

# Introduction to GIS

## Learning Objectives

- Define GIS
- Differentiate GIS with other Information Systems
- List basic components and subsystems
- Outline different approaches to studying GIS
- Catalog various industries associated with GIS
- Identify representative applications in various fields



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# GIS

- GIS is a computerized method of
  - collecting,
  - storing and retrieving
  - analyzing
  - visualizing and presenting spatial and related *aspatial* data
- You better believe it –
  - Data from a lot of high-tech gadgets and some of the most expensive satellites converges at GIS to make it "simple" to understand



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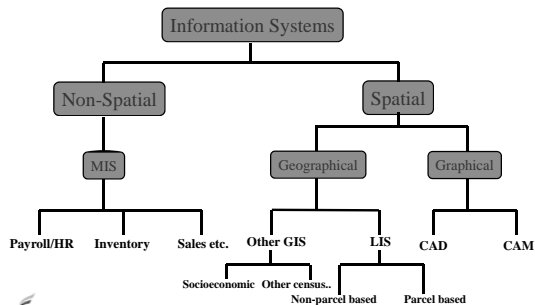
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# Information Systems



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## The Spatial Systems

- **Cartography**
  - The good ole method of making a map
- **Computer Aided Cartography (CAC)**
  - Excellent for display but lacks the analytical capabilities of GIS
- **Computer Aided Design (CAD)**
  - The engineers' tool to bring things to "life!"
  - Self contained - not tied to external data files
- **Computer Aided Manufacturing (CAM)**
  - Integrated CAD and robotics
- **Geographic Information Systems (GIS)**
  - CAC and more (mainly with an additional relational database management system)

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## Components of GIS

- **Data**
  - Most critical component (more details on next slide)
- **Technology**
  - Includes hardware and software
  - Fast changing
- **Broad and specific application areas**
  - Industry specific: e.g. Govt., commercial etc.
  - Field specific: e.g. environmental, census demographic etc.
- **People**
  - Business analysts
  - System developers
  - End users

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## Data for GIS

**Comprises of**

- **Geodetic control network**
  - graphical framework by which different sets of geographic data can be spatially cross-referenced with one another)
- **Topographic base**
  - Obtained by various methods of land surveying/ photogrametry
- **Geographic overlays**
  - Thematic data pertaining to specific GIS applications (e.g. vegetation cover; road network; streams etc.)

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## The 4 Subsystems of GIS

- Data input
  - Collects and preprocesses data
  - Transformations
- Data storage and retrieval
  - Organizes data for efficient retrieval, update and editing
- Data manipulation
  - The essence of GIS
- Reporting



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## The Business of GIS

- Software Industry
  - ESRI – Environmental Systems Research Institute (major player); AutoDesk; and Many more
- Data industry
  - No data – no GIS
- GIS service industry
- Publishing
- GIS Education
  - Principles vs. vocation



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## Approaching the study of GIS

- GIS as a field by itself
    - Example: geographic science; GIS
  - GIS as a branch within Information Systems
    - CEIE 410/510 is also an approved elective for Information Systems students
  - GIS as applied to a particular field
    - Example: GIS in Engineering
  - GIS as a spatial data institution
- Regardless of the approach – you MUST know the fundamentals!!



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## 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*



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