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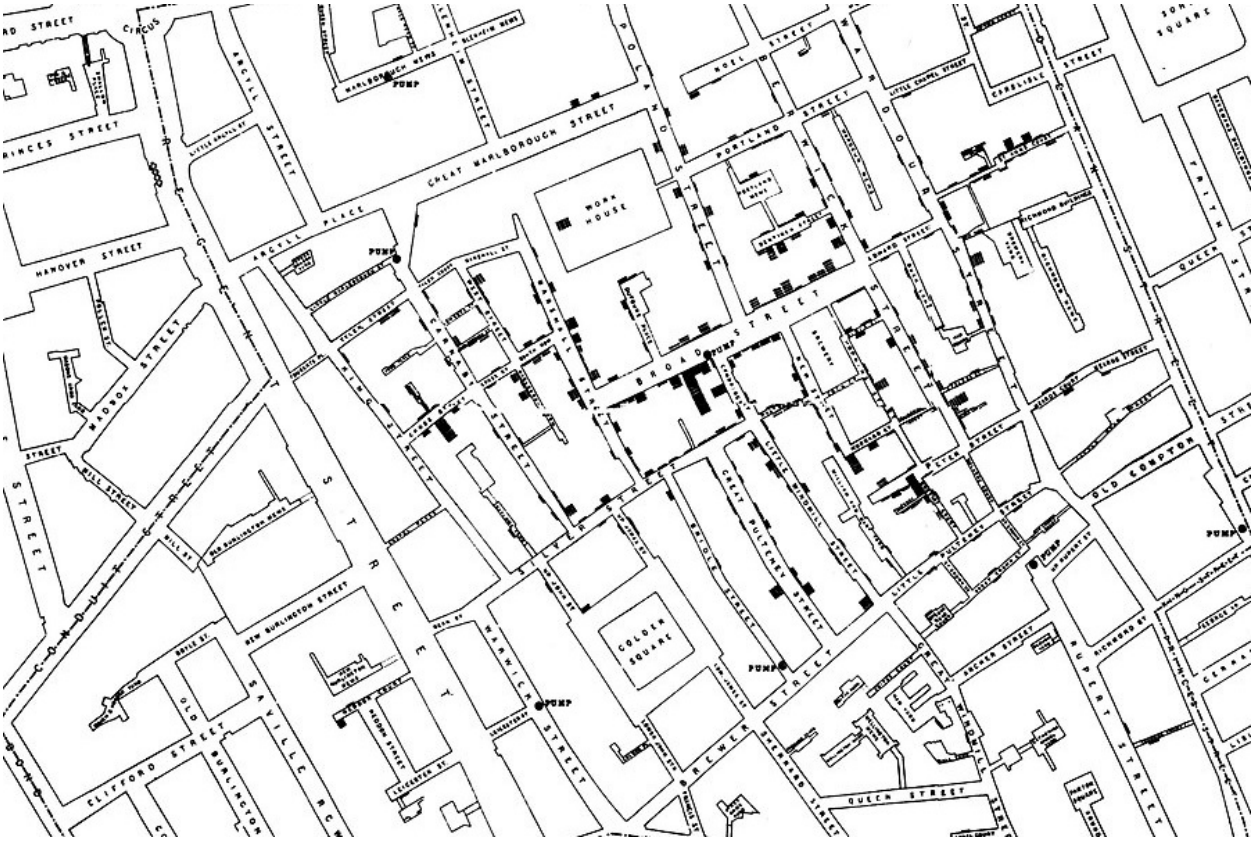

[Original map by John Snow showing the clusters of cholera cases in the London epidemic of 1854]

A picture is worth a thousand words

This old saying also applies to science and citizen science, where data visualisation can help us to explore and understand data and to communicate results. Visualisations come in many forms – hand-drawn scribbles, complex digital imagery, or multidimensional, interactive applications. Visualising data has become its own field of expertise that requires both artistic and scientific skill.

Have you ever drawn a map to explain a route to someone, taken note of penalty points in a game or jotted an excitement timeline while watching a movie? Think about when you last visualised data or information – how did you do it, and what did you use it for?

Some data are relatively stable or taken at one point in time – these are static (e.g., the size of a population). Other data change over time – these are dynamic data (e.g. temperature). They usually describe one changing aspect, also called a variable. Some data show the relationship between two or more variables.

Two common types of data visualisations are:

+ **Time-series graphs:** These usually show how a variable changes over time. The data on these graphs can be historical from observed and measured data, or future projections based on simulations. Historical time series graphs can also be based on simulations.
+ **Maps:** These show information and data in relation to a specified system of reference. Two or more variables are plotted against each other. Standard maps combine geological and infrastructure information (such as topography and street maps) with a geographic location; but you can map any information that has a location based on the geographic coordinate system (latitudes and longitudes). There are other “maps” based on different reference systems (like a [weekly mood map](http://devplanner.com/DevPlannerHelp/mood-color.htm), or even [mapping a person’s mental state](https://en.wikipedia.org/wiki/File:Challenge_vs_skill.svg) while performing an activity related to a perceived challenge and the person’s skill level).

A famous map often used to illustrate how maps can give insights from data is John Snow’s map of cholera cases from the London epidemic in 1854, which you can see above. Cholera cases cluster mainly around the contaminated Broad Street water pump, visually supporting the theory of a link between cholera infections and the water supply.

Watch this short video to see more examples and types of data visualisations:

[Data visualisation examples on YouTube](https://www.youtube.com/watch?v=sb1UkU5rR90)

We can further distinguish between static, animated or interactive visualisations. Static visualisations are single images. Animated visualisations consist of moving images, and interactive visualisations change based on input from a user (such as clicking, scrolling, or moving a cursor).

This [static, map-based visualisation](https://projects.christianlaesser.com/travel-visa-inequality/) focuses on relational data about a country’s equality ranking based on travel visa contracts with other countries. Here is [another static, map-based visualisation](http://metrocosm.com/global-migration-map.html), with animated features for visual effect. This shows cumulative national net-migration between 2010 and 2015 and the level of migration between countries, across the globe.

Animated visualisations show a change of a variable (think of [urban sprawl](https://www.youtube.com/watch?v=2WGPvWPpey8&list=PLzYZm159uzQNc7H5UCCXHx4c4TKdCeaNt&index=2&t=0s)), for example.

[In this video](https://www.youtube.com/watch?feature=player_embedded&v=jbkSRLYSojo), Hans Rosling, a famous demographer, shows how animated data visualisation can help better understand global population changes.

How was this done before it was relatively easy to animate such visualisations? Here is a wonderful example of how [dynamic

information](http://www.radicalcartography.net/index.html?fisk) (the historical change of the riverbed of the Mississippi river) was captured in a hand-drawn map in the 1940s.

Real-time visualisations give insights to current states and (almost) real-time changes of a system (think of [dynamic weather maps](https://www.windy.com), or more specific services such as [lightning trackers](http://map.blitzortung.org).

The COVID-19 crisis has brought a [new wave of data visualisations](https://duckduckgo.com/?q=covid+19+data+visualizations&va=z&t=hc&iar=images&iax=images&ia=images) to the world and has shown how crucial visualisations are to communicate important information in a digestible way. COVID-19 visualisations, amongst others, helped to track infection numbers, illustrate local differences, explain policy measures to the public, and to monitor progress on keeping infections at bay.

In the next step we are going to look at how to decide what type of visualisation is best, and consider visual biases to be aware of.