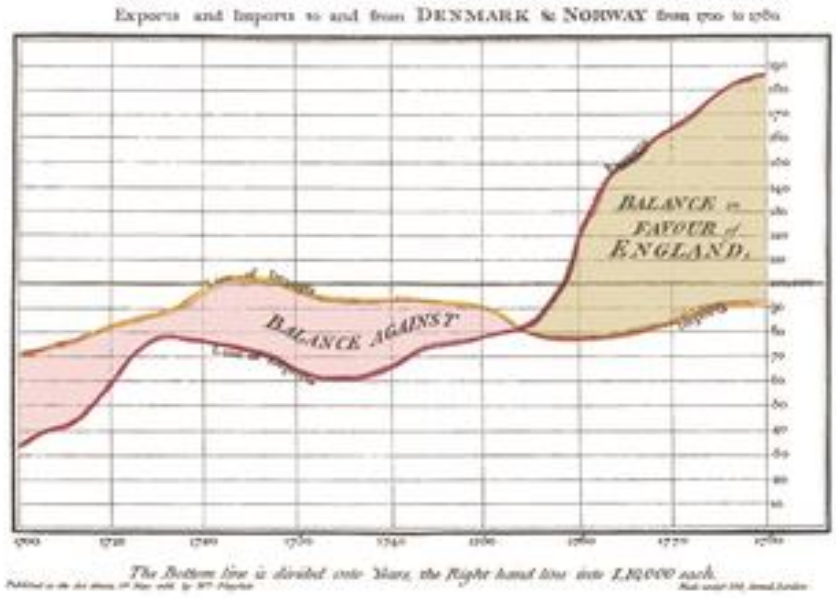
A brief history of graphs.

Data is presented in graphs as information is easier to retain visually than as numbers or tables. This has been recognised for over 200 years. William Playfair, who is acknowledged as the creator of the bar and pie graphs in 1786 and 1801, stated that

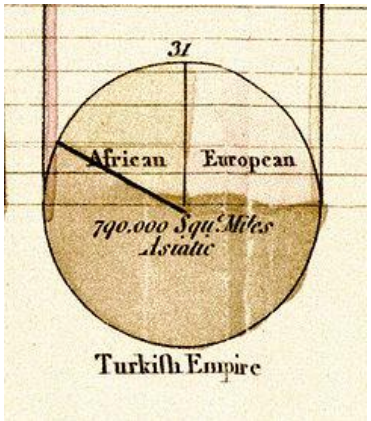
> *'Information, that is imperfectly acquired, is generally as imperfectly retained; and a man who has carefully investigated a printed table, finds, when done, that he has only a very faint and partial idea of what he has read; and like a figure imprinted on sand, is soon totally erased and defaced.'* (Playfair, The Commercial and Political Atlas, 1786).

Examples of Playfair's graphs:

Playfair's trade-balance time-series chart (Playfair, Commercial and Political Atlas, 1786)

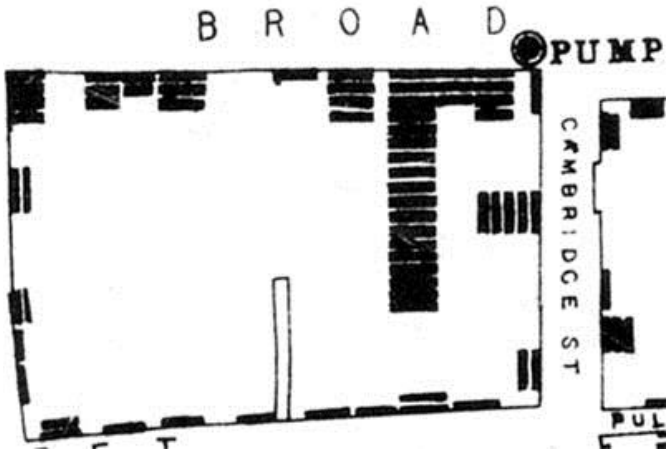


Proportions of the Turkish Empire located in Asia, Europe and Africa before 1789 (Playfair, Statistical Breviary, 1801)

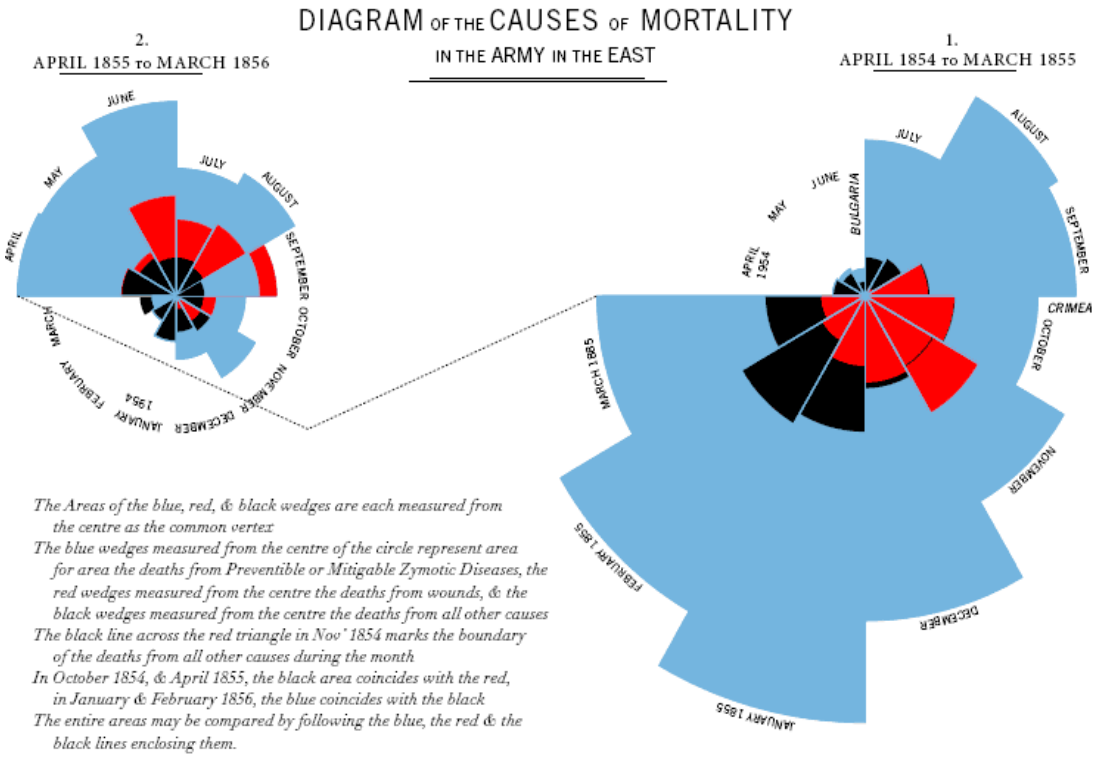


Two early graphics that were the basis of policy change were John Snow's 1854 'Broad Street Map' which was used to locate the origin (the Board Street Pump) of an outbreak of cholera in London and the 1858 'Rose' of Florence Nightingale, a diagram of the causes of death in the Crimean war that showed that most soldiers were dying from preventable diseases not war injuries. Small (1998) suggests that while Florence Nightingale was not the first person to use graphics to present statistics '*she may have been the first to use them for persuading people of the need for change*'.

John Snow's Map of Board Street Cholera deaths:



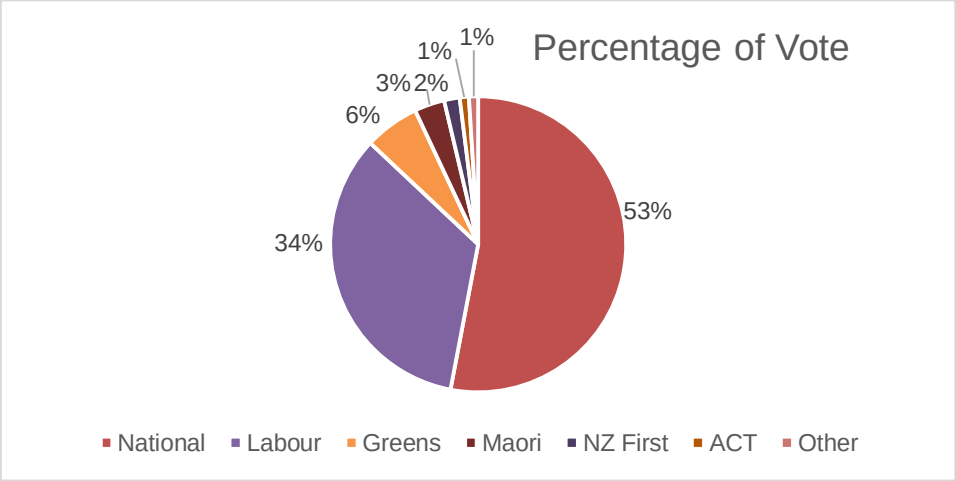
Florence Nightingale's Rose (reproduced from Small, 1988)



A short video about Nightingale's Rose is available at http://www.bbc.co.uk/programmes/p00chk4w. Today, many graphs are available as dynamic visualisations (able to be played over time) and a dynamic version of Nightingales' Rose is available at http://understandinguncertainty.org/nightingale.

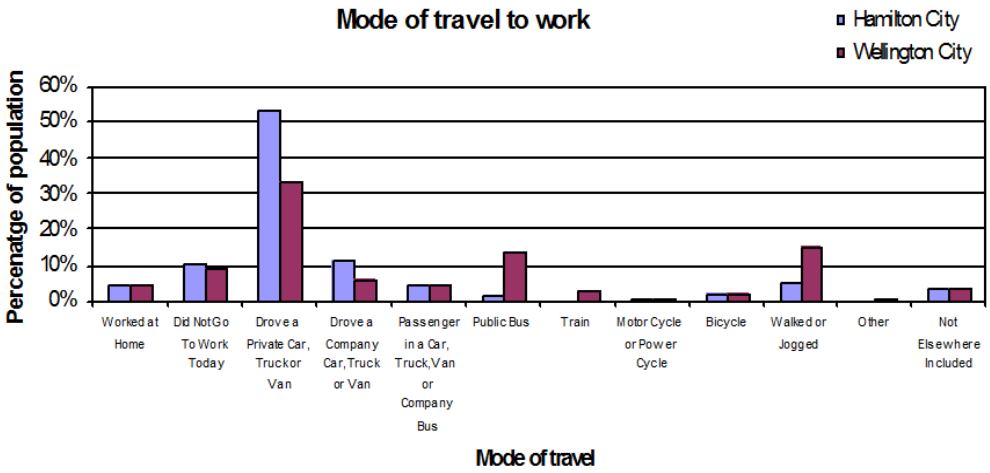
Many of the types of graphs shown above are still in use today and can be created in Excel. For example, Pie graphs are regularly used to look at the likely proportions of votes from opinion poll data.

Example: February 17, 2006 TVNZ Colmar Brunton Poll



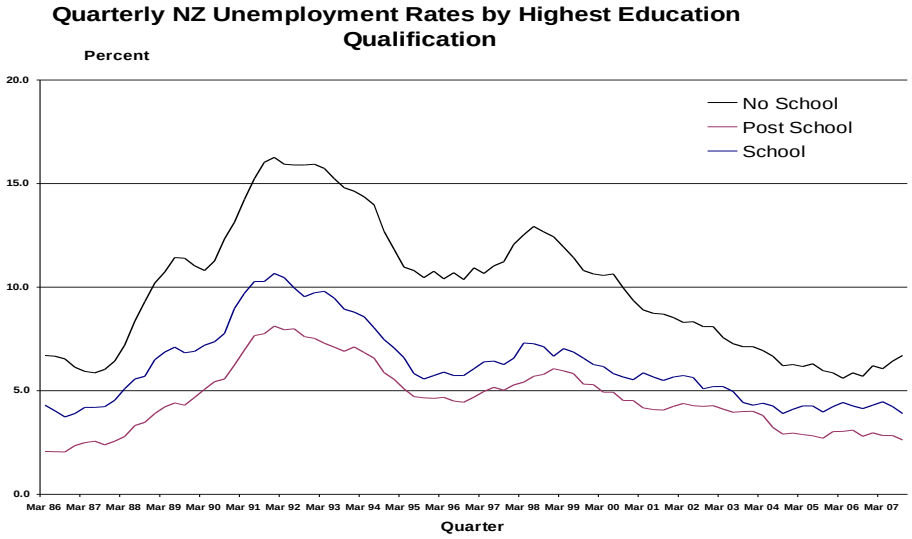
Bar charts (histograms and box plots) are still routinely used to compare data distributions for different groups as in the following example that looks at different travel preferences in two New Zealand cities.

Example: (Statistics New Zealand, Census 2006)

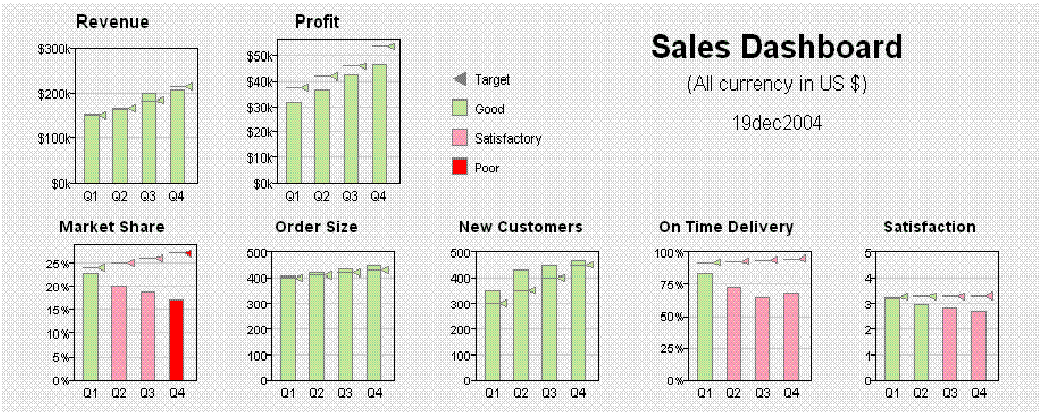


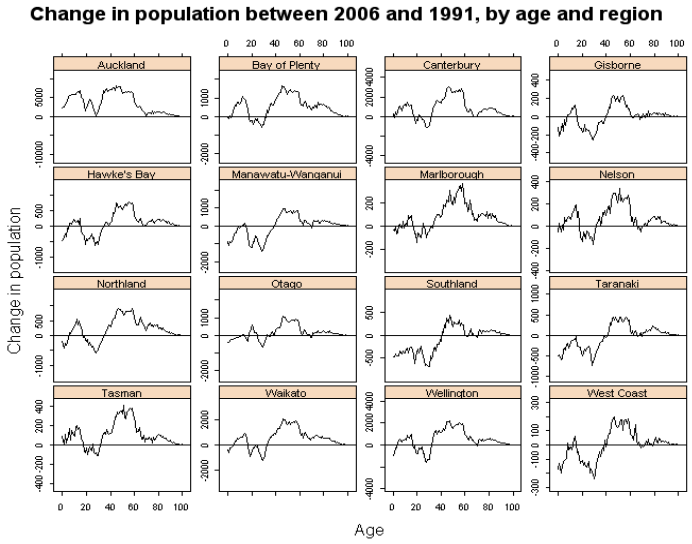
A particular type of line graph, a time series, is a simple but powerful graph often used for looking at trends for different groups across time, as in the example below that shows unemployment rates by highest educational qualification in New Zealand.

Example: Statistics New Zealand, Household Employment Survey



Simple graphs that can be created in Excel are sometimes displayed with multiple graphs as in the following examples. Dashboards show many indicators simultaneously. Tableaus show the same indicator in multiple groups.



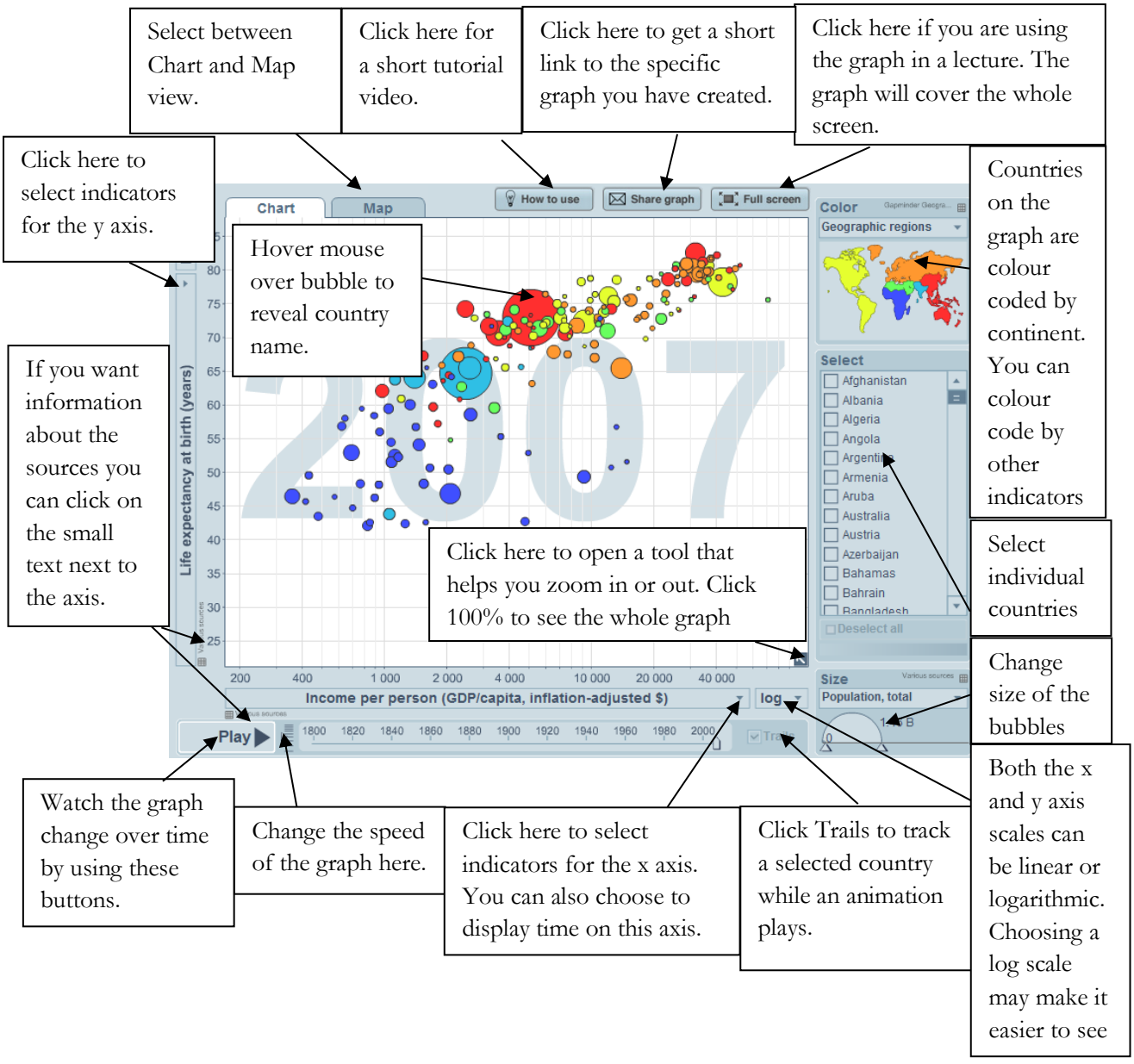


Source: Statistics New Zealand

Many recent graphs that extend those that can be created in Excel have dynamic (play over time) and interactive features. Dynamic population pyramids and other interactive graphs are now routinely used by many national statistics offices (e.g. http://www.stats.govt.nz/tools_and_services/interactive-pop-pyramid.aspx an http://www.china-profile.com/data/ani_ceu_pop.htm).

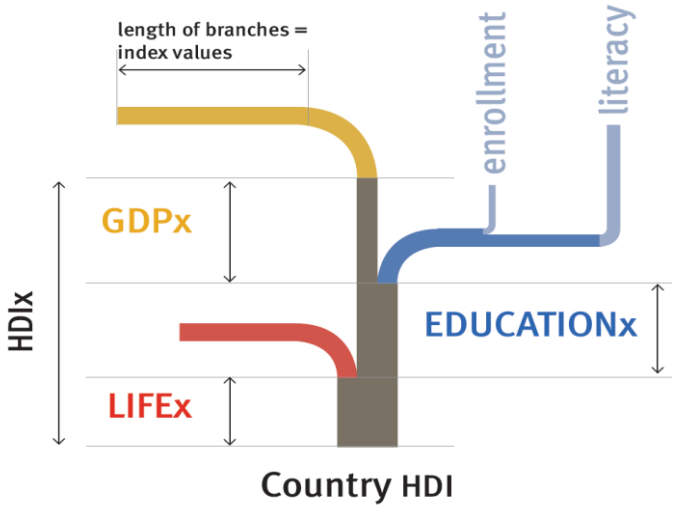
Possibly the best known dynamic and interactive graph is Hans Rosling's Gapminder (www.gapminder.org) that uses bubble graphs to display five variables simultaneously: region (colour), relative population size of a country (size of bubble), two other variables chosen from a set of OECD indicators (on the vertical and horizontal axes) and time (as the dynamic variable). Some of the interactive features of Gapminder are shown below.

Rosling (2010) suggested that the exploration of data using these graphs raises new policy questions and also challenges old 'myths'.



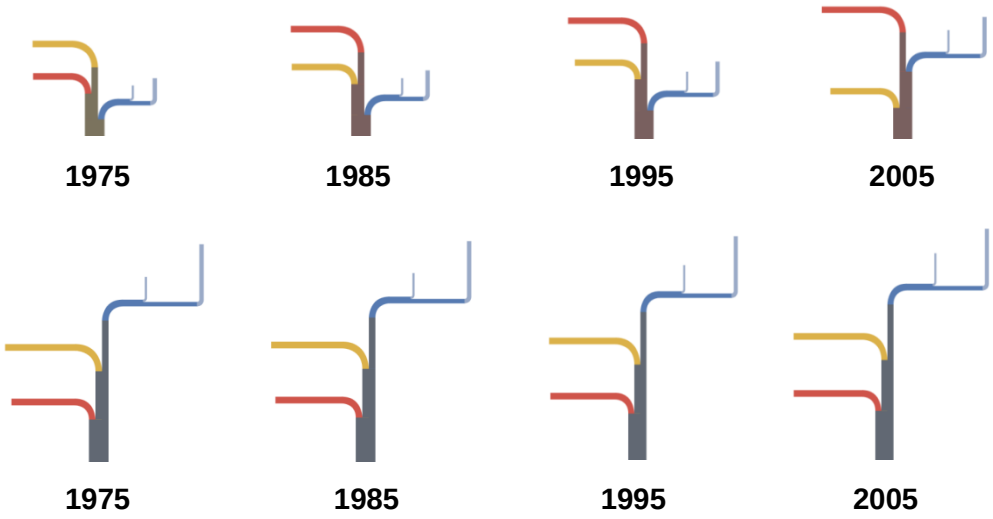
Even with static (non-moving graphs), creativity is a feature of many modern graphics, although many of these require more sophisticated graphing tools than Excel to create. Examples include Hidaglo's tubular 'Development Tree' displaying the Human Development Index (HDI) for any country (Hidaglo, 2010).

Hidaglo's Tubular tree representation of the Human Development Index (HDI)



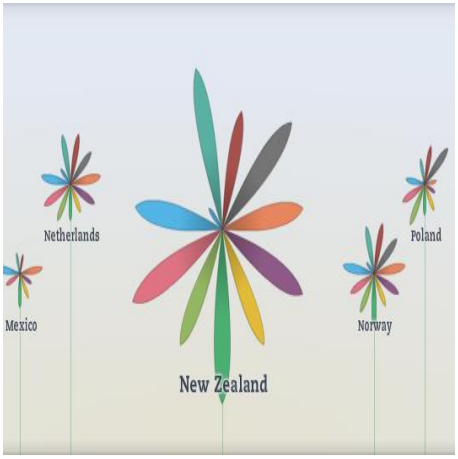
The HDI representation for any country can be created at (http://chidalgo.com/Gallery/HDR2010/DevelopmentTreeApplications.zip) as in the example below.

Hidaglo's HDI, 1975-2005 for Egypt (top) and New Zealand (bottom)

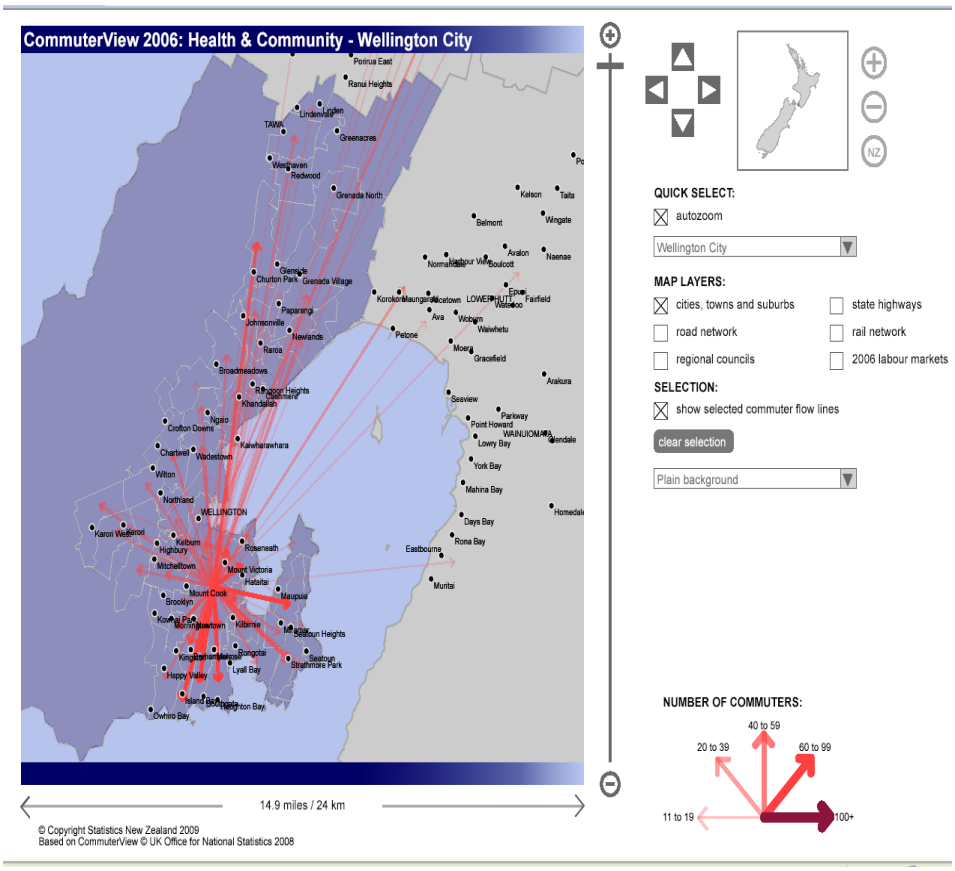


Another example is the Organization for Economic Co-operation and Development (OECD) 'floral' representation (the Better Life Index) that allows for quick comparisons between countries on a set of socio-economic indicators http://www.oecdbetterlifeindex.org/.

Example: New Zealand's Better Life Index (2011)



The use of graphs and the display of geographic data in maps is increasing rapidly, in particular in the media, as more and bigger datasets become available. The following example shows how a large data set of people's movement from work to home (commuting patterns) in New Zealand can be displayed effectively on a map.



Graphs and maps are now being integrated with using Geographic Information Systems (GIS) software. However, as more and more graphs are produced we need to be sure that they are based on good, rather than bad, data and that the graph accurately represents the data.