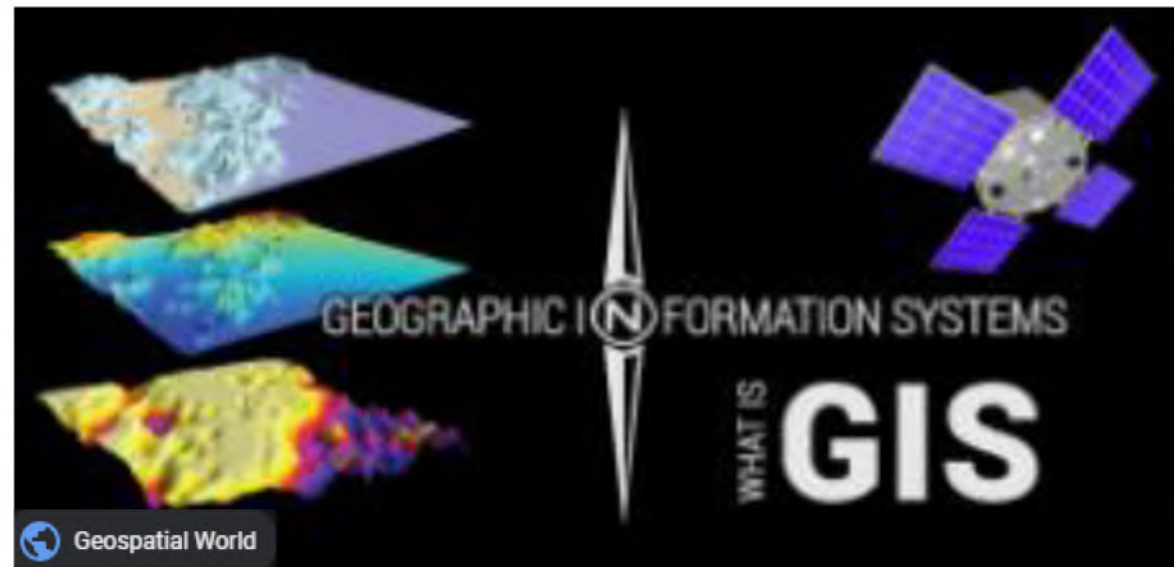




GEOGRAPHIC INFORMATION SYSTEMS

GIS CONCEPTS

SIMPLIFIED





Geographical Information Systems (GIS)

- Concepts of:
 - GIS
 - Remote sensing
 - Resolution
 - Pixels
 - Spatial resolution
 - Spatial and attribute data
 - Vector and raster data
 - Spatial objects
 - Points/Nodes
 - Lines
 - Area/Polygons
- Concept of layering of information
- Components of GIS
- Sources of information for GIS
- Data manipulation and analysis:
 - Concept of data manipulation
 - Data integration
 - Buffering
 - Querying
 - Statistical analysis
- Data standardisation
- Data sharing
- Data security



GIS is a computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface.

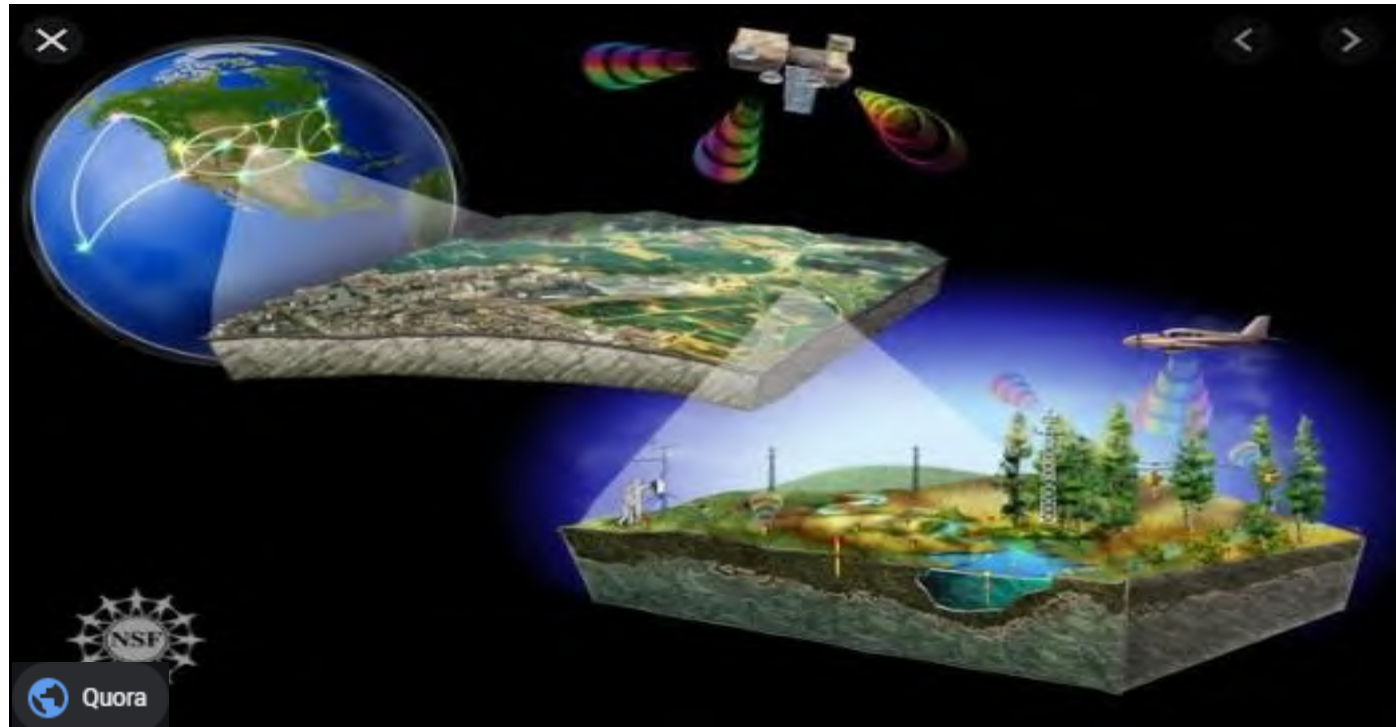


BREAKING IT DOWN

- Geographic – place on Earth, Spatial – Where something is on earth?
- Information – data (facts) put together(layering) to make sense e.g. the number of people using a road. Data used in GIS can be the following: Maps, Remote sensing, Spatial resolution, Spectral resolution
- System – interrelated information – Using the data to make it mean something.



Remote sensing refers to getting information about the earth's surface from a vertical (from above) distance e.g. satellite images.



Done by:

Satellite

Aeroplane

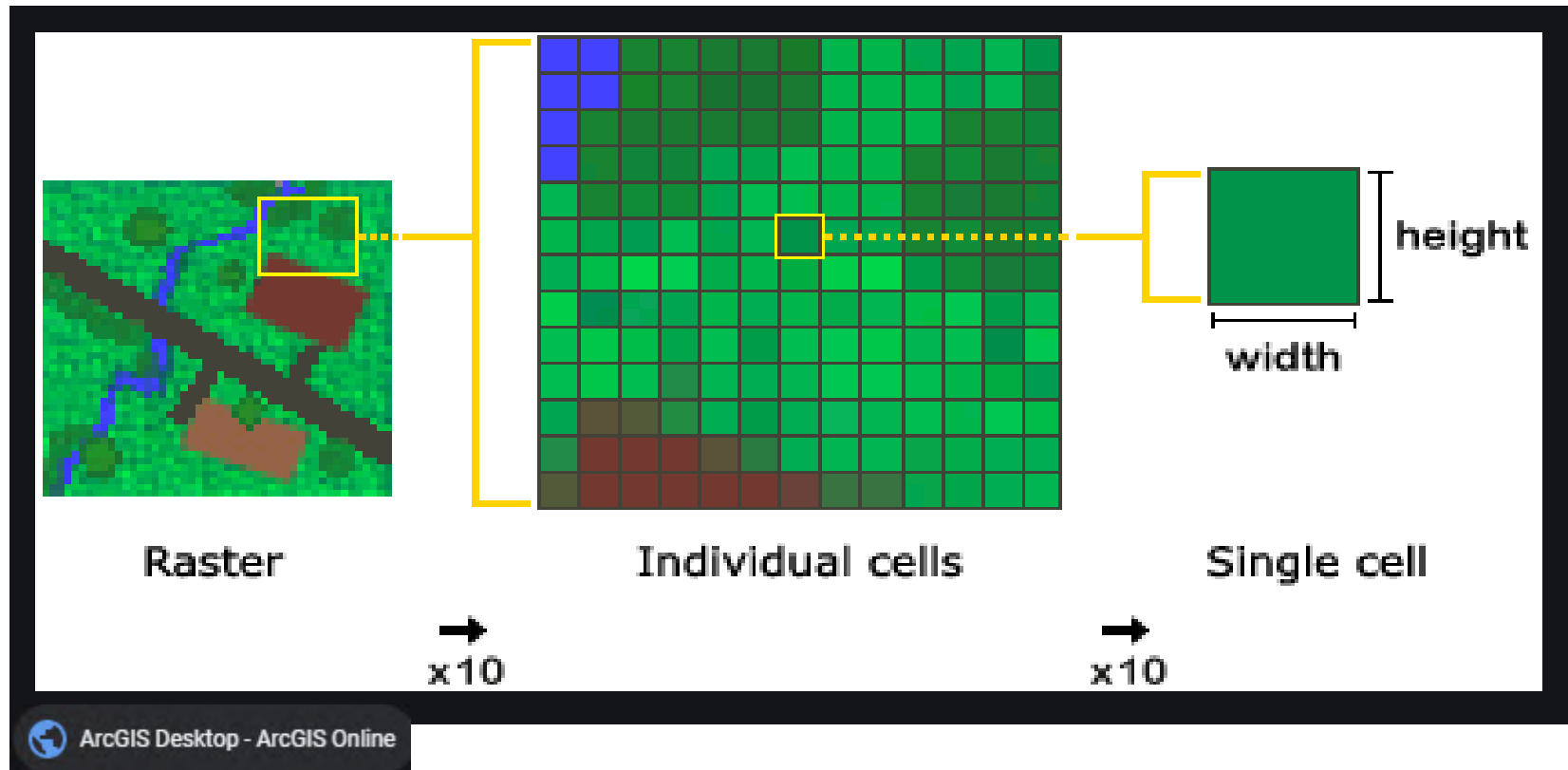
Hot air balloon

(A distance from above)



A pixel is the smallest unit of a digital image or graphic that can be displayed and represented on a digital display device.

Refers to digital/grid cells



takealot.com



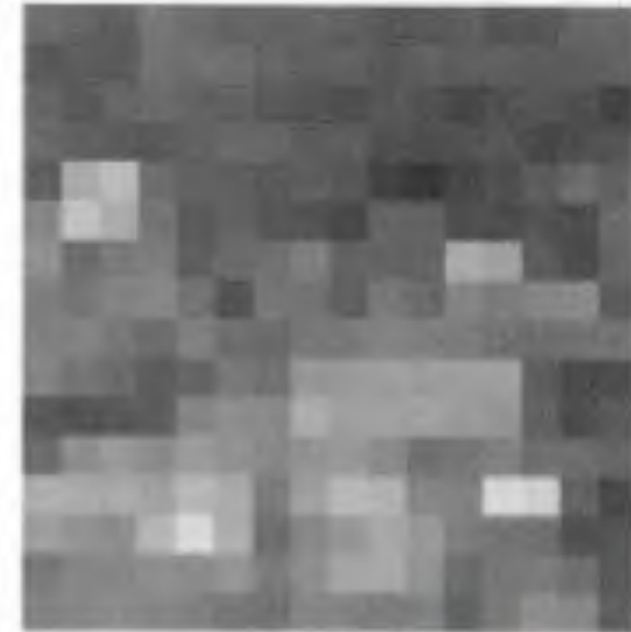
Resolution refers to the clarity of an image.



0.5 x 0.5 m



5 x 5 m



20 x 20 m



The more the pixels the clearer the image

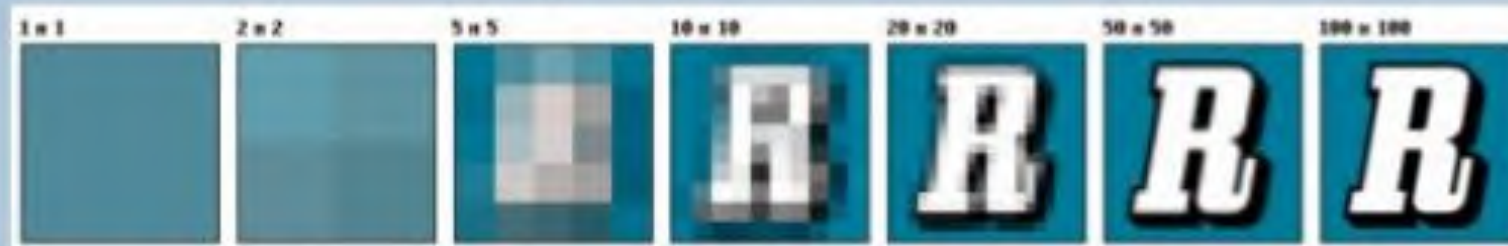
R. Davechand 2020



Spatial Resolution refers to the detail of an image determined by the size and number of pixels
E.G. the size of the smallest feature that can be detected by a satellite sensor or displayed in a satellite image.

Spatial Resolution

The term *resolution* is the pixel count in digital imaging
Higher the number of pixels, higher is the spatial resolution.

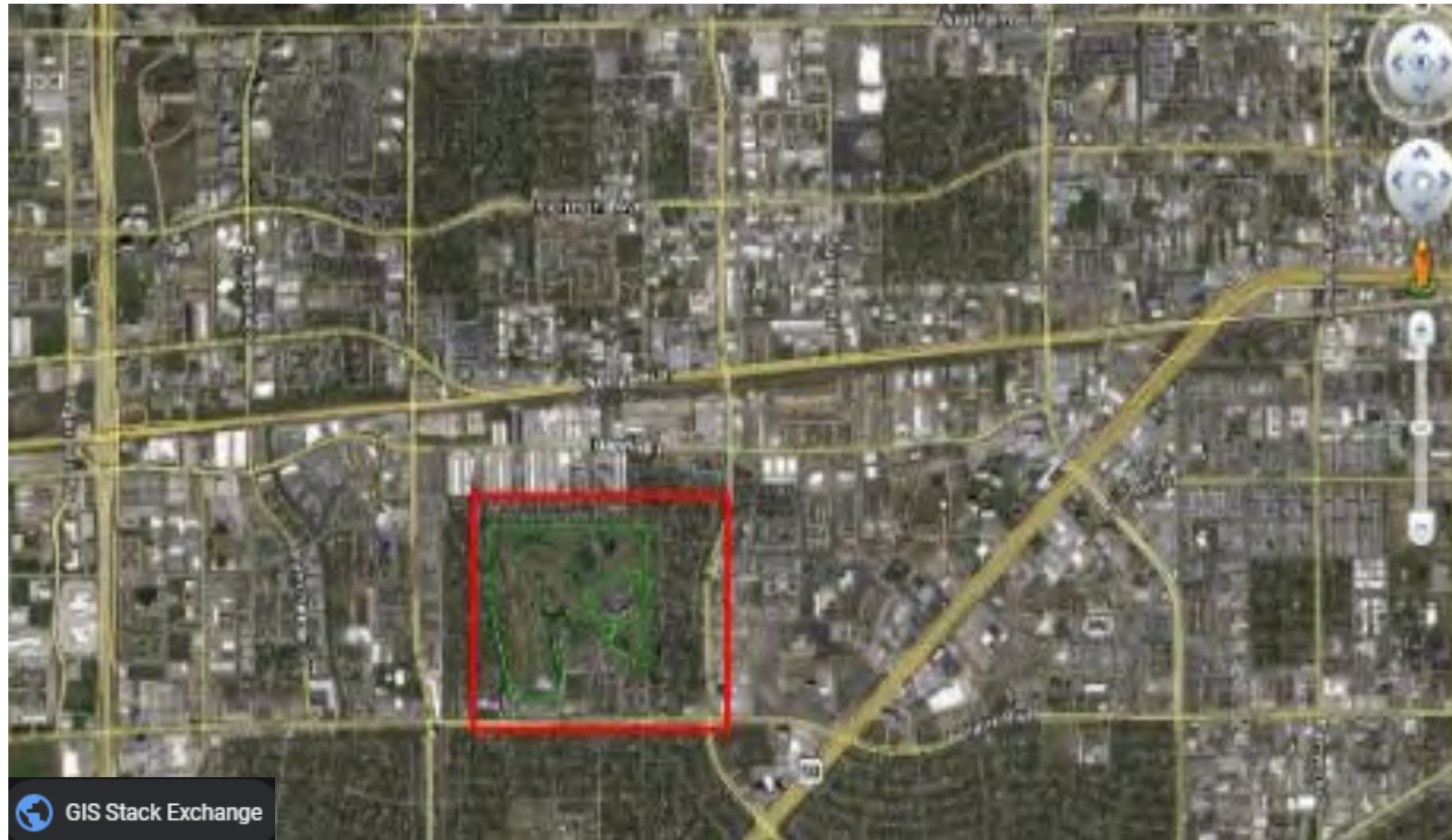


- Spatial Resolution is the size of areas represented by each pixel in a digital photo





Spatial Data refers to information about the location and shapes of (geographic) features.
E.G. grid reference







Attribute Data refers to further information about an area (feature) in addition to its location.
(descriptive data) E.G. The temperature of a given area

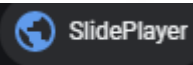




Spatial objects

- | Type | Symbol |
|------------|--------------------------------------------------------------------------------------|
| • Points | Δ 252 .1328 |
| • Lines |  |
| • Polygons |  |

Adapted from







Vector data refers to the representation of a geographic feature using point, lines and polygons





Raster Data refers to the representation of a geographic feature using rectangular grid cells also referred to as pixels or picture elements





Data layering refers to different types of information/data layers are projected onto one another/placed on top of one another





Data integration refers to the combining of two or more data layers.

3. Data Integration:

- A GIS makes it possible to link, or integrate, information that is difficult to associate through any other means.
- Thus, a GIS can use combinations of mapped variables to build and analyze new variables.

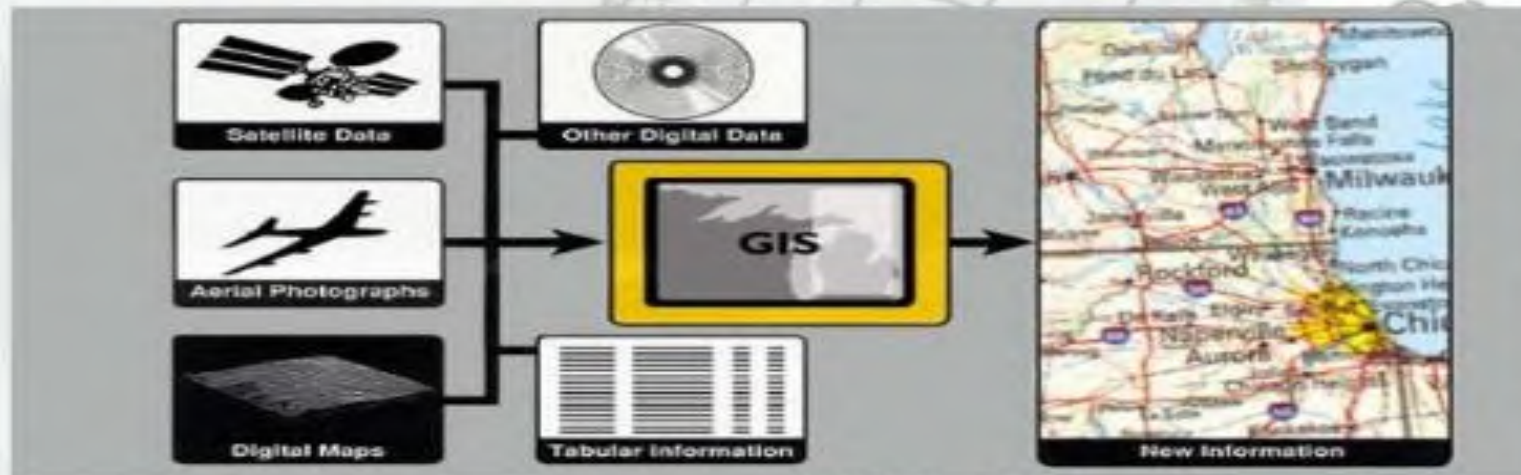


FIG:- Data integration is the linking of information in different forms through a GIS.



THE FIVE COMPONENTS OF A GIS ARE:

Hardware, Software, Data, people and organizations, processes (methods).

.It allows us to collect, store and process data e.g. to produce maps and answer on spatial queries.





Sources of information

The most common general sources for spatial data are: hard copy maps; aerial photographs; remotely-sensed imagery; point data, samples from surveys; and existing digital data files.

Existing hard copy maps, e.g. sometimes referred to as analogue maps, provide the most popular source for any GIS project.

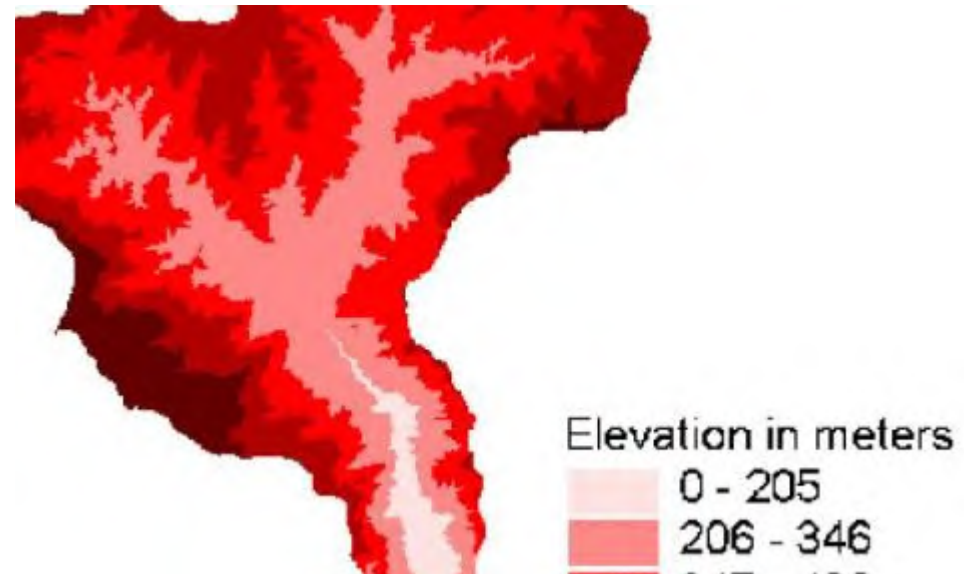


Data manipulation occurs when data is processed and converted making it easier to use (into more useful information).

E.G. correcting distortions and sharpening definitions



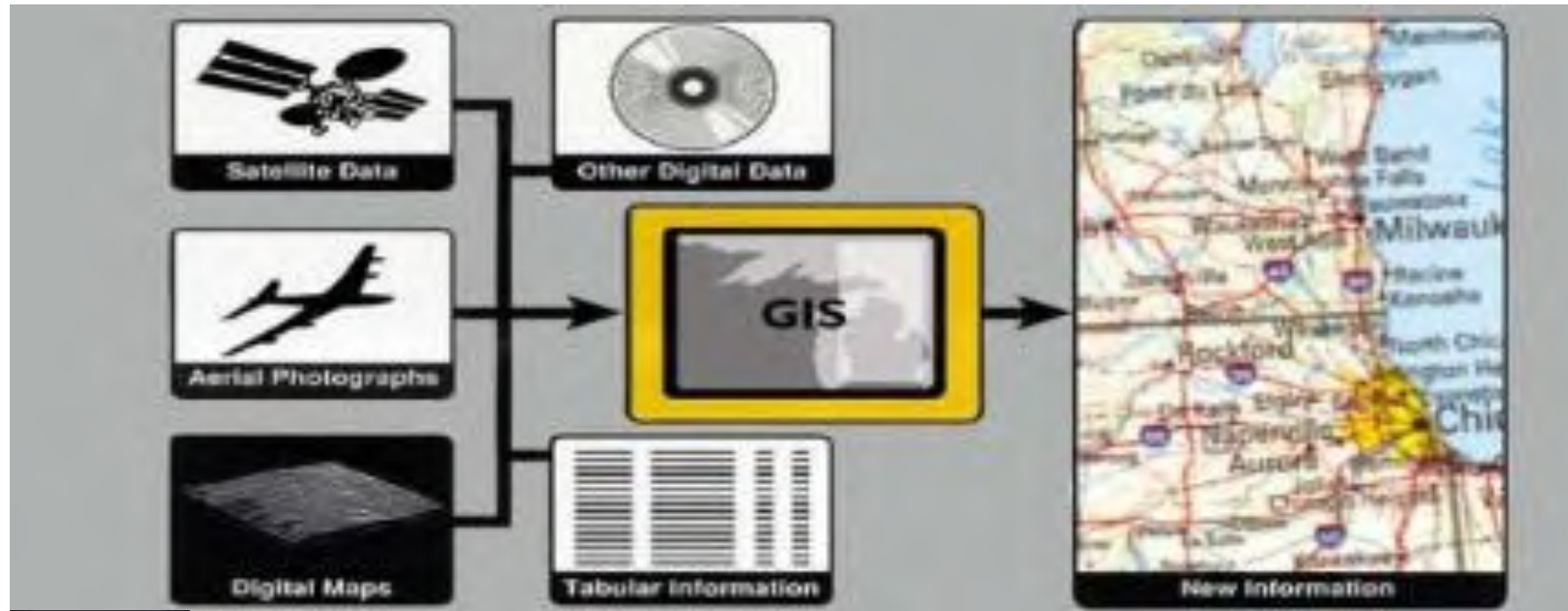
SlideShare



GIS Lounge

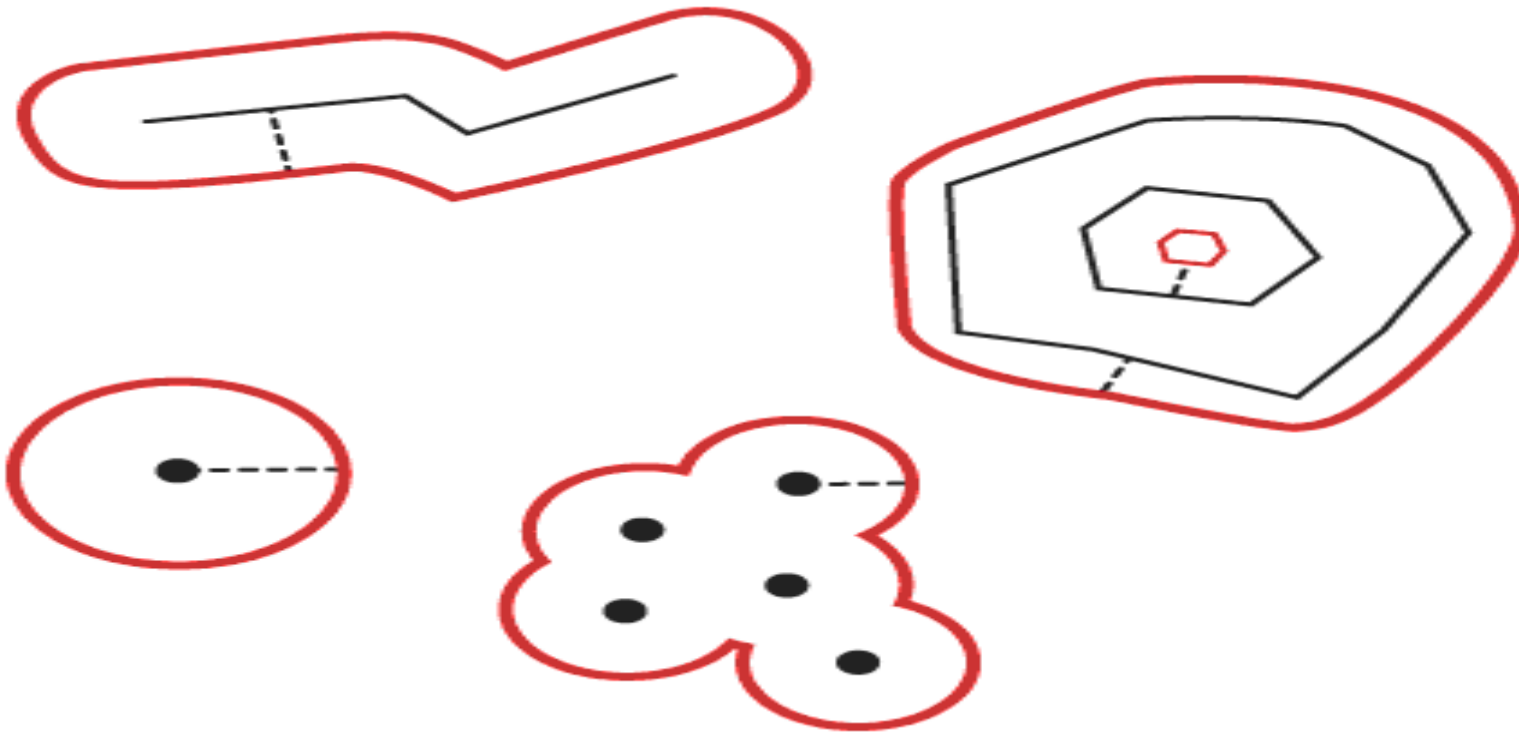


Data integration involves the combining of data layers. (creating more useful information)

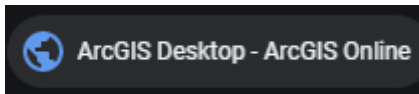




Buffering refers to the demarcation of an area around a (geographic) feature or location.

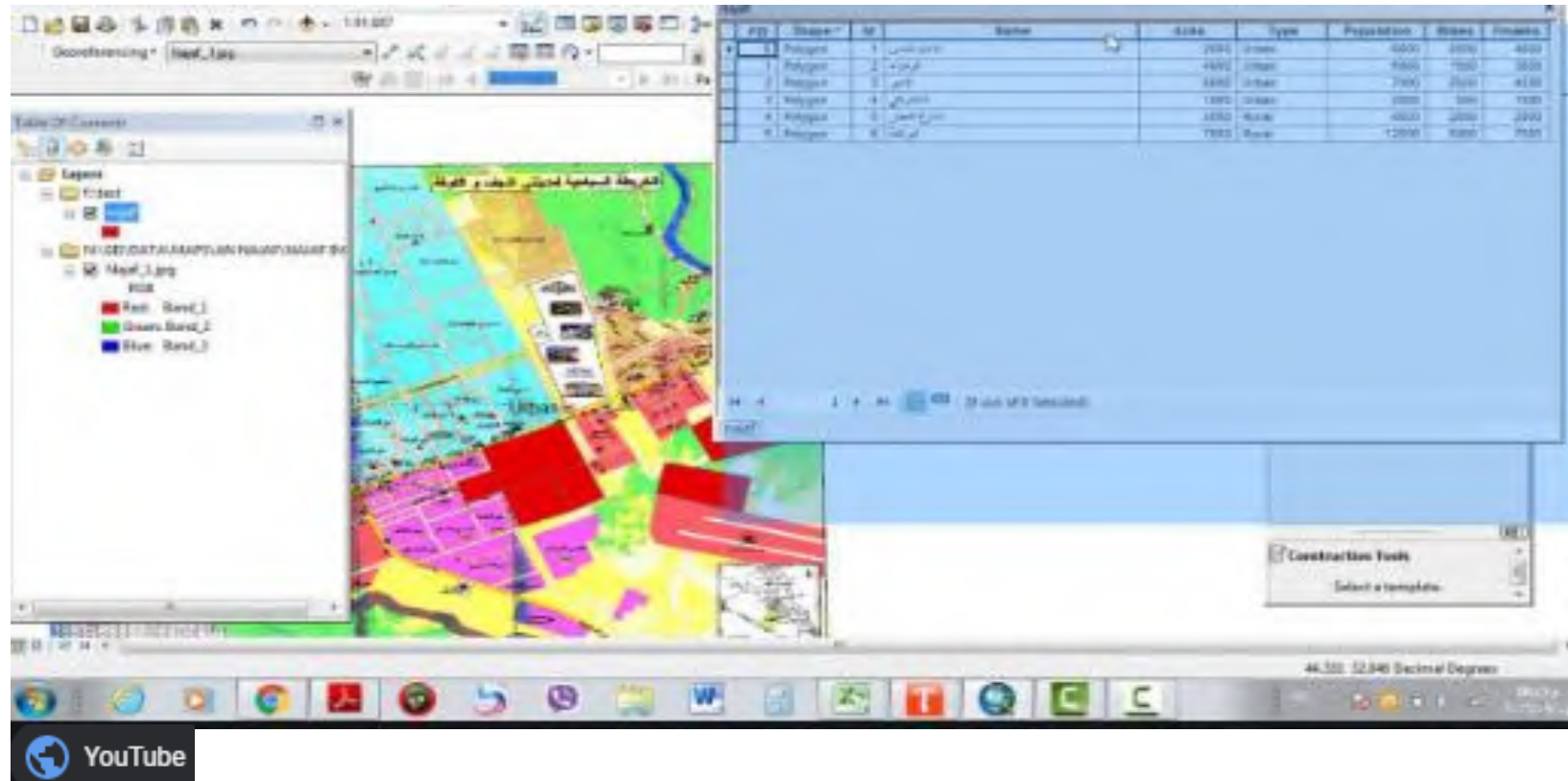


Adapted from





Querying is the ability to ask and answer questions about geographic features and their attributes and the relationship between them





Statistical analysis Interpreting the various forms of statistics in relation to a query that might not be obvious simply by looking at a map

PERCENTAGE (%) INCREASE IN CRIME LEVELS			
TYPE OF CRIME	SUBURBS		
	Townhill (F7)	Mountain Rise (F1)	Plessislaer (I6)
Housebreaking	18,6%	11,3%	23,4%
Car hijacking	100%	177,8%	36,4%

[Adapted from SAPS crime statistics 2015–16 by Theuns Kruger, Graphic 24]

DBE PAST PAPER

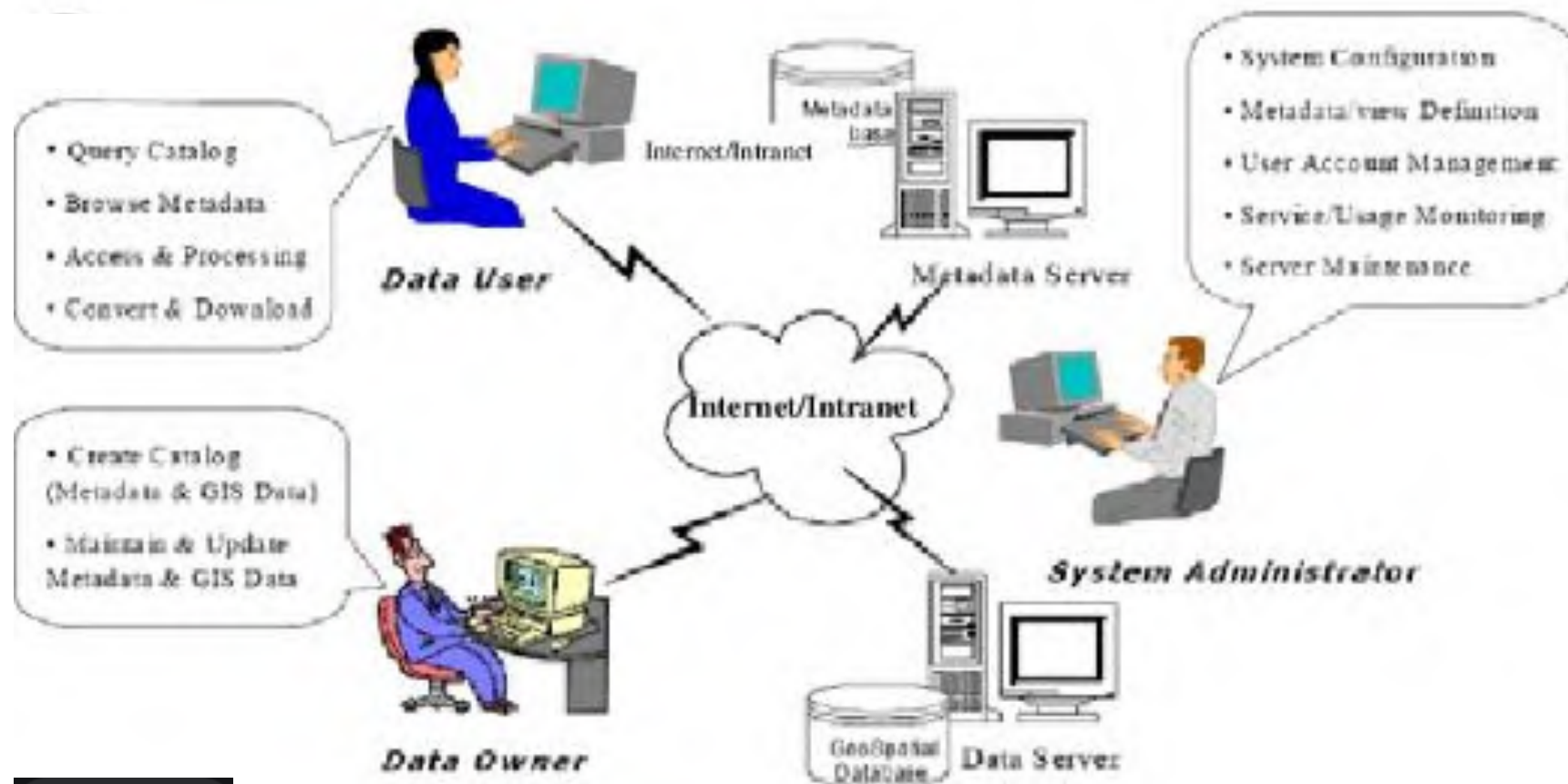


Data Standardisation is a process of transforming a variable into a more analytically useful form making (spatial) data more interchangeable

REFERENCE		VERKLARING
National Freeway; National Route		Nasionale Deurpad; Nasionale Roete
Arterial Route		Hoofverkeersroete
Main Road		Hoofpad
Secondary Road; Bench Mark		Sekondêre Pad; Hoogtemerk
Other Road; Bridge		Ander Pad; Brug
Track and Hiking Trail		Dowwe Pad en Voetslaanpad
Railway; Station or Siding		Spoorweg; Stasie of Sylyn
Other Railway; Tunnel		Ander Spoorweg; Tonnel
Embankment; Cutting		Opvulling; Deurgrawing
Power Line		Kraglyn
Built-up Area (High, Low Density)		Beboude Gebied (Hoë, Laë Digtheid)
Buildings; Ruin		Geboue; Muresie
Post Office; Police Station; Store		Poskantoor; Polisieostasie; Winkel
Place of Worship; School; Hotel		Plek van Aanbidding; Skool; Hotel
Fence; Wall		Draadhelning; Muur
Windpump; Monument		Windpomp; Monument
Communication Tower		Kommunikasietoring
Mine Dump; Excavation		Mynhoop; Uitgraving
Trigonometrical Station; Marine Beacon		Pellbaken; Seevaartbaken
Lighthouse and Marine Light		Vuurtoring en Seevaartlig
Cemetery; Grave		Begraafplaas; Graf
International Boundary and Beacon		Internasionale Grens en Baken
Provincial Boundary		Provinsiale Grens
Protected Area		Bewarings Gebied
Perennial River		Standhoudende Rivier
Perennial Water		Standhoudende Water
Non-perennial River		Nie-standhoudende Rivier
Non-Perennial Water		Nie-standhoudende Water
Dry Water Course		Droë Loop
Dry Pan		Droë Pan
Marsh and Vlei		Moeras en Vlei
Pipeline (above ground)		Pyplyn (bo die grond)
Water Tower; Reservoir; Water Point		Watteroring; Reservoir; Waterpunt
Coastal Rocks		Kuslynrotse
Prominent Rock Outcrop		Prominente Klipbank
Erosion; Sand		Erosie; Sand
Woodland		Beboste Gebied
Cultivated Land		Bewerkte Land
Orchard or Vineyard		Boord of Wingerd
Recreation Ground		Ontspanningsterrein
Row of Trees		Rye Bome



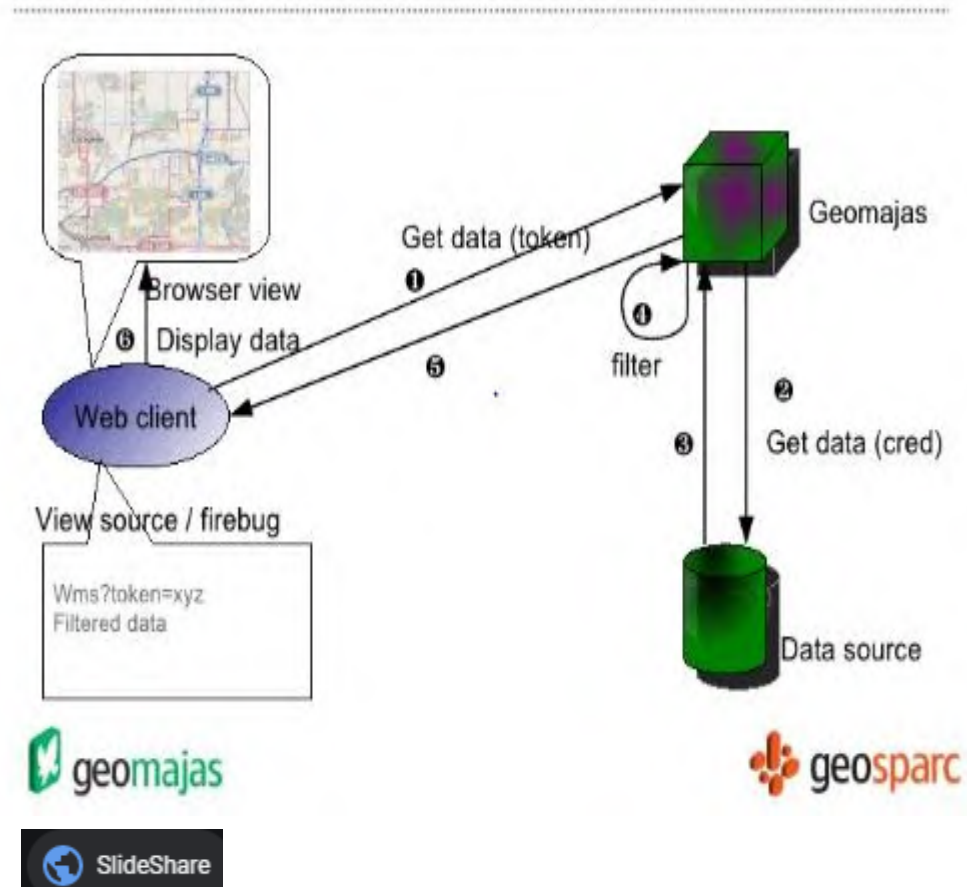
Data sharing refers to GIS systems that allows others to use your (spatial or non-spatial data) data.
E.G. Cloud GIS





Data security refers to restricting the availability of data to certain people or organisations.

Security proxy



Shop Acer



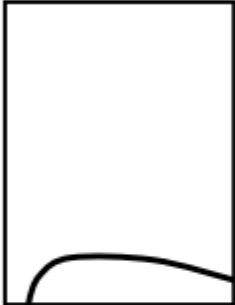
MiStore South Africa



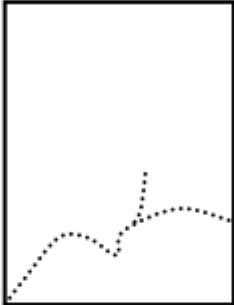
DBE PAST PAPER - Paper GIS

4.2.1 Use the THREE data layers below to create a paper GIS in the block provided.

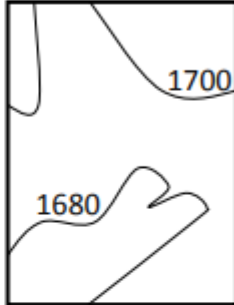
LAYER 1




LAYER 2






LAYER 3



PAPER GIS



KEY

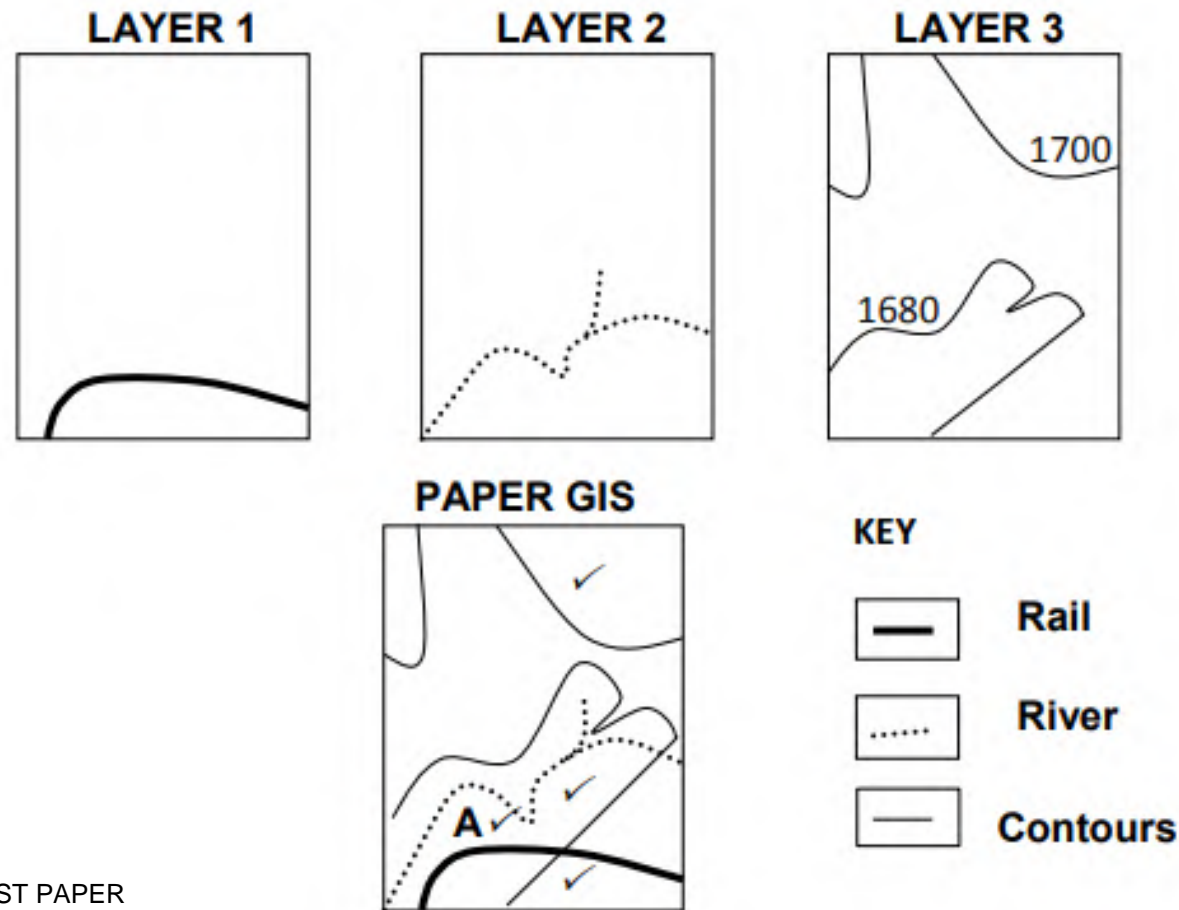
	Rail
	River
	Contour

(3 x 1) (3)

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. Paper GIS



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