

Definition of GIS



▶ Definition of GIS

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- Definition of GIS
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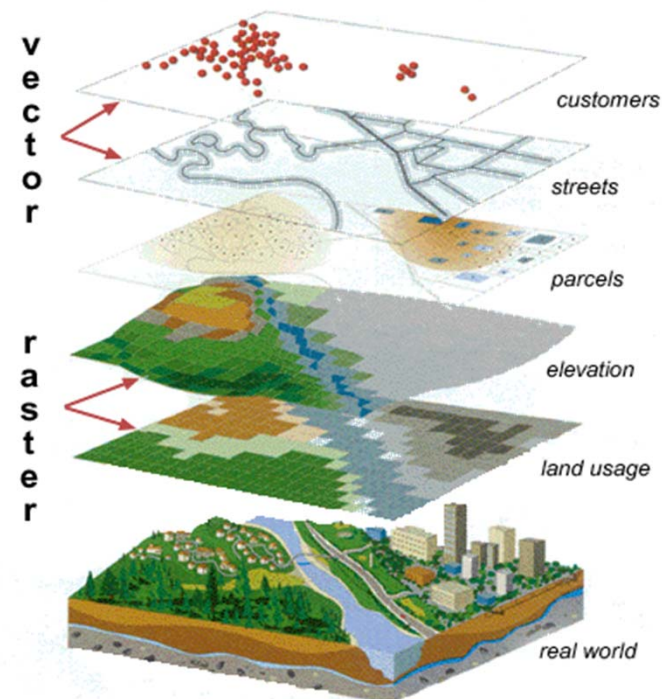
- ▶ Geographic Information Systems have been developed because spatial information is very important to humans.
- ▶ A GIS helps us gather and use spatial data. Ways that we gather and use spatial data have been radically altered by advances in electronics and software.



- ▶ Data is a collection of attributes (numeric, alphanumeric, figures, pictures) about entities (things, events, activities)
- ▶ Information is the organization of data such that it is valuable for analysis, evaluation, and decision making Information Systems and Planning
- ▶ Information systems are the means to transform data into information.
- ▶ Information systems are used in planning and managing resources.

How GIS Works

- ▶ Information is stored in layers.
- ▶ Similar data types or “themes” are stored in each layer.
- ▶ Data queries are given in terms of what layers are desired
- ▶ Data are then displayed by overlaying all data requested on a single map.



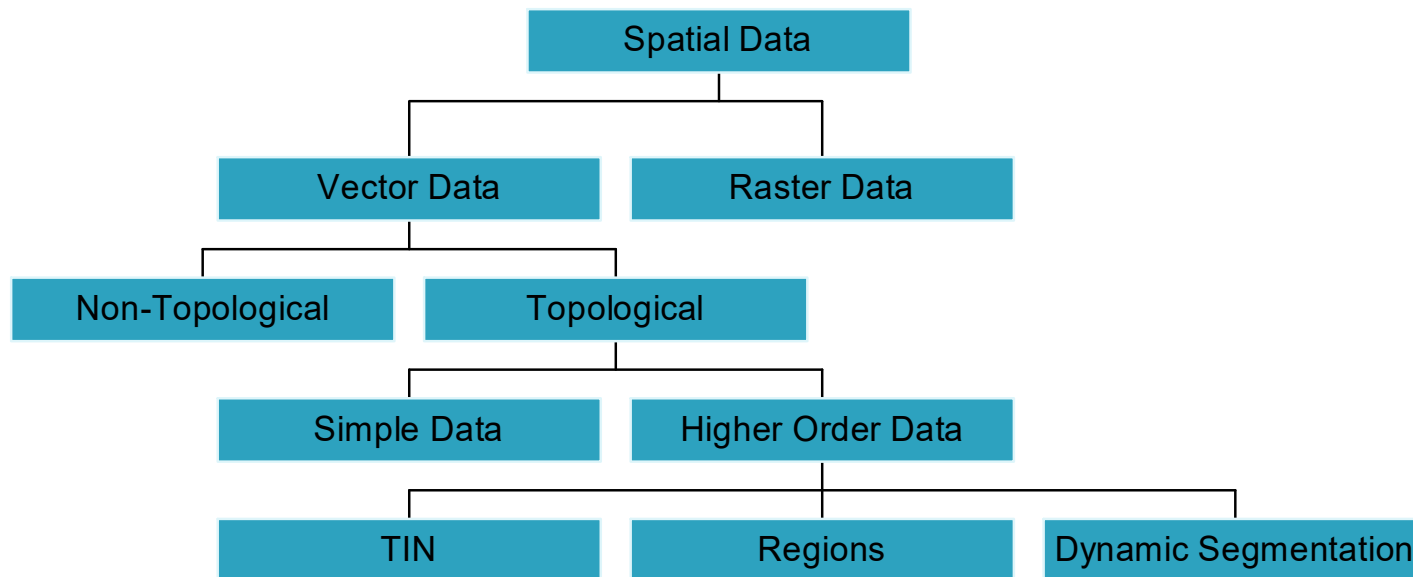
Geospatial data have both spatial and thematic components:

▶ *Spatial component*. The observations have two aspects

in its localization:

- absolute localization based in a coordinates system
- topological relationship referred to other observations.

Types of Spatial Data



- ▶ A geographic information system (GIS) is a computer system for capturing, storing, querying, analyzing, and displaying geographically referenced data. Also called geospatial data, geographically referenced data are data that describe both the location and characteristics of spatial features such as roads, land parcels, and vegetation stands on the Earth's surface

What is a GISystem?

- ▶ Many definitions of GIS have been suggested over the years, such as
 - "a container of maps in digital form"
 - "a computerized tool for solving geographic problems"
 - "a tool for performing operations on geographic data that are too tedious or expensive or inaccurate if performed by hand" (Longley, et al, Geographic Information Systems and Science, 2001).
- ▶ Let's look at some of the definitions given by the professional institutes:
- ▶ **USGS** (United States Geological Survey): In the strictest sense, a GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information, i.e. data identified according to their locations.

What's Basic Data Model in GISystem?

- ▶ Vector data model

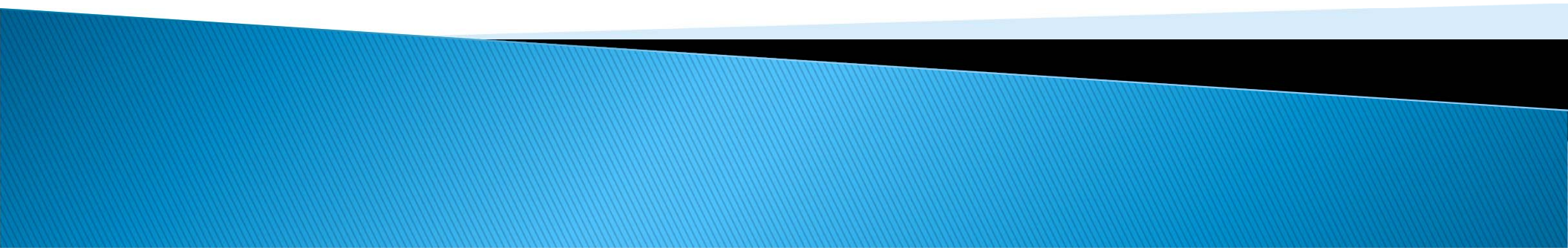
Vector data represents the locations of the discrete objectives by points, lines and areas.

- ▶ Raster data model

Continuous numeric values, such as elevation, and continuous categories, such as vegetation types, are represented using the raster model. Raster model divides the entire study area into a regular grid of cells in specific sequence, each cell has a unique value representing different types.

- *Raster Data*: data represented as a regular grid. (e.g. digital elevation model or DEM, images)
- Vector Data: data represented as points, lines, or polygons. (e.g. roads, streams, boundaries)
 - Non-Topological Vector Data: no relationship between vector data objects (handled primarily by ArcView)
 - Topological Vector Data: explicit spatial relationships among features (handled primarily by ArcInfo)
 - Higher-Order Data: explicit grouping of topologic data (TINS based on elevation points, regions that are related)

Problems



- ▶ Problems that involve an aspect of location, either in the information used to solve them, or in the solutions themselves, are termed geographic problems. Here are some examples:

- ▶ Health care managers solve geographic problems (and may create others) when they decide where to locate new clinics and hospitals.
- ▶ Delivery companies solve geographic problems when they decide the routes and schedules of their vehicles, often on a daily basis.
- ▶ Transportation authorities solve geographic problems when they select routes for new highways.

- ▶ Forestry companies solve geographic problems when they determine how best to manage forests, where to cut, where to locate roads, and where to plant new trees.
- ▶ National Park authorities solve geographic problems when they schedule recreational path maintenance and improvement.
- ▶ Governments solve geographic problems when they decide how to allocate funds for building sea defenses.
- ▶ Travelers and tourists solve geographic problems when they give and receive driving directions, select hotels in unfamiliar cities, and find their way around theme parks
- ▶ Farmers solve geographic problems when they employ new information technology to make better decisions about the amounts of fertilizer and pesticide to apply to different parts of their fields.