SISTEM & SUB-SISTEM SIG

oleh:

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SISTEM SIG

INPUT DATA

MANAJEMEN DATA

ANALISIS DATA

KELUARAN

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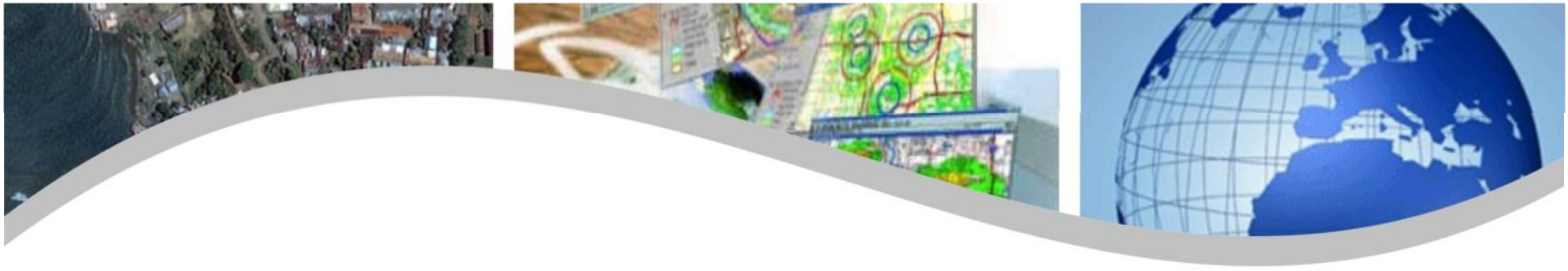
Users need to understand both data and software in order to create unique spatial questions and maintain the spatial information produced.

Data Input	Refers to the creation of digital spatial data.
Data Management	Refers to unique issues in the maintenance of spatial data such as error or level of accuracy; storing data; retrieving data; and metadata. Data management is one of the key issues determining the usability of spatial data.
Data Analysis	Is what allows users to answer questions that may not be explicitly stated in the data.
Data Output	Refers to the method used to visually display analysis performed using GIS. Output can be in the form of jpg to large plotted images.



Input Data

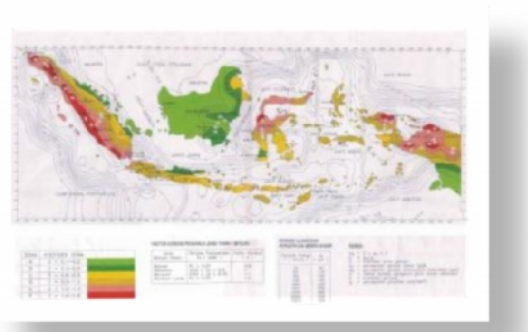
The creation of digital spatial data

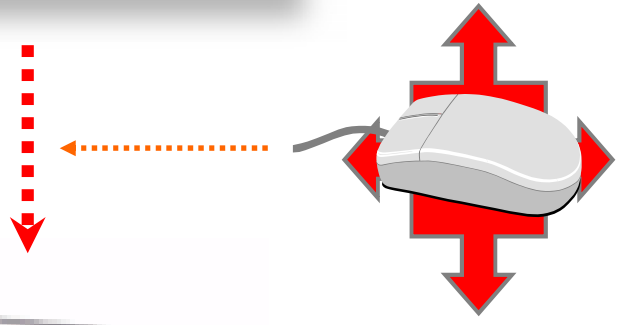
X & Y Coordinate: Used when a user has spatial data in X & Y coordinates.

Database Entry: Commonly used when a user has attribute information related to common spatial locations, such as the census.

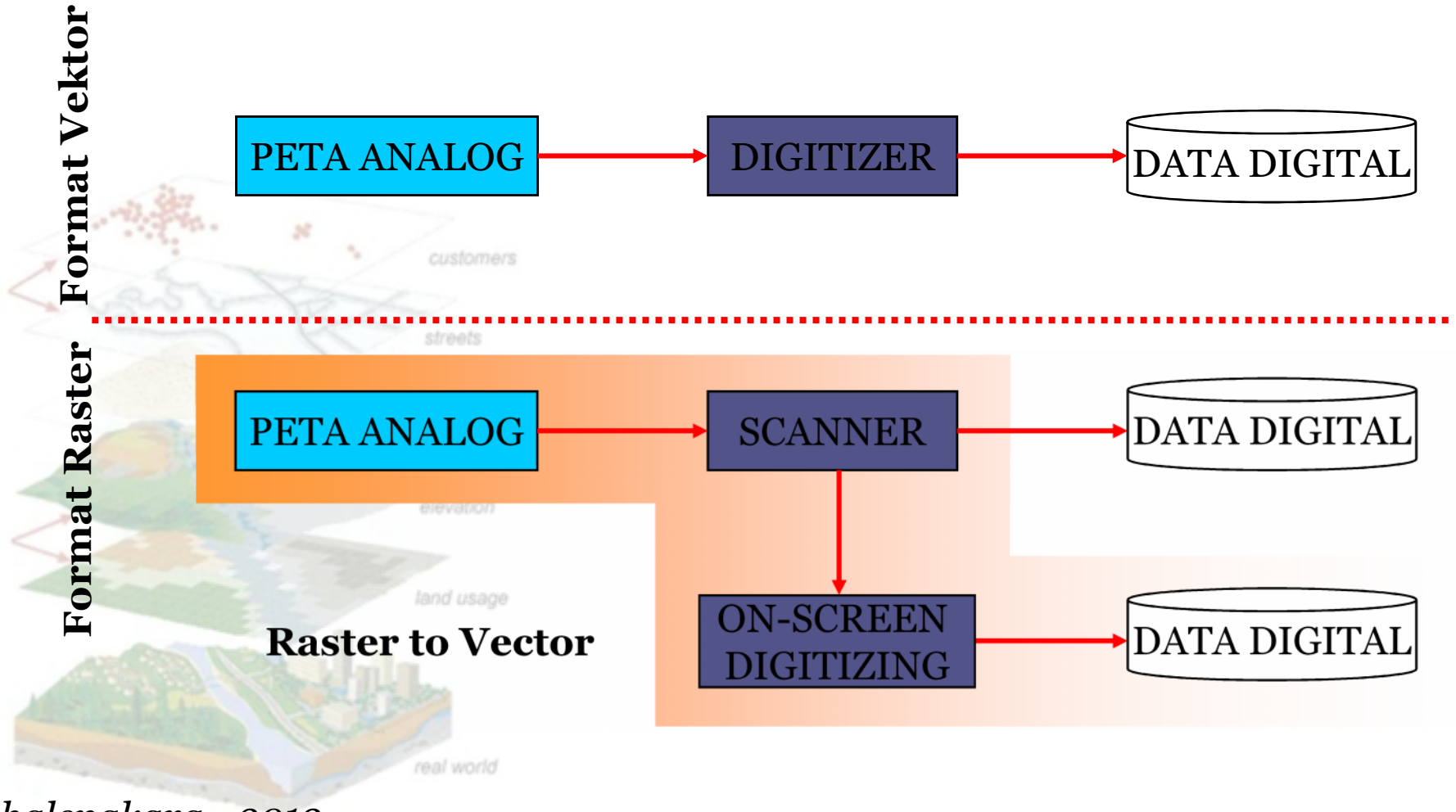
Digitize: Used when a user has a paper map that they would like to convert into a digital file.

Scan: Used when a user has a paper map that lends itself to reading spatial features in a rasterized format.





Konversi informasi analog ke digital



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- ***Preliminary processing data***
- ***Most difficult task, takes 75% of time and cost.***

Sub-Fungsi dalam Input Data:

- Perancangan data (pendefinisian data input: jenis data, format data, struktur data, klasifikasi, tujuan
- Digitisasi
- Pembangunan topologi
- Penyuntingan/editing
- Transformasi proyeksi
- Konversi format data
- Pemberian atribut, dll.

Input dalam SIG dapat berupa:

a. **Data spasial** :

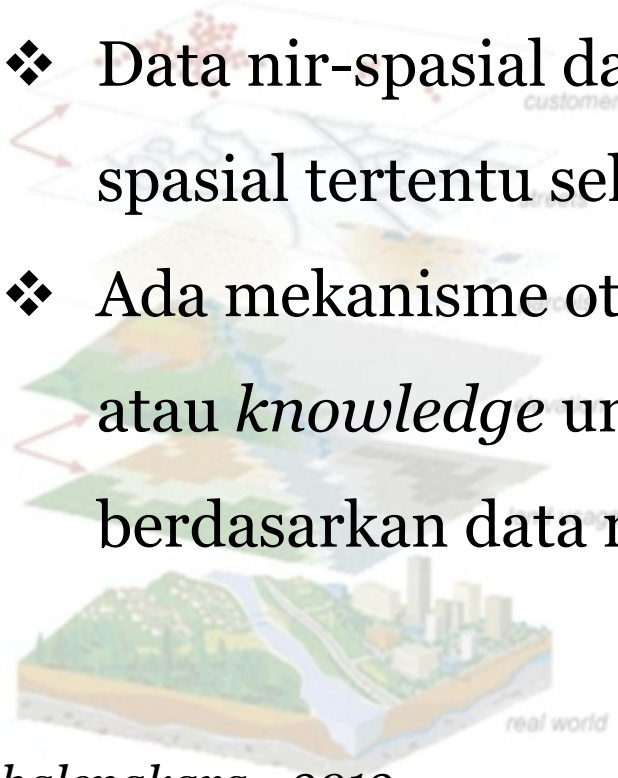
- Peta Analog (peta topografi, peta tematik)
- Foto Udara
- Citra Satelit

b. **Data Nir-spasial**:

Data yang tidak secara langsung mempunyai/memuat aspek spasial (jumlah penduduk, pH tanah, tekstur tanah, klas jalan, dsb).

SIG dapat berjalan apabila:

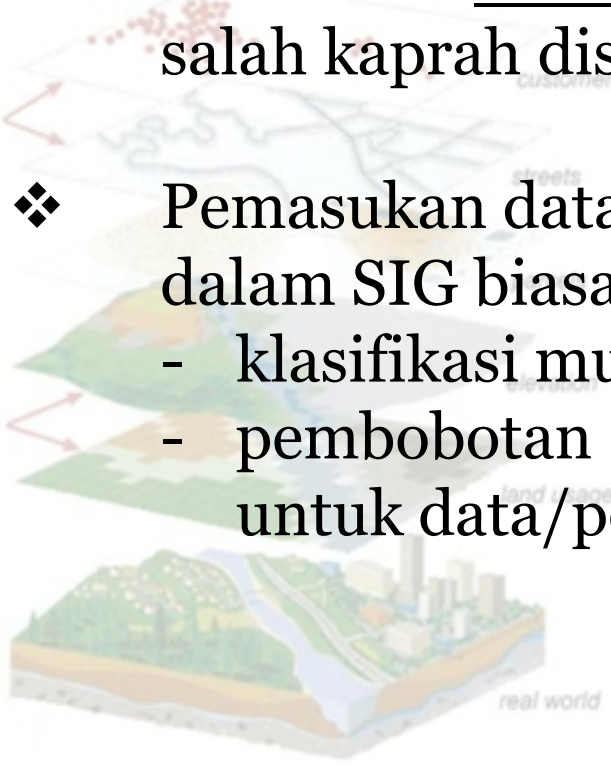
- Seluruh data masukan mempunyai format yangsama (format digital)
- Data nir-spasial dapat dirujukkan ke suatu entitas spasial tertentu sehingga berfungsi sebagai atribut
- Ada mekanisme otomatis yang dikontrol oleh nalar dan atau *knowledge* untuk menurunkan informasi baru berdasarkan data masukan tadi.



Input (Pemasukan) Data SIG

- Pemasukan data kedalam SIG pada prinsipnya adalah pengubahan format data dari analog digital. Proses ini disebut **DIGITISASI** (digitization) dan secara salah kaprah disebut *DIGITASI*.

- Pemasukan data yang sudah berformat digital ke dalam SIG biasanya berupa:
  - klasifikasi multispektral (untuk citra digital satelit)
  - pembobotan (scoring) dan penyesuaian koordinat untuk data/peta yang sudah berformat digital.



DIGIT(is)ASI

Digitasi pada umumnya diterapkan dengan dua metode:

1) **<u>Raster digitization</u>**
   → (Biasa disebut pelarikan/ penyiaman atau scanning)

2) **<u>Vector digitization</u>**
   → Perunutan /*tracing* kenampakan batas-batas satuan pemetaan dan kenampakan topografis lain untuk menghasilkan peta garis digital

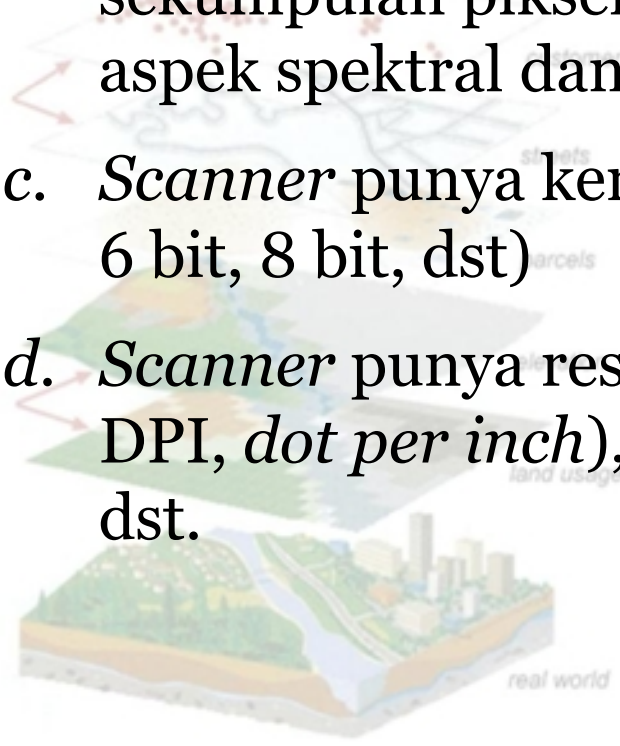
DIGITASI RASTER

a. Menggunakan pelarik (*scanner*)

b. Hasil data adalah peta berformat raster (tersusun atas sekumpulan piksel). Piksel adalah data yang punya aspek spektral dan spasial sekaligus.

c. *Scanner* punya kemampuan bit-coding tertentu (4 bit, 6 bit, 8 bit, dst)

d. *Scanner* punya resolusi tertentu (dinyatakan salam DPI, *dot per inch*), 100 dpi, 200 dpi, 300 dpi, 400 dpi, dst.



Apa yang ”bisa” dan biasa didigitasi raster?

Pada prinsipnya, semua citra/peta pada media dua dimensi dapat didigitasi, contoh:

- foto udara
- peta tematik
- peta topografi

Pada berbagai SIG saat ini, digitasi raster (scanning) lebih efektif dan efisien diterapkan pada:

- citra hardcopy (misal foto udara sebagai tampilan)
- peta tematik dengan bentuk, macam dan ukuran satuan pemetaan yang tidak terlalu kompleks.

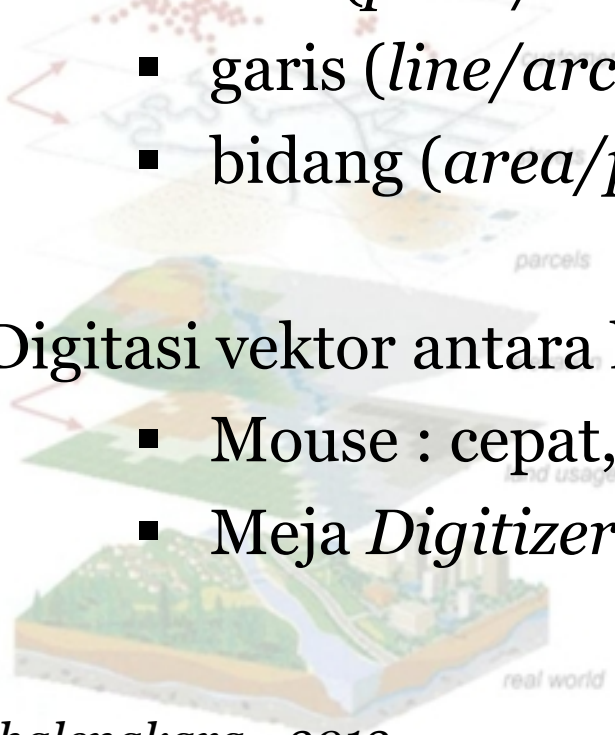
DIGITASI VEKTOR

Data vektor adalah data spasial yang disimpan dalam struktur geometris tertentu, dengan memisahkan informasi:

- titik (*point/node*)
- garis (*line/arc*)
- bidang (*area/poly*)

Digitasi vektor antara lain dapat dilakukan dengan:

- Mouse : cepat, mudah, akurasi rendah.
- Meja *Digitizer* : lambat, susah, mahal, akurasi tinggi.



PROSEDUR INPUT DATA 1

ON-SCREEN DIGITIZING

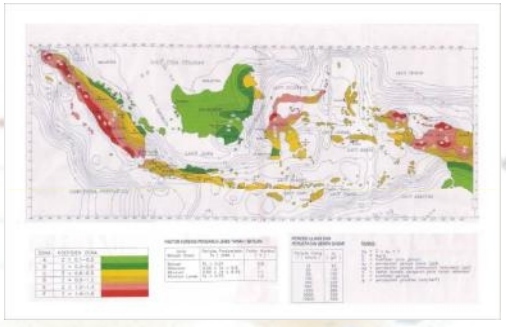
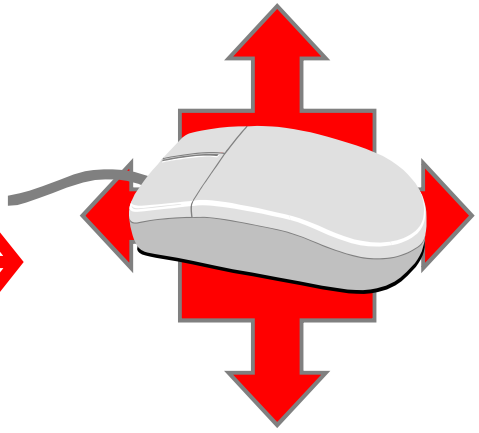


Image hasil scanning
JPEG, TIFF, dll

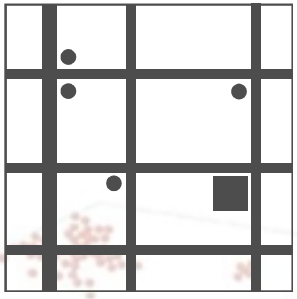
Koreksi geometrik/
georeferencing
(pemberian koordinat)



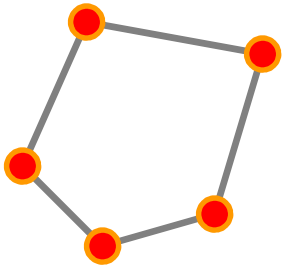
Digitizing
Tracing dilakukan
per-layer

Peta, GPS

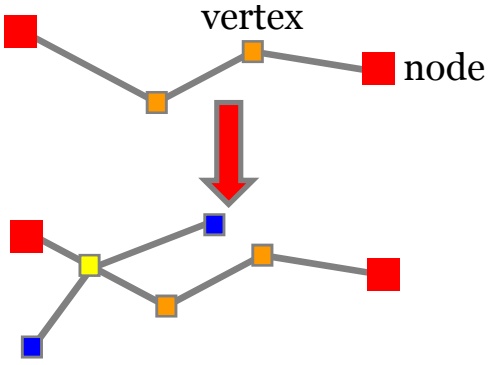
PROSEDUR INPUT DATA 2



Data hasil digitizing



Pembangunan topologi



Editing features

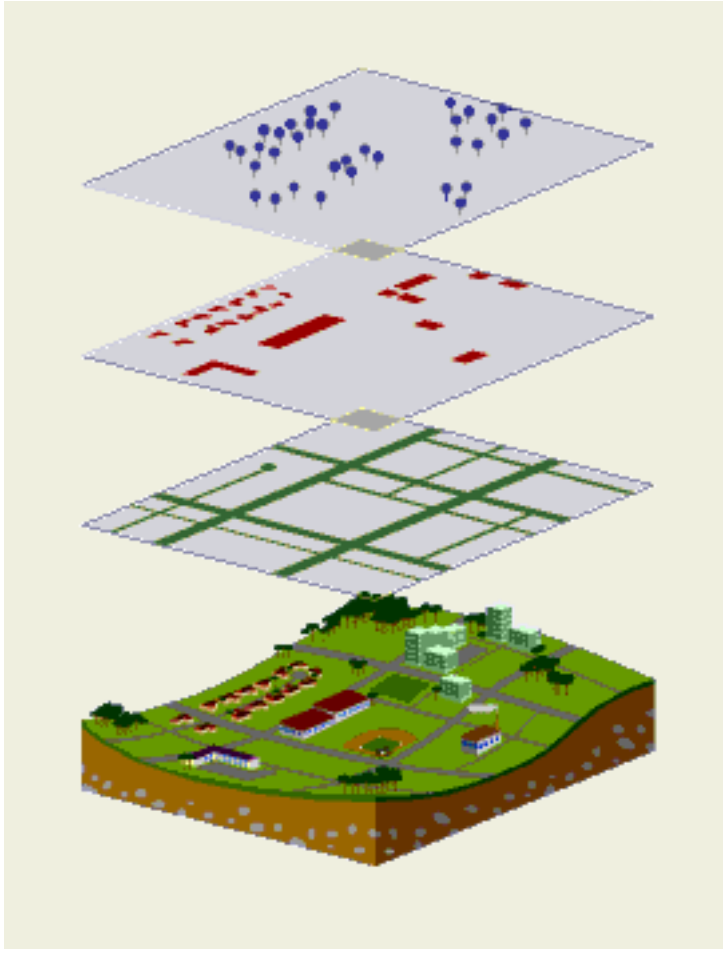
Shape	Id	Name
Line	4	A
Line	3	B
Line	2	C
Line	1	D

Pemberian atribut

TOPOLOGY :
relationships among points, lines, and polygons, include adjacencies, connectivity, and containment.

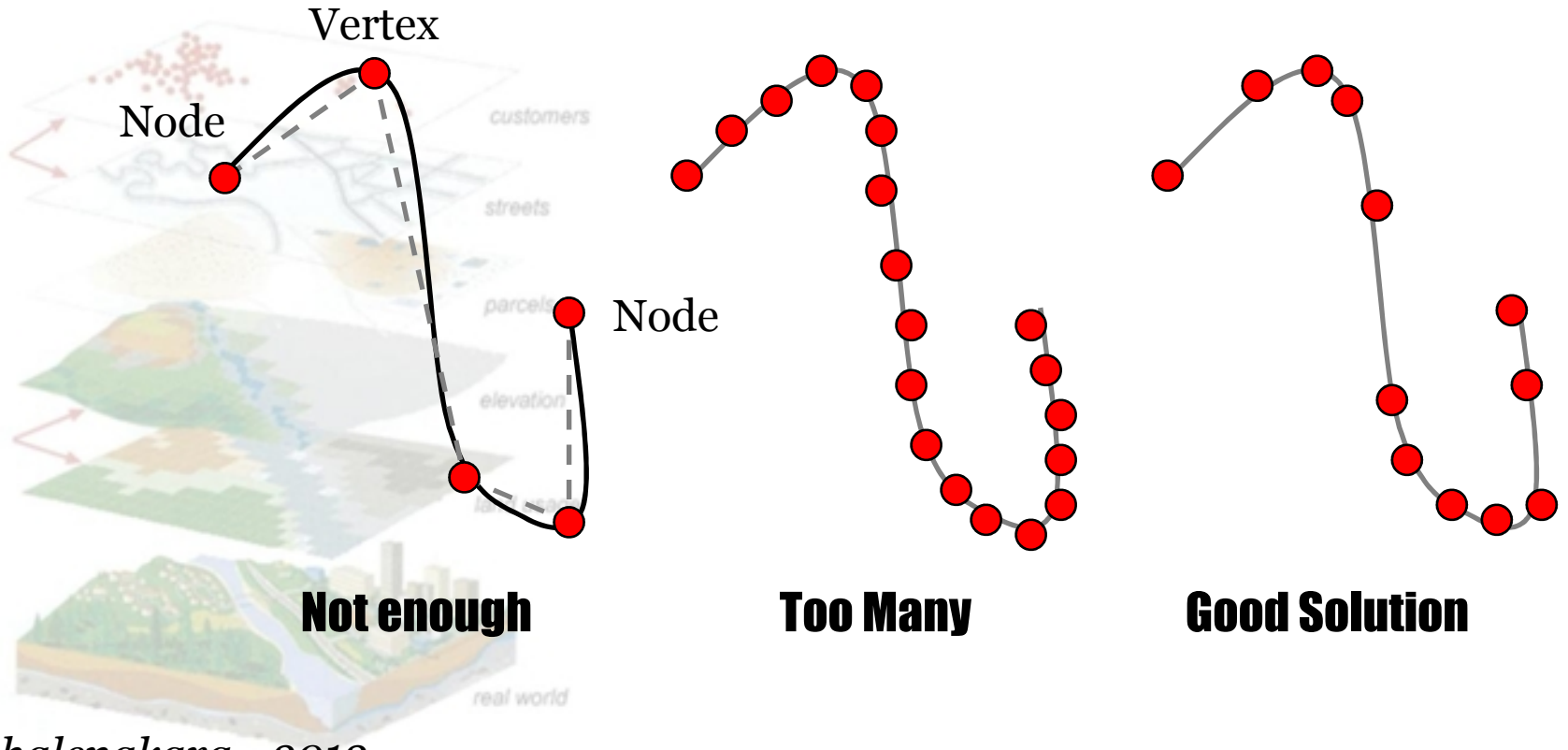
BEBERAPA ATURAN !!

- Tentukan tujuan
- Digitasi informasi yg benar2 dibutuhkan
- Pilih sumber input konvensional
- Gunakan level akurasi yg sesuai
- Input data terpisah dlm tema2 spesifik



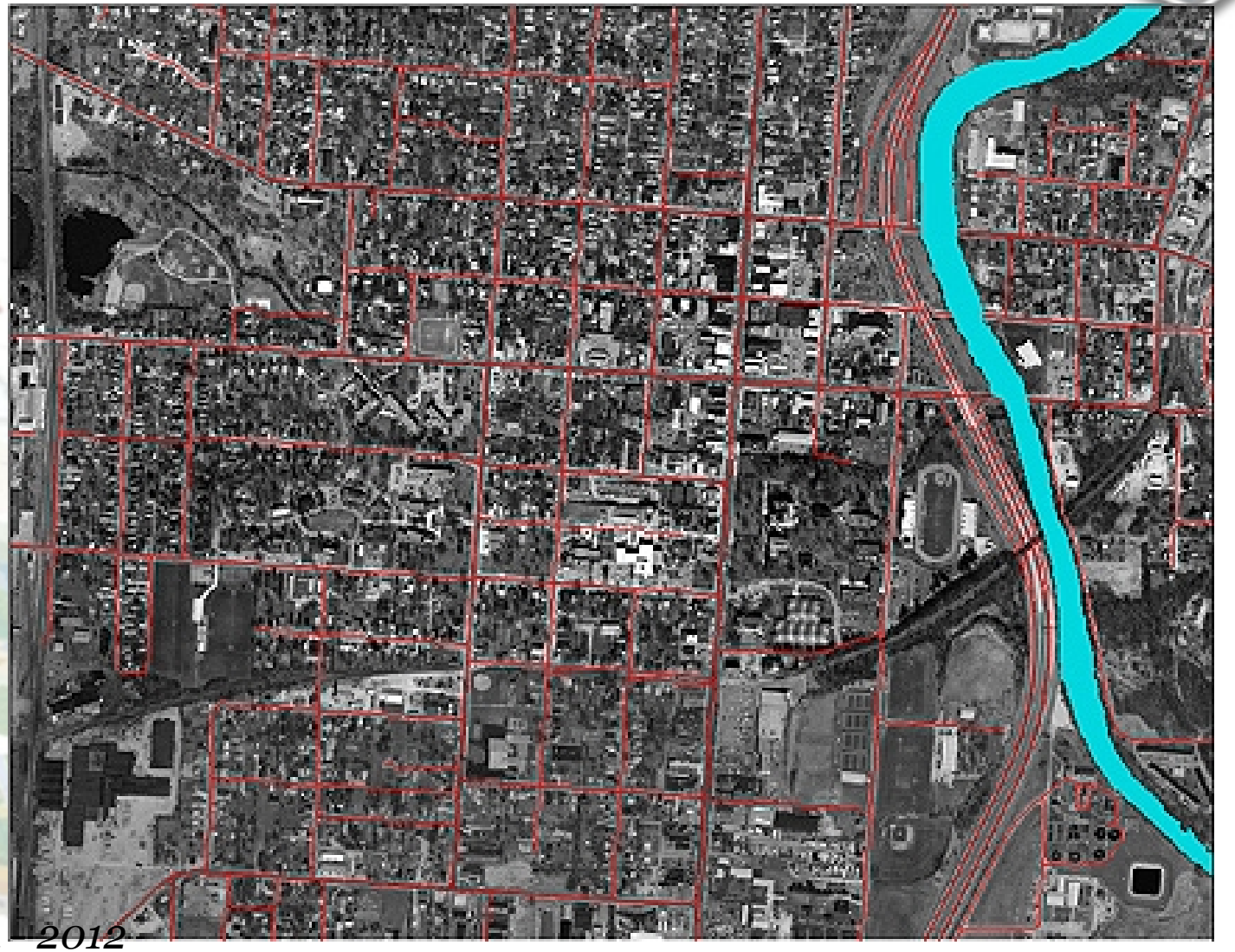
LEVEL AKURASI

- Seberapa besar akurasi yg diinginkan

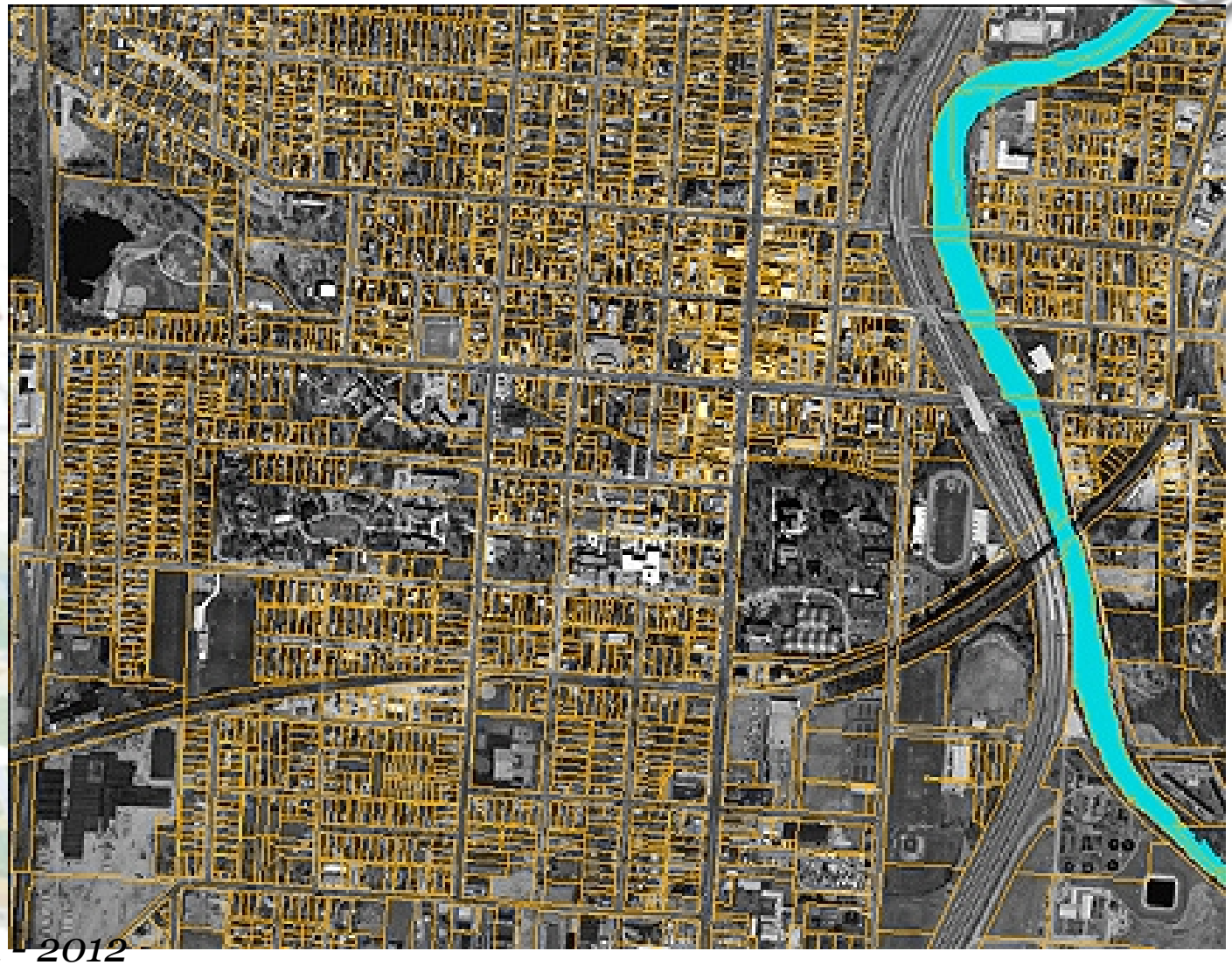


Contoh: data dasar (FU)

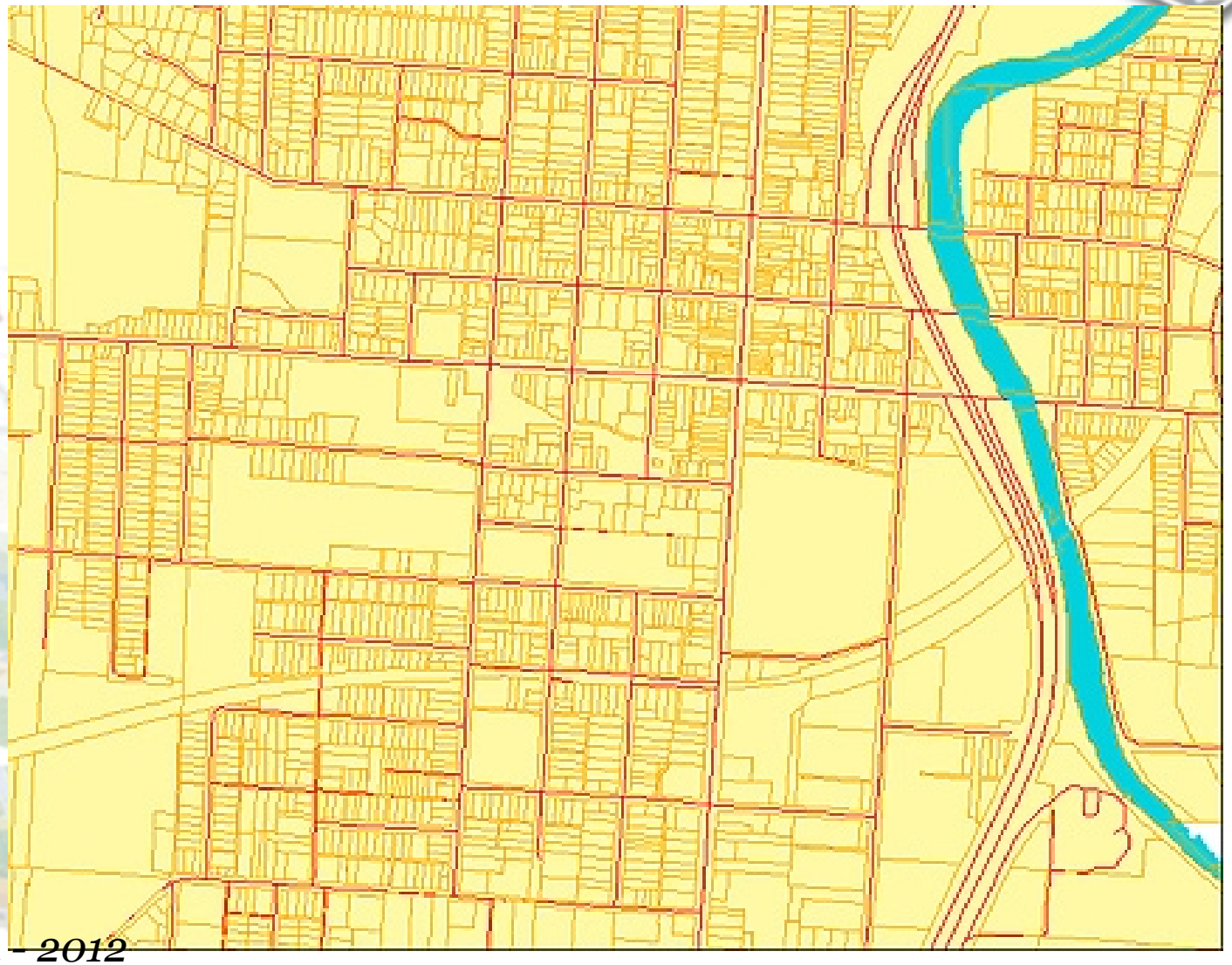
Contoh: digitasi jalan utama & sungai



Contoh: digitasi bidang tanah



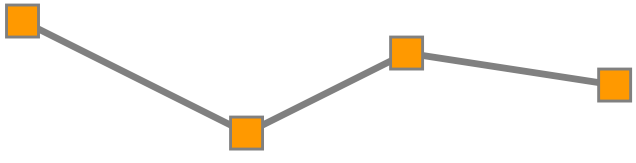
Contoh: hasil akhir



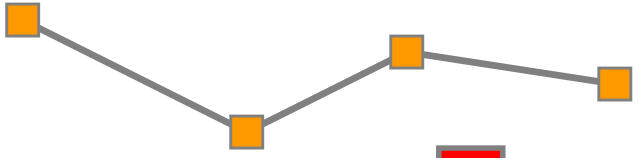
EDITING VECTOR OBJECT

- **Points**
  - Simply changing the coordinate.
  - Dragging and dropping the most common.
- **Lines**
  - Changing the coordinate of one or more points.
  - Splitting a line in two.
  - Merging lines.
- **Polygons**
  - Changing the coordinate of one or more points (the last point is also the first point).
  - Splitting a polygon in two.
  - Using a boundary to draw another polygon.
  - Merging polygons.
  - Creating an island in a polygon.
  - Creating an intersection.

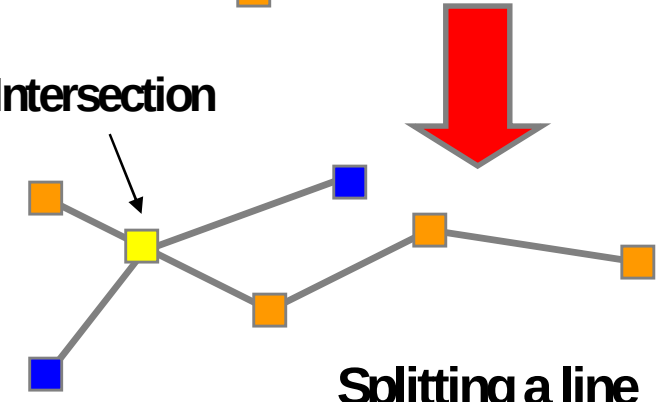
EDITING VECTOR OBJECT



Moving a point (vertex)

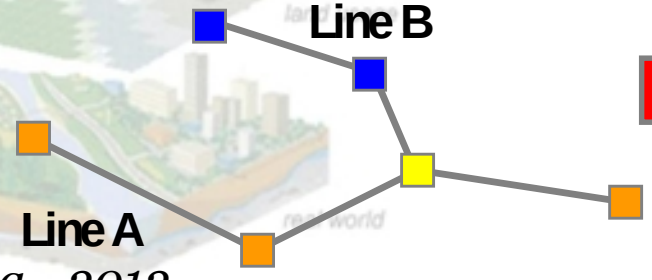


Intersection



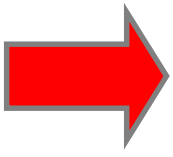
Splitting a line

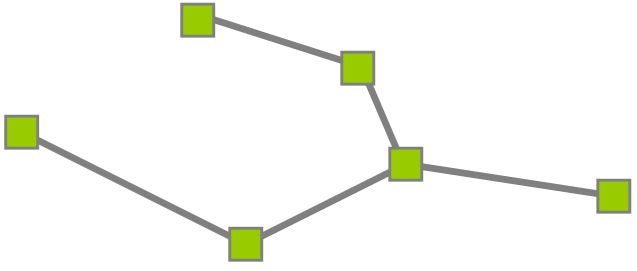
Merging lines



Line B

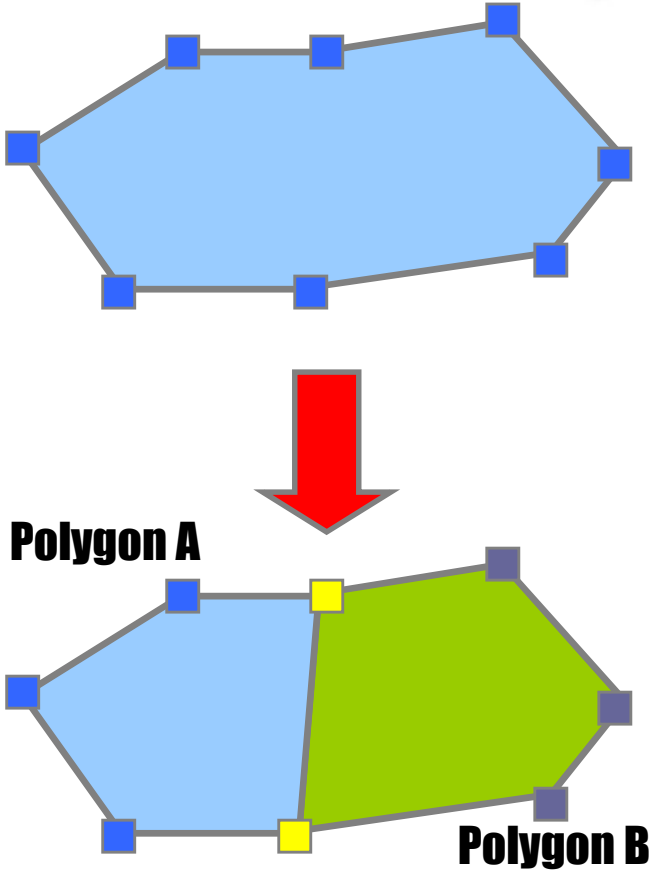
Line A





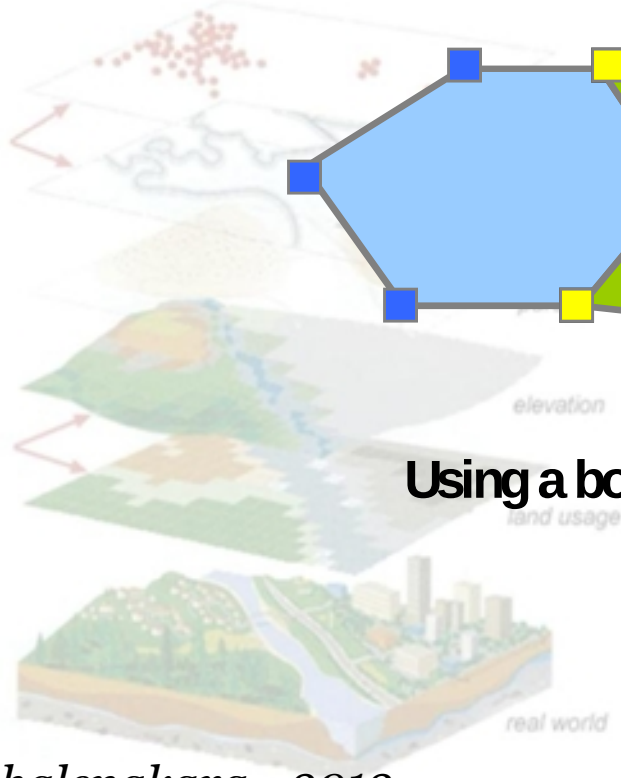
EDITING VECTOR OBJECT

Moving a point (vertex)

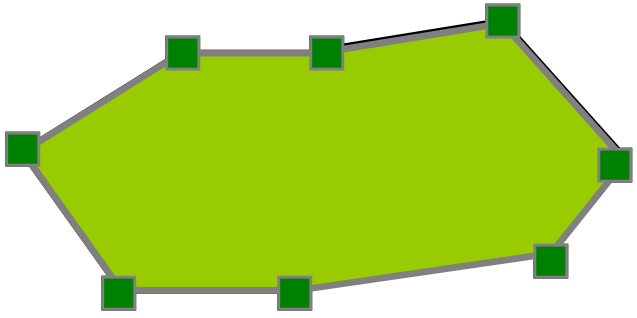


Splitting a polygon

EDITING VECTOR OBJECT

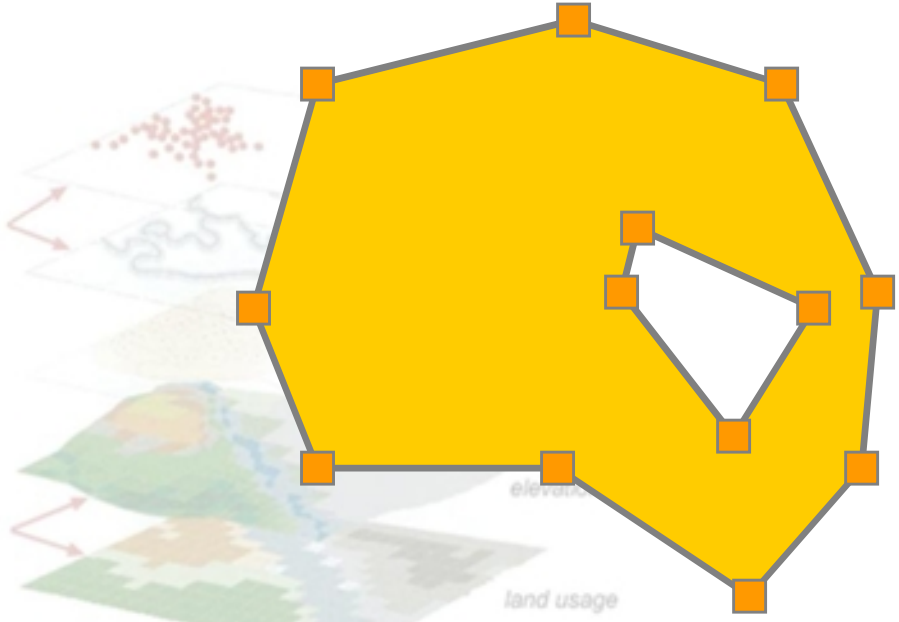


Using a boundary

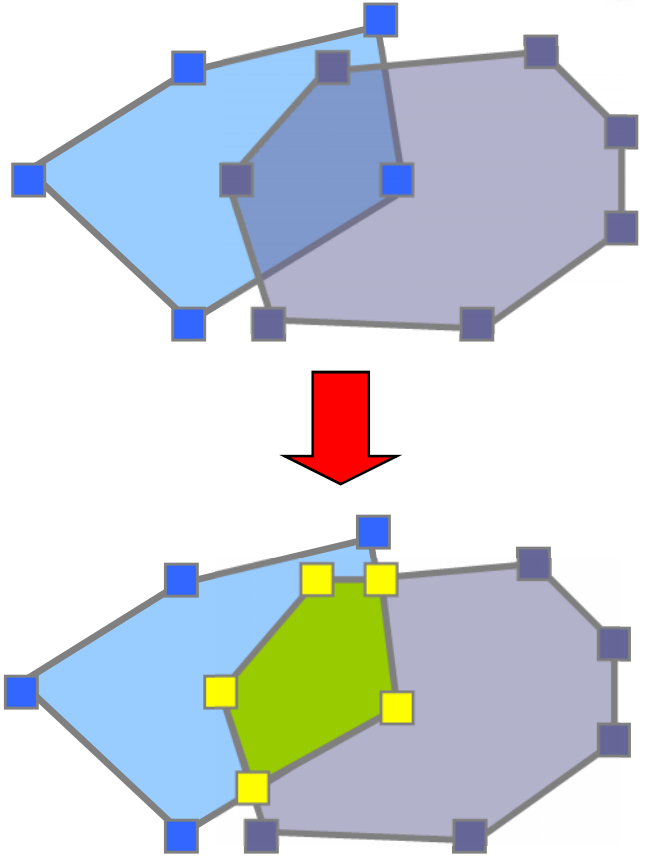


Merging polygons

EDITING VECTOR OBJECT



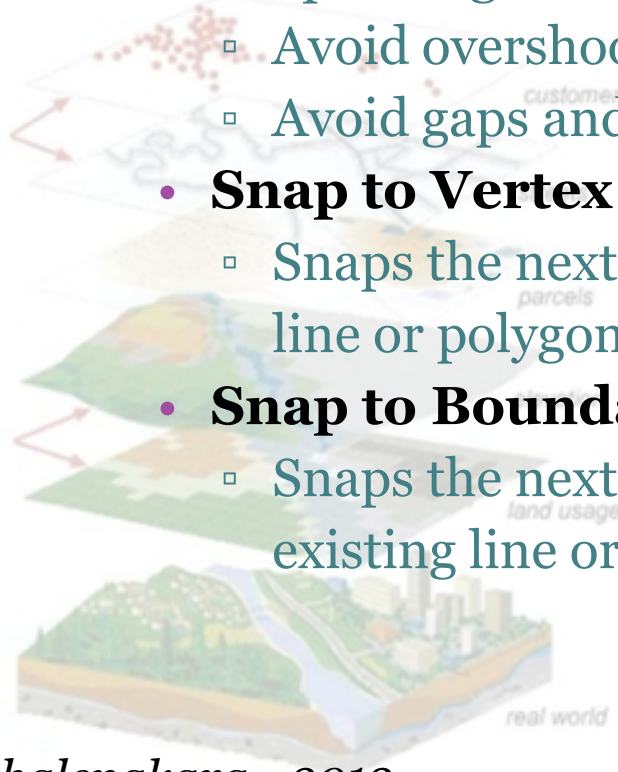
Creating an island



Creating an intersection

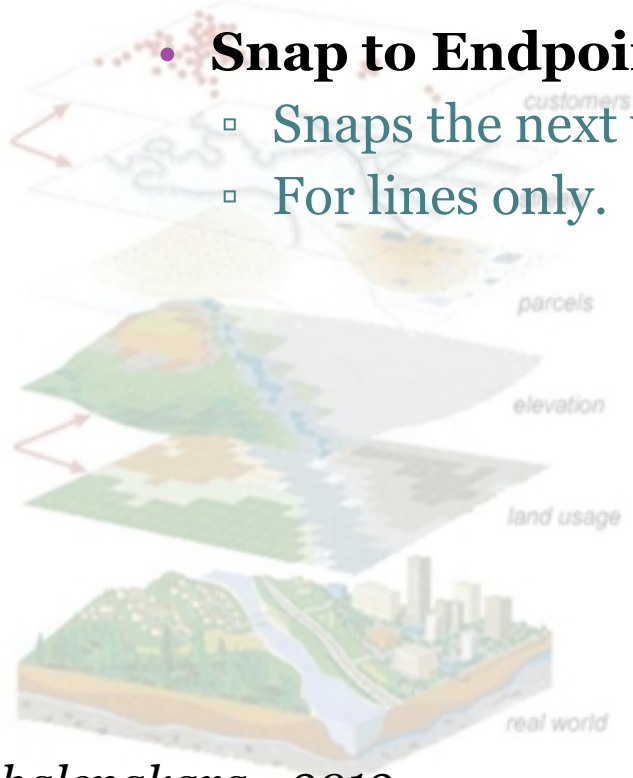
EDITING VECTOR OBJECT

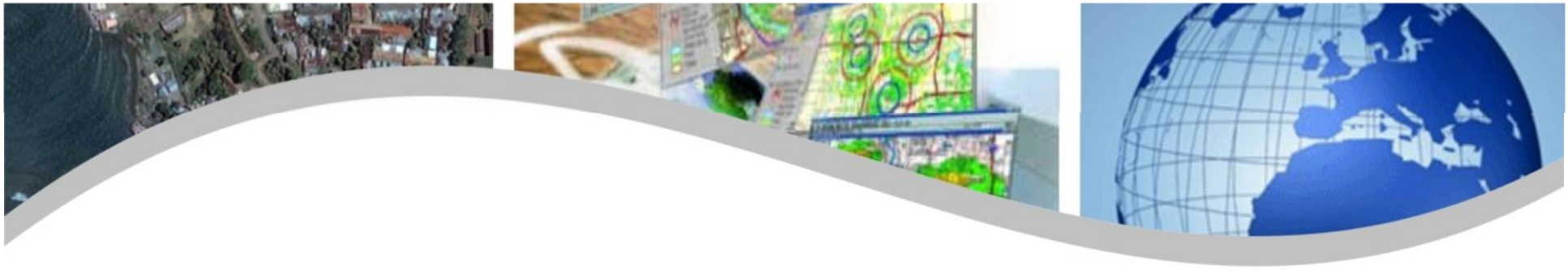
- **Snapping**
  - Make a vertex take the coordinates of a reference.
  - Spanning tolerance defines the “search space”.
  - Avoid overshoots and undershoots for lines.
  - Avoid gaps and overlaps for polygons.
- **Snap to Vertex**
  - Snaps the next vertex to the nearest vertex in an existing line or polygon.
- **Snap to Boundary**
  - Snaps the next vertex to the nearest line segment in an existing line or polygon boundary.



EDITING VECTOR OBJECT

- **Snap to Intersection**
  - Snaps the next vertex to the nearest node common to two or more lines or polygons.
- **Snap to Endpoint**
  - Snaps the next vertex to the nearest endpoint of an existing line.
  - For lines only.





Manajemen Data

Refers to unique issues in the maintenance of spatial data. Data management is one of the key issues determining the usability of spatial data.

Data Errors / Level of Accuracy

- Errors in digitizing
- Errors in original data
- Errors in data entry
- Method of data entry
- Scale of data

Storing Data

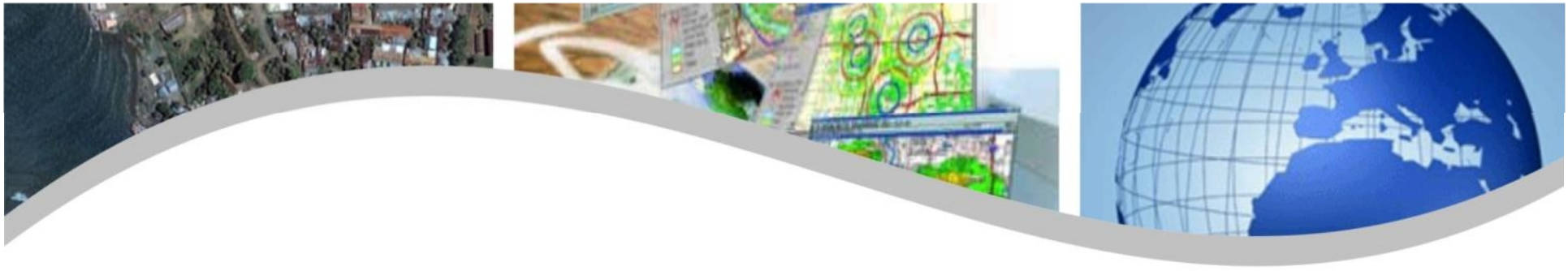
- Upkeep of historical data sets
- Warehousing state and city data

Retrieving Data

- How can users access stored data

Metadata

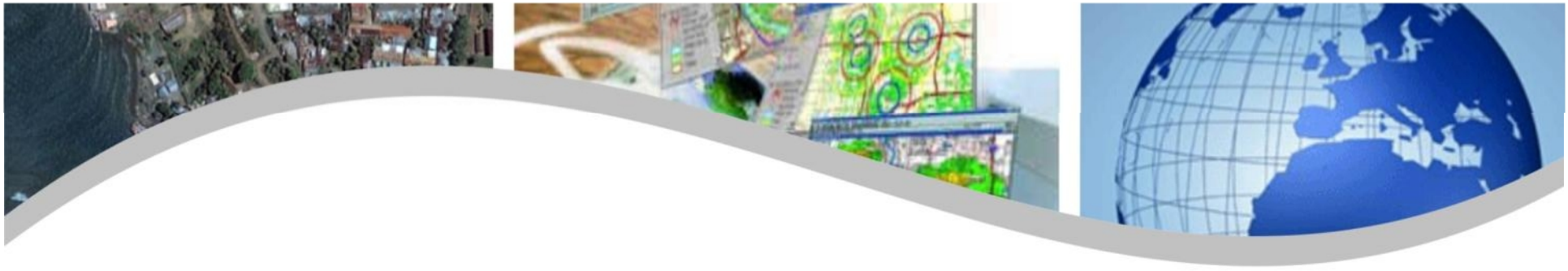
- Using national standards to record and maintain key information about data creation, scale, projection, and attributes.



Analisis Data

Is what allows users to answer questions that may not be explicitly stated in the data.

- Retrieval
- Map Generalization
- Map Abstraction
- Map Sheet Manipulations
- Buffer Generation
- Polygon Overlay & Dissolve
- Measurements
- Digital Terrain Analysis
- Network Analysis



Keluaran Data

Display and output of GIS data are achieved by both printers and computer screens. These output devices require software to format text and, if a map is to be drawn, graphics software to convert data into drawing instructions.