GEOGRAPHICAL INFORMATION SYSTEM
CONCEPT & PRINCIPLES
(T-1_lec-3)

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➢ What Next?
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Learning Objectives

1. Understand history of development of GIS.
2. Understand the need , purpose & benefit of GIS.
3. Develop idea of different benefits of use & need of GIS through conceptual models.

Learning Outcomes

1. Able to explain historical development of GIS
2. Illustrate major attributes of Need, Uses, benefits, potential of GIS

HISTORY OF GIS

▪**1854** – The term GIS that used scientific method to create maps was used by John Snow in 1854. He used points on London residential map to plot outbreak of Cholera.

▪In **1930s** and **1940s,** developments in statistical methods and appropriate mathematics were blocked by lack of suitable computing tools.

▪Development of computer technology in **1950s**

▪MIMO (Multiple Input Multiple Output) concept developed in **1959**

▪ Early 1**960s**, with the availability of the digital computer, spatial analysis and thematic mapping have been able to blossom.

▪In ancient times, cartography was a major tool, which has formed the basic of modern day GIS. Paper map and its accompanying memoir was the database it contained. Geography Techniques (by hand) pre 1960s: John Snow, Minard's Map (Napoleon)

▪Forestry – Canada (+E Africa) – CGIS

▪First GIS – Roger Tomlinson 1960+, operational from 1971+

HISTORY OF GIS.....

- USA – Government Organisations: USGS, US Forest Service, others incl. CIA

- Academia
    - **Edinburgh** – GIMMS 1970+ (Sold from 1973), MSc GIS 1985+
    - **Harvard** – Computer Graphics and Spatial Analysis Lab 1965

- ESRI 1969 Env. Consultancy – Arc/Info 1982 -> ArcView Desktop 1995 -> ArcGIS 1999

- Physics/Space (Moon landings) later CAD/Utilities – LaserScan/Intergraph 1969

- Demographics/Consultancy – MapInfo 1986

- OpenSource – GRASS, Quantum GIS (QGIS), gvSIG, … link to DBMS

- Web GIS – WMS, WFS, Google Maps, Google Earth, OGC, OpenStreetMap

- Modern GIS has seen series of development. GIS has evolved with the computer system. Here are the brief events that has happened for the development of the GIS system.

History of Development of GIS

• GIS has evolved from geography & geo-related disciplines

1960s

Automated cartography

Spatial algorithms & models

Spatial Analysis Lab 1965

Canadian GIS (CGIS) in 1963
Roger Tomlinson 1960+,

Harvard – Computer Graphics and Spatial Analysis Lab 1965

Physics/Space (Moon landings)

CAD/Utilities

1970s

Various GIS packages

ESRI 1969 Env. Consultancy

operational from 1971

GIMMS 1970+ (Sold from 1973),

1980s

Arc/Info 1982

MapInfo 1986

MSc GIS 1985

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1990s

PC-based GIS
ArcView Desktop 1995

Web GIS
WMS, WFS, Google Maps,

Open GIS
OpenSource – GRASS,

2000..

Web GIS
Google Earth, OGC, OpenStreetMap

gvSIG,
link to DBMS

Open GIS
Quantum GIS (QGIS),
MapTiler

PURPOSES & BENEFITS OF GIS

➢ Why Use GIS instead of Paper Maps?

➢ Maps use points, lines, areas and symbols to help identify real world features and provides limited information.

➢ While, amount of information is unlimited in GIS, which stores all the information about map features in a GIS database and links the features on the map to the information about them.

➢ One can add new themes to a GIS database or delete old themes, also one can separate themes to create more themes, or combine themes if they have a common characteristics.

➢ For e.g. GIS stores map features referred as attributes. The attributes of a river, might include its name, length, average depth, rate of flow, water quality, how many dams are on it, and how many bridges cross it.

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POTENTIAL BENEFITS OF GIS ARE:

➢ Capability of providing quick and easy access to large volumes of data

➢ Ability to offer an improved map service

➢ Opportunity to reduce sets of manual maps held and associated storage costs

➢ Greater efficiency resulting in increased staff capacity and savings

➢ Faster and more extensive access to geographic information throughout the organization

➢ Improved analysis e.g.. of areas, distances, patterns, etc

➢ Better communication of information to public officers, end user

➢ Improved quality of services

➢ Better targeting and coordination of services

➢ One can use the themes or layers in a GIS database to analyze multiple situations and solve multiple problems. The design of a GIS database is strong, because it's flexible.

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What can be done with GIS ?

Mapping where things are
- location, pattern, distribution of feature

Mapping quantities
- Such as where the most and least are, or to find places that meet required criteria and take action, or to see the relationships between places

Mapping Densities
- A density map helps to measure the number of features/concentrations using a uniform areal unit, such as acres or square miles.

Mapping change
- in an area to anticipate future conditions, decide on a course of action, or to evaluate the results of an action or policy.

Finding what's nearby
- Find out what is occurring within a set distance of a feature by mapping what is nearby.

Finding What's Inside
- to monitor what is happening and to take specific action by mapping what is inside a specific area.

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Why Need GIS ?

Improved management *of* available resources
- **GIS can link data sets together by common locational data, such as addresses**
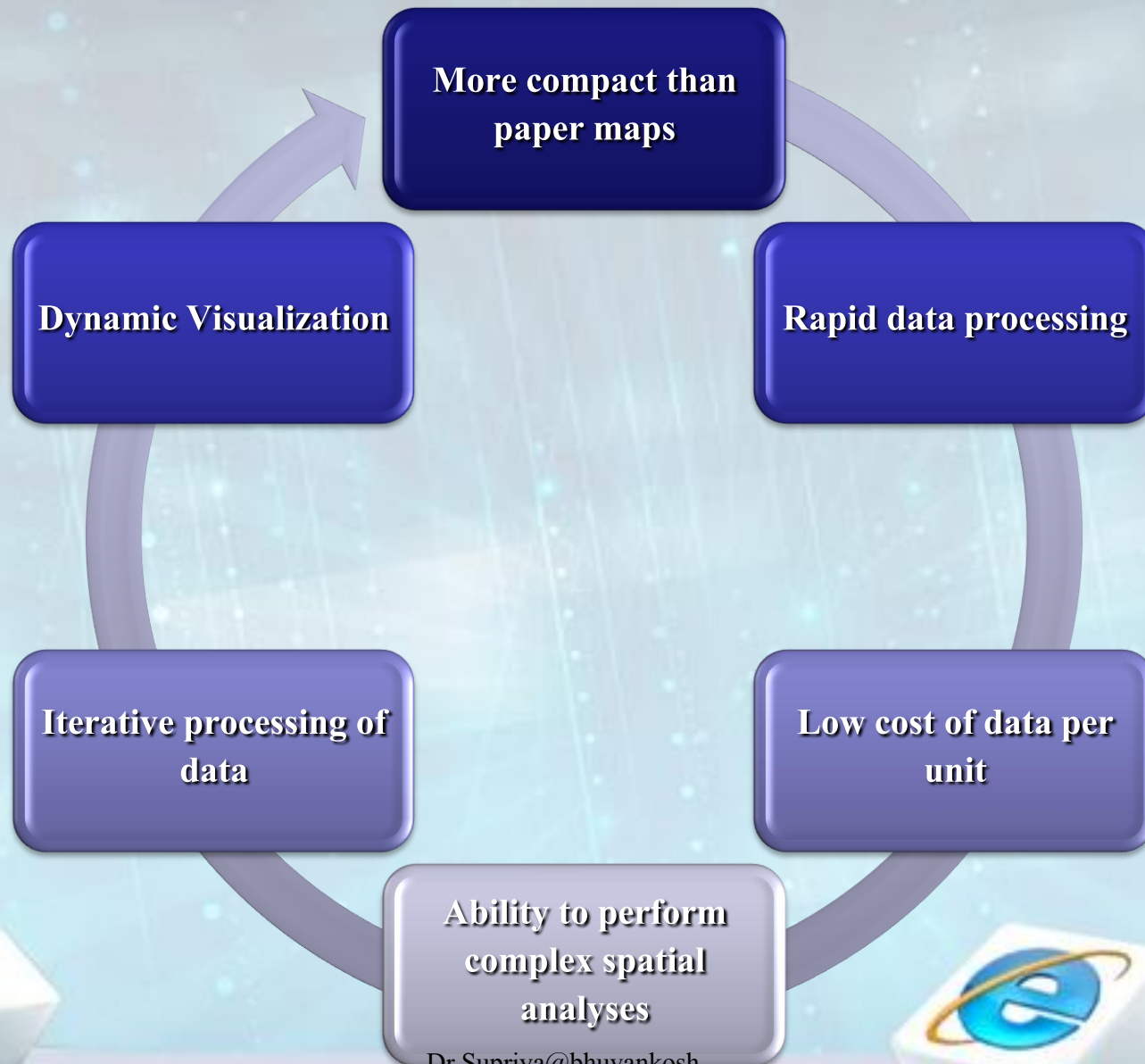
Make better decisions
- **A GIS is not just an automated decision making system but a tool to query, analyze, and map data in support of the decision making process.**

Flexible Map Making
- **A GIS creates map much more flexible than traditional manual or automated cartography approaches.**

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Why Use a GIS?

More compact than paper maps

Rapid data processing

Dynamic Visualization

Iterative processing of data

Low cost of data per unit

Ability to perform complex spatial analyses

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WHY NEED OF GIS MODELING?

- Simplification of reality
- Increases the understanding of a situation or system
- Explain trends
- Provides useful guidance
- Evaluations of scenarios
- Extrapolation of information to other areas
- Predicting the future

GIS MODEL

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What Next

- In the next lecture module different model questions assigned for the students related to the topic- GIS: Concept & Principles

1. MCQ
2. Short Type
3. Long Type
4. Short Notes
5. Topic for Assignments/PPts

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MUST READ

▪Albert , C.P.Lo. & Yeung. K.W., (2007) Concept and techniques of Geographic information system ; PHI Learning PVT Ltd. New Delhi

▪Burrough,P.A. and McDonnell, R.A., (1998) : Principles of Geographic Information Systems, Oxford University Press, Oxford. De Mers, Michael N., (1999) : Fundamentals of Geographic Information Systems, John Wiley & Sons, NewYork.

▪Fraser Taylor, D. R. (1991): Geographical Information System, London.

▪ DevidattChauniyal, Sudoor Samvedanevam Bhaugolik Soochna Pranali.

▪Heywood, I. et al. (2004) : An Introduction to Geographic Information Systems, Pearson Education.

▪Longley, P.A., Goodchild, M.F., Maguire, D.J. and Rhind, D.W., (2001), Geographic Information Systems and Science, Wiley, Chichester.

▪ Siddiqui, An Introduction to Geographical Information System.

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