Topic no 2: Definition, Key Components and Functional Subsystem

Definition:

"A system for capturing, storing, checking, integrating, manipulating, analysing and displaying data which are spatially referenced to the Earth. This is normally considered to involve a spatially referenced computer database and appropriate applications software"

We can also defined GIS as follows:

"A special case of information system where the database consists of observation son spatially distributed features, activities or events, which are definable in space as points, lines or area. A geographic information systems manipulates data about these points, lines and areas to retrieve data for ad hoc queries and analyses"

GIS is Unique:

GIS is unique tool because

a) GIS handles SPATIAL information

  ✓ Information referenced by its location in space

b) GIS makes connections between activities based on spatial proximity.

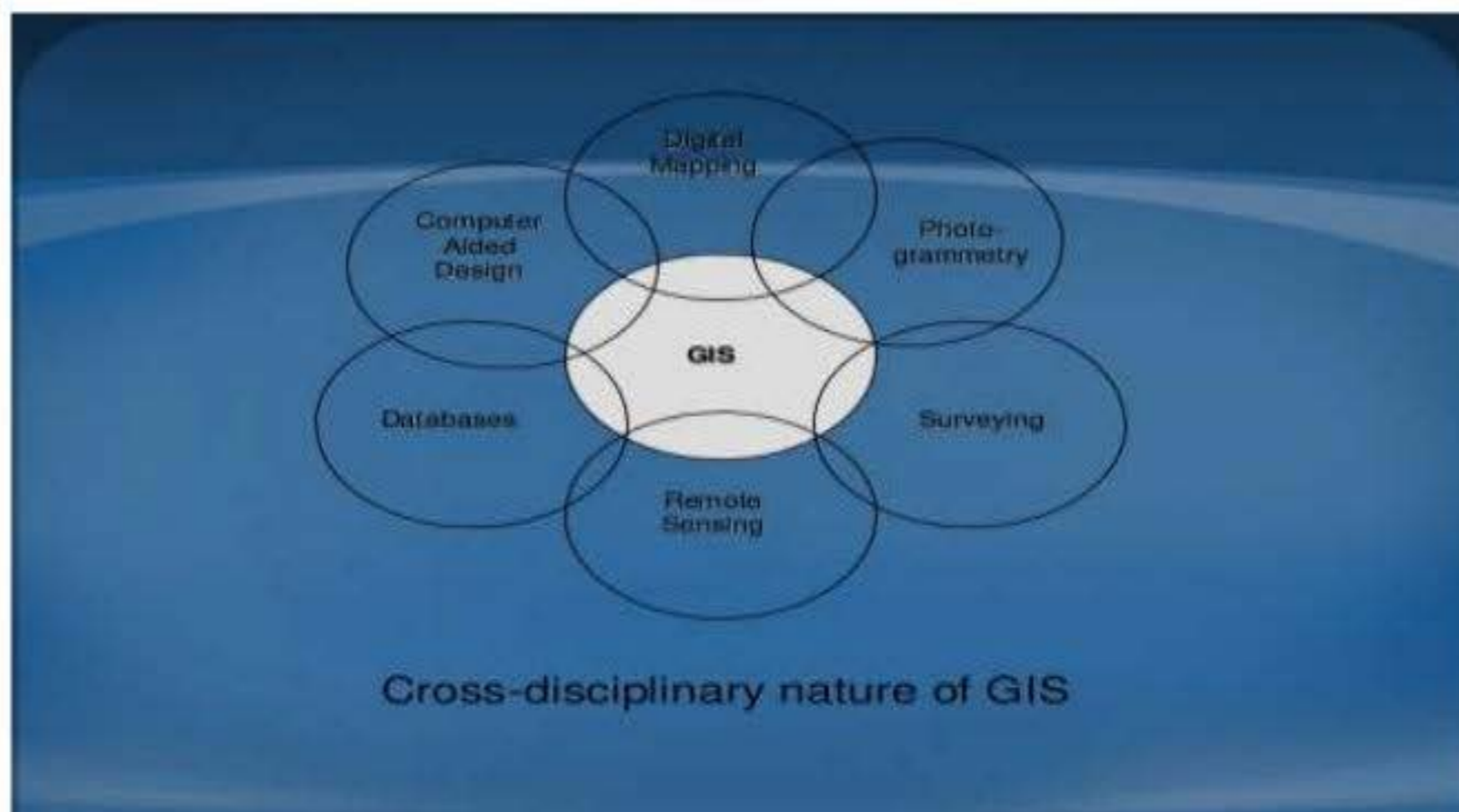**Nature of GIS:** The study of GIS is a multidisciplinary or interdisciplinary field

Fig: No: 02 Nature of GIS

Components of a GIS:

A working GIS integrates five key components: hardware, software, data, people, and methods.

Fig No: 03 components of GIS

Hardware

Hardware is the computer on which a GIS operates. Today, GIS software runs on a wide range of hardware types, from centralized computer servers to desktop computers used in stand-alone or networked configurations.

Software

GIS software provides the functions and tools needed to store, analyze, and display geographic information. Key software components are

- Tools for the input and manipulation of geographic information
- A database management system (DBMS)
- Tools that support geographic query, analysis, and visualization
- A graphical user interface (GUI) for easy access to tools

Data:

Possibly the most important component of a GIS is the data. Geographic data and related tabular data can be collected in-house or purchased from a commercial data provider. A GIS will integrate spatial data with other data resources and can even use a DBMS, used by most organizations to organize and maintain their data, to manage spatial data.

People:

GIS technology is of limited value without the people who manage the system and develop plans for applying it to real-world problems. GIS users range from technical specialists who design and maintain the system to those who use it to help them perform their everyday work.

Methods:

A successful GIS operates according to a well-designed plan and business rules, which are the models and operating practices unique to each organization.

GIS Subsystem:

A GIS has four main functional subsystems. These are:

1. a data input subsystem;
2. a data storage and retrieval subsystem;
3. a data manipulation and analysis subsystem; and
4. a data output and display subsystem.

Data Input:

A data input subsystem allows the user to capture, collect, and transform spatial and thematic data into digital form. The data inputs are usually derived from a combination of hard copy maps, aerial photographs, remotely sensed images, reports, survey documents, etc.

Data Storage and Retrieval:

The data storage and retrieval subsystem organizes the data, spatial and attribute, in a form which permits it to be quickly retrieved by the user for analysis, and permits rapid and accurate updates to be made to the database. This component usually involves use of a database management system (DBMS) for maintaining attribute data. Spatial data is usually encoded and maintained in a proprietary file format.

Data Manipulation and Analysis:

The data manipulation and analysis subsystem allows the user to define and execute spatial and attribute procedures to generate derived information. This subsystem is commonly

thought of as the heart of a GIS, and usually distinguishes it from other database information systems and computer-aided drafting (CAD) systems.

Data Output:

The data output subsystem allows the user to generate graphic displays, normally maps, and tabular reports representing derived information products.

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