What is GIS?

60-520 Seminar
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Earth Sciences

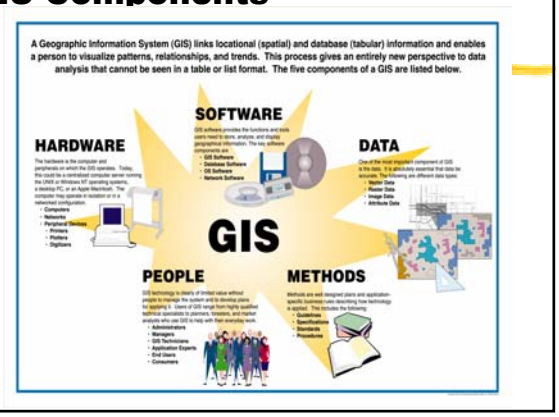
What is Geomatics?

- The science and technology of gathering, analyzing, interpreting, distributing and using geographic information
- Tools include GPS, GIS, Remote Sensing, Surveying and Cartography

What is GIS?

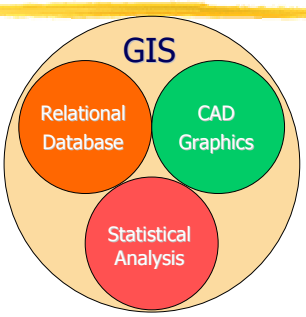
- **G**eographic **I**nformation **S**ystem
- "An integrated software package for the input, management, analysis, and display of spatially referenced data"
- Maps, plus more!
- Transforms *data* into *information*

GIS Components



GIS Technology

- GIS borrows from other software technology:
  - Relational Database Management Systems
  - Computer Assisted Design and Graphics Software
  - Statistical Analysis and Reporting Packages

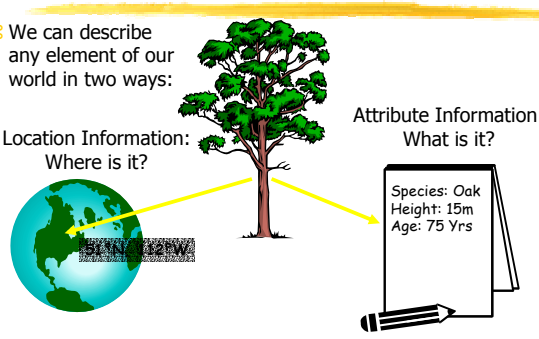


Describing Our World

- We can describe any element of our world in two ways:

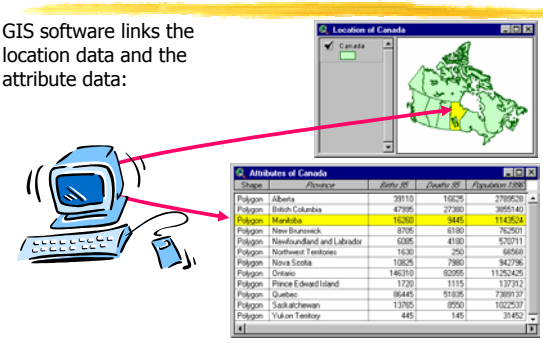
Location Information: Where is it?

Attribute Information: What is it?



GIS - Links Data Sets

- GIS software links the location data and the attribute data:

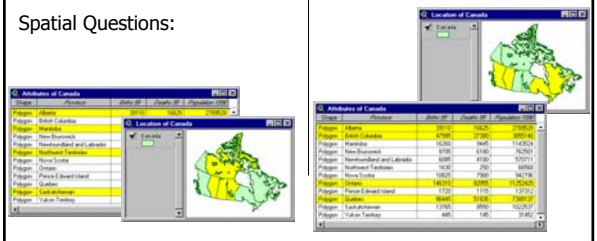


GIS - Analysis

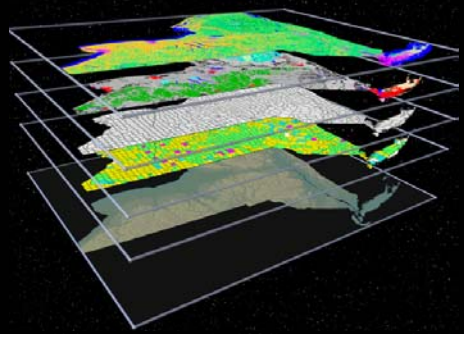
- GIS software can answer questions about our world:

Attribute Questions:

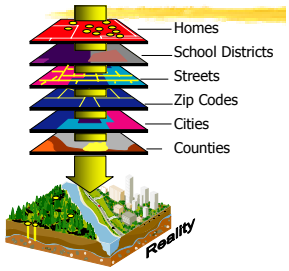
Spatial Questions:



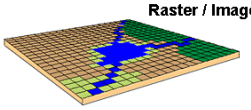
The World: "Layers" of Data



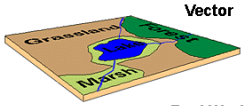
Spatial Data Models



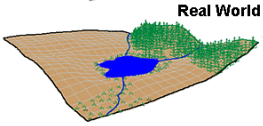
Raster / Image



Vector



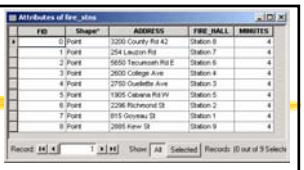
Real World



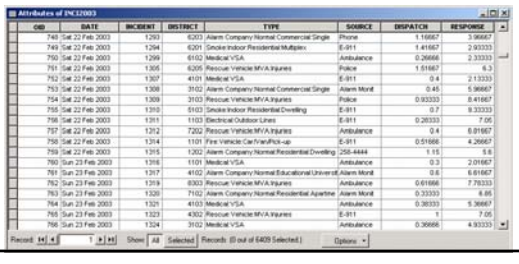
Summary - What is GIS?

- GIS is about using data to describe our world in two ways:
  - Location Data - Where is it?
  - Attribute Data - What is it?
- GIS software maintains a link between layers of location and attribute data
  - With the Link, we can ask questions about our world…

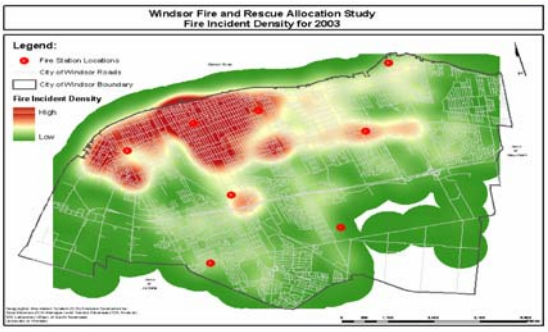
Example: Fire Response



- 9 fire stations handled 6409 incident calls in 2003



Where were the calls?



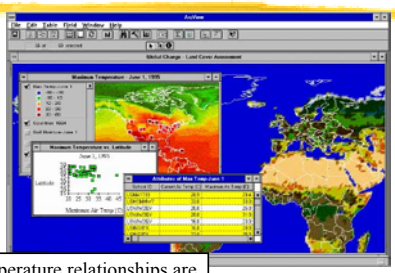
Your Typical Tabular Analysis

- Target reponse time is less than 4 minutes per call
- How well did we do in 2003?
- 67 of 91 call zones had an average > 4 minutes
- **WHY?**
- **WHERE?**

The GIS View

Environmental

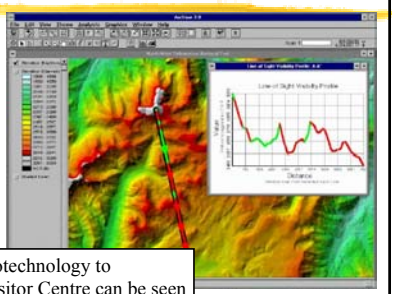
- What are the effects of Global Warming?



Land cover and temperature relationships are made clear when the data are seen at once using Geotechnology.

Park Management

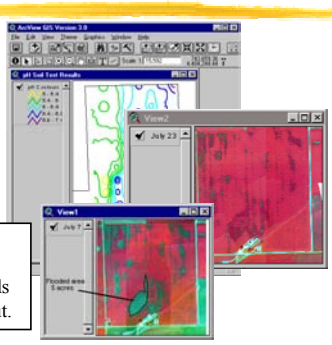
- Will the new building spoil the Park Scenery?



Park planners use Geotechnology to determine if a new Visitor Centre can be seen from the peak.

Agriculture

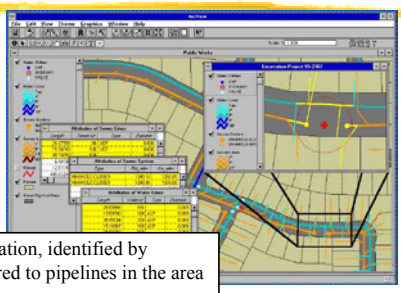
- How can I improve food production?



Geotechnology is used in making crop management decisions to maximize yields and minimize fertilizer input.

Public Utilities

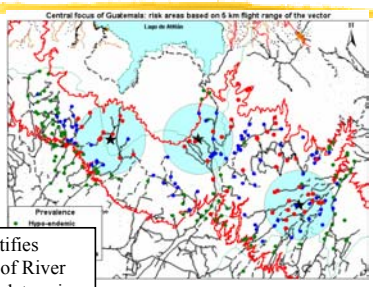
- Is it safe to dig here?



A proposed excavation, identified by address, is compared to pipelines in the area using Geotechnology.

Health Care

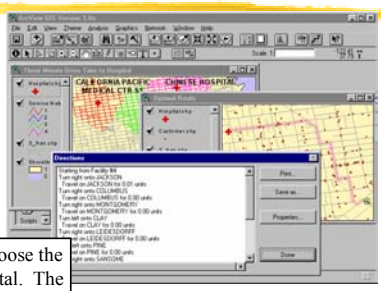
- What Communities are at risk from Disease?



Geotechnology identifies communities at risk of River Blindness and helps determine the impact of treatment.

Emergency 911

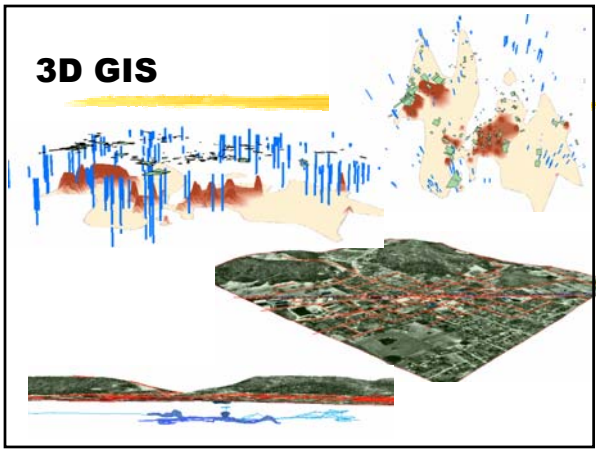
- What is the fastest route to the Hospital?



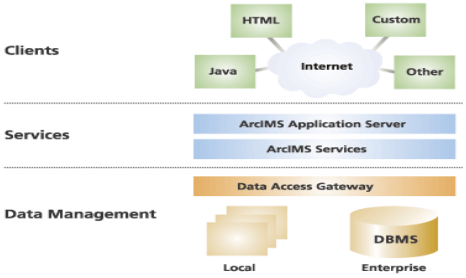
Geotechnology can choose the fastest route to a hospital. The GIS can take into account traffic and other impediments.

Mobile Access

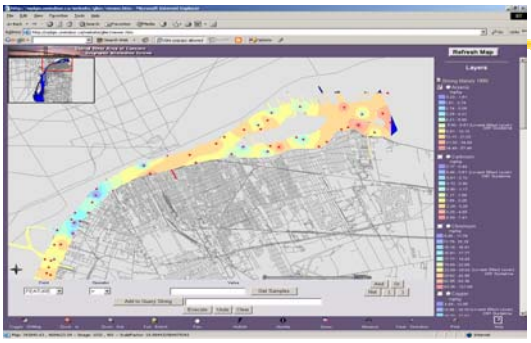
3D GIS



Web Based GIS



Web Based GIS



Our Community Projects

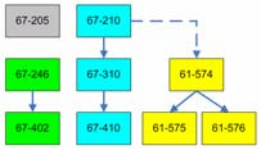
- iCity Historic Sites of Walkerville
- Pelee Island – How we got to the Present Millenium
- City of Windsor Tourism Mapping Project
- Great Lakes Institute – Detroit River Study
- Windsor-Essex Health Gateway
- Health Canada Air Quality Study – Landuse Regression Modeling
- Windsor Fire and Rescue – Fire Station Allocation Study
- Windsor – Essex Geospatial/Environmental Metadata Locator Tool

Our Geomatics Projects

- **GIST** – Integrating AI/ES and GIS methods for real-time geotechnical hazard monitoring – ***recruiting PhDs***
- **GPR Construction Kit** – Ground-penetrating radar, GPS, and GIS for 3D subsurface model construction
- **DrillView** - 3D query, analysis and visualization of subsurface structure using borehole and lithology data
- **ProbeFusion** – Mobile environmental data acquisition system for real-time GIS updating
- **ECO-COSM** – Spatial simulation modelling framework
- **OCIPEP** – GPS and radio modem transmission reliability in urban areas

Our Geomatics Courses

- Undergrad GIS (Service)
  - 67-205: Intro to GIS
- Undergrad GIS (Core)
  - 67-210: Principles and Applications of GIS
  - 67-310: GIS Problem Solving and Spatial Modeling
  - 67-410: Advanced Methods in GIS Analysis



- Undergrad Geomatics
  - 67-246: Intro to Aerial Photography and Cartography
  - 67-402: Remote Sensing
  - 61-470: GIS: A Computing Perspective (special topics)
- Graduate Geomatics
  - 61-574: Adv.Topics in Geoinformatics
  - 61-575: Adv. Integration of Remote Sensing and GIS Techniques
  - 61-576: Environmental Modelling and Spatial Simulation
- B.Sc. Geoinformatics
  - Joint Earth Sciences - Computer Science Honours program