GEOGRAPHICAL INFORMATION SYSTEM

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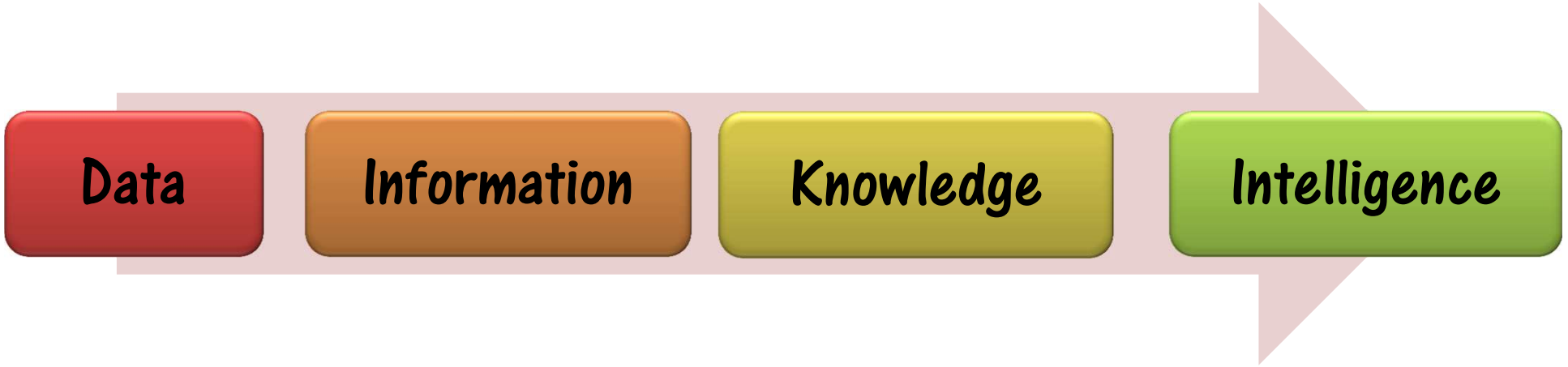
What is GIS?

- Geographic Information Systems
- Commonly known as " Geographical Information Systems"

One of the fastest growing sectors of the computer industry and one of the most essential components of Information Technology (IT) infrastructure of modern society



- **Data:** Collection of facts or figures that pertain to places, people, things, events and concepts represented in form of numerical values, alphanumeric characters, symbols and signals
- **Information :** Data transformed through processes such as structuring, formatting, conversion and modeling – to a form that is meaningful to a user – processed or value added data having certain perceived value to a user
- **Knowledge :** Transformation of data into information raises the knowledge of the user/ user community to a level appropriate for specific decision making process
- **Intelligence/ wisdom:** Deployment of knowledge by the user to perceive relationships, formulate principles, and introduce personal values and beliefs.

The transformation of Data into Information is the core function of Information Systems

SYSTEMS & INFORMATION SYSTEMS

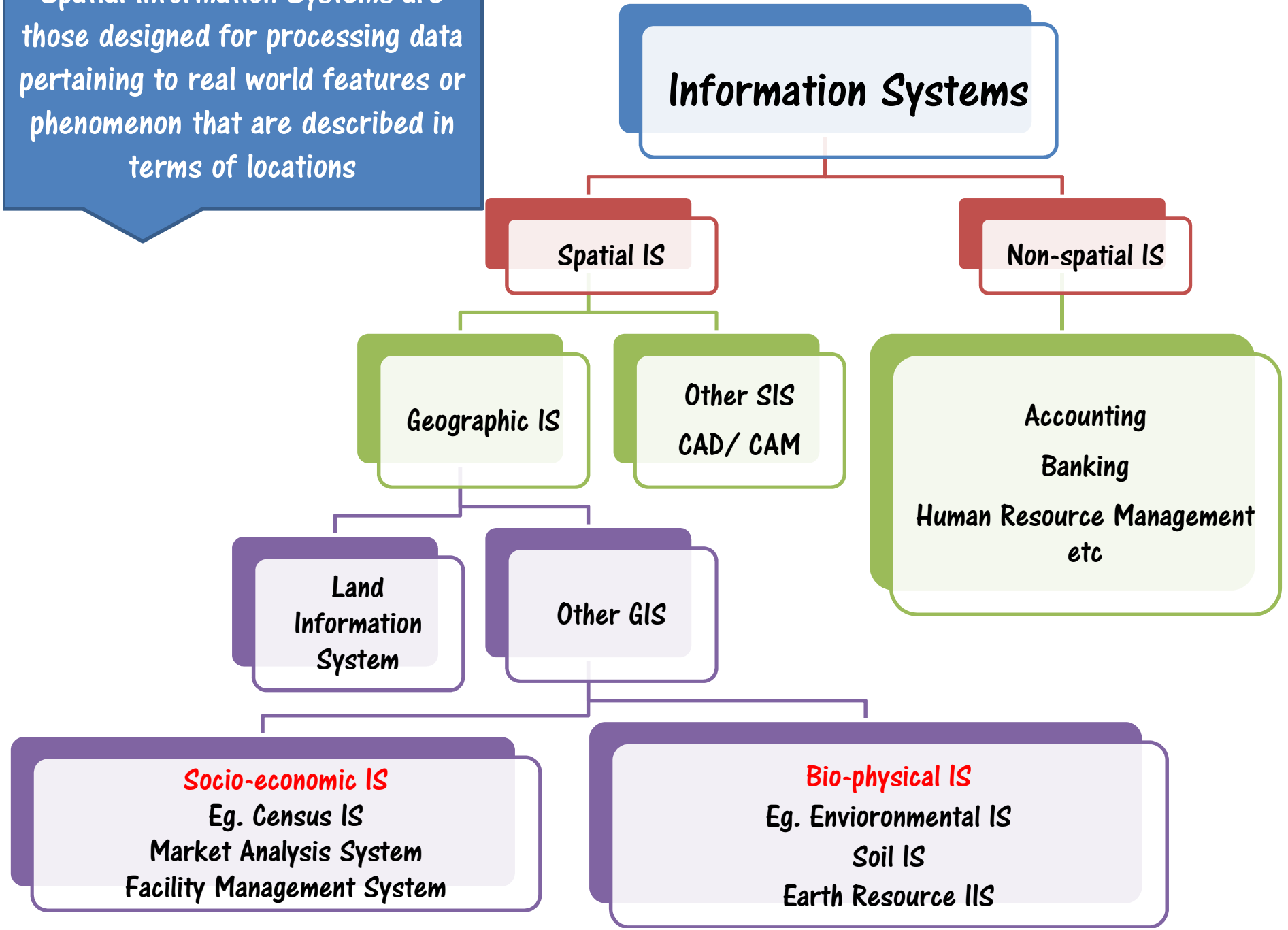
All systems physical or conceptual have the following common characteristics:

1. They are formed or constructed to achieve certain basic objectives/functions
2. An individual system is composed of many interrelated parts, which may themselves be operational systems
3. These parts operate individually and interact with one another according to certain rules of conduct – law, procedures…etc.

Information System

1. Set up to achieve the specific objectives of collecting, storing, analyzing, and presenting information in a systematic manner
2. Structurally composed of interrelated components that include a combination of data, technical and human resources
3. Made up of input, processing, and output subsystems, all working according to a well defined set of operational procedures and protocols

Spatial Information Systems are those designed for processing data pertaining to real world features or phenomenon that are described in terms of locations



GIS- A SPECIAL CLASS OF INFORMATION SYSTEMS

Only those SIS that are used for processing and analysing geospatial data is GIS

Geographic

The focus on geospatial data and their application for spatial problem solving makes GIS unique among information systems

Earth

All data in the system is pertinent to Earth's Features and resources including human activities based on or associated with these features or resources

Geographic space

Common among the data in the system and problems it aims to solve is geography – location, distribution, pattern and relationship within a specific geographical reference framework

GEOSPATIAL DATA

A special form of spatial data that is characterized by two crucial properties

- Reference to Geographic Space – data are registered to an accepted geographical coordinate system of Earth's surface so that data from different sources can be spatially cross referenced and integrated

- Representation at geographic scale – data are normally recorded at relatively small scales and as a result, must be generalized and symbolized

GIS.....

GEOGRAPHICAL : The science of Earth's physical features, resources, climate, population etc…

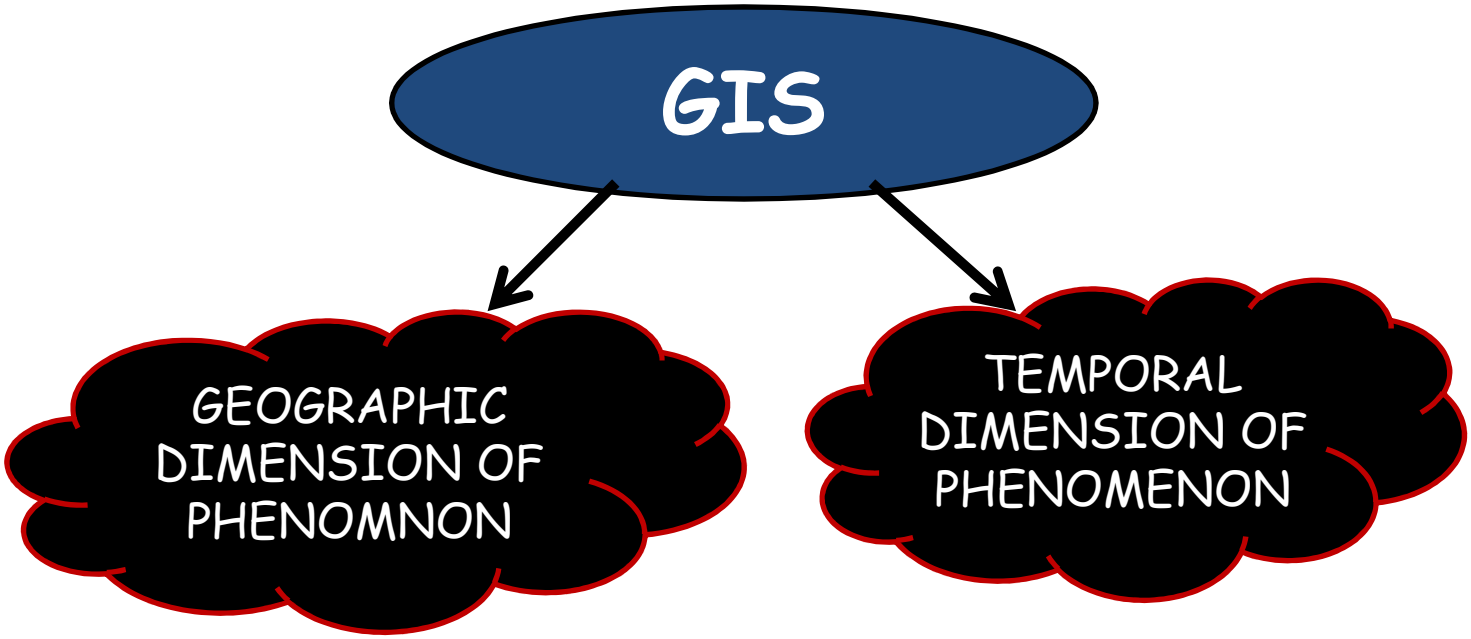
INFORMATION : processed, manipulated and organized form of data which adds to the knowledge of the person receiving it and is useful for decision making.

SYSTEM : a set of things that are connected or that work together

What's special about GIS?

- Integration of spatial and non-spatial information
- Decision making tool with support of organized data.
- Dynamic map display and interactive queries.
- Solution to real world problems with multiple options: enables modeling and visualization of alternatives

- GIS professionals deal with **Geographic Space – Space having positional data relative to Earth's Surface. We deal with Spatio-temporal problems.**

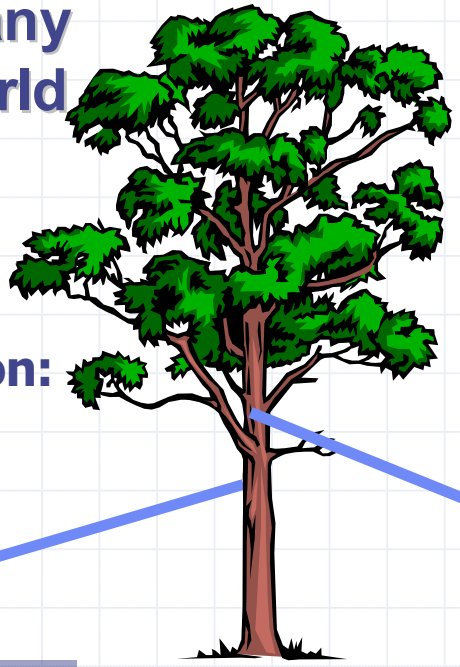


Phenomenon have different characteristics on different locations

Phenomenon have different characteristics for different moments in time

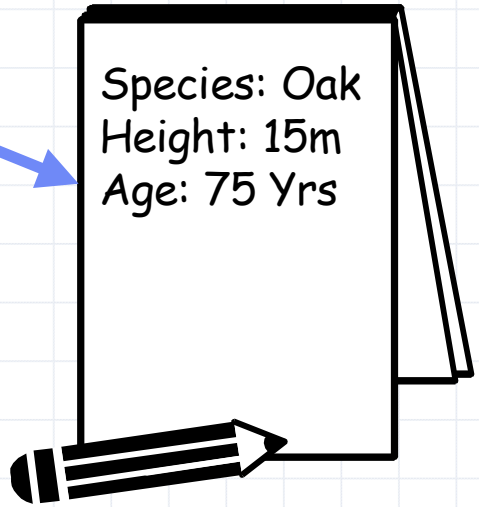
Describing our World

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



Location Information:
***Where* is it?**

Attribute Information:
***What* is it?**



***Geographical or spatial data* represent phenomenon from the real world in terms of**

- **Location** – position with respect to a known coordinate system
- **Attributes** – characteristics that are *unrelated* to the position
- **Topology**- The spatial interrelationships of phenomenon with each other , which describe how they are linked together.

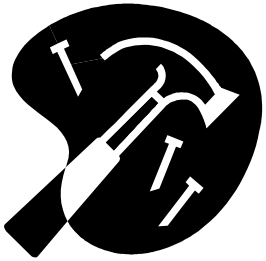
DEFINING GIS
GEOGRAPHIC + INFORMATION + SYSTEM

- "A system of hardware, software and procedures designed to support the capture, management, manipulation, analysis, modeling, and display of spatially referenced data for solving complex planning and management problems" – Rhind (1989)
- " A computer system capable of assembling, storing, manipulating, and displaying geographically referenced information, i.e., data identified according to their locations" (USGS, 2005)

Common ideas

- It is a computer based system
- The system is specially designed and implemented for two subtle but interrelated purposes – (1) managing geospatial data, (2) using these data to solve spatial problems

SOME MORE Definitions of GIS



Tool box based definitions – focus on methodology

- **A powerful set of tools for collecting, storing, retrieving at will, transforming and displaying data from the real world (Burrough 1986)**

- **A system for capturing, storing, checking, manipulating, analysing, and displaying data which are spatially referenced to Earth (Deptt. of Environment 1987)**

- **An Information Technology which stores, analyses and displays data which are spatially referenced to Earth. (Parker 1968)**

DEFINITIONS OF GIS....

Database definitions – focus on differences in data organization methods needed to handle spatial data

- **Any manual or computer based set of procedures used to store and manipulate geographically referenced data (Aronoff 1989)**
- **A database system in which most of the data are spatially indexed, and upon which a set of procedures operated in order to answer queries about spatial entities in the database (Smith et al. 1987)**

DEFINITIONS OF GIS....

Organization based definitions- emphasis on the role of institutes and people in handling spatial information.

- **A decision support system involving the integration of spatially referenced data in a problem solving environment (Cowen 1988)**
- **An institutional entity, reflecting an organizational structure that integrates technology with a database, expertise and continuing financial support over time (Carter 1989)**