Introduction to QGIS

University of Southampton GeoData Institute

- What is OpenSource GIS?
- What is QGIS?
- The Map Window
- Attribute Tables
- Print Composers
- Plugins
- Geoprocessing
- Finding Help

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What is OpenSource GIS?

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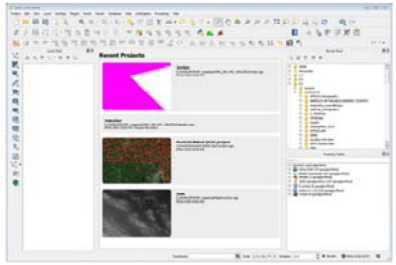
- Free to download from the internet
- Free to distribute
- Capability to develop add-ons/plugins or download from user community that other developers have programmed
- Examples: QGIS, GRASS, MapWindow, GVSIG and many more.

- Most start as GIS data viewers but have progressed over time to become GIS mapping and analysis applications.

OpenSource GIS applications began as free GIS data viewers. Over time these have evolved to become GIS mapping and analysis applications.

What is QGIS?

- QGIS began as a GIS viewer
- Underwent rapid & major development, harnessing capabilities of other platforms and add-ons from user community
- User friendly GUI (graphical user interface)
- Ability to add plugins with functionality
- http://www.qgis.org/

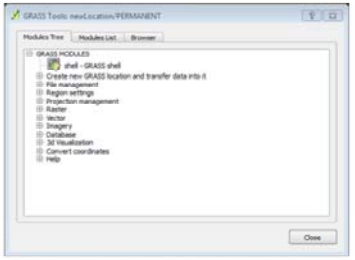


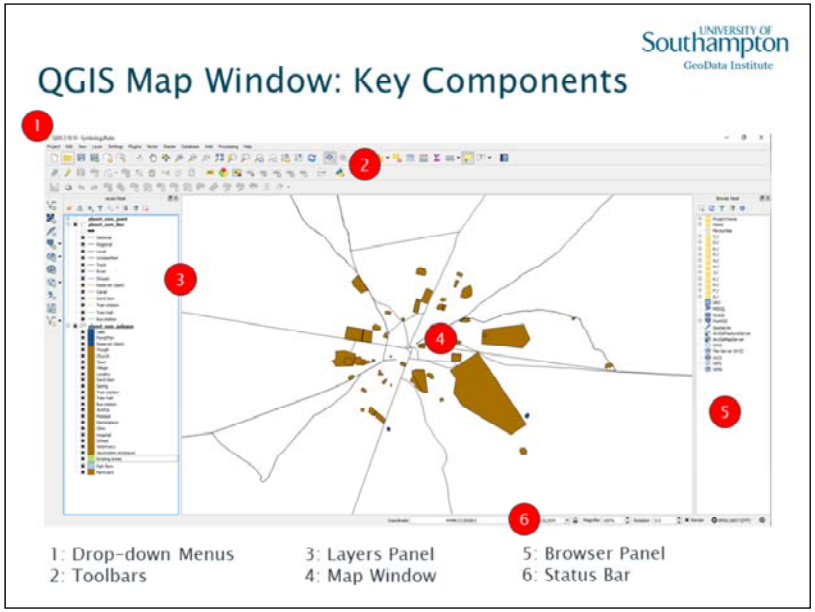
QGIS is a user friendly Open Source Geographic Information System (GIS) licensed under the GNU General Public License. QGIS is an official project of the Open Source Geospatial Foundation (OSGeo). It runs on Linux, Unix, Mac OSX, and Windows and supports numerous vector, raster, and database formats and functionalities.

QGIS can be downloaded from http://www.qgis.org/

What is GRASS?

- A self contained Open Source GIS application
- GUI (Graphical User Interface) not as user friendly as QGIS hence the functionality being available as a plugin for QGIS
- "GRASS is a bit complex" – quote from the GRASS tutorial!



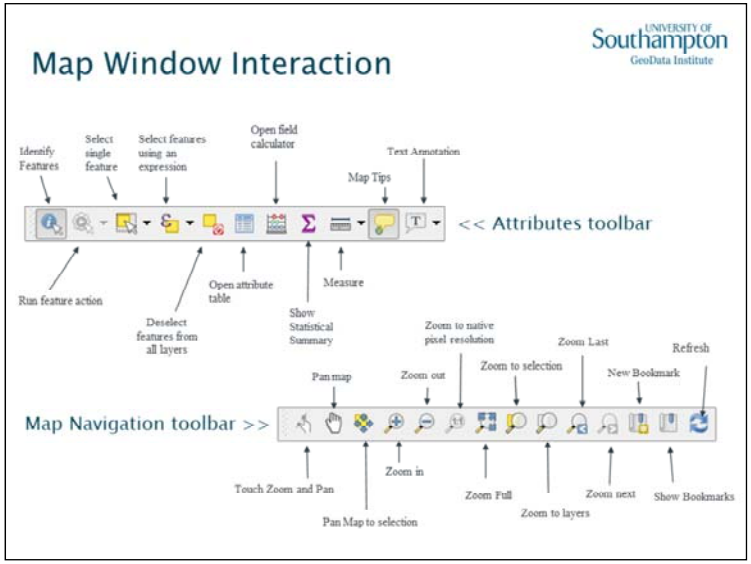


User Interface

The QGIS user interface holds six main components:

1. Drop-down Menu Bar – Access to all QGIS commands, grouped into themed menus.
2. Toolbars – Customise your interface choosing from a very wide range of themed toolbars, giving access to the different areas of QGIS functionality
3. Layers Panel – this shows a list of all layers loaded within the QGIS project along with their data type thumbnail
4. The Map Window – This is your working window. This shows all the spatial data currently loaded in the current QGIS project.
5. Browser Panel – Providing access to your drives and network connections, enabling you to locate data and drag it onto the Map Window
6. Status Bar – this area shows a lot of additional information such as scale, coordinates, and current coordinate system

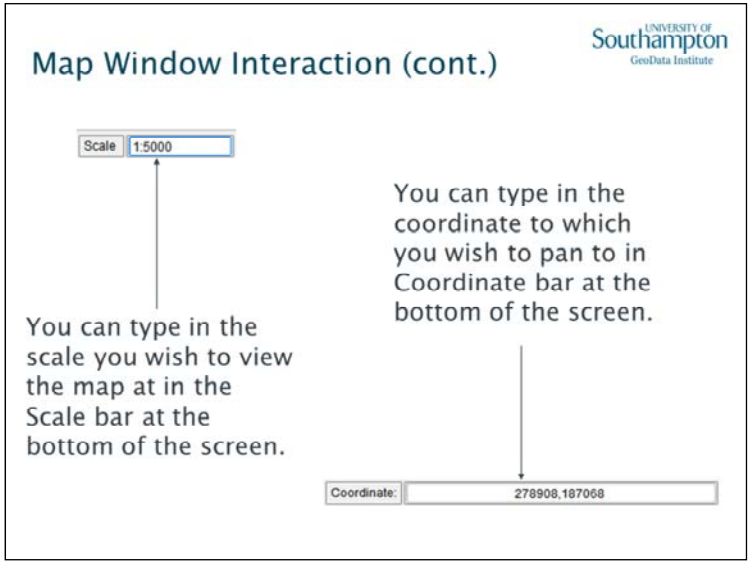
Using ArcMap



The **Tool Bar** contains tools that perform operations that require input from the mouse.

Identify Features	Identify the geographic feature or place you click on.
Select Single Feature	Select a feature by clicking on it.
Unselect all features	Unselect all currently selected features in all layers.
Open Attribute table	Open the attribute table for the selected feature.
Show Statistical Summary	Display descriptive statistics for features
Measure Area	Measure an area
Map Tips	Hover over a feature in the map window to view one of its attributes.
New Bookmark	Create a new bookmark
Show Bookmarks	Display a list of all bookmarks.
Text Annotation	Add an annotation label to the map.
Pan Map	Pan the map.
Zoom in	Zoom in to the map
Zoom out	Zoom out of the map.

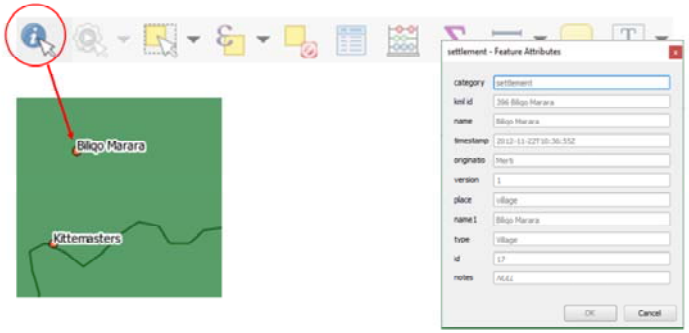
Zoom to native pixel resolution currently selected raster.	Zooms to the native pixel resolution for the
Zoom Full	Zooms to the full extent of all datasets
Zoom to selection selected features	Zooms to the full extent of the currently
Zoom to layers selected layer	Zooms to the full extent of the currently
Zoom to last	Zooms to the last extent
Zoom to next	Zooms to the next extent
Refresh	Re-draws the map window



Toggle between displaying the map coordinates of the cursor and the coordinates of the extents of the map window by clicking the icon to the left of the 'Coordinates' or 'Extents' text in the status bar

Identifying Features

- Use the Identify tool to display all the attributes of the feature
- It provides a simple way of retrieving attribute data from map features



To view the attribute information stored about an item

1. Select that layer in the Layer list
2. Select the Identify Features tool
3. Click the mouse pointer over the map feature you want to identify.

A new window will open showing you the attributes for the feature clicked on

To switch between identifying from the Active Layer and all layers alter the setting under the 'Map Tools' tab in *Settings* > *Options*

The ability to use the identify tool on layers may also be disabled on a layer by layer basis in the Project Properties (*Settings* > *Project Properties…*)

Statistics

- The base QGIS install provides a handy descriptive statistics panel.
- The icon is found in the Attributes toolbar

Spatial Bookmarks

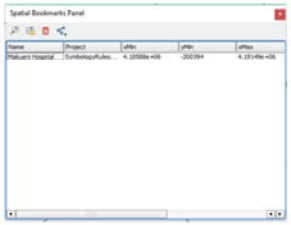
- Record a particular geographic extent that you wish to save and return to later
- For example:
  - create a spatial bookmark that identifies a study area and give it a name
  - Return to the study area by clicking the name in the bookmark list
  - Any bookmark you create will be available in all your QGIS project windows.

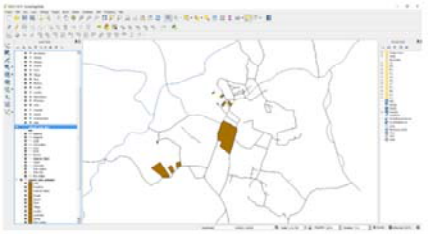
A spatial bookmark identifies a particular geographic extent that you want to save and return to it later. For example, you might create a spatial bookmark that identifies a study area. As you pan and zoom around your map, you can easily return to the study area by accessing the bookmark.

You can create a spatial bookmark at any time. As a shortcut, you can also create bookmarks when you find and identify map features.

Spatial Bookmarks

- To create a new bookmark, either click on the bookmark button  , or go to **View> New Bookmark**..., or press **Ctrl+B**

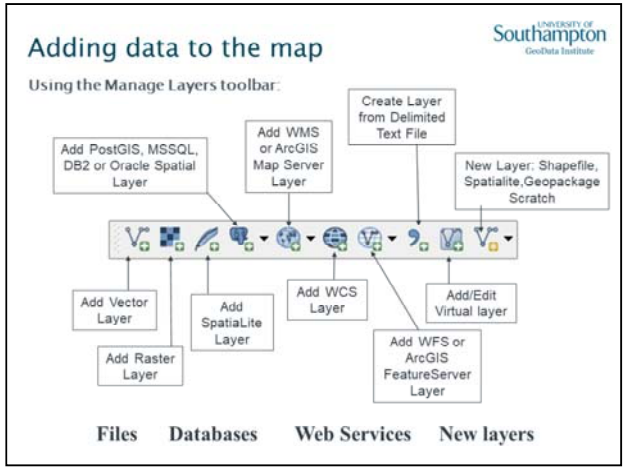




Spatial Bookmarks are defined within the *Bookmarks… Create* menu.

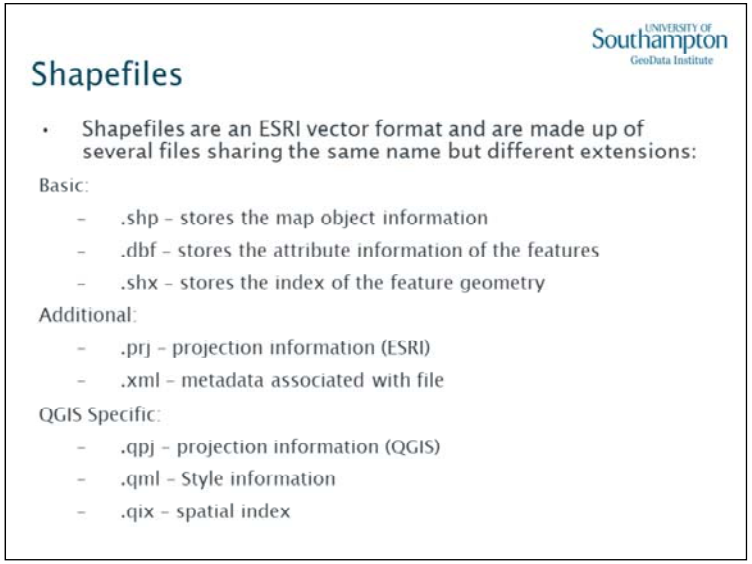
The bookmarks can be given a name as shown in the above slide.

Bookmarks are stored independently from projects in a file in your user directory. It is possible to share them, but not particularly straightforward



Manage Layers toolbar

Add Vector Layer	Add a vector dataset
Add Raster Layer	Add a raster dataset
Add SpatiaLite Layer	Connect to and add a SpatiaLite dataset
Add PostGIS Layer	Connect to and add a PostGIS dataset
Add MSSQL Spatial Layer	Connect to and add a MSSQL spatial dataset
Add Oracle Spatial Layer	Connect to and add an Oracle spatial dataset
Add DB2 Layer	Connect to and add a DB2 Layer
Add WMS Layer (WM(T)S: Web Map (Tile) Service)	Create a new WMS connection
Add WCS Layer (WCS: Web Coverage Service)	Connect to and add a new WCS Layer
Add WFS Layer (WFS: Web Feature Service)	Connect to and add a new WFS Layer
Create Layer from Delimited Text File	Create a layer from a delimited text file
New Layer	Create a new layer; either Shapefile, Spatialite dataset or Scratch layer (temporary layer deleted on programme closure)



Shapefiles

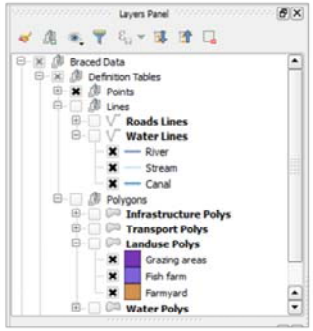
Shapefiles are ESRI vector format and are made up of several components.

QGIS uses shapefiles as a standard vector file format.

NB If you move a shapefile to a different location on your computer (or a different computer), you must move all of the associated files. Otherwise the layer will not open, or the full information may not be available.

Map Layers & the Layers Panel

- A layer is a set of features of the same object type (e.g Point, Polyline or Polygon)
- A layer represents a single dataset
- Group folders allow you to organise layers appropriately

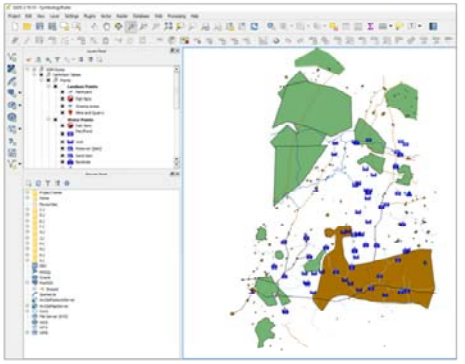


Map Layers

Remembering the principle of layers within the GIS from the Introduction to GIS presentation – it is important to remember to position layers appropriately to make the layers visible and effective.

Map Layers & the Layers Panel

- You can toggle visibility of layers
- Layers appear in their drawing order. i.e. the layer at the top of the list will be the upper-most layer on the map.
- Right-click on a layer name, to reveal many more options.



Layers Window

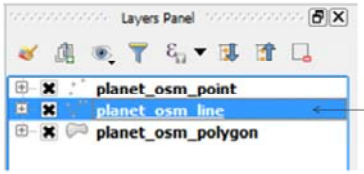
The layers window shows the drawing order of all the layers in the map document.

The layers can be moved up and down the Layer window to change the drawing order. To do this, 'click and hold' on the layer name in the layer window and then drag the layer to its correct position.

Right clicking on a layer name will give you a number of interaction options with that layer, such as 'zoom to layer extent', 'Remove', 'Set layer CRS', 'Open Attribute Table' and 'Properties'.

Setting the Active Layer

- Before attempting to work with a layer make sure that it is highlighted in the Layers window – it is then called the Active layer

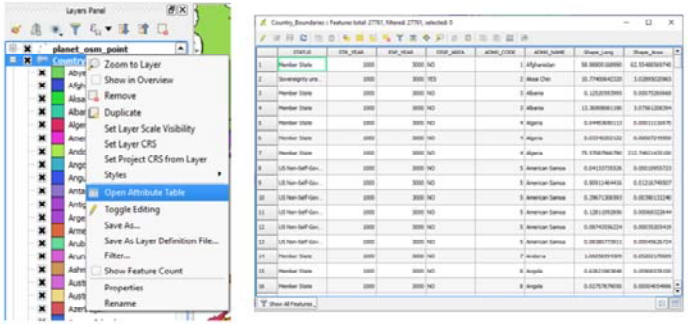


To set which layer you want to select from, select it in the Layers window.

Different layers can have active selections at the same time.

Working with Tables

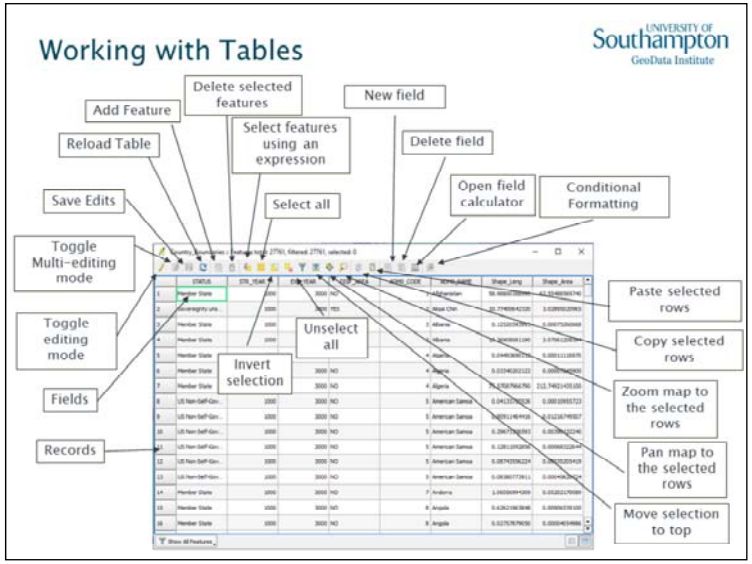
- Window for displaying tabular data (like a spreadsheet)
- Rows & columns referred to as **records** & **fields**
- Attribute tables contain information about the layer's features



Working with Tables

To view the attribute table for a layer, right click on the layer in the layer window > Open attribute table.

The attribute table will show you all the data associated with your spatial data.

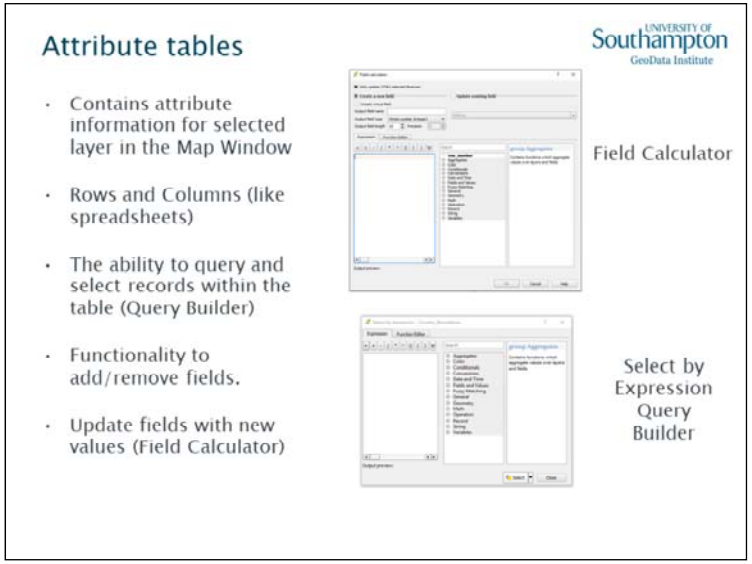


Working with Tables

When opened the attribute table shows all of the attribute information for the selected layer in a similar way to a spreadsheet with rows and columns.

Fields can be added and removed.

The search functionality in the attribute table allows you to search the records in the attribute table by different fields.



Attribute tables

Attribute tables can be accessed by right clicking on layers within the Legend list and clicking "Open Attribute Table". Attribute tables can also be accessed via the button on the toolbar.

When opened the attribute table shows all of the attribute information for the selected layer in a similar way to a spreadsheet with rows and columns.

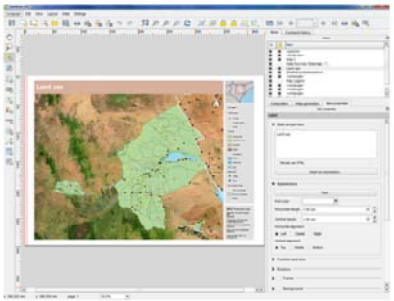
Fields can be added and removed

Query builder allows users to select records dependant on specified criteria.

Field Calculator allows users to update columns with specified information. Field Calculations can be applied to selections.

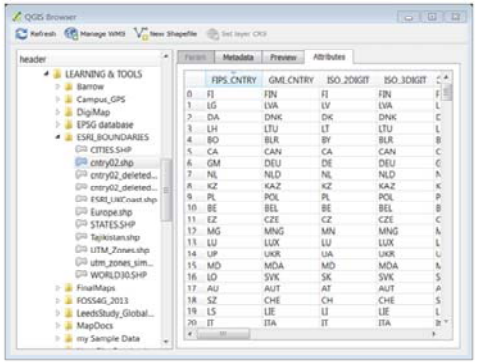
Attribute tables are covered in more detail later in the course materials

The Print Composer



- The print composer allows you to set up your map ready for printing.
- Maps can be exported directly to PDF, SVG and any major image file type such as PNG, JPEG, TIFF, BMP as well as printed.

QGIS Browser



A 'GIS aware' Windows Explorer built into QGIS

- Review data properties and metadata
- Preview your datasets
- View attributes
- Add data to map window

! Access the Browser as a standalone application or a side-panel within the QGIS map window

The QGIS Browser allows you to navigate your file system, to browse for and add GIS data to your Project. You can preview your datasets as well as review properties and metadata.

You can access the browser in two ways:
1. As a standalone application
2. As a side-panel within your map window

1. The standalone application

The standalone Browser enables you to organise and manage you data, without having to start a QGIS map project. Navigating your file system follows the same logic as Windows Explorer, in terms of storage drives and expandable folders, however the Browser does not display file types that are incompatible with QGIS, thus aiding the process of searching for data. Highlighting a single dataset, you will be able to review that data in 3 or 4 different ways depending on the type of data. The Param tab gives details of connection-based datasets, e.g. MSSQL Spatial or PostGIS. The Metadata tab provides general information about the data. The Preview tab will provide a visual impression of the data, without having to import it into a QGIS map window (good for rapidly scanning multiple datasets). The Attributes tab presents the attribute values embedded in the data.

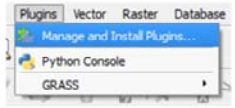
2. Side-panel Browser within your map window

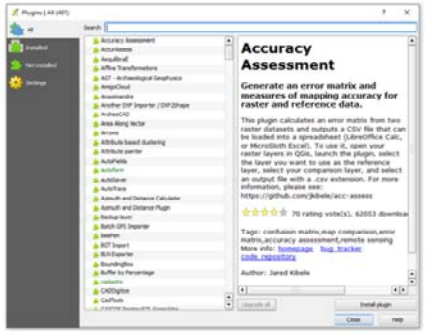
The side panel Browser does not provide the previewing functionality of the standalone Browser. It is intended to allow easy navigation of your file system

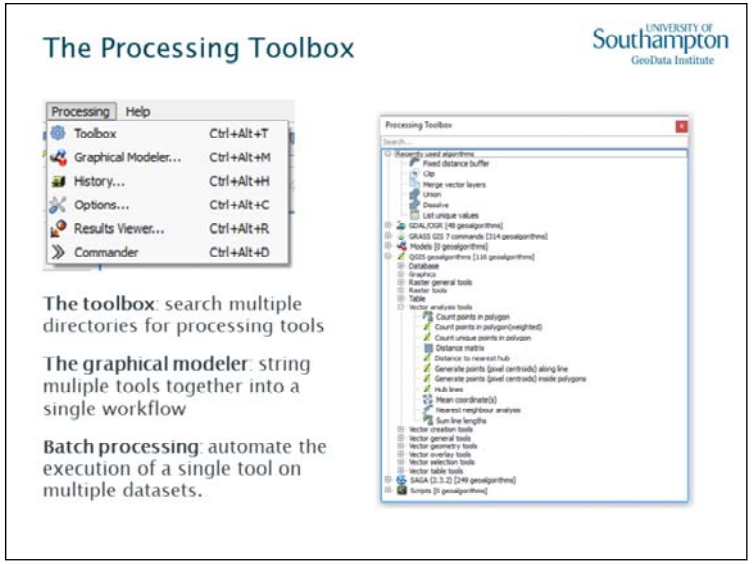
from within a map project window. It will display GIS compatible data and allow you to intuitively drag-and-drop the data into your map. You can filter down by file type or file name by using the input text box at the top of the Browser panel.

Plug-ins

- There are Plug-ins within QGIS that allow users to further improve the functionality of the software,
- For developers there is also the option to create Plug-ins and add scripts to allow further functionality within QGIS.







QGIS Geoprocessing Framework

There are four basic elements of the geoprocessing user interface, which are used to run algorithms (processing tools) for different purposes. Choosing one tool or another will depend on the kind of analysis that is to be performed and the particular characteristics of each user and project. All of them (except for the batch processing interface, which is called from the toolbox, as we will see) can be accessed from the Processing drop-down menu.

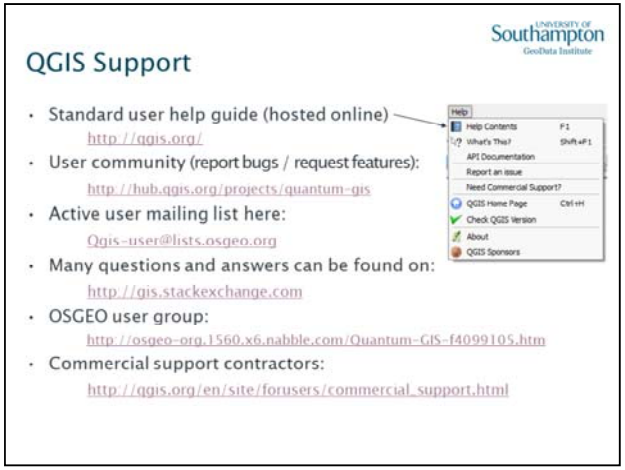
The toolbox: The main element of the GUI, it is used to execute a single processing tool or run a batch process based on that tool.

The graphical modeler: Several tools can be combined graphically using the modeler to define a workflow, creating a single process that involves several sub-processes.

The history manager: All actions performed using any of the aforementioned elements are stored in a history file and can be later easily reproduced using the history manager. This can be useful in the production of metadata – an 'audit trail' describing the data processing that has taken place.

The batch processing interface: This interface allows you to execute batch processes and automate the execution of a single tool on multiple datasets.

(Source: http://docs.qgis.org/2.2/en/docs/user_manual/)



Finding Help

The links above represent current support options available to the QGIS user, from simple (free) to fee-based

Some of these links are accessible from the Help menu within QGIS