GEOGRAPHICAL INFORMATION SYSTEM
CONCEPT & PRINCIPLES
(T1-lec-2)

Dr. Supriya

Assistant Professor (Guest)

Department of Geography

Patna University, Patna

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  ➤ **Map scale**
  ➤ **Component of GIS**
➤ **What Next?**

Learning Objectives
Students learn to-
- familiarize with uniqueness of GIS;
- understand relationship of Map Data and Scale in GIS platform;
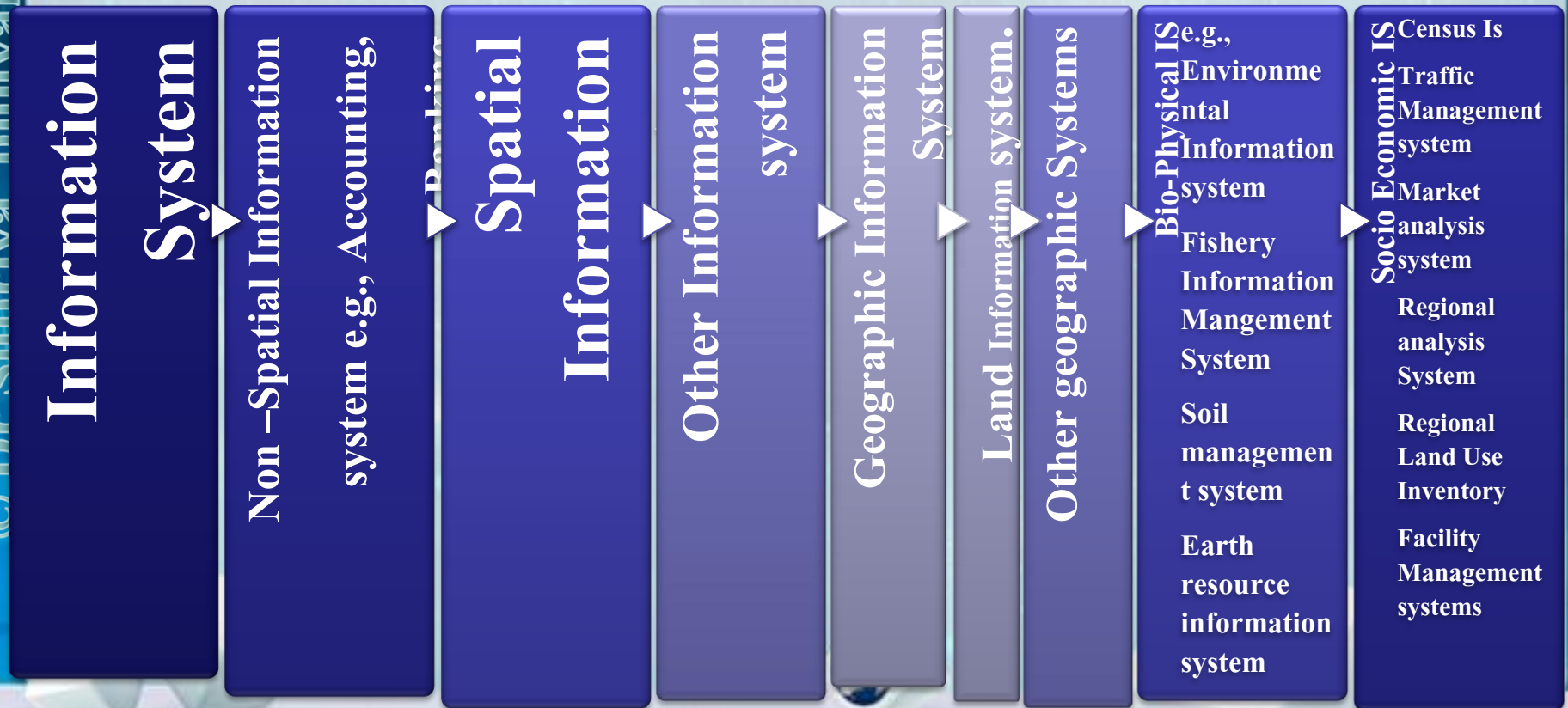- familiarizes with different principles of GIS.

Learning Outcomes
➤ After completing this lecture students will able to-
- understand the uniqueness of GIS;
- Understand the major principles in GIS

INTRODUCTION

GIS is a computer based Information system which is used to capture, store, manipulate, analyze and represent spatially referenced data which convert the spatial information for solving complex spatial Problems.

| Information System | Non –Spatial Information system e.g., Accounting, | Spatial Information | Other Information system | Geographic Information System | Land Information system. | Other geographic Systems | Bio-Physical IS | e.g., Environmental Information system Fishery Information Mangement System Soil management system Earth resource information system | Socio Economic IS | Census Is Traffic Management system Market analysis system Regional analysis System Regional Land Use Inventory Facility Management systems |

Typology of information system- adapted from Albert & Yeung

UNIQUENESS OF GIS AGAINST OTHER INFORMATION SYSTEM

❑ **A geographic information system (GIS) is a software tool for mapping and analyzing just about any object you can think of on earth—from forest land to urban landscape, earthquake faults to tennis courts, oil rigs to four-star restaurants.**

❑ **GIS technology integrates powerful database capabilities with the unique visual perspective of a good old-fashioned map. This makes GIS unique among information systems.**

❑ **Its analyses can be used in a wide range of public and private enterprises, helping in planning, cost reduction, and better-informed decision making.**

RELATIONSHIP BETWEEN MAP, DATA &INFORMATION
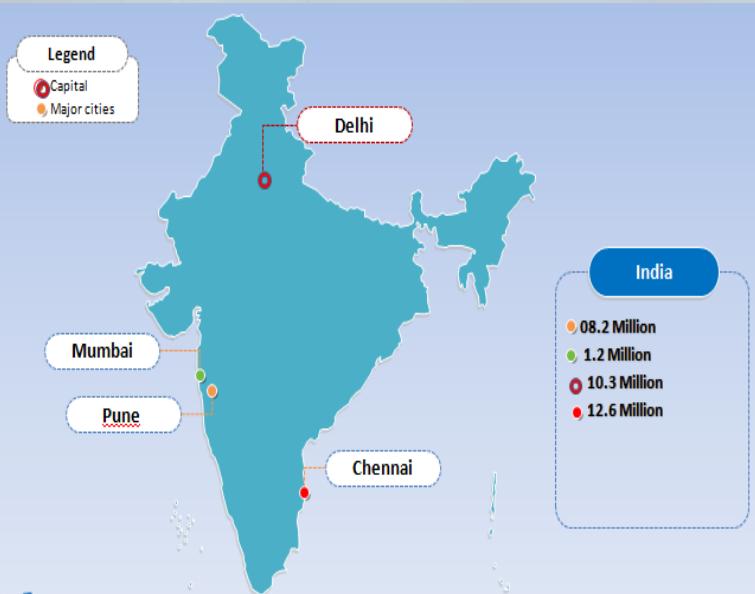
S.No.	City	Population
1	**Pune**	**08.2 M**
2	Mumbai	**1.2 Million**
3	New delhi	**10.3 Million**
4	**Chennai**	**12.6 million**

S.No.	City
1	Pune
2	Mumbai
3	New delhi
4	Chennai

Data is basically verifiable facts about the real world.

Information is *data* organized to reveal patterns and to facilitate search.

Difference between data & information

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DATA IN GIS

It is the most important part of GIS. There are two distinct data types required in GIS – Spatial and Non-spatial

Spatial Data: *Correspond to discrete entities recognizable in the real world such as river, roads,, parks, cities, villages etc.*

In other words, the entities of real world which can be mapped, drawn as drawings or even photographed. Geographic Data Types: Points; Lines; Areas – Polygons

Non - Spatial Data: *Correspond to the **attribute information associated** with discrete entities recognizable in the real world such as population of a city or town, no. of mountains, parks, urban area etc.*

In other words, these are characteristics of features that are not mappable, but are descriptive of the features (Name of owner, timber volume etc.). They can be stored as database.

Attribute data may come from different sources such as paper records, existing databases, spreadsheets, DBMS etc.

```
Geographic
Information System
        |
   -----------------------------------------
   |                                       |
Spatial or Map data              Non-spatial or Attribute
                                          data
Such as Maps, Images
etc.                             Such as tables, graphs etc.
```
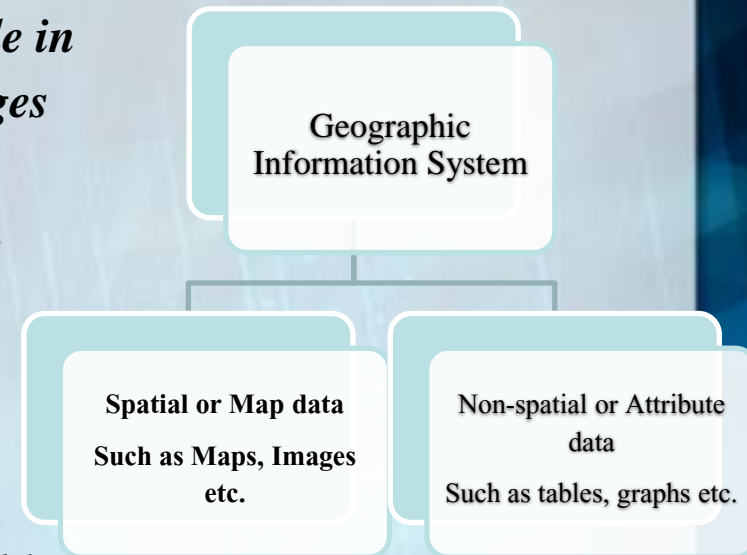
Point Features: **Features too small at a scale to be represented in another manner**

Examples:

o A building in a city map

o A town in a state map

o A country in a map of the universe

Line Data: Represent map features that are too narrow to be shown as an area or features that have no width

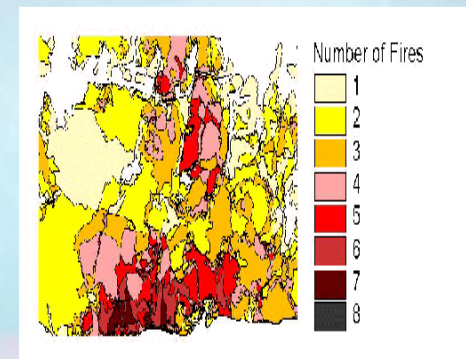**Examples**

o A City boundary in a state map

o An Interstate in a national map

o Drainage, Roads
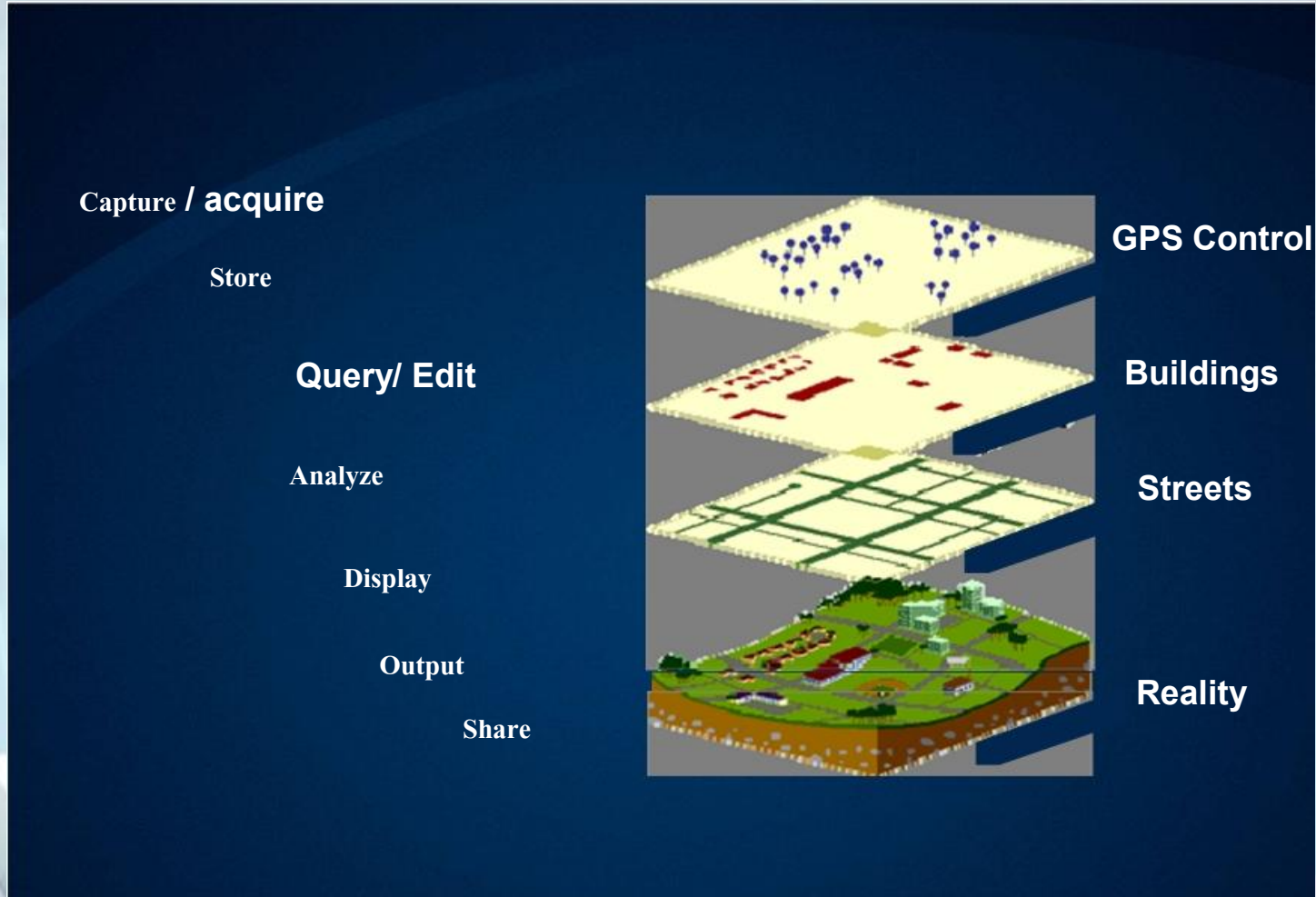
Area Features: A closed series of points

Examples

o A building in a local map

o A city in a country map

o A city in a state map

o A state in a national map

Annotations: Are text strings that describe a geographic feature

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Number of Fires
1
2
3
4
5
6
7
8

PRINCIPLES OF GIS

* GIS is a Computer based System capable of integrating, storing, editing, analizing, sharing and displaying geographically referenced data

Capture / acquire

Store

Query/ Edit

Analyze

Display

Output

Share

GPS Control

Buildings

Streets

Reality

Capturing Data

Hardcopy maps

Federal "Wild Lands"

Digital data

Coordinates

```
480585.5,  3769234.6
483194.1,  3768432.3
485285.8,  3768391.2
484327.4,  3768565.9
483874.7,  3769823.0
```
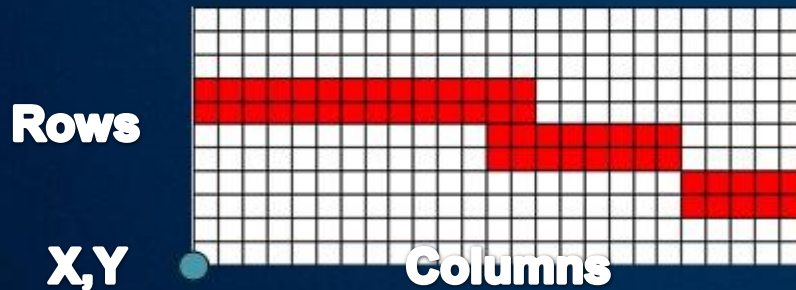
GIS Data
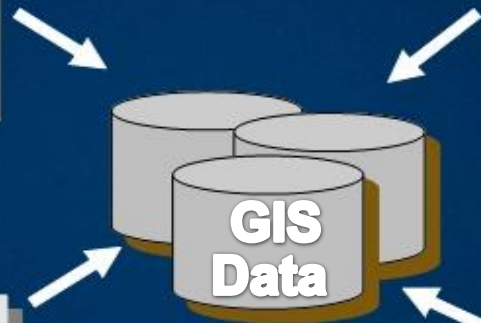
GPS

STORING DATA

- **Vector formats**

  - Discrete representations of reality

  X,Y   X,Y
          X,Y

              X,Y

- **Raster formats**
  - Use square cells to model reality

  Rows

  X,Y   **Columns**

  **Reality
  (A Highway)**

• Real world entities are abstracted into three basic shapes

Roads

Buildings

Point

Line

Polygon

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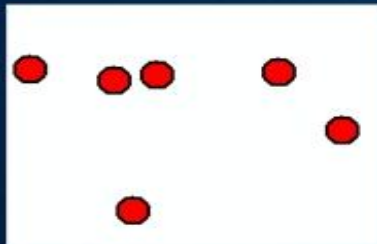
QUERY & Analysis

IDENTIFYING SPECIFIC FEATURES

Identify Results

Layers: `<Top-most layer>`

- division
  - SAKET

Location: (-515519.210956 3166129.312752)

Field	Value
OBJECTID	232
SHAPE	Polygon
DIVISION_NAME	SAKET
DIVISION_CODE	SKT
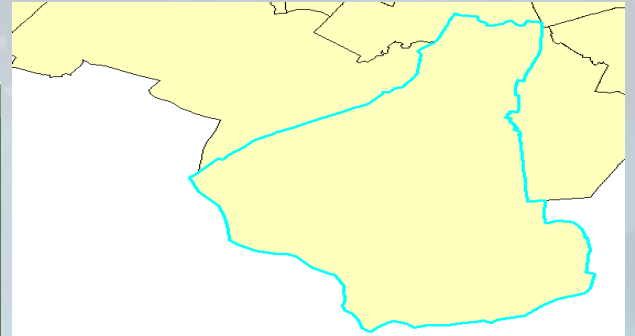
Analysis

Proximity

Which parcels are within 50 feet of the road?

Overlay
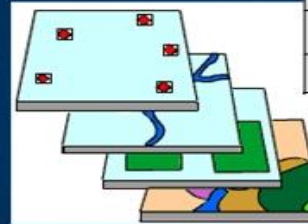
Well type	Drilled
Building owner	Smith
Soil type	Sandy

Network

accident

hospital
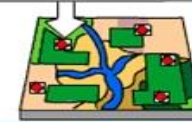
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REPRESENTATION
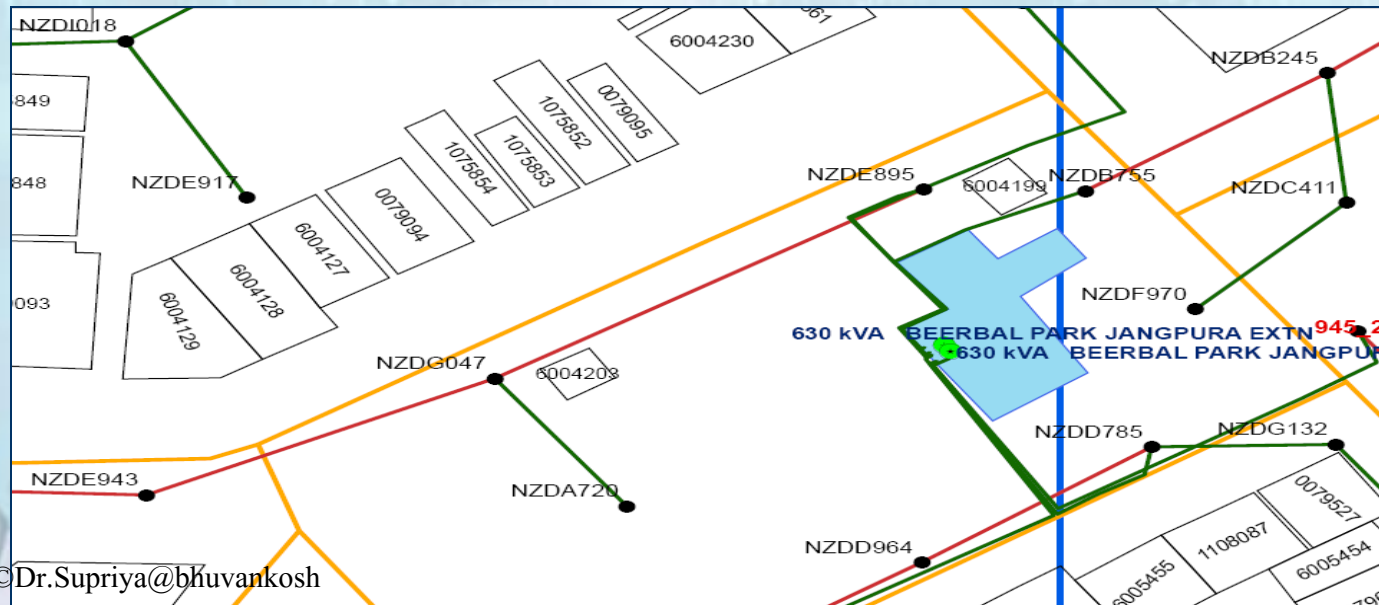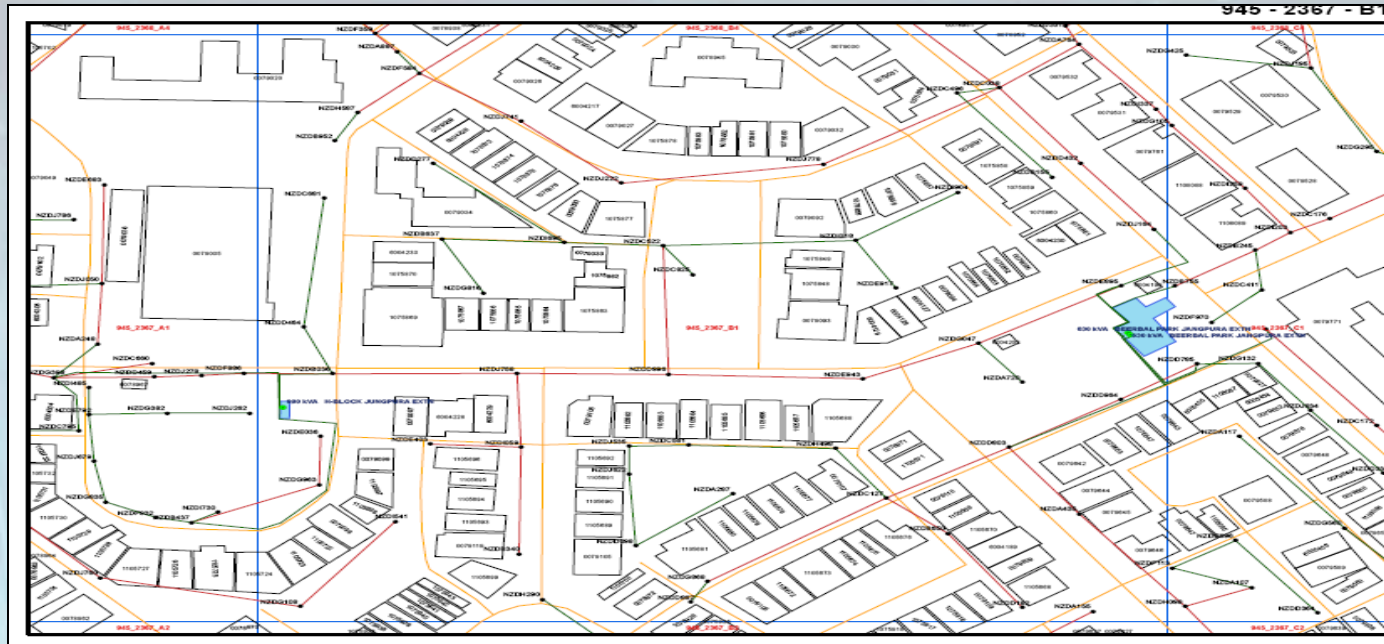
Maps

OUTPUT

Paper map

Internet

GIS Data

Image

Delhi.jpg
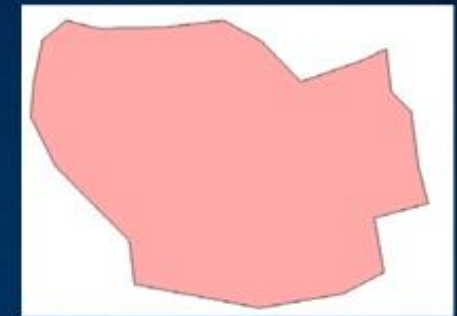
Document

Delhi.mxd

MAP SCALE

- Map scale determines the size and shape of features

Large scale

Smaller area
More detail

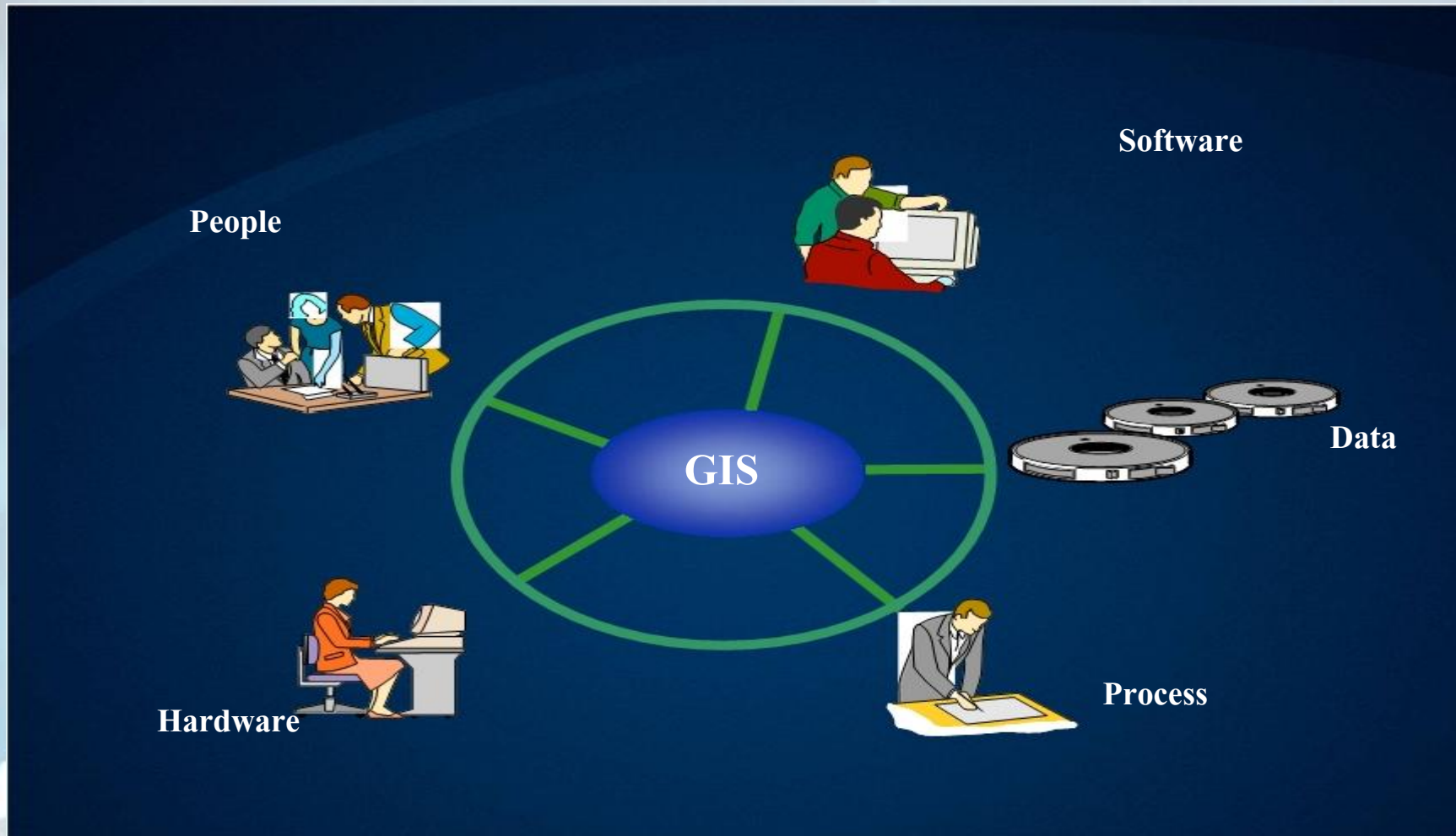1:500

1:24000

Small scale

Larger area
Less detail

1:24000

city

1:24000

1:250000

What Next?

✓ **History of GIS**

✓ **Purposes & Benefits of GIS**

✓ **What can be done with GIS**

✓ **Why Need GIS ?**

✓ **Why Use a GIS?**

✓ **Why GIS modeling?**

✓ **Model Questions**

MUST READ

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Contact me:
Mob/ WA: 9006640841
Emai:supriyavatsa52256@gmail.com
Webpage: http://bhuvankosh.com