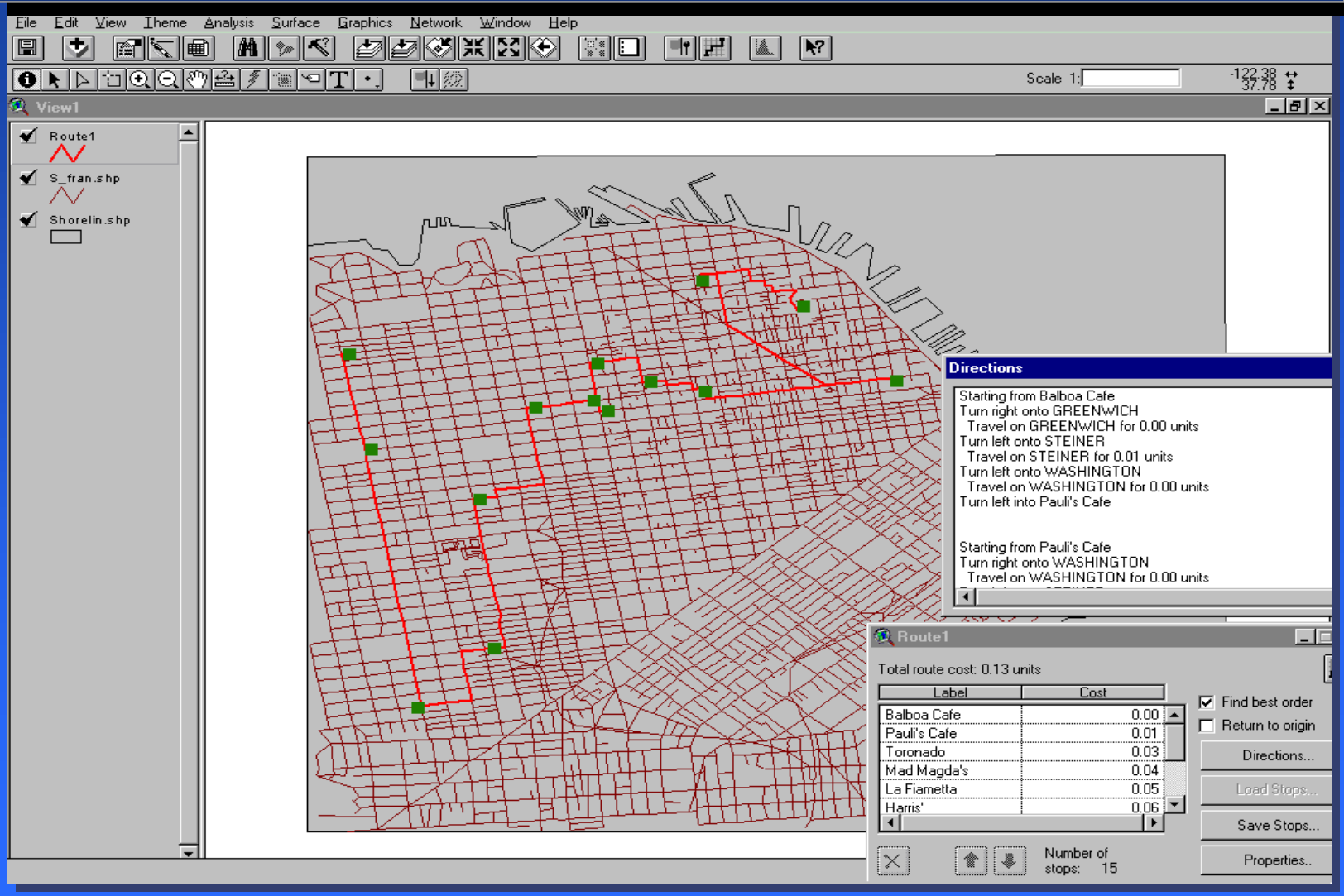


Some Ways GIS is Used

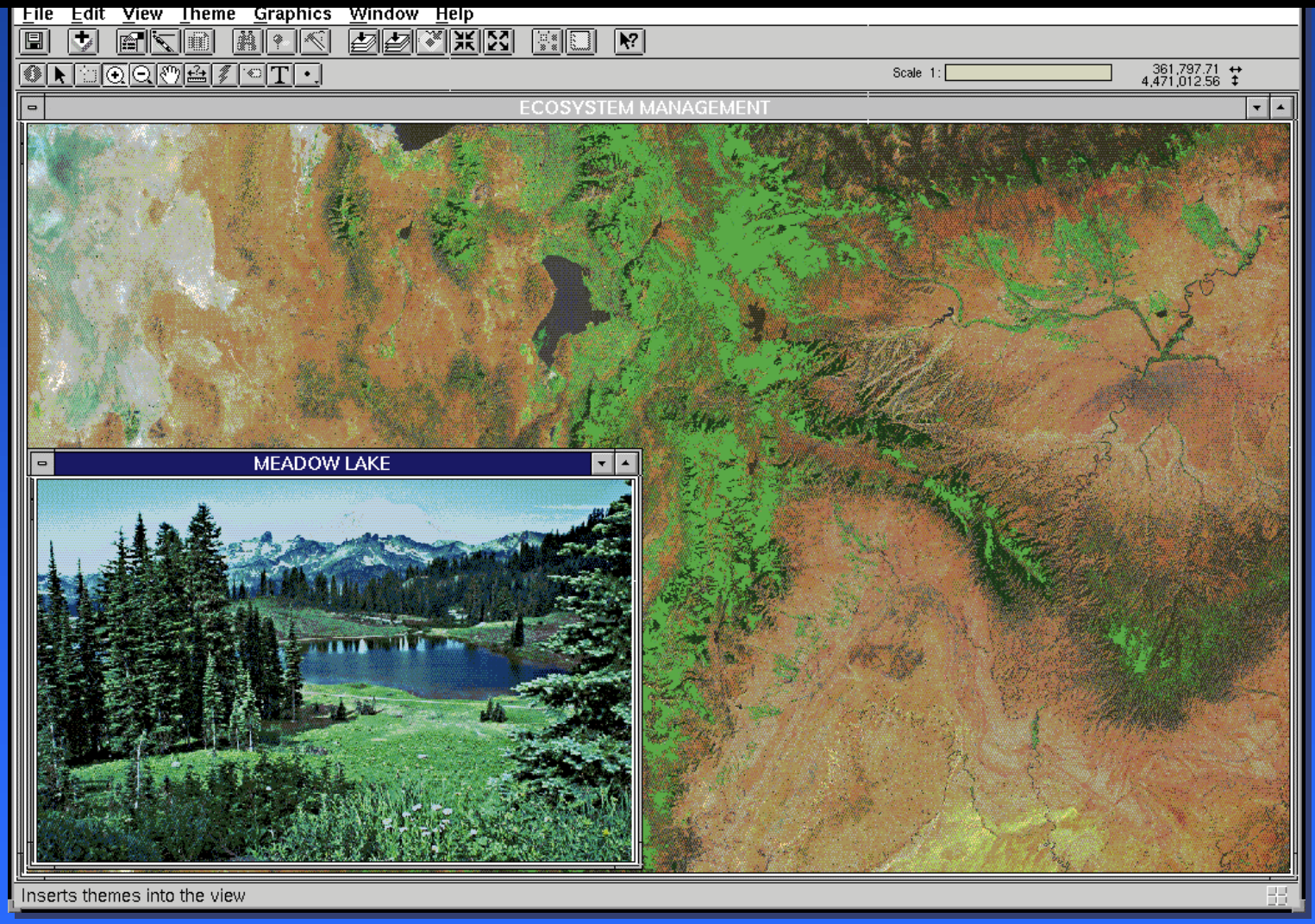
- **Emergency Services** – Fire & Police
- **Environmental** – Monitoring & Modeling
- **Business** – Site Location, Delivery Systems
- **Industry** – Transportation, Communication, Mining, Pipelines, Healthcare
- **Government** – Local, State, Federal, Military
- **Education** – Research, Teaching Tool, Administration

Wherever Spatial Data Analysis is Needed

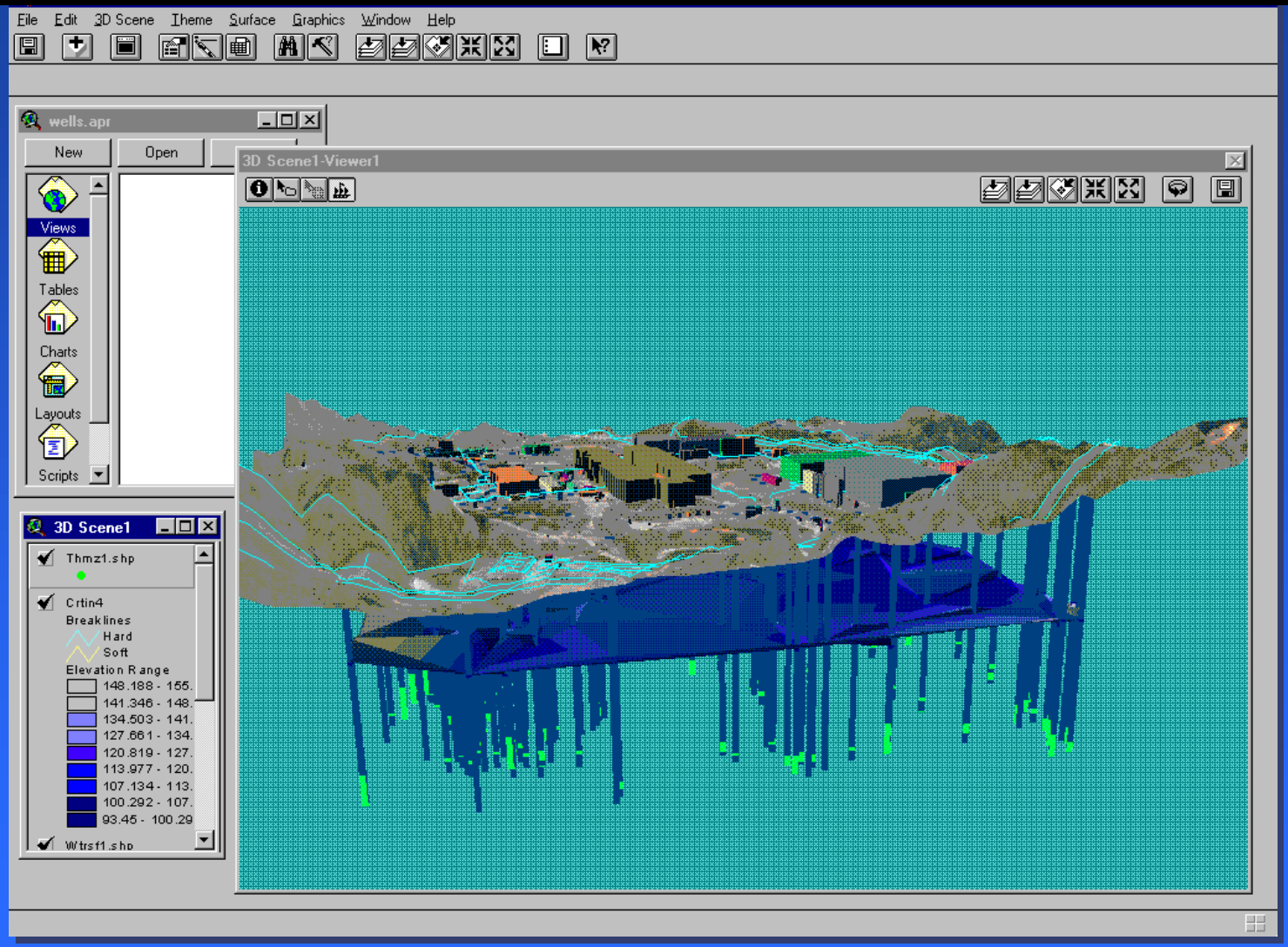
Network Solutions



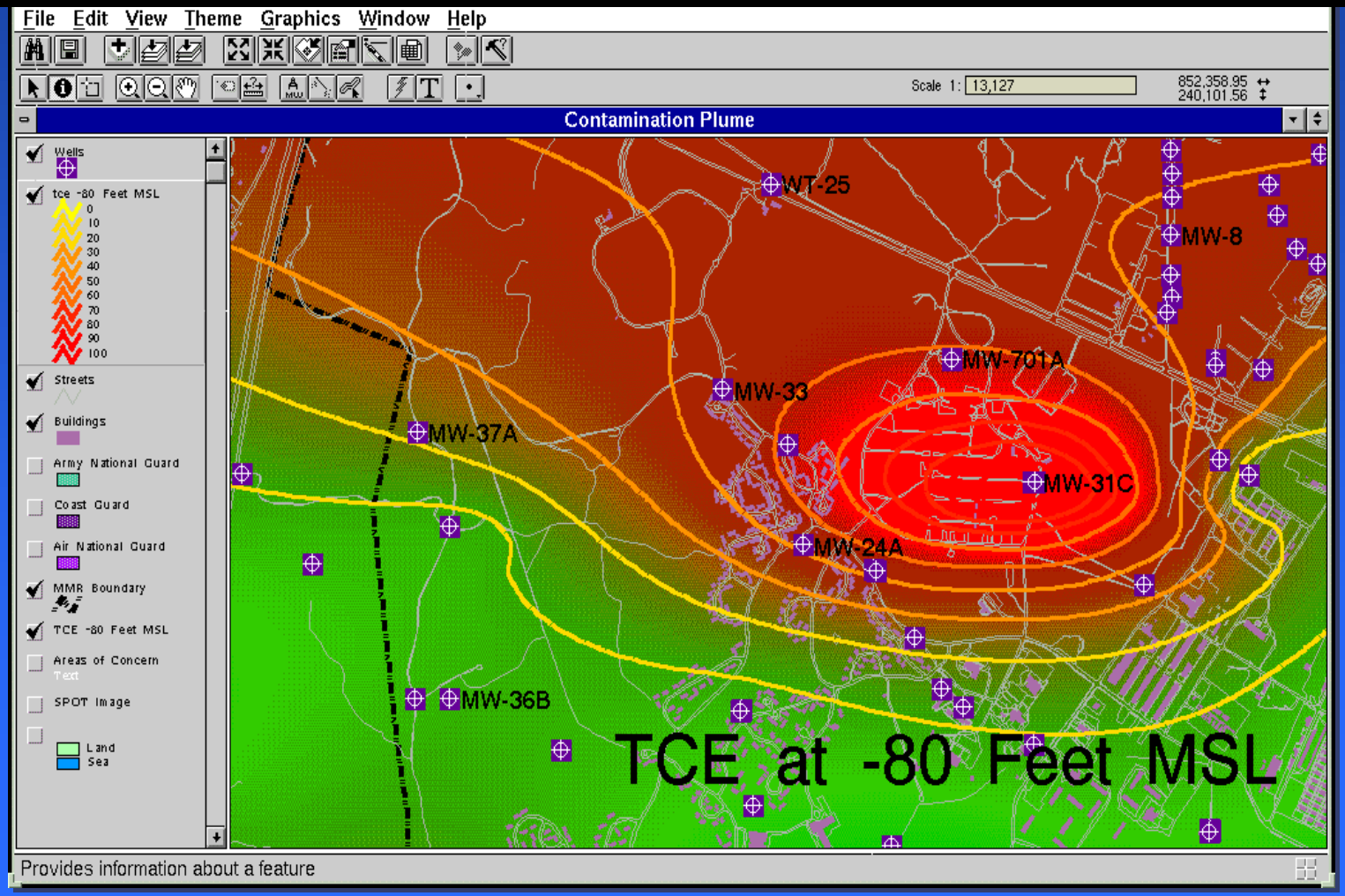
Ecosystem Management



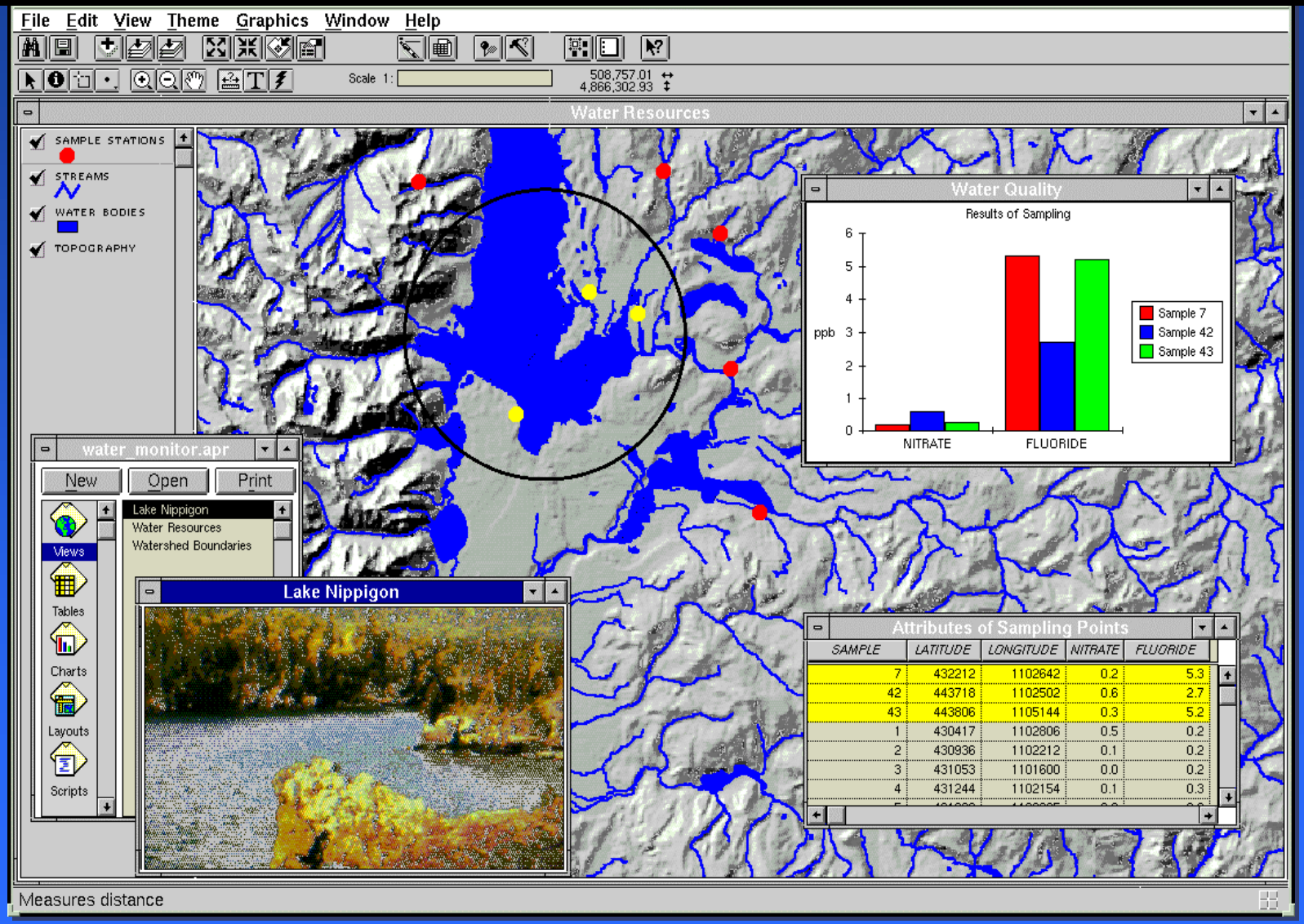
3D Mine with Well Data



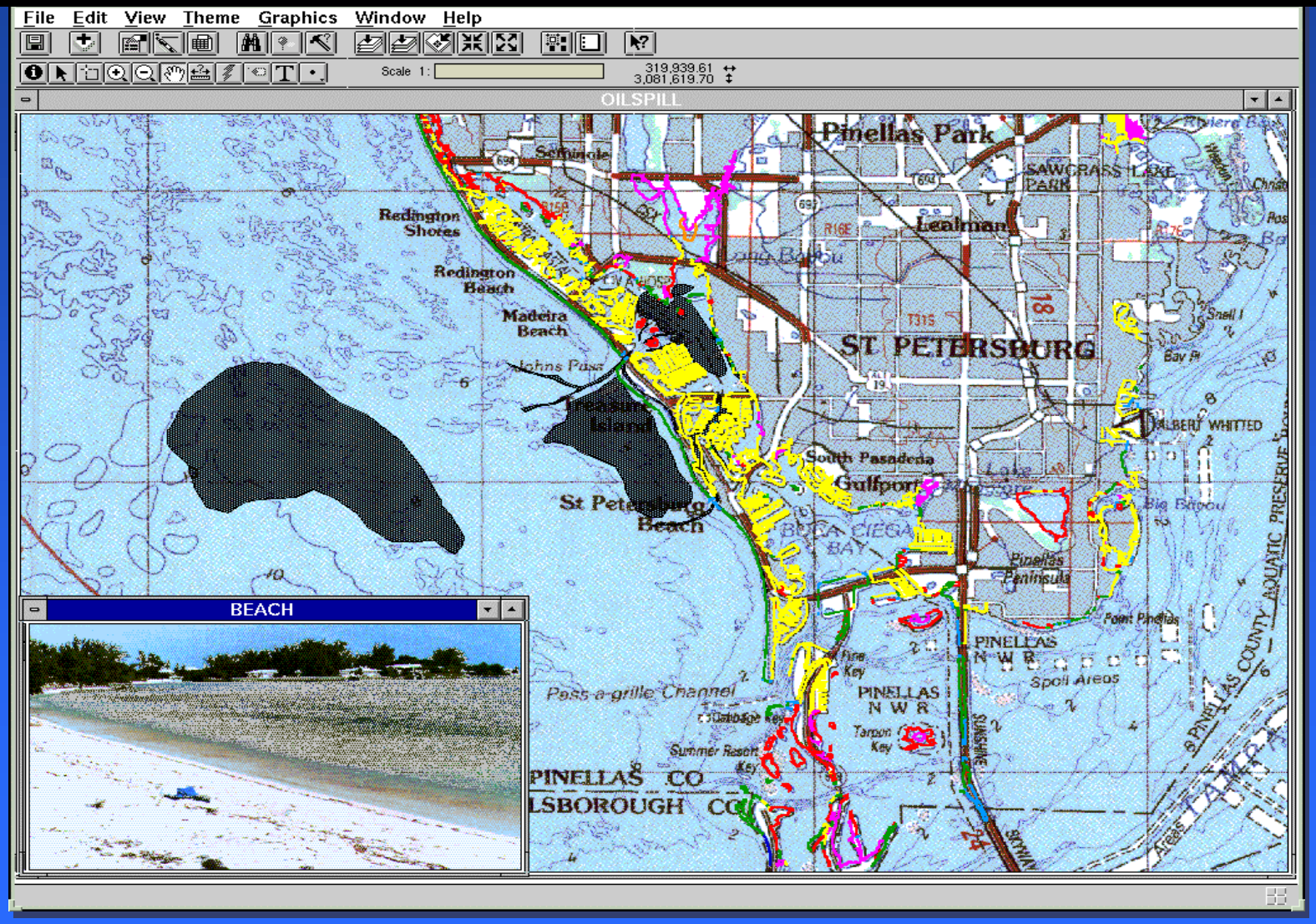
Environmental Monitoring Toxic Plume



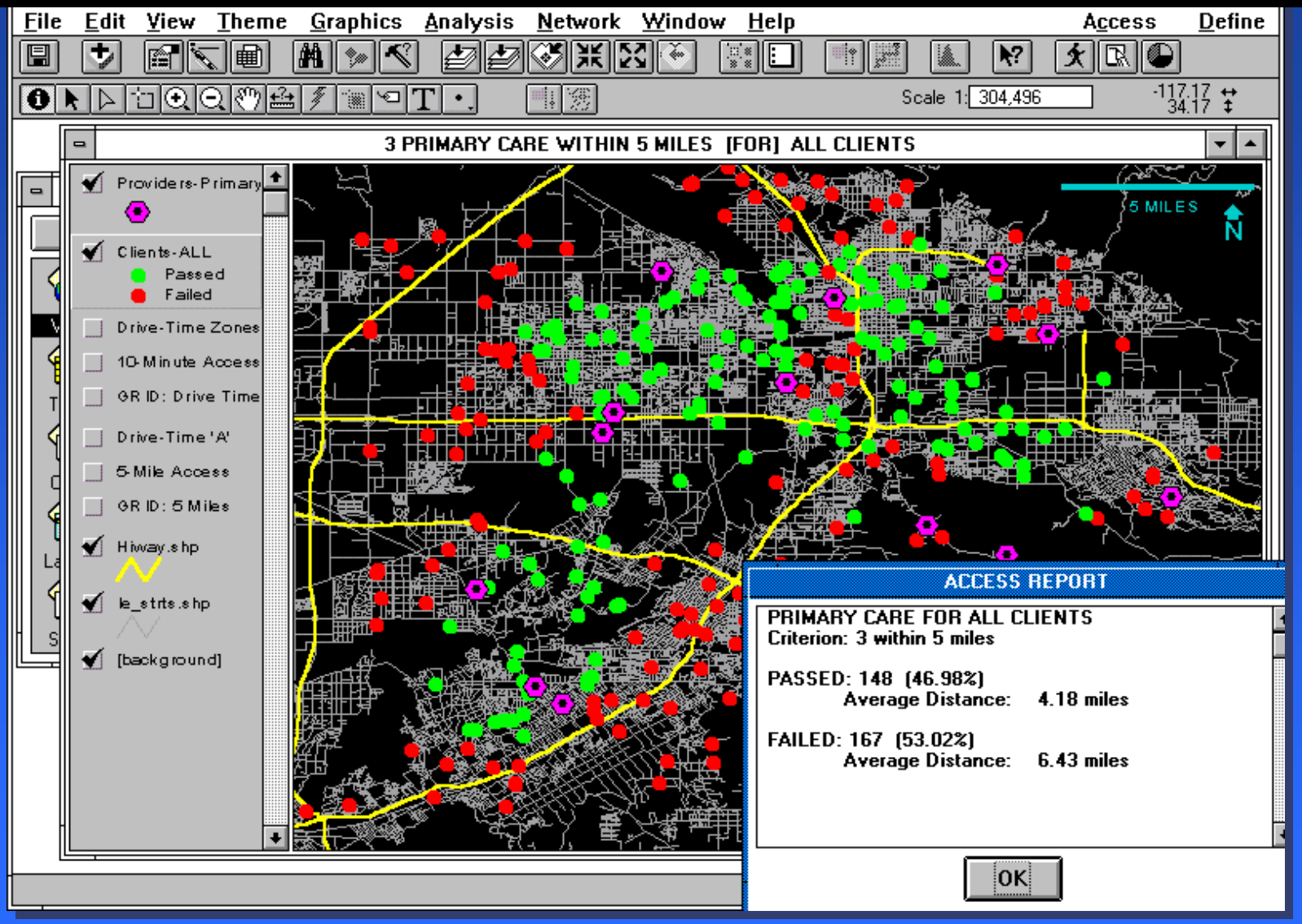
Combining Various Display Methods



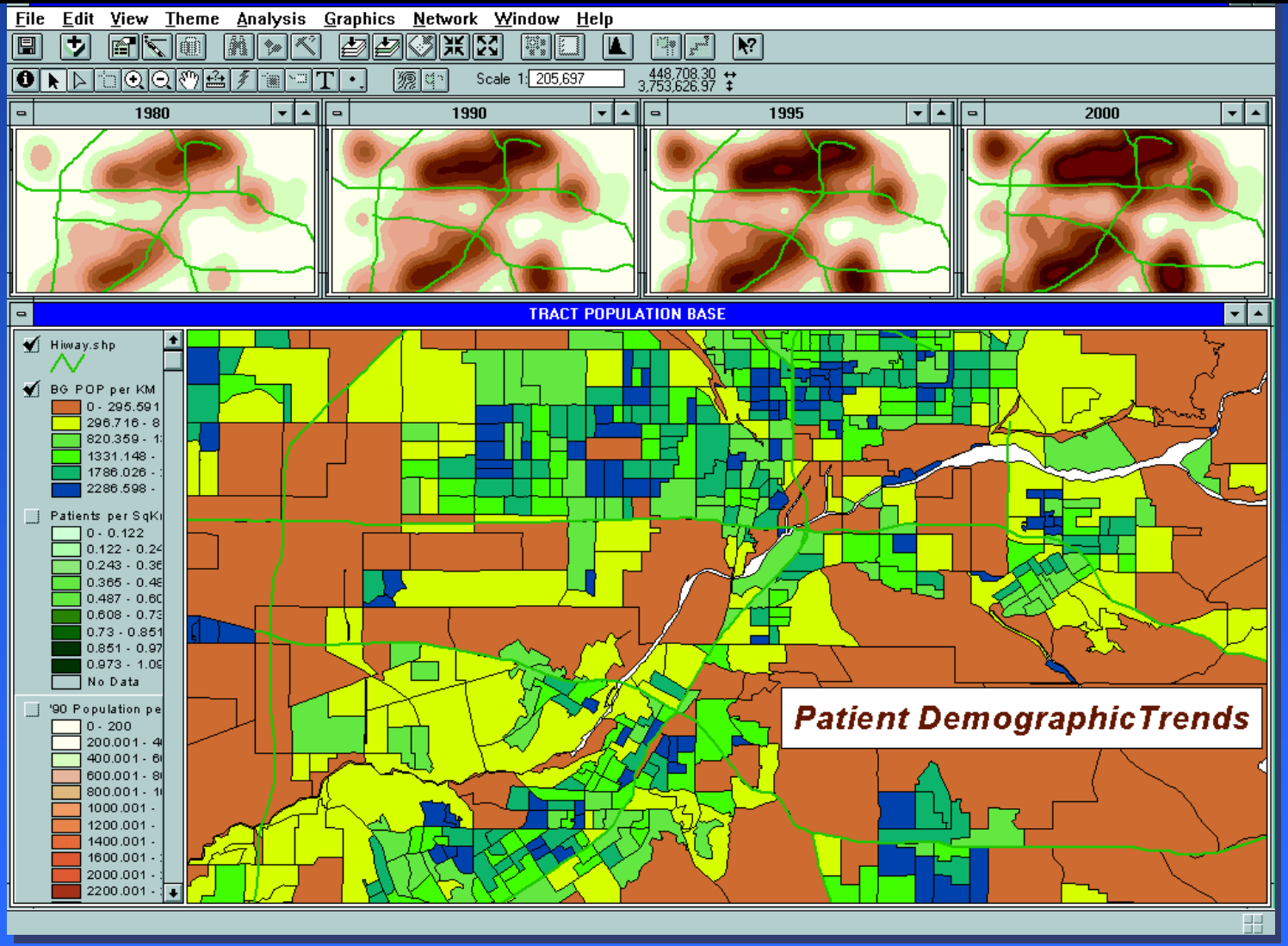
Oil Spill and Contamination



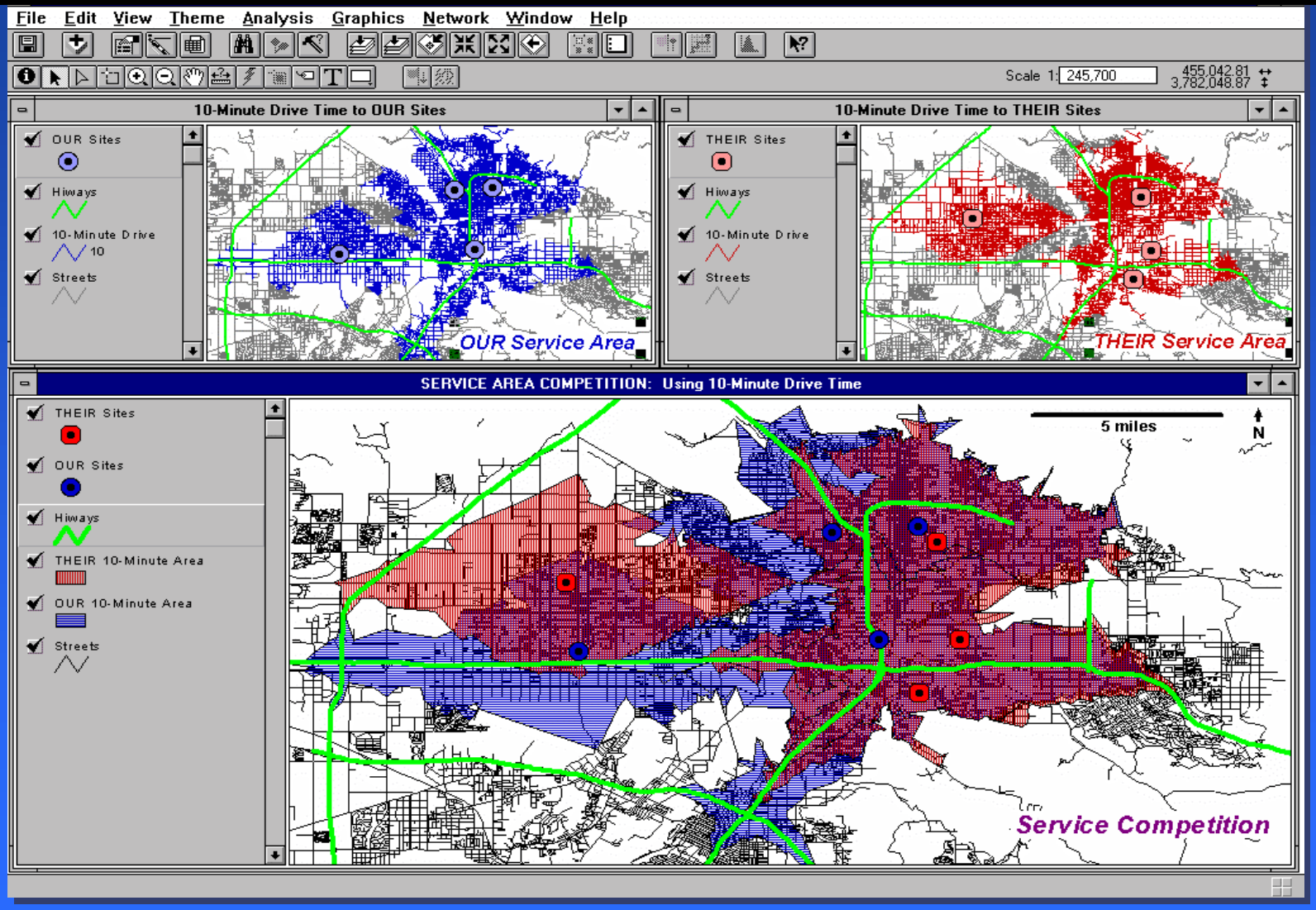
Site Location and Client Distance



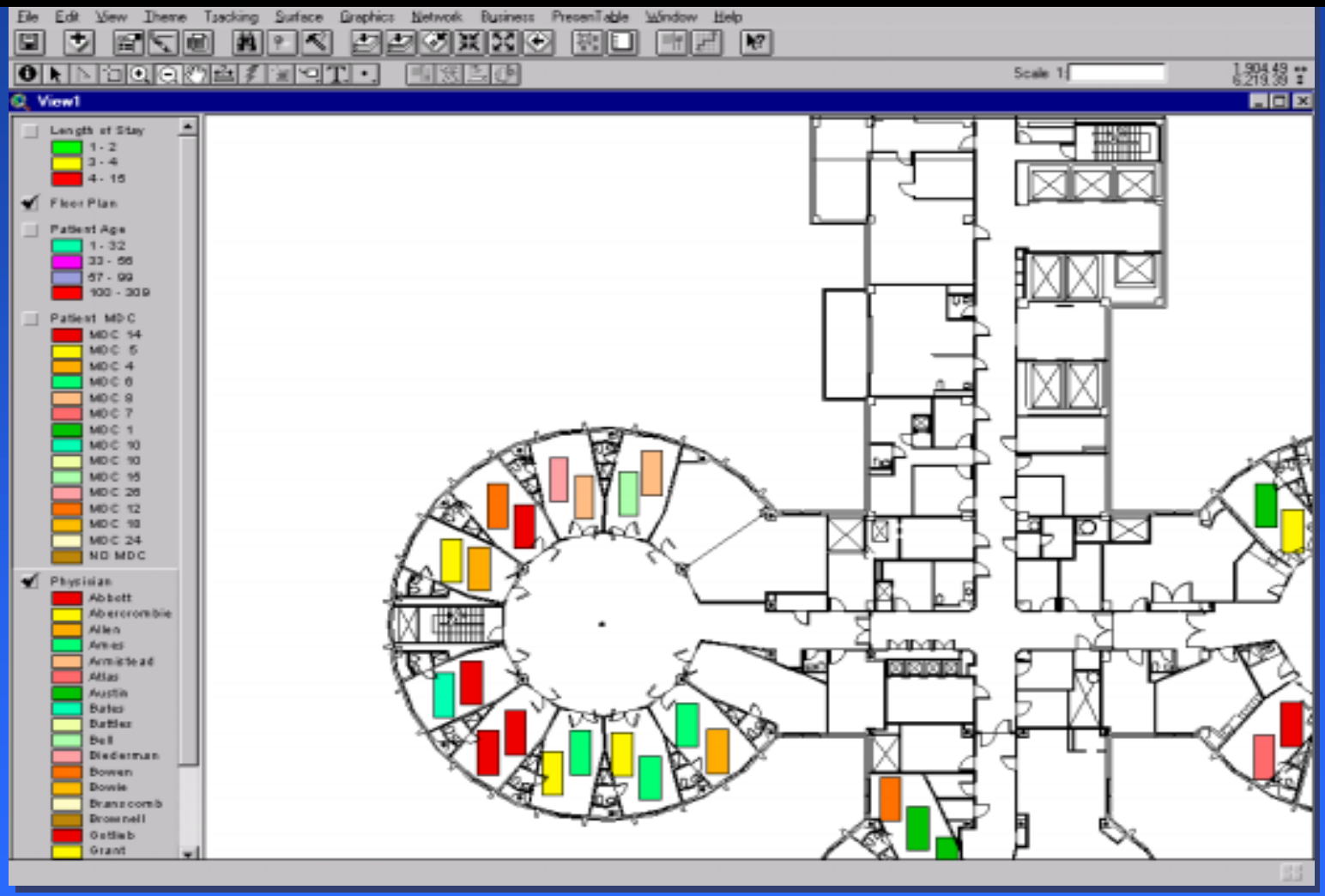
Modeling of Future Trends



Clusters and Comparison of Data



Loma Linda Hospital Facilities



GIS on the Internet

- **Olympics**
  - — http://citymap.cityofsydney.nsw.gov.au/
- **National Geographic Map Machine**
  - — http://www.nationalgeographic.com/maps.index.html
- **Find a Home** — http://www.realtor.com
- **ATM Locator** — http://www.visa.com
- **Store Locator** — http://www.godiva.com
- **GIS Info** — http://www.gis.com