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INTRODUCTION TO OPEN SOURCE GIS & QGIS

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Introduction to GIS

GEOGRAPHIC

implies that locations of the data items are known, or can be calculated, in terms of Geographic coordinates (Latitude, Longitude)

INFORMATION

implies that the data in a GIS are organized to yield useful knowledge, often as colored maps and images, but also as statistical graphics, tables, and various on-screen responses to interactive queries.

SYSTEM

implies that a GIS is made up from several inter-related and linked components with different functions. Thus, GIS have functional capabilities for data capture, input, manipulation, transformation, visualization, combinations, query, analysis, modelling and output.

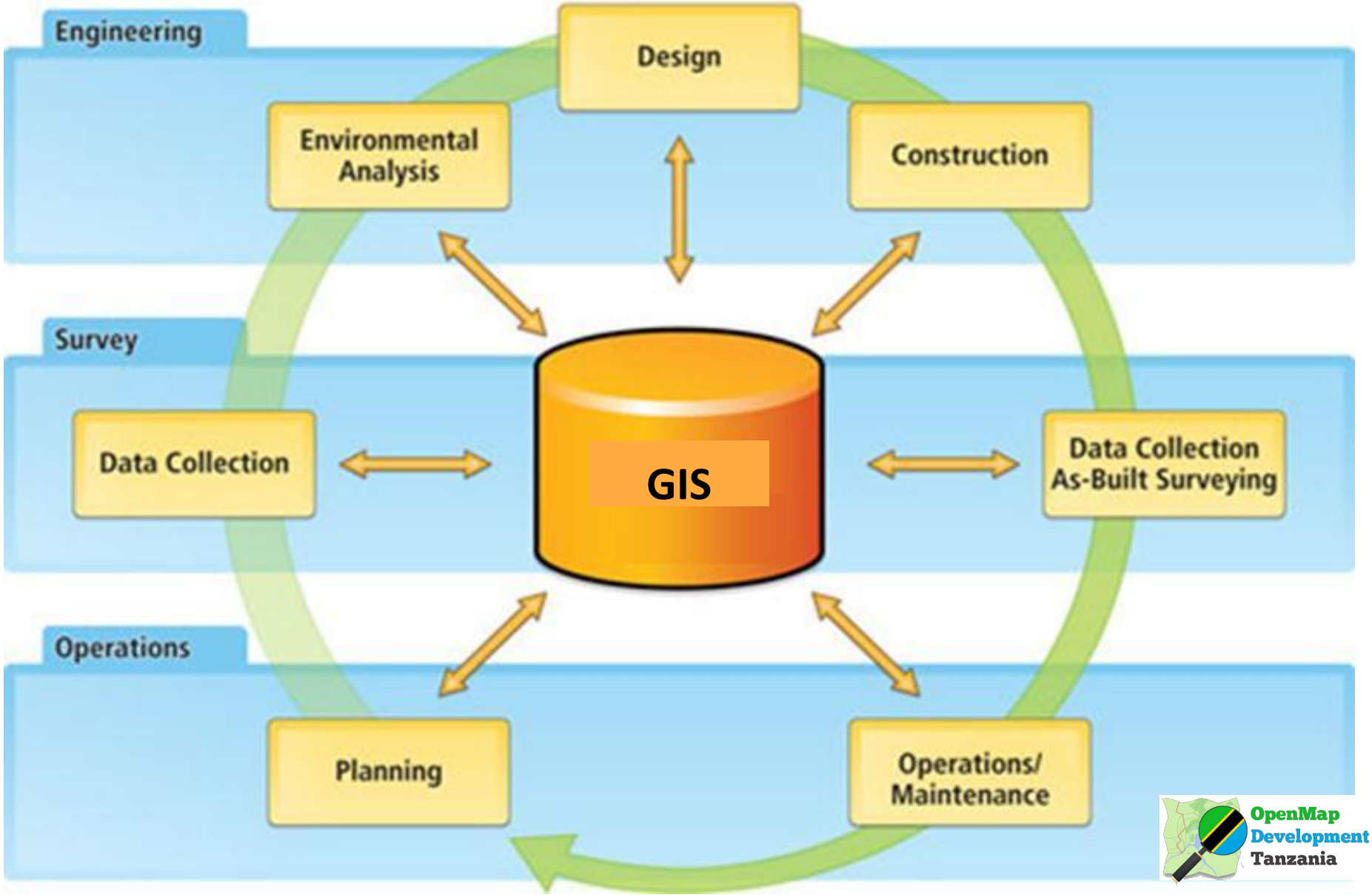
What is GIS?

A geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data.

GIS-as a System

Note:GIS is more than just software. People and methods are combined with geospatial software and tools, to enable spatial analysis, manage large datasets, and display information in a map/graphical form.

Uses of GIS



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With GIS, we can do...

- Mapping
- Environmental Impact Assessment

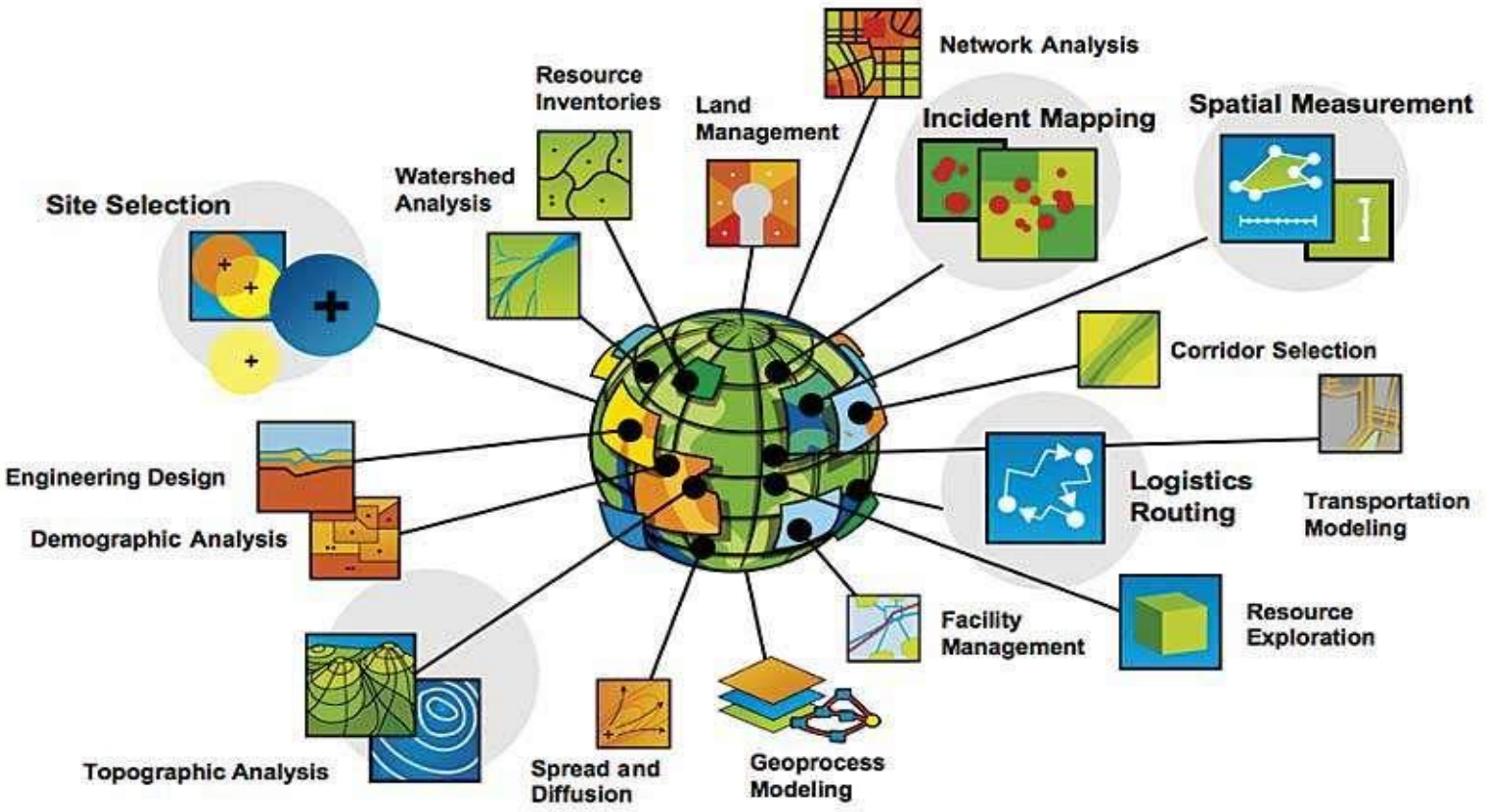
- Accident analysis and hotspots analysis
- Urban planning

- Disaster Management and Mitigation
- Flood Damage Estimate
- Natural Resources Management
- Assets Management and Maintenance
- Planning and Community Development

GIS-Becoming as Instrument of Evolution

GIS Is Being Applied Around the World

Across Many Disciplines, Professions, and Organizations



Becoming an Instrument

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Categories of GIS Softwares

- Proprietary software

- Open source GIS

- Esri produces Arcmap which is a licensed software, that means using it you need to buy and its extensions are sold also.
- OSGEO Foundation-produces Quantum GIS (QGIS) whis non licensed software, it access and usage is for free and its packages (plugins) are for free.

Why use Open Source GIS?

- Marketable skills
- Supported by huge development & support community
- Low start-up costs
- Full stack available to all users
- Works on all major platforms (Mac, Linux, Windows)
- Works with existing GIS files
- And it's FREE!

Quantum GIS Is Open GIS Software

QGIS®
trademark

Installing QGIS

- The program can be shared and installed offline or downloaded online. QGIS website

For Windows

Prior to installation, you need to determine whether or not your computer runs on a 32-bit or 64-bit system.

1. Open the Start Menu, right-click on “Computer”, and select “Properties”.
2. Under “System”, the correct system type will be listed

Install QGIS from Shared file

To install from a shared file:

1. Go to the folder shared with you.
2. Select the appropriate installer folder based on your operating system (Windows 32-bit; Windows 64-bit; or Mac).
3. Open the installer to begin the installation process.

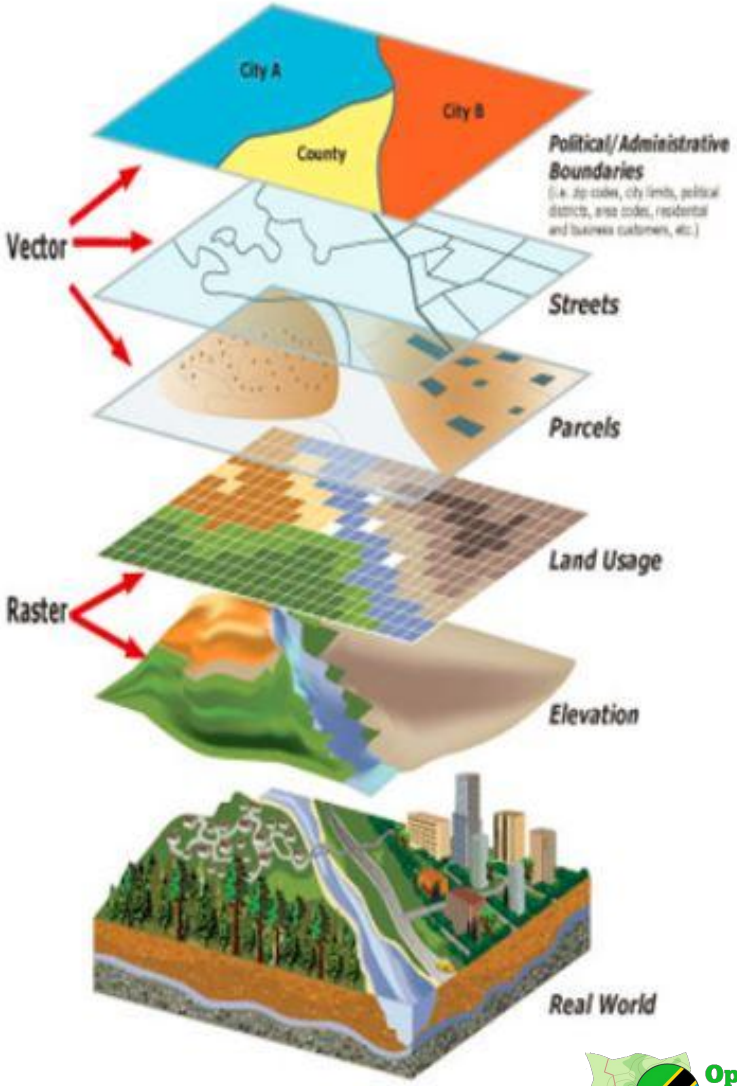
Basic Concepts

Contents:

- Data types
- Data formats
- Map layers
- Qgis Interface
- Qgis Plugins
- Basic Qgis Tools

Data Types

- Two main categories
  - Vector data
  - Raster data



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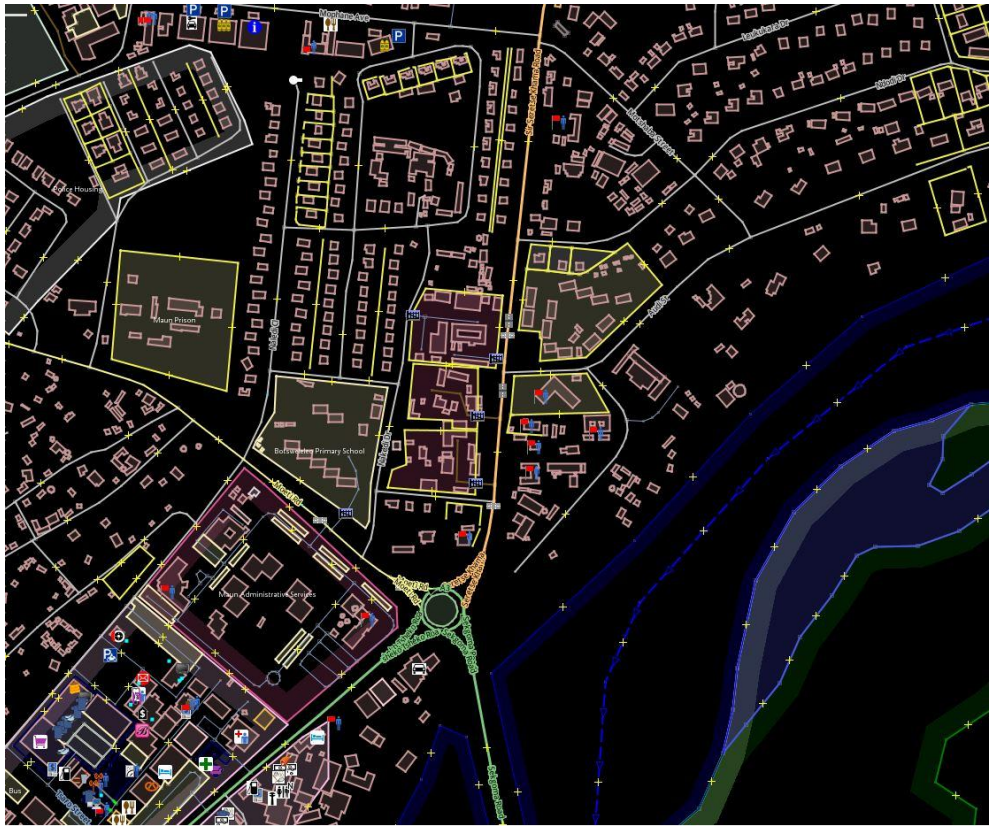
Data types

- Two main categories
  - Vector data
  - Raster data

Data Types: Vector data presentation

- Three ways
  - **Points-**e.g water points
  - **Lines-**e.g roads
  - **polygons-**Building



Data types: Raster presentation

- **Raster data:**
  grids of pixels containing images or data

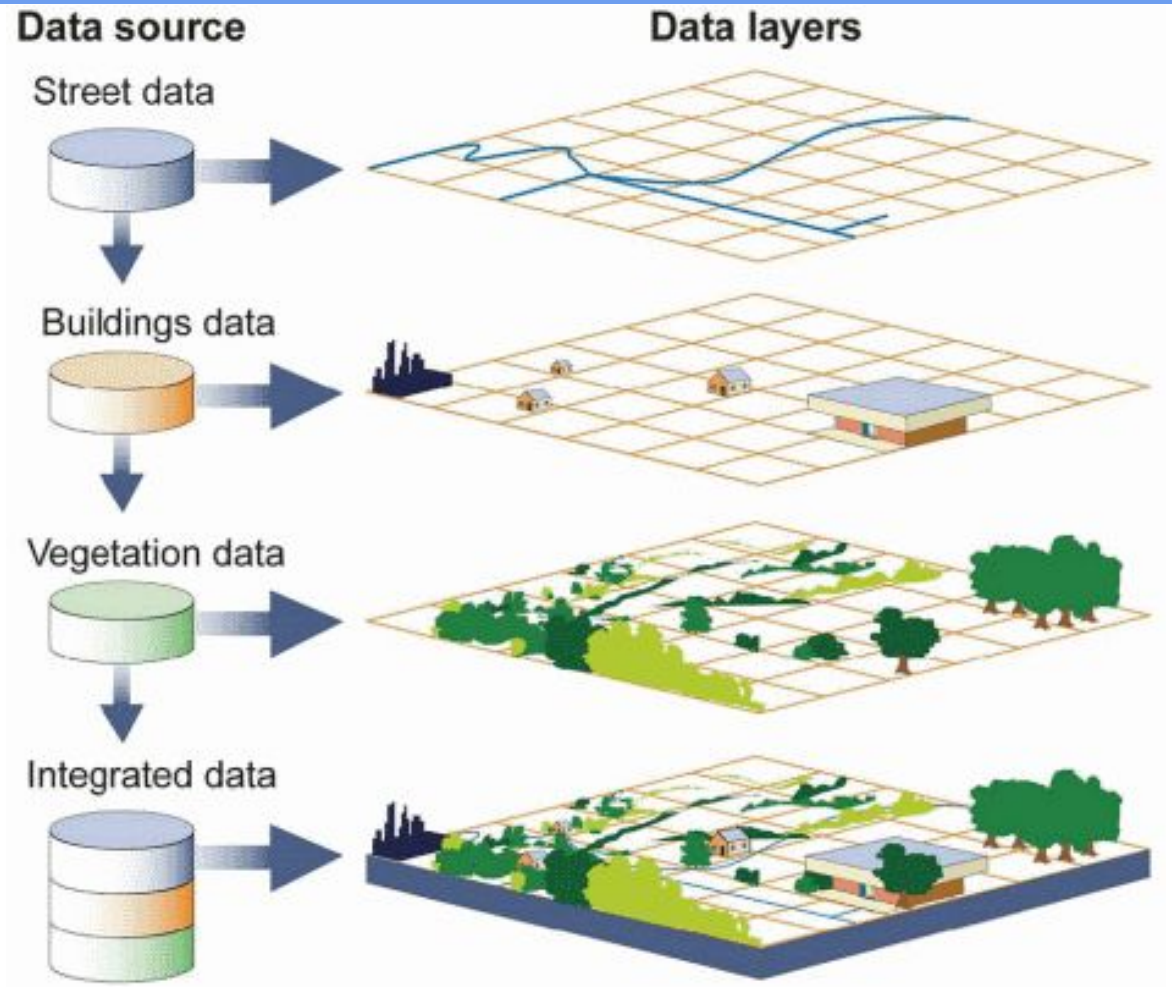
Data formats:Vector data

1. Shapefiles -shp
2. Geojson-Json
3. Geopackage-GPKG
4. GPS Data-GPX
5. Google map Data-KML OR KMZ(zipped)
6. Data in Excel sheet -CSV
7. GeoDataBase-GDB
8. Drawing from Autocad/arccard-dwg
9. Openstreetmap-.osm
10. Comma Separated Value-.csv

Data formats:Raster data

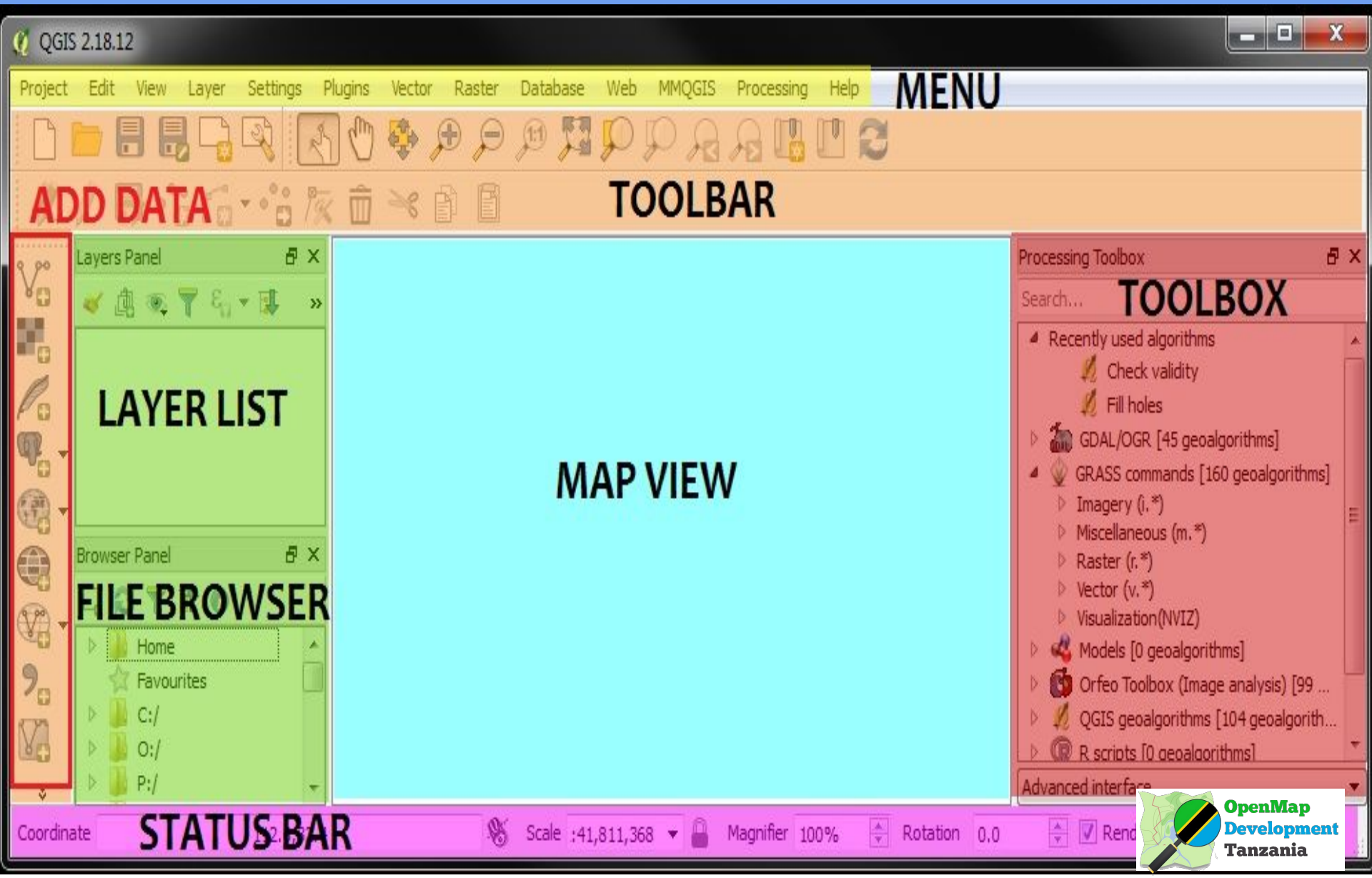
1. Portable Network Graphics-.PNG
2. Joint Photographic Expert Group-.JPEG
3. Enhanced Compressed Wavelet-. ecw
4. Tagged Image File Formats-.TIFF
5. Geo Tagged Image File Formats-.GEOTIFF
6. Digital Elevation Model-.ddf
7. Portable Document Format-.PDF

Map Layers



A map contains a set of layers for a common geographical area.

QGIS Interface



QGIS Interface

1. **MENU BAR** provides access to all the main functions and plugins
2. **TOOLBAR** provides one-click common functions, and task-specific functions
3. **ADD DATA** along the left side is the default location for the Manage Layers Toolbar
4. **LAYER LIST** shows all data layers currently added to the project
5. **FILE BROWSER** browse to geodata files and drag them onto the map canvas to open them
6. **MAP VIEW** provides a dynamic visualization of the active data layers that can be mapped
7. **STATUS BAR** provides some vital information about the current project settings

QGIS Interface

1. **PROJECT** menu is for Opening, Saving, setting Project Properties (such as CRS), launching Print Composer, or saving quick image of map view
2. **EDIT** menu is for adding, modifying, deleting spatial features within an editable data layer
3. **VIEW** menu is for primary Pan, Zoom, Feature Selection, and Toolbar Controls
4. **LAYER** menu is for Adding, Removing, Visibility of data layers, and for changing Layer Projections
5. **SETTINGS** menu controls the basic Project settings, Project projection, Language Locale, & other defaults
6. **PLUGINS** menu lists the installed Plugins where you can Add or Remove Plugins
7. **VECTOR** menu contains Table Manager, Topology Checker, and other useful tools (***NOTE***: *Most of the geoprocessing functions, like Buffer, Point in Polygon, Select by Location, etc have MOVED to the Processing menu*)
8. **RASTER** menu is for Raster processing functions, such as Heatmap and Zonal Stats (more are enabled with GRASS)
9. **DATABASE** menu provides basic import / export operations for databases that have ALREADY been connected using the Manage Layers Add Database buttons.
10. **WEB** menu contains the OpenLayers Plugin, where many basemaps can be added (including OSM, Google, Bing, etc), and also has the TileLayer Plugin
11. **PROCESSING** menu contains the TOOLBOX for running many geoprocessing tasks, the Model Builder for chaining tasks, and controls the additional scripts that can be run in QGIS such as Grass, Python, R, SAGA, etc.

QGIS Plugins

Plugins allow you to extend the functionality of QGIS.

Importance of Qgis Plugins

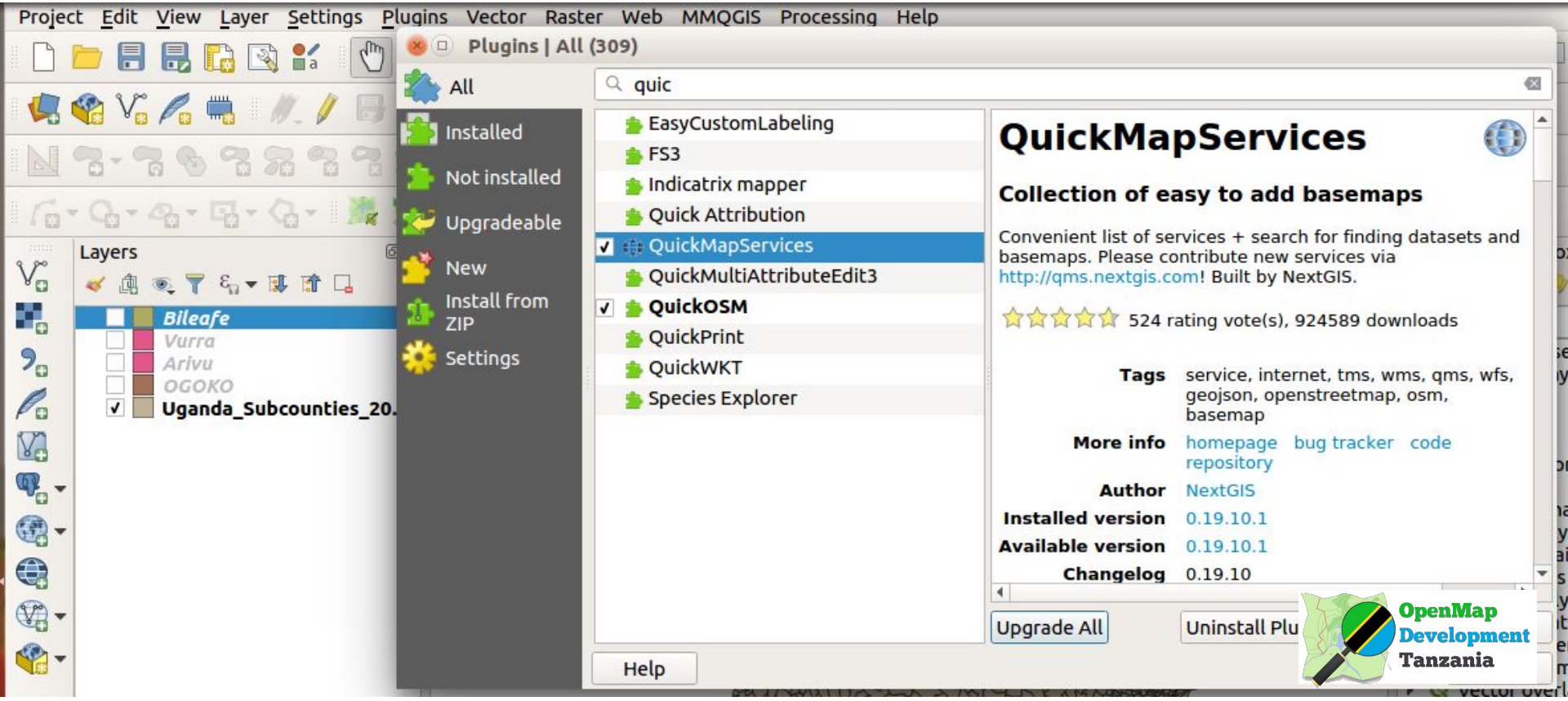
Allows many new features and functions to be easily added to the application

Crucial Plugins

Quickmapservices,QuickOsm,DB Manager, MMQGIS and AutoSaver

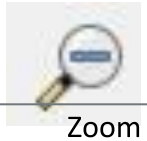
How to Install Plugins

1. To install plugins, click on the menu item Plugins ‣ Manage and Install Plugins. In the dialog that opens, find the QuickMapServices plugin. Then click the “Install Plugin” button.
2. Next, find the QuickOSM plugin. Then click the “Install Plugin” button.



Basic Qgis Tools

- Here's a list of some other commonly used tools. Feel free to play around with them if you like. The important thing for now is to start getting familiar with QGIS.

Pan Map	Drag the map into new location
Zoom In	Zoom in on the map
Zoom Out 	Zoom out on the map
Zoom Full	Zoom so that all layers fit in the map window
Open Attribute Table	Open a layer's attribute table
Select Single Feature	Select a feature in selected layer
	Toggl features i

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