A Brief Introduction to Geographic Information Systems (GIS)

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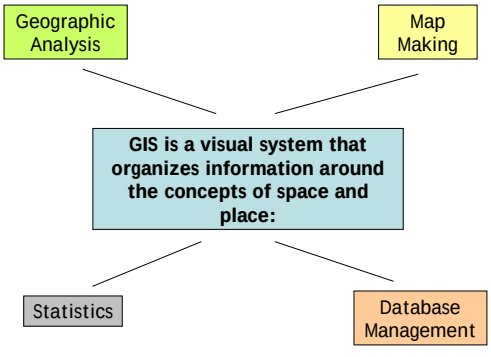
GIS: *an acronym for geographic information system.*

"An integrated collection of computer software and data used to manage information about geographic places, analyze spatial relationships, and model spatial processes. A GIS provides a framework for gathering and organizing spatial data and related information so that it can be displayed and analyzed."

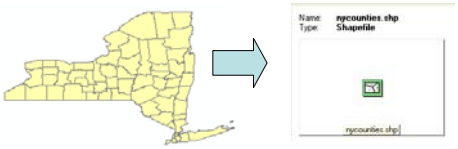
- *A to Z GIS*, Wade and Sommer, ESRI Press 2006



Narrow definition: software and data. Broader definition: software, hardware, data, metadata, and people.

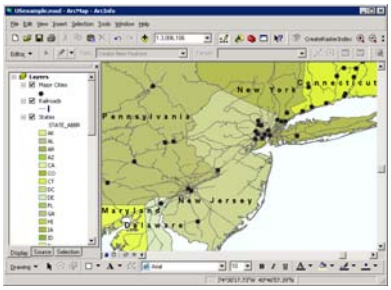
GIS Files are Features

Geographic features are represented by individual files or layers that can be added to a map. These features are the "raw materials" used for analysis and map making.



GIS Software

GIS software acts as an interface, or a window, for viewing and working with the various data files.

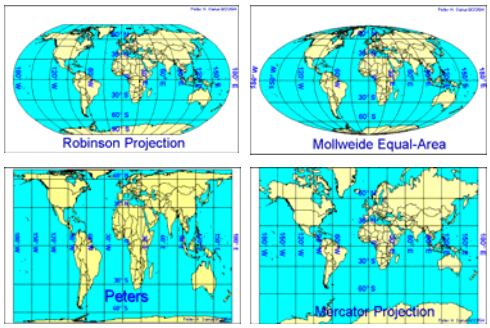


Georeferencing

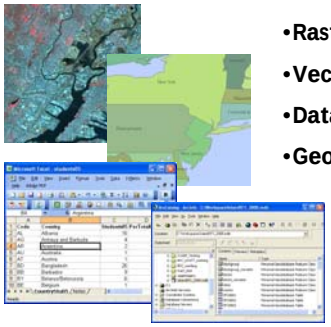
Each GIS layer is related (georeferenced) to an actual location on the earth because it is assigned a particular map projection and coordinate system.

Since projections and coordinate systems are standardized, GIS data can easily be shared as long as all of the GIS files being viewed share the same standard.

Map Projections and Georeferencing:



Four kinds of data files you can use with GIS:



- Raster
- Vector
- Data Tables
- Geodatabases

GIS Files: Raster

Raster files represent a continuous surface. This surface is divided into grid cells of equal size. Each cell appears as a particular color, based on some value (i.e. reflected light).

Common raster file formats include Tiff files .tif, JPEGs, .jpg, and SID files .sid.

GIS Files: Vector

Vector files consist of discrete coordinates which are visually represented as points, lines, or polygons (areas).

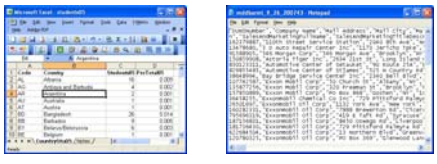
Common vector file formats include Shapefiles .shp, and Coverages .cov.

Vector Data Continued

Each feature within a vector file exists visually but also has a record that is stored in a table that is connected to the file. These records are descriptors, or attributes, that describe each feature. These attributes can be mapped.

Tabular Data

Data tables that contain records for places can be mapped in GIS in one of three ways.



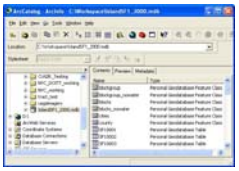
Common table formats include Excel files .xls, Database files .dbf, text files .txt, comma-delimited files .csv, and Access databases .mdb.

Joining Tabular Data to GIS Files:

Data tables that share a common field with a GIS feature can be joined to that GIS feature using relational database operations.

GIS Files - Geodatabases

Geodatabases are containers that can hold related vector, raster, and tabular data files in one place. Good for consolidating, organizing, and relating data.

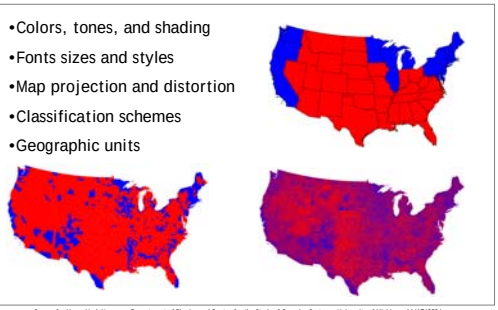


Common geodatabase formats include personal geodatabases – Microsoft Access .mdb, and file geodatabases .gdb.

GIS – Technical. Cartography – Art.

The message that a map sends can be altered by:

- Colors, tones, and shading
- Fonts sizes and styles
- Map projection and distortion
- Classification schemes
- Geographic units



Source for Maps: Mark Newman, Department of Physics and Center for the Study of Complex Systems, University of Michigan, 11/17/2004
http://www-personal.umich.edu/~mejn/election/ (12/18/2007)

Tutorial

To Learn More About GIS:

- GIS Subject Guide
- ESRI Virtual Campus
- Gothos.info
- **Books and Tutorials**
- **Courses**
- **Workshops**
- **Consultation**

PUMS Data

- Subset of original sample data containing individual responses from Decennial Census SF3 and ACS. Allows you to build your own samples for particular population characteristics
- Can be compiled to geographic areas called PUMAs, which are based on tract boundaries
- Sample of housing units and persons in housing units available for 5% of population (for PUMAs – areas with > 100,000 residents) and 1% of population (Super-PUMAs – areas with > 400,000 residents)
- NYCRDC provides access to restricted non-public microdata.

NYCRDC Part 3

Spatial Statistics and Spatial Research using the Census RDCs

Thursday May 8, 2008

12 noon to 2:30pm (Lunch from 12 to 12:30pm)

Room 301, 135 E 22nd St

(corner of Lexington Ave)

THE END!