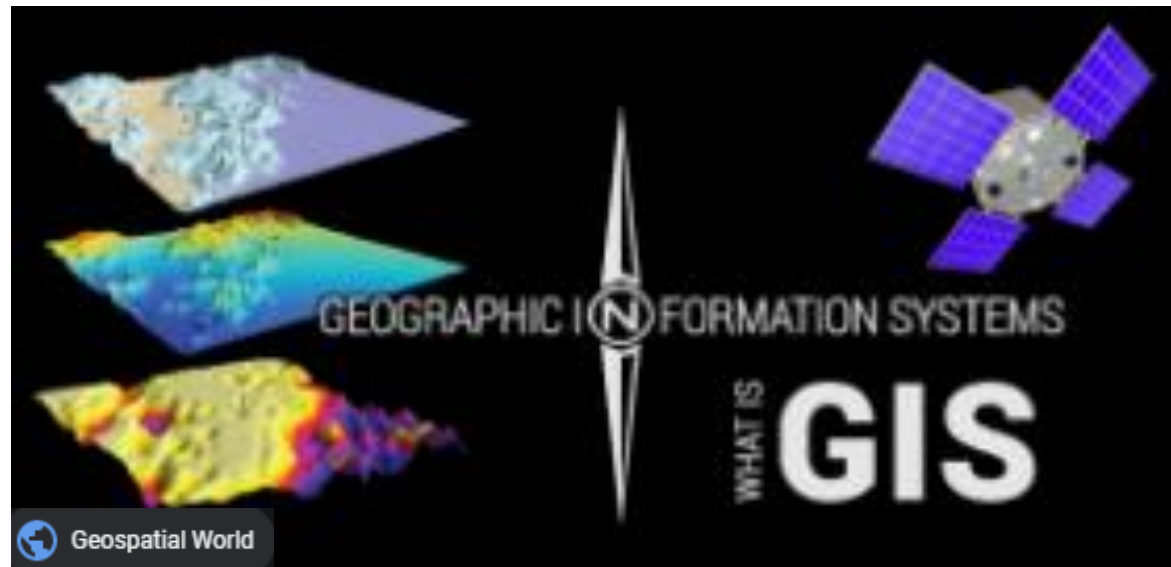




GEOGRAPHIC INFORMATION SYSTEMS

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.

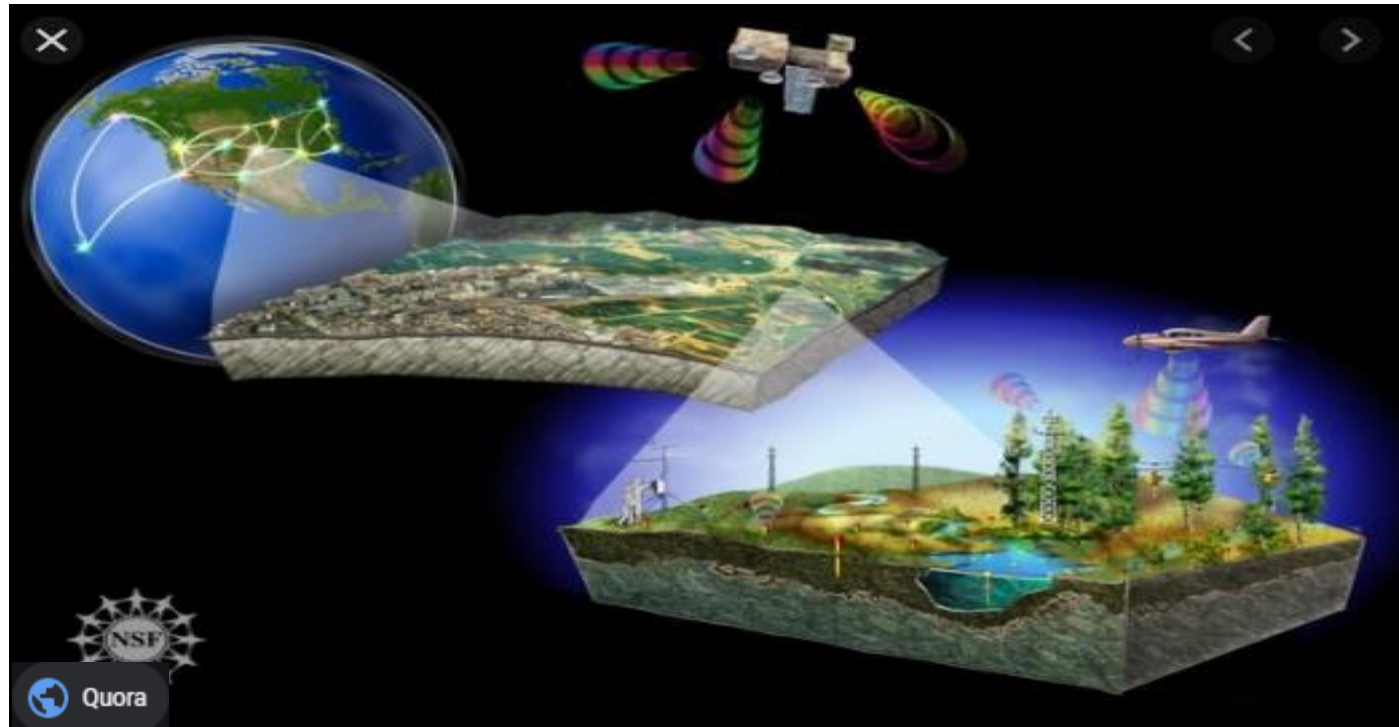


BREAKING IT DOWN

- 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.

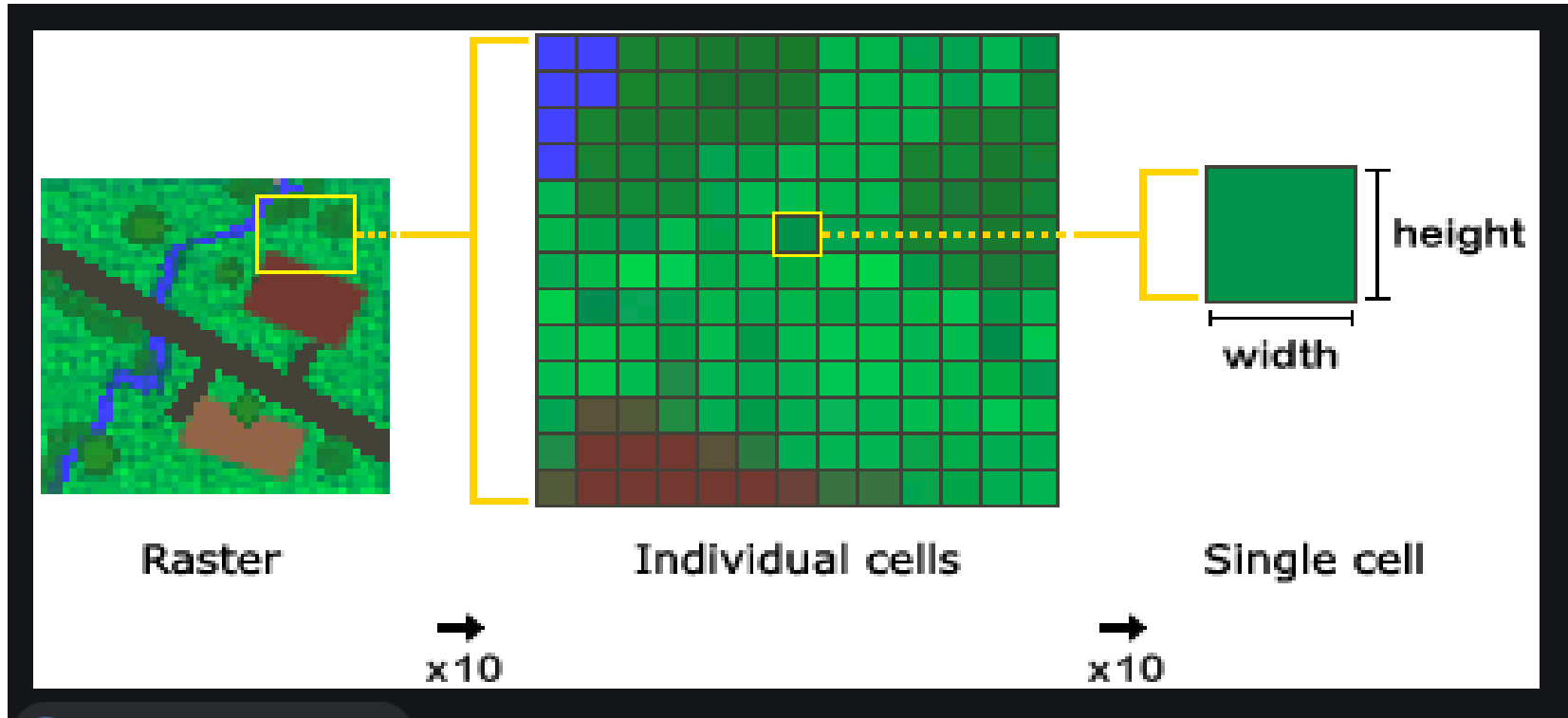


Done by:
Satellite
Aeroplane
Hot air balloon
(A distance from above)



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**

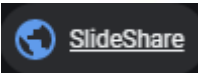
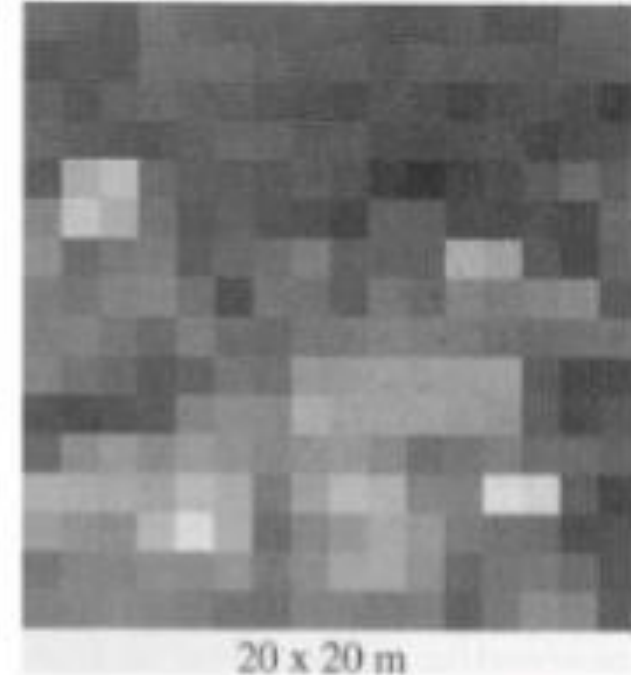


takealot.com

ArcGIS Desktop - ArcGIS Online



Resolution refers to the clarity of an image.



The more the pixels the clearer the image

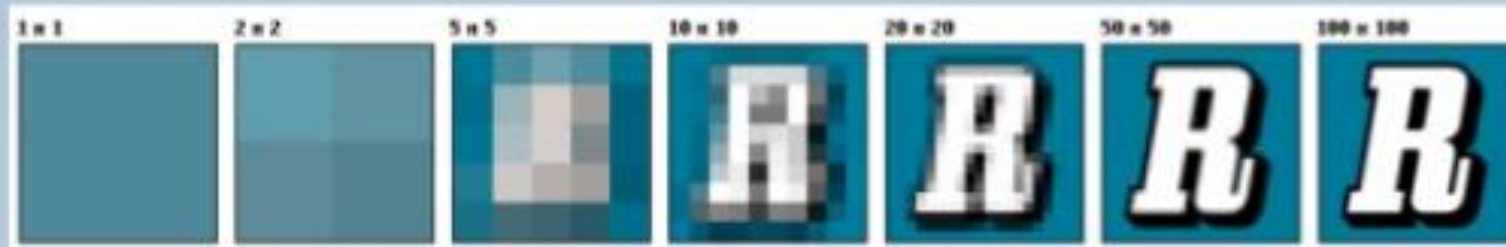
R. Davechand 2020



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





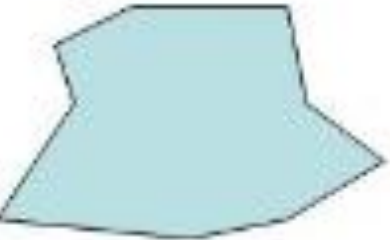


Attribute Data refers to further information about an area (feature) in addition to its location. (descriptive data) E.G. The temperature of a given area

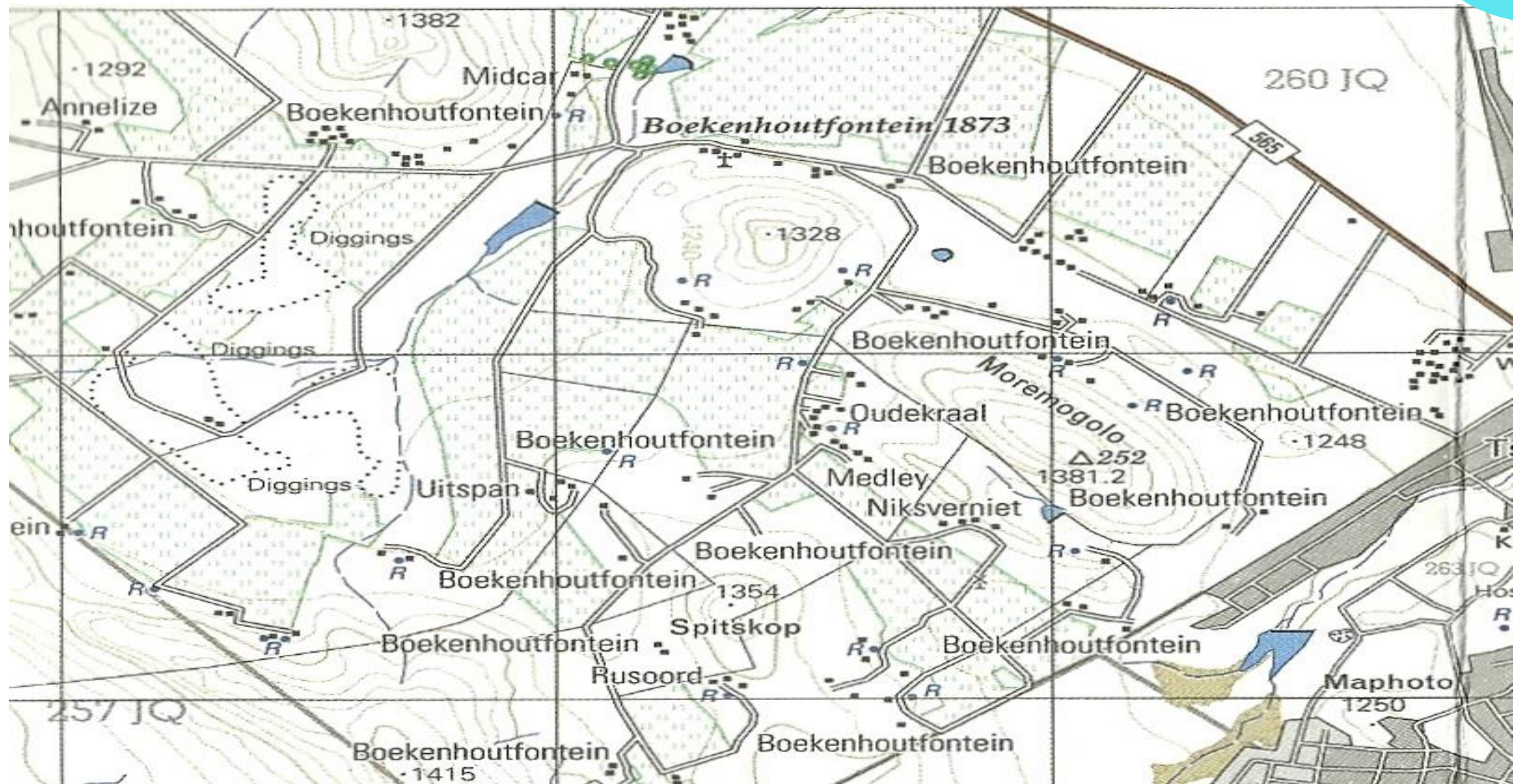




Spatial objects

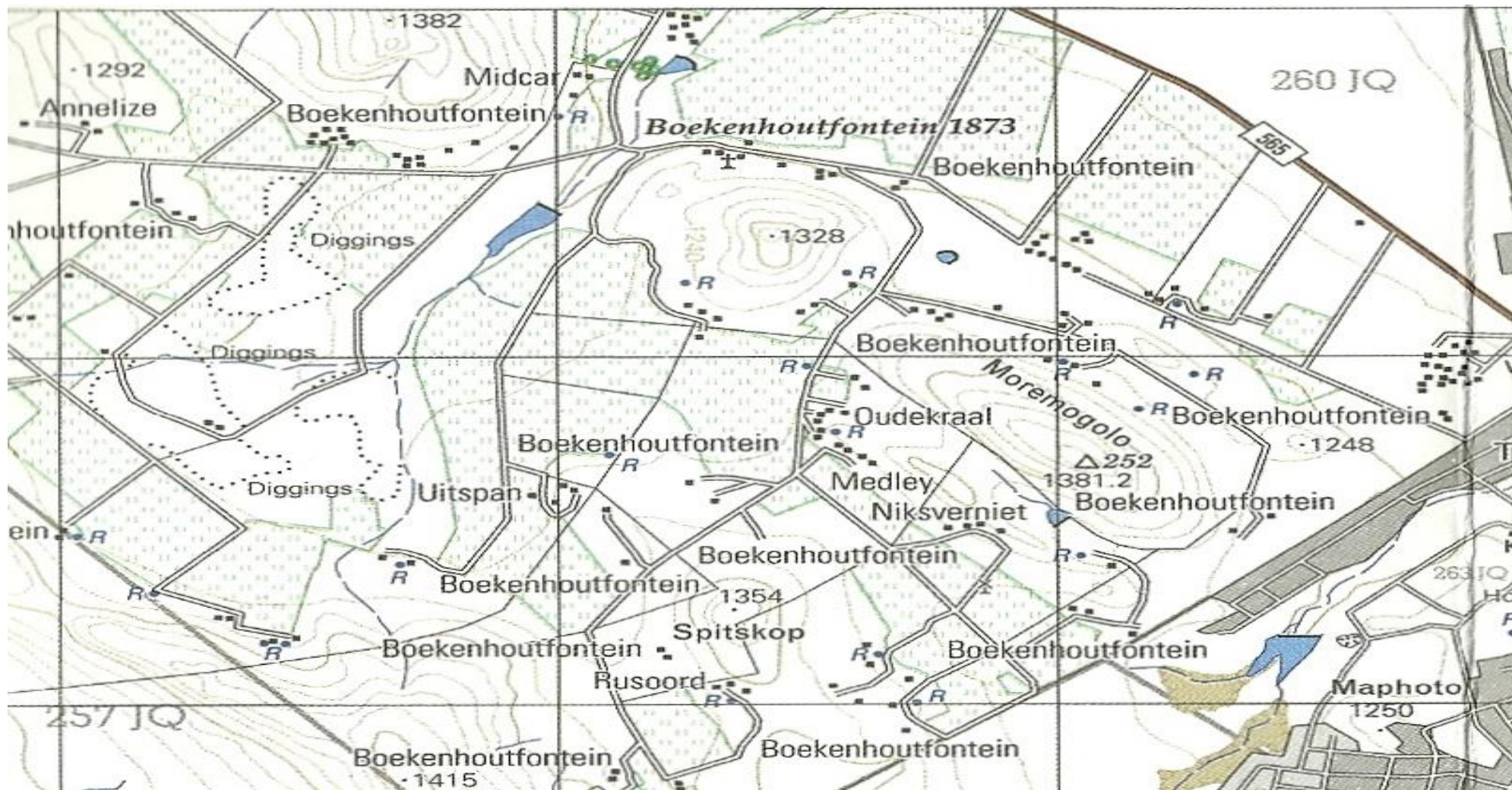
Type	Symbol
<ul style="list-style-type: none">• Points	 Δ 252 .1328
<ul style="list-style-type: none">• Lines	
<ul style="list-style-type: none">• Polygons	

Adapted from  SlidePlayer





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



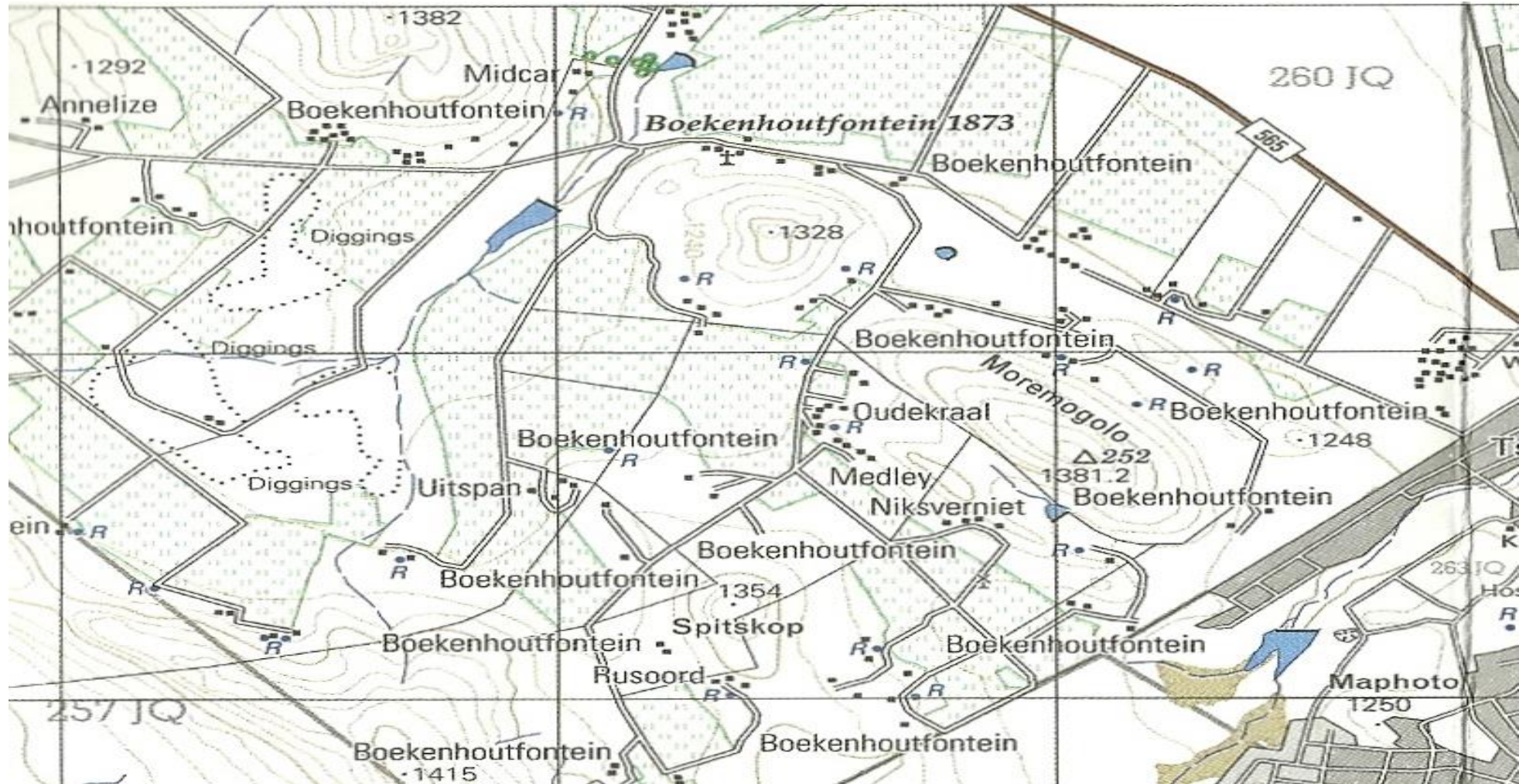


Raster Data refers to the representation of a geographic feature using rectangular grid cells also referred to as pixels or picture elements





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.

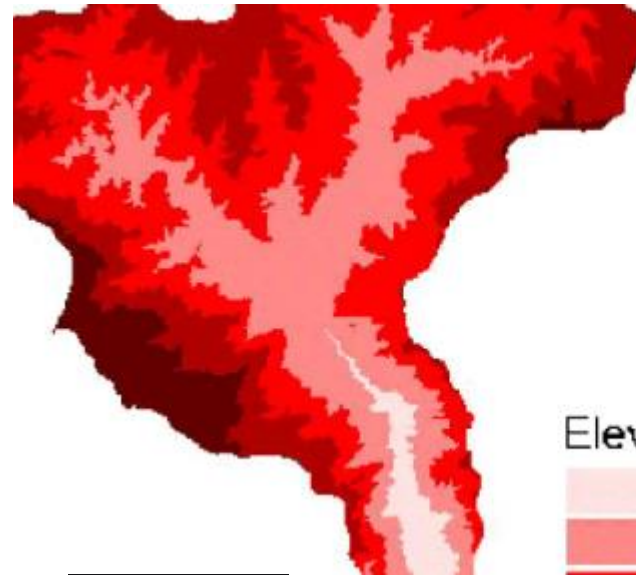
Existing hard copy maps, e.g. sometimes referred to as analogue maps, provide the most popular source for any GIS project.



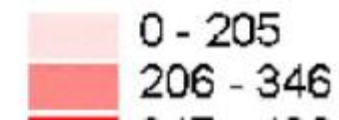
Data manipulation occurs when data is processed and converted making it easier to use (into more useful information).
E.G. correcting distortions and sharpening definitions



SlideShare



Elevation in meters

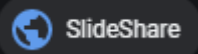
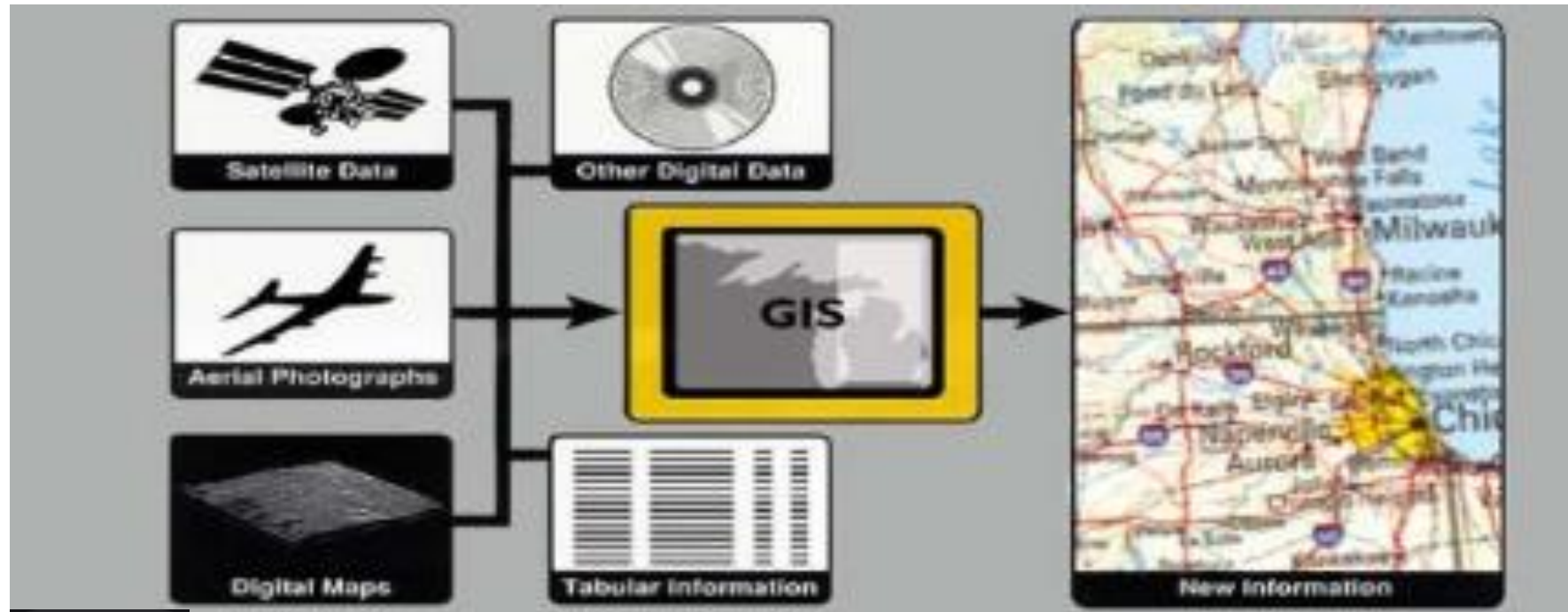


GIS Lounge



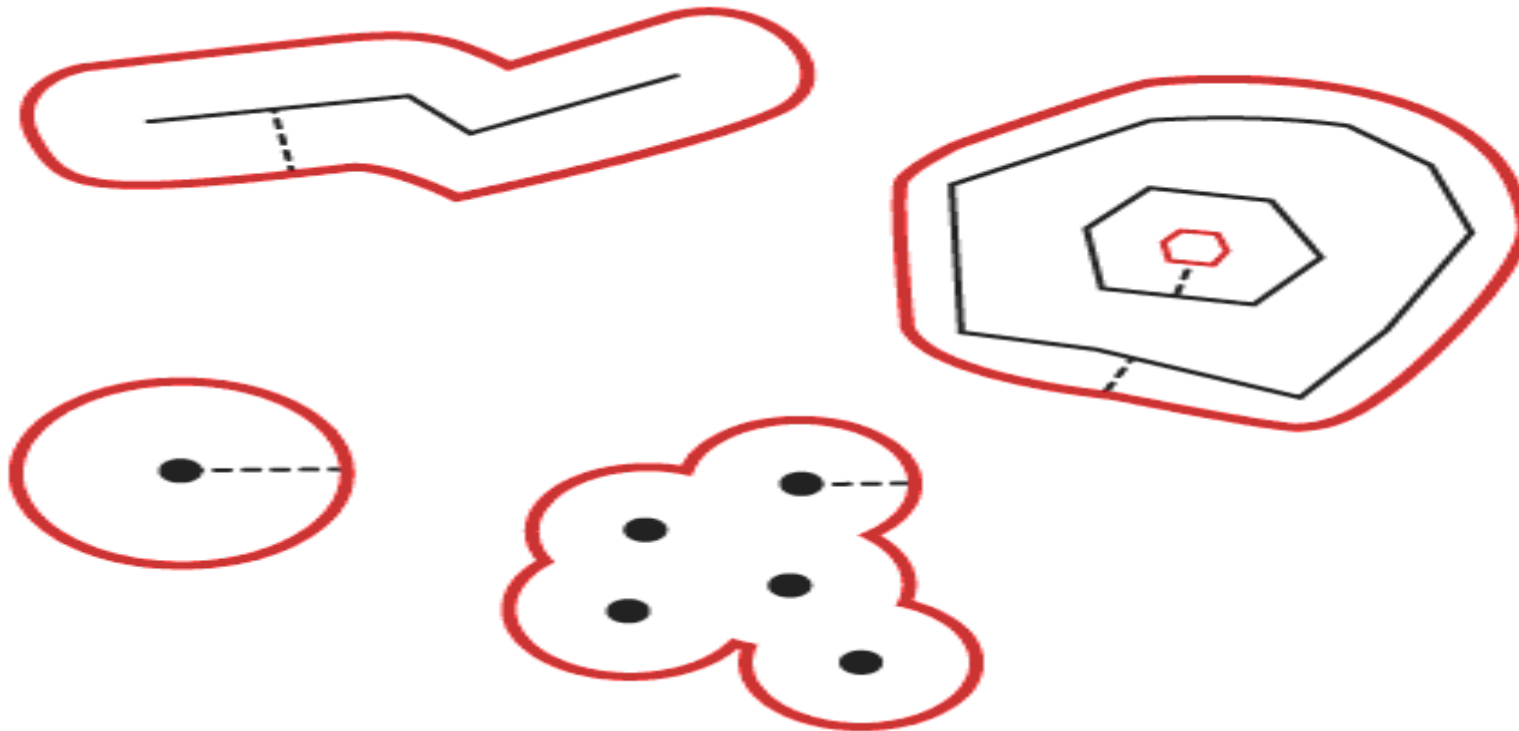
Geography with Dave

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

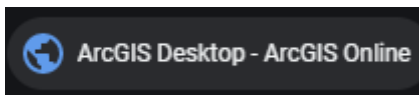




Buffering refers to the demarcation of an area around a (geographic) feature or location.



Adapted from





Geography with Dave

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

The screenshot displays a GIS application window with a map of a city area. The map is overlaid with a data table. The table has columns for ID, Shape, Name, Area, Type, Population, Status, and Features. The data is as follows:

ID	Shape	Name	Area	Type	Population	Status	Features
1	Polygon	الحي السكني 1	2000	Urban	4000	2000	4000
2	Polygon	الحي السكني 2	4000	Urban	8000	2000	8000
3	Polygon	الحي السكني 3	8000	Urban	16000	2000	16000
4	Polygon	الحي السكني 4	10000	Urban	20000	3000	20000
5	Polygon	الحي السكني 5	30000	Urban	60000	2000	20000
6	Polygon	الحي السكني 6	70000	Urban	140000	3000	70000

The interface also includes a legend on the left with categories like 'Red Area_1', 'Green Area_2', and 'Blue Area_3'. A 'Coordinate Tools' panel is visible at the bottom right. The Windows taskbar at the bottom shows various application icons and the system clock.



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









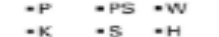





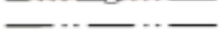










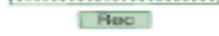



PERCENTAGE (%) INCREASE IN CRIME LEVELS			
TYPE OF CRIME	SUBURBS		
	Townhill (F7)	Mountain Rise (F1)	Plessislaer (I6)
Housebreaking	18,6%	11,3%	23,4%
Car hijacking	100%	177,8%	36,4%

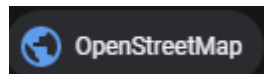
[Adapted from SAPS crime statistics 2015–16 by Theuns Kruger, Graphic 24]

DBE PAST PAPER



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

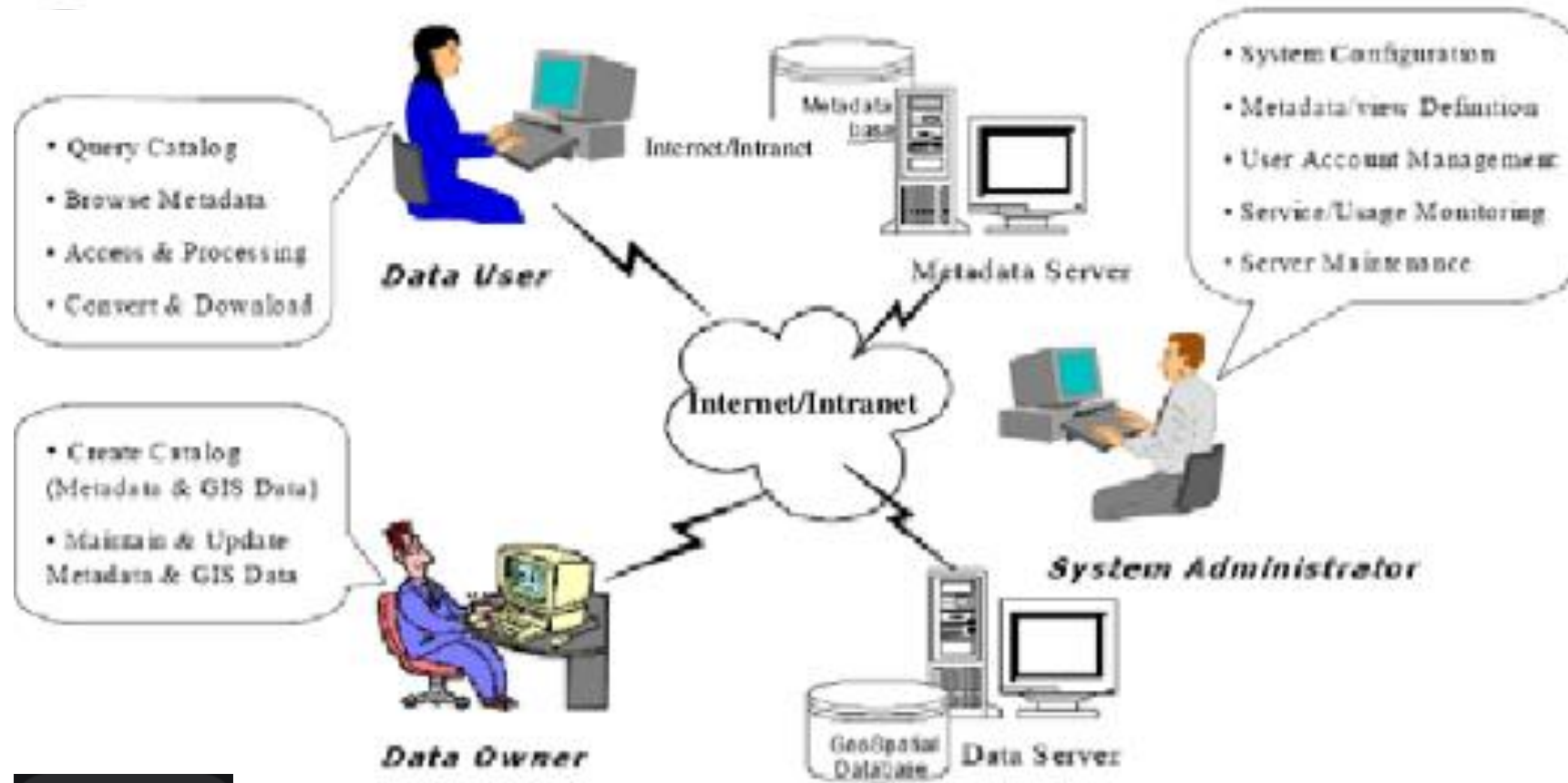
REFERENCE	VERKLARING
National Freeway; National Route.....	Nasionale Deurpad; Nasionale Roete
Arterial Route.....	Hoofverkeersroete
Main Road.....	Hoofpad
Secondary Road; Bench Mark.....	Sekondêre Pad; Hoogtemerk
Other Road; Bridge.....	Ander Pad; Brug
Track and Hiking Trail.....	Dowwe Pad en Voetslaanpad
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, Lae Digtheid)
Buildings; Ruin.....	Geboue; Mursie
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; Grava.....	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.....Watertoring; 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





Geography with Dave

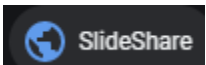
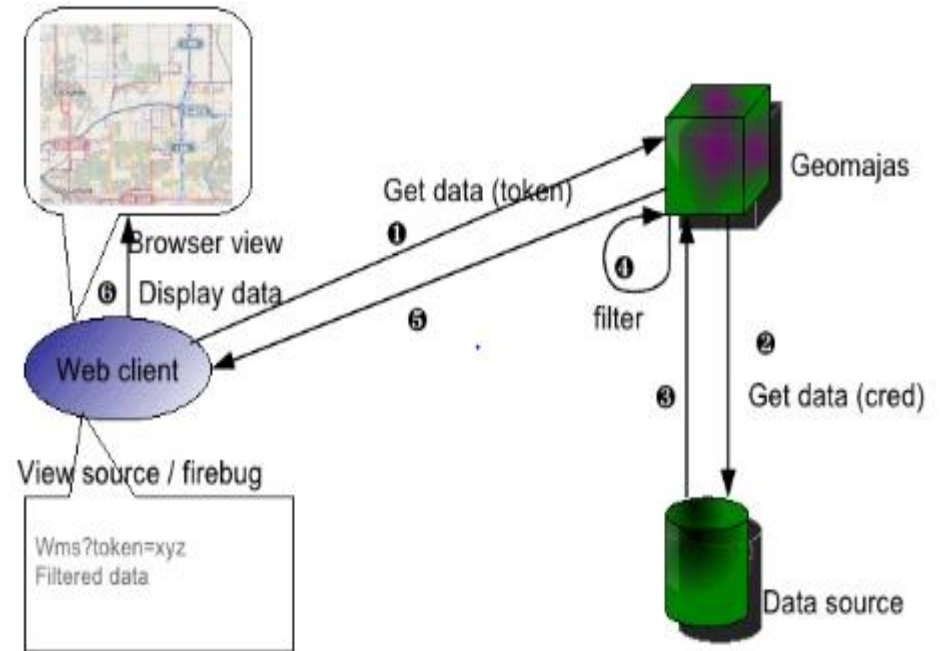
Data sharing refers to GIS systems that allows others to use your (spatial or non-spatial data) data.
E.G. Cloud GIS





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

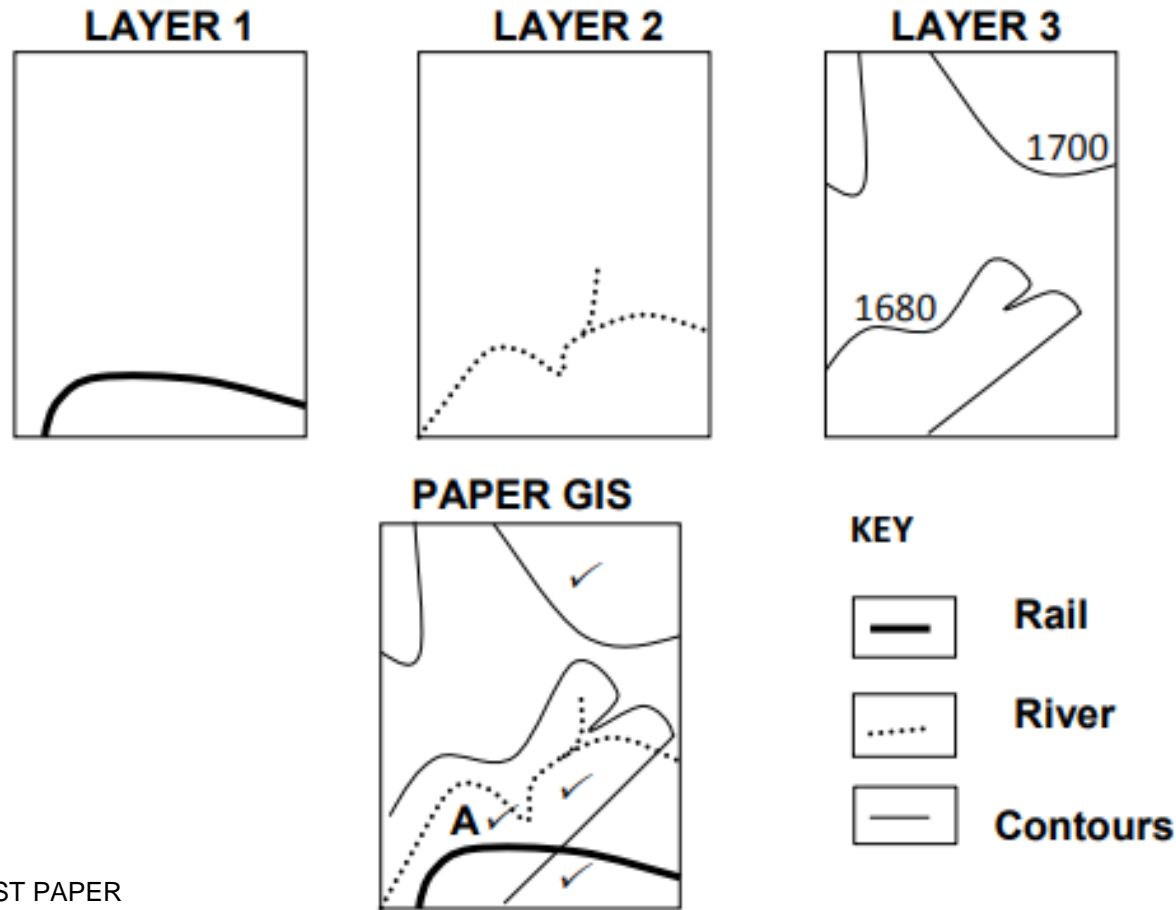
- Rail
- River
- Contour

(3 x 1) (3)

DBE PAST PAPER



. Paper GIS



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