What is GIS

Karin Larsson. LU GIS Centre
What is a Geographical Information System, GIS

• “A computerised information system for management, analysis and visualisation of geographical.”

• Key word: Geography – at least some part of data is spatial.
Questions we try to answer with GIS:

1. **Where** is something?
2. What **size** has something? E.g. a lake.
3. Why is something at a certain place?
4. **What spatial patterns** can be found?
5. What other variables are there?
6. Where is something in **relation** to something else?
7. Which **processes** are working?
8. What happens **if**...?
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8. **What happens if...?**
”Maps” – Model of reality – yesterday and today
Map data = Geographical data

**Geometric data:**
- Object with a **spatial** structure.

*For example:*
- roads,
- buildings,
- vegetation and
topography

**Attribute data:**
- **Descriptions** of the geometric objects.
  *For example:*
- Speedlimits for roads.
- Owner of houses.
- Inhabitants in a city.

**Different types of attribute data:**
- Tables
- Text
- Documents
- Pictures
- Films
- Sound.....etc
Geographical data II

- Geographical data has a location – usually coordinates.
- We can tell where they are.

In longitude, latitude

In X, Y, (Z)
Reality is too complex; we have to:

• Sort out relevant data.
• Divide data into thematic groups.
• Simplify features into discrete objects.
Divide data into thematic groups.

With the same spatial referens.
Simplify geometry as

Features into discrete objects

Represented as:
1. Points (houses, wells, bore holes)
2. Lines (roads, rivers, electric lines)
3. Polygons (lakes, estates, forest)

OR as

Continuous surfaces into discrete entities with fixed intervals

Represented as: Matrices.
   Topography
   Precipitation
   Temperature
Map + much more
GIS – A tool in the decision making process

Mats Söderström
Evolution of GIS Technology

- Desktop GIS
- Client-Server GIS
- Web GIS
- UbiGIS
- Distributed GI Services
- Spatial Cloud Computing
- Mobile GIS
- LBS

Ali Mansourian
Spatial Cloud computing Architecture

- Data Providers
- End-users
- GIS App.
- Developers
- Data
Development of data and accessibility (SDI)

Few producers, few users, different formats and (no) standards

SDI Cooperation / standards

Everyone is a producer. Everyone is a user – Data quality?
Development of remote data capture/collection techniques

Field work

Aerial photographs

1st generation sensors

Satellites

GPS

Mobile phones. "Internet of things"!

Everyone is a producer

Drones

Radar, Lidar, Hyperspectral…

Satellites
Development of geographic presentation

Dynamic time and space. 2D.

Static time and space. 2D.

Cartography for screens + zoom

Varying media platforms - mobile

Varying senses to "read"

“MAP” sense, listen

Dynamic time and space 3D

IMAGE/PHOTO
3D Citymod.

Dynamic time and space

Varying "paper copy"
Development of geographic analysis

Static time and space. 2D.

Separate analysis of change in time and space.

Dynamic time and space 3D.
Development of geographic analysis

- Search by attribute and location
- Visualisation
- Analysis
- Modelling Simulating
ALL of these are developing fast!

- Computer power
- Software
- User interface
- Data structure
- Analysis
- Visualisation
- Data
- Applications
- Accessability
Swedish National Geodata Strategy

Geodata Council – Geodatarådet: Development of the Swedish infrastructure for access to and exchange of geodata.

The goals formulated in *The Swedish National Geodata Strategy 2016 – 2020* are:

- Geodata are open
- Geodata are usable
- Geodata are accessible
- Collaboration is well developed

For contribute solutions for some of today’s challenges:

- Innovation and business growth
- Digitization of public administration
- Streamlining of the urban planning process
- Climate adaptation and environmental threats
- Defence and civil contingencies”

For more information about geodata in Sweden:
www.geodata.se
geodatasekretariatet@lm.se
GIS Centre – Centre for Geographical Information Systems at Lund University

GIS centre can provide:

- Support service for Lund University staff.
- Self-study GIS course for staff.
- Coordination, initialisation and/or collaboration in research projects involving GIS.
- Facilitating/supporting access to geodata.
- Provide site license access to GIS software (for LU students and staff).
- Advice regarding development of GIS and geodata education.
- Aerial photos from the 1940’s for download.

Contact and information: [www.gis.lu.se](http://www.gis.lu.se)
Geodata for Lund University students and staff:

Data from:

- Lantmäteriet (the Swedish mapping, cadastral and land registration authority).
  Aerial photographs, maps, elevation and laser data, cadastral information.

- Sveriges geologiska undersökning, SGU (Geological Survey of Sweden).
  Geodata on bedrock, soils, ground water.

- Statistiska centralbyrån, SCB (Statistics Sweden)
  Population and build up area definition data.

- Sjöfartsverket (Swedish Maritime Administration).
  Nautical maps.

https://maps.slu.se/
Data provision scheme 2014 - 2017

Sw. Univ. of Agric. Sc. (SLU)
- SLU Data store
- GET application server

Sw. Research Council
- Ass. of Sw. Higher educ. Advisory group

Data providers
- Lantmäteriet
- Statistics Sw.
- Sw. Maritime Adm.
- Sw. Geol. Surv.
- Sw. Transp. Adm.

Users:
- Students & Staff at 30 universities

National academic CAS

Financial grants/fees
 Legal agreements
 Data distribution
 User identification
Data provision scheme 2018 - ?

Universities pay SLU

Data providers
- Lantmäteriet
- Statistics Sw.
- Sw. Maritime Adm.
- Sw. Geol. Surv.
- Sw. Transp. Adm.

From 2016 no lic. fee, uses GET
From 2014, Still lic. fee, uses GET
No lic. fee, uses GET
Free from 2016

Sw. Univ. of Agric. Sc. (SLU)
- SLU Data store
- GET application server

Users: Students & Staff at 32 colleges/universities

National academic CAS

Financial grants/fees
Legal agreements
Data distribution
User identification
Summary

• We can do more with GIS
• We can do it easier with GIS
• **BUT** : Knowledge about spatial data and geographical analysis is important!
Thank you!

Questions?

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