Lecture 4: How to Design a GeoDB

GEOG 419: Advanced GIS
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Key is asking the right questions:
► How can GIS technology be implemented to streamline existing functions or change the way we achieve a goal?
► What data will benefit the organization the most?
► What data can be stored?
► Who is responsible for maintaining the database?

Truths about Design
► Time-consuming
► No end-use applications
► If not done:
  ▪ Database may not meet requirements
  ▪ Can end up with duplicate, missing, or unnecessary data
  ▪ Lack of necessary management techniques

Objectives of Design
► Design should define goals, identify, analyze, and evaluate design alternatives, and create implementation plan
► Investment of time and money up front saves even more time and money later
► A functional, well-organized database:
  ▪ Satisfies organizational objectives
  ▪ Contains all necessary data
  ▪ Accommodates different views of the data
  ▪ Distinguishes maintenance apps from user apps
  ▪ Organizes data so that different users access the same data

Design Guidelines
► Involve users
► Take it one step at a time
► Build a team
► Be creative
► Create deliverables
► Keep organizational goals and objectives in focus
► Do not add detail prematurely
► Document carefully
► Be flexible
► Plan from your model

Steps in Building a GeoDB
► Model the user’s view of data
► Define objects and relationships
► Select geographic representation
► Match to geodatabase elements
► Organize geodatabase structure
Model the User’s View
- Identify the functions that support the organization’s goals and objectives
- Identify the data required to support the functions
- Organize the data into logical sets of features
- Define an initial implementation plan
- Identify organizational functions

Define Entities and Relationships
- Identify and describe entities
- Identify and describe the relationships among these entities
- Document the entities and relationship with UML diagrams
- Create statements about how the system works then evaluate those statements in terms of entities and relationships

Identify the representation of entities
- Is the feature represented on a map?
- Is the shape of a feature important?
- Is the feature best accessed through its relationship with another feature?
- Will the feature have different representations at different scales?

Match to a GeoDB model
- Determine appropriate geodb representation for entities
  - Spatial type = point
    - Unconnected = point feature
    - Connected = simple junction
  - Connected with internal topology = complex junction
  - Spatial type = line
    - Stand-alone line = line feature
    - Line in a system = simple edge
    - Line with connected sections = complex edge
  - Areas = polygon feature (with potential planar topology)
  - Objects = objects

Organize into Geographic Datasets
- Assign entities to feature classes and subtypes
  - Feature classes vs. subtypes
- Group related sets of features into geometric networks or planar topologies
  - Simple edges & junctions, complex edges & junctions = geometric network
  - Need space-filling and no overlapping = planar topology
- Organize feature classes and datasets into geodb’s