# Introduction to Data Visualisation

# Introduction to Data Visualisation

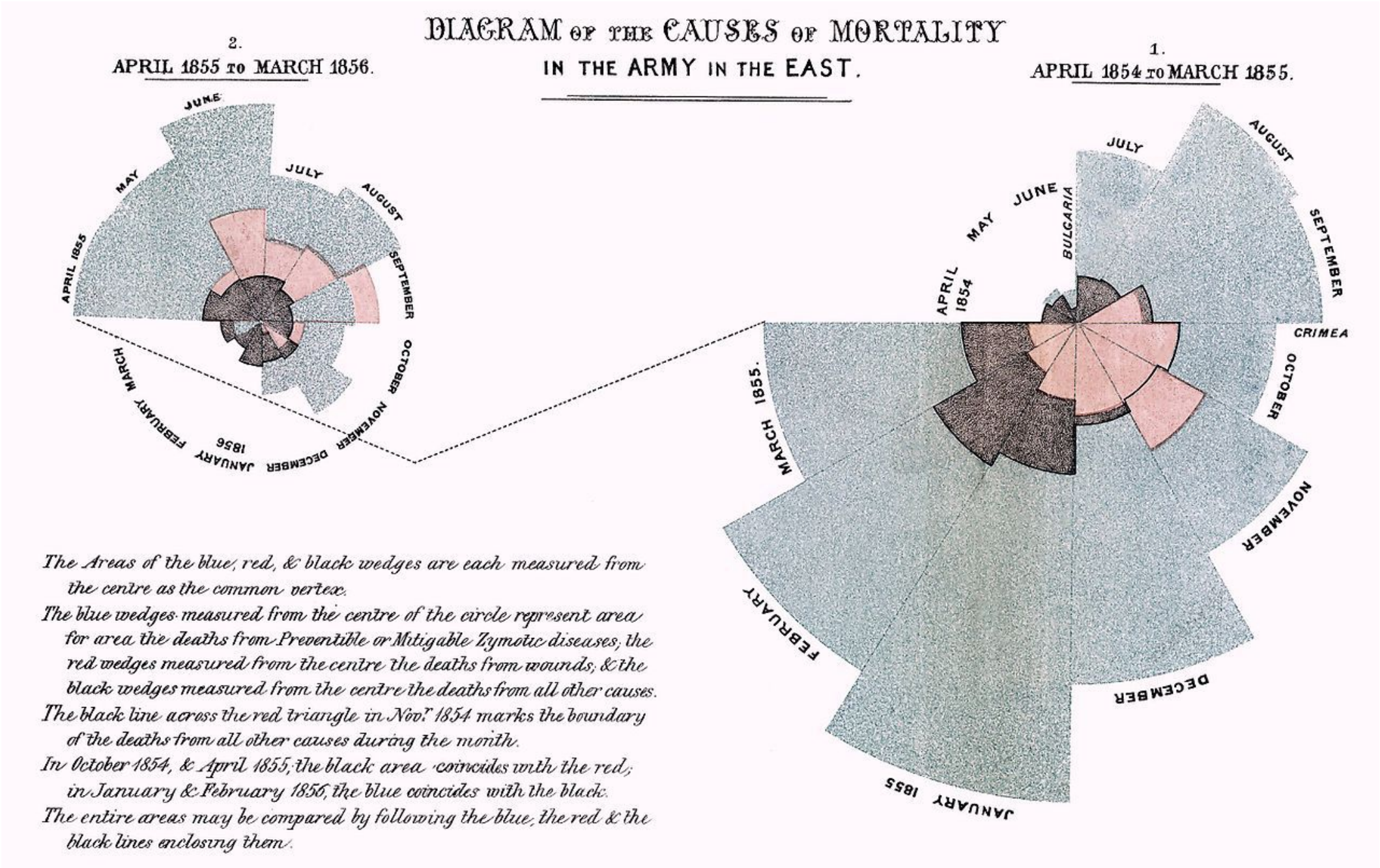
- History
- Types
- Principles
- Tools

# Introduction to Data Visualisation: History

Cholera Map, London, 1854

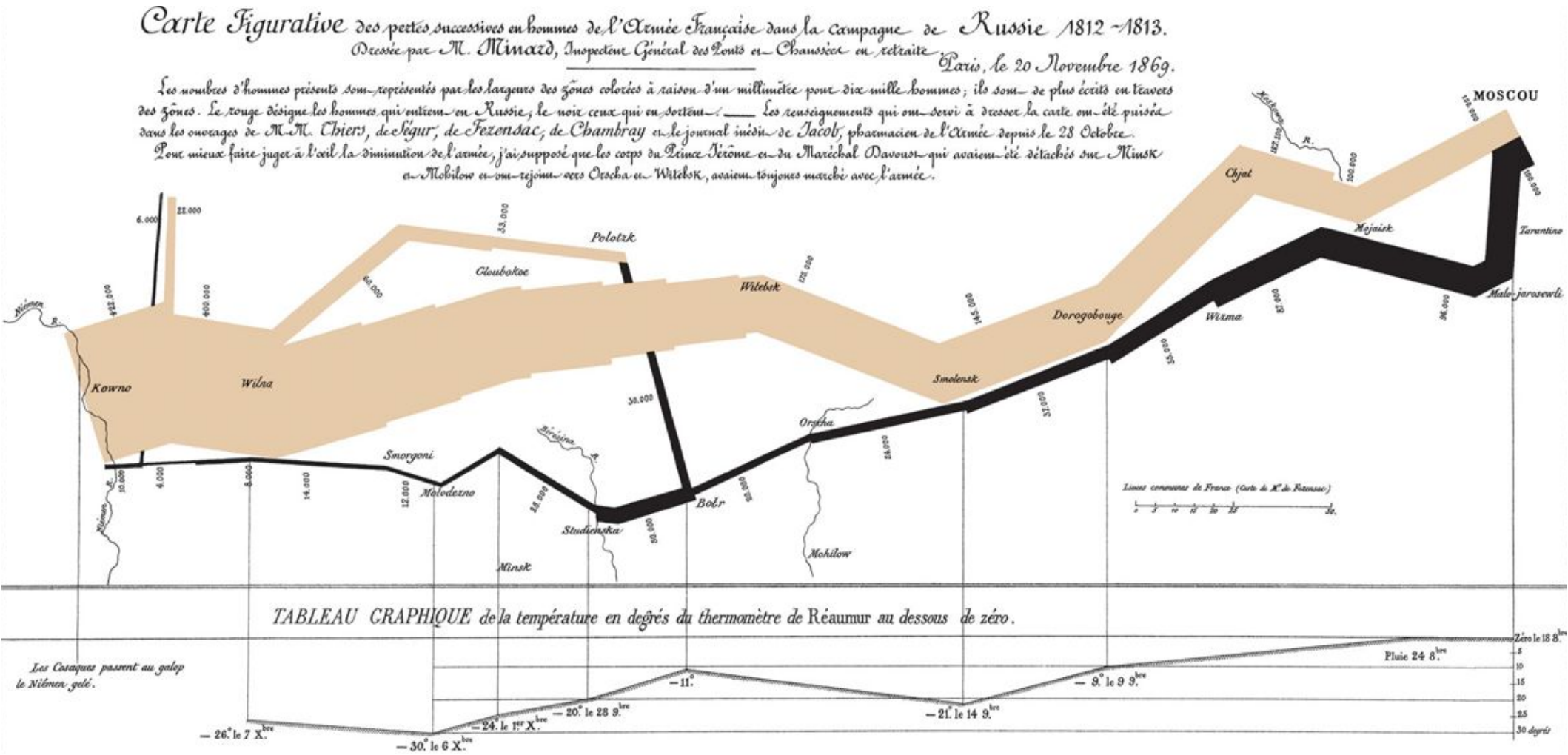
# Introduction to Data Visualisation: History

Visualisation of mortality data of British army, Crimean War, 1856



# Introduction to Data Visualisation: History

Napoleon's March, 1861



# Introduction to Data Visualisation: History

## What is data?

- it depends upon the context
- it depends upon the question
- it depends upon the answer

# Introduction to Data Visualisation: History

## Uses of data

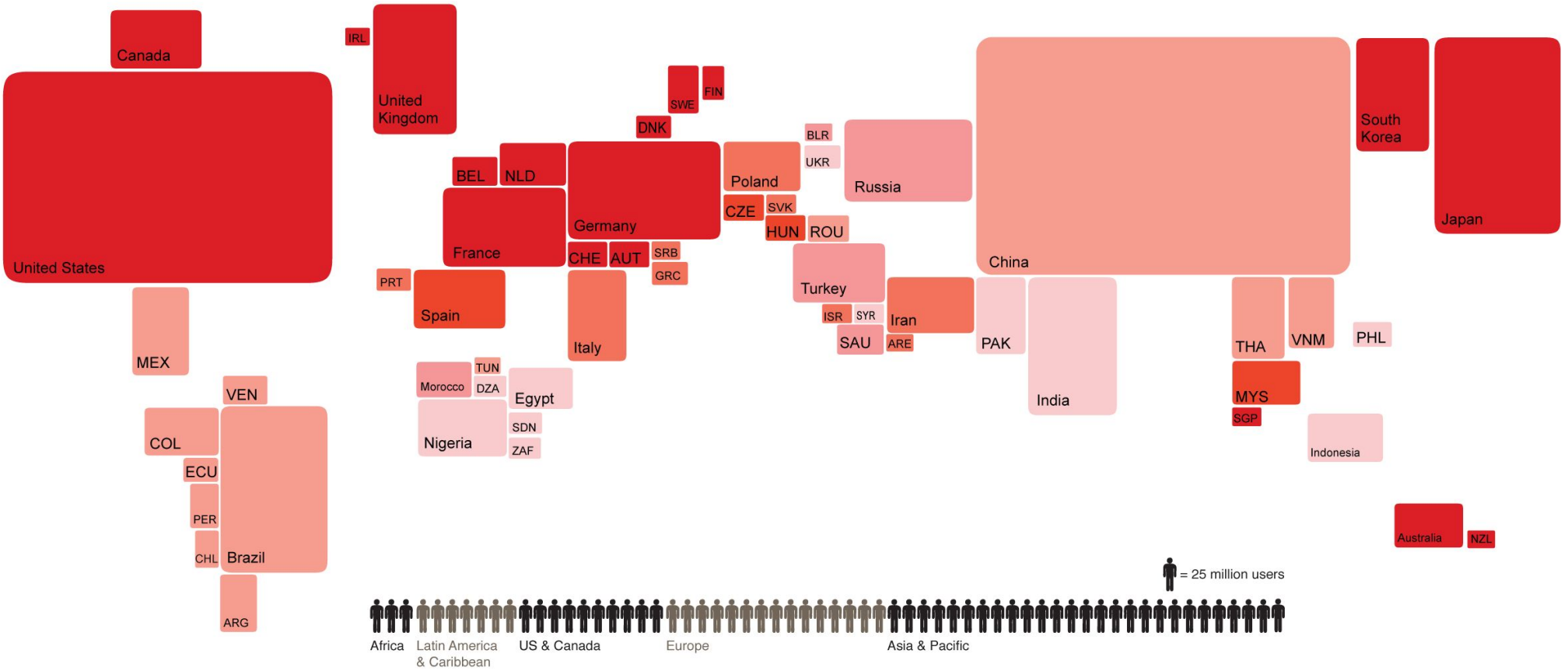
- description
- argument
- documentation or archival

# Introduction to Data Visualisation: History

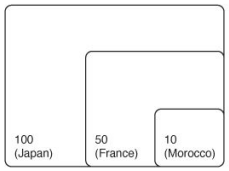
## Types of data

- quantitative (textual)
- qualitative (textual)
- spatial
- media (sensory)

# Introduction to Data Visualisation: History




Total number of Internet users (in millions), 2008




Internet penetration (% population)

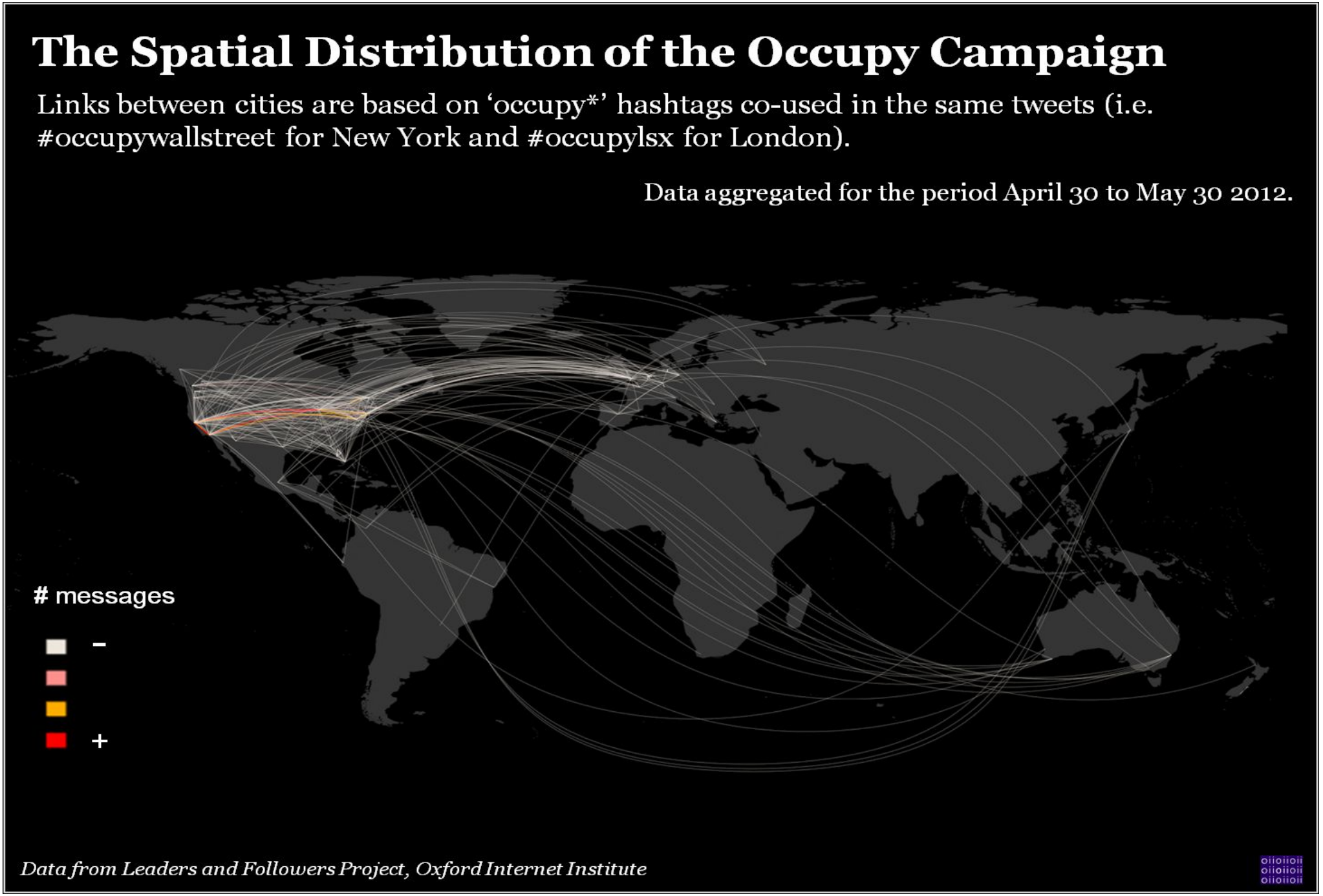
- Under 20%
- 20% - 40%
- 41% - 50%
- 51% - 60%
- Over 60%

## Internet Penetration

Visualization and analysis by Dr Mark Graham, Scott A. Hale and Monica Stephens in collaboration with Dr Corinne M. Flick and the Convoco Foundation.

This map and other visualizations can be found on the OII visualization website at http://www.oii.ox.ac.uk/vis/

# Introduction to Data Visualisation: History



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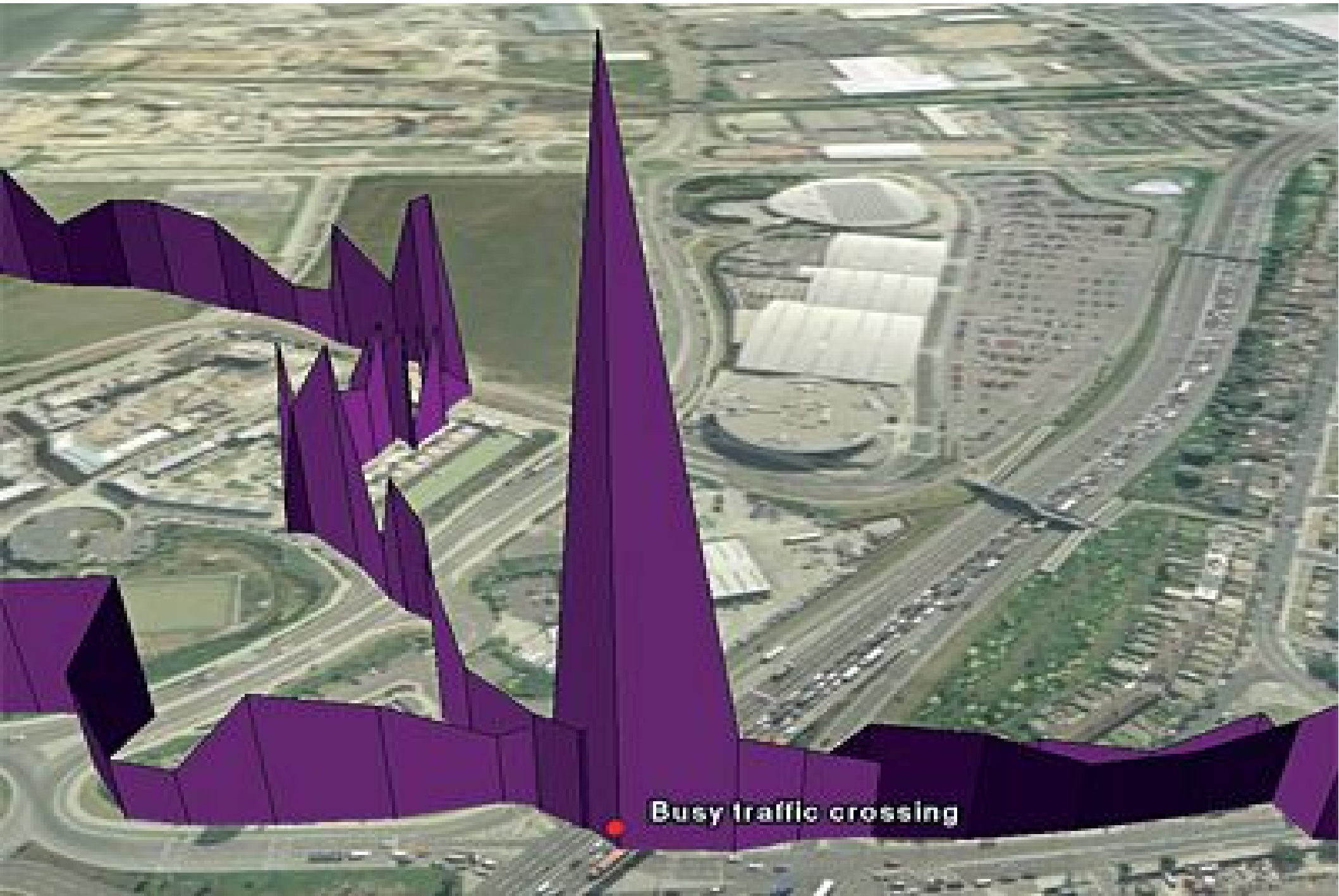


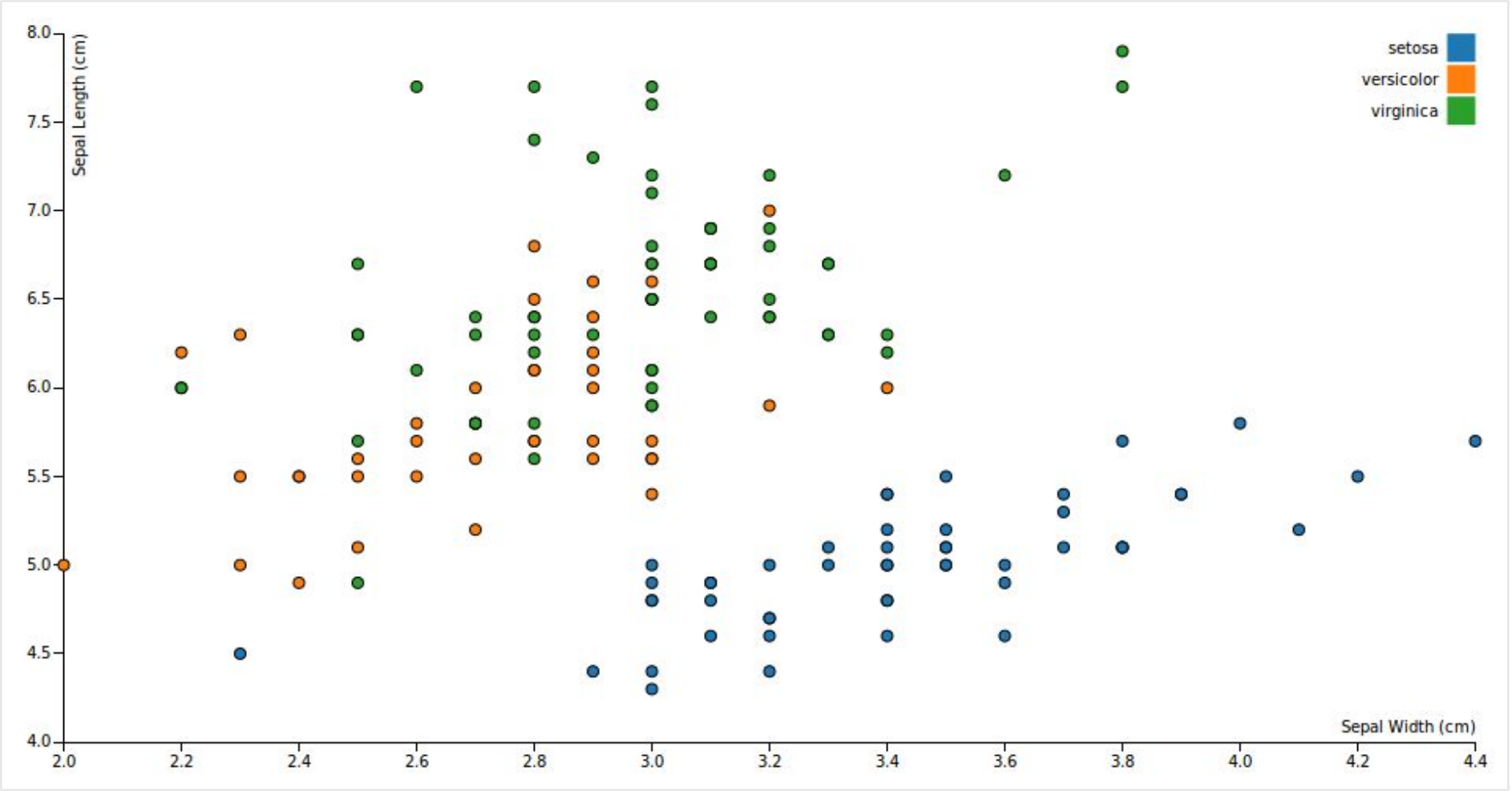
# Introduction to Data Visualisation: Types

## Types of charts

- scatterplot, line chart, area chart, bar chart
- pie chart, tree map, parallel sets
- bubble chart, radar chart
- time line, flow chart, steamgraph
- choropleth, flow map, cartogram

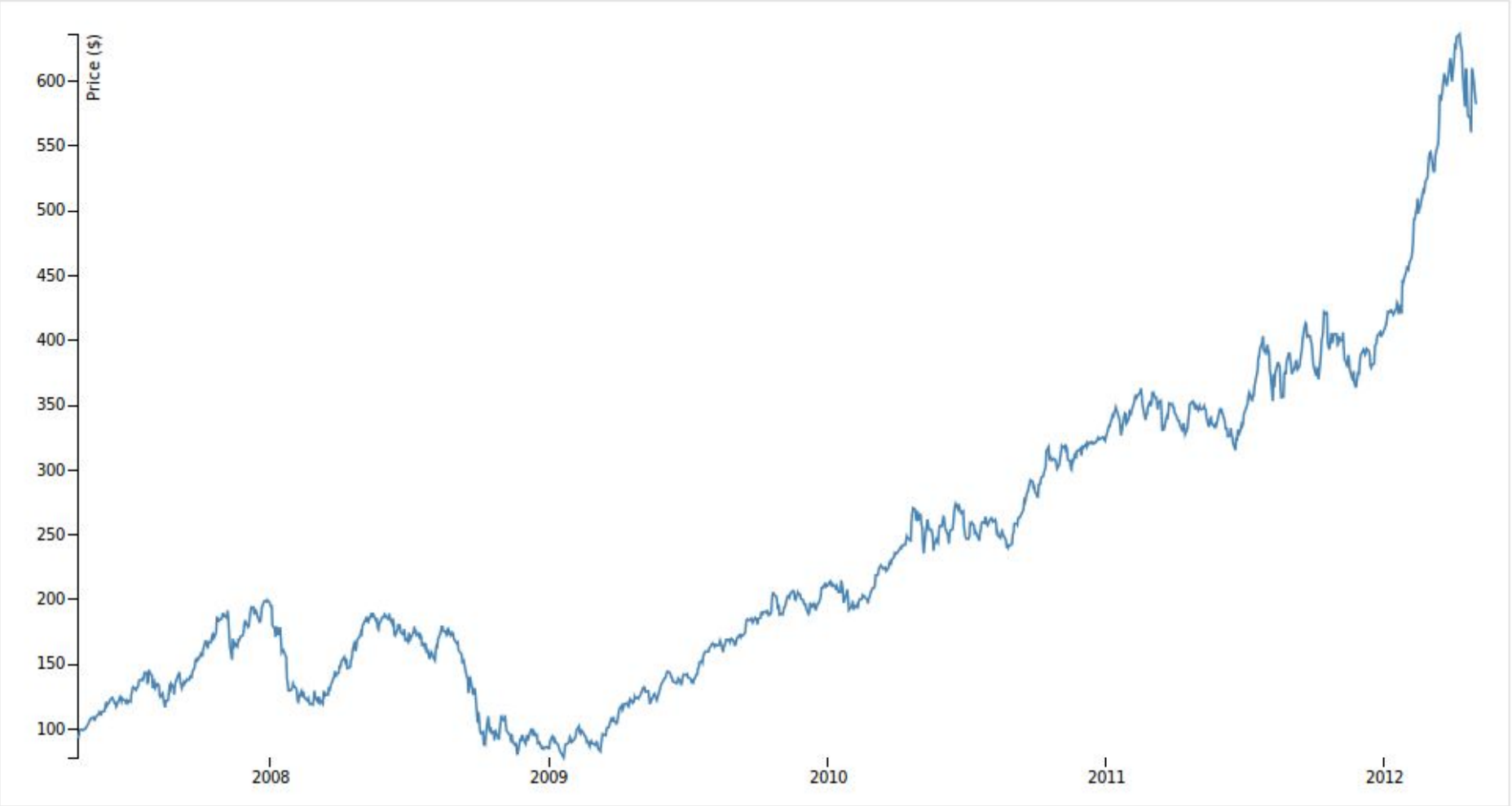
# Introduction to Data Visualisation: Types

Scatterplot



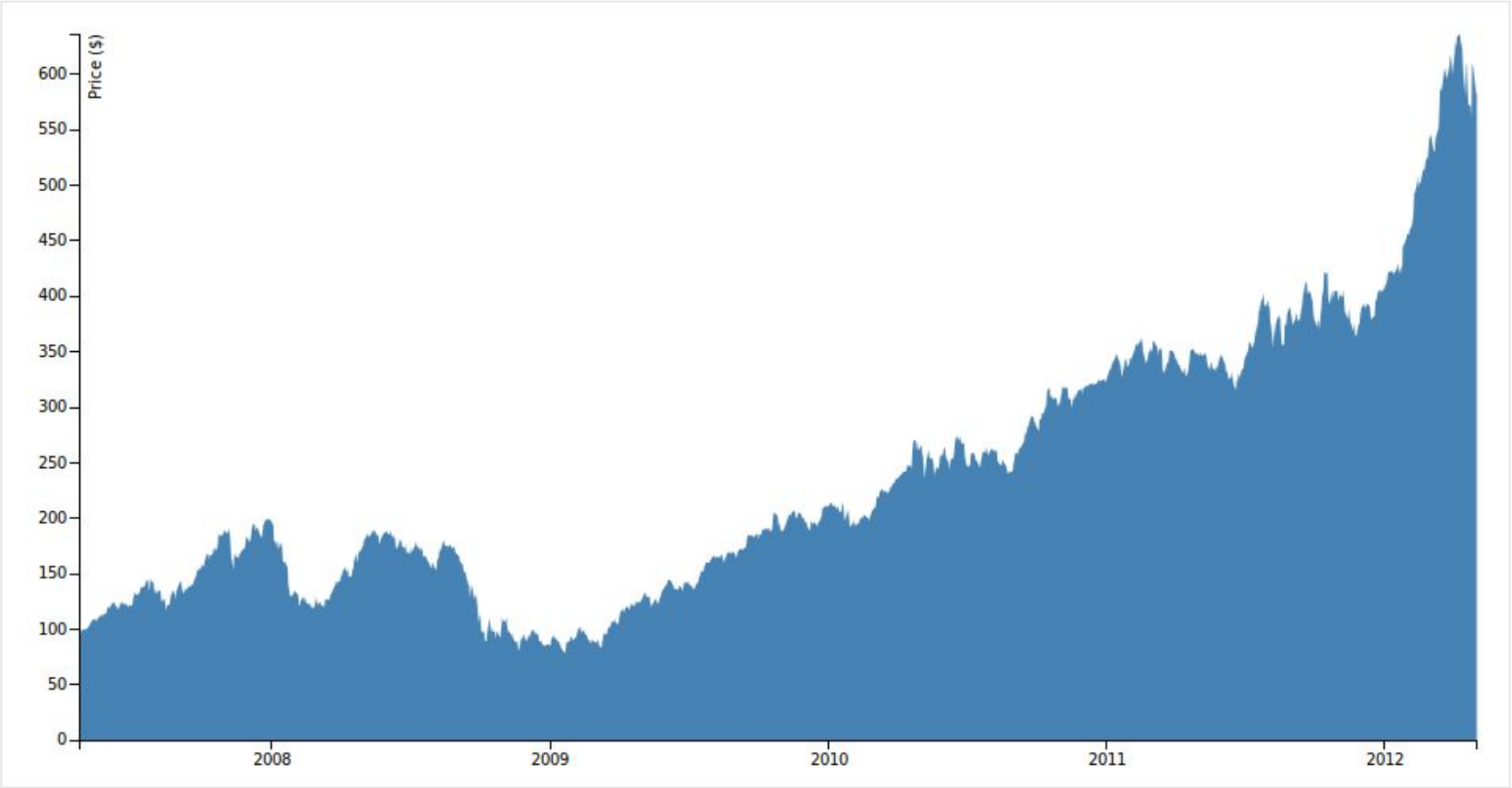
# Introduction to Data Visualisation: Types

Line Chart



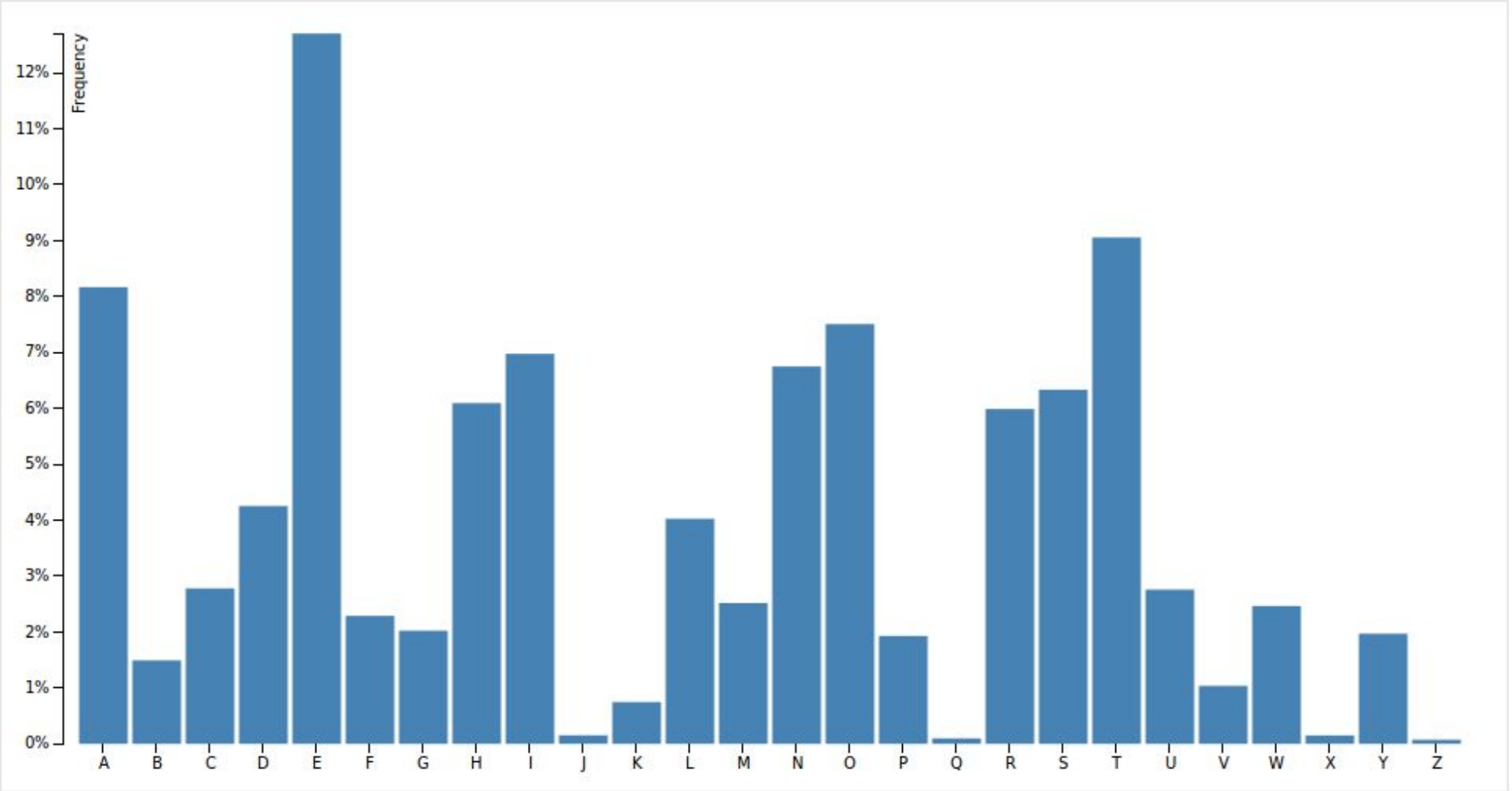
# Introduction to Data Visualisation: Types

## Area Chart



# Introduction to Data Visualisation: Types

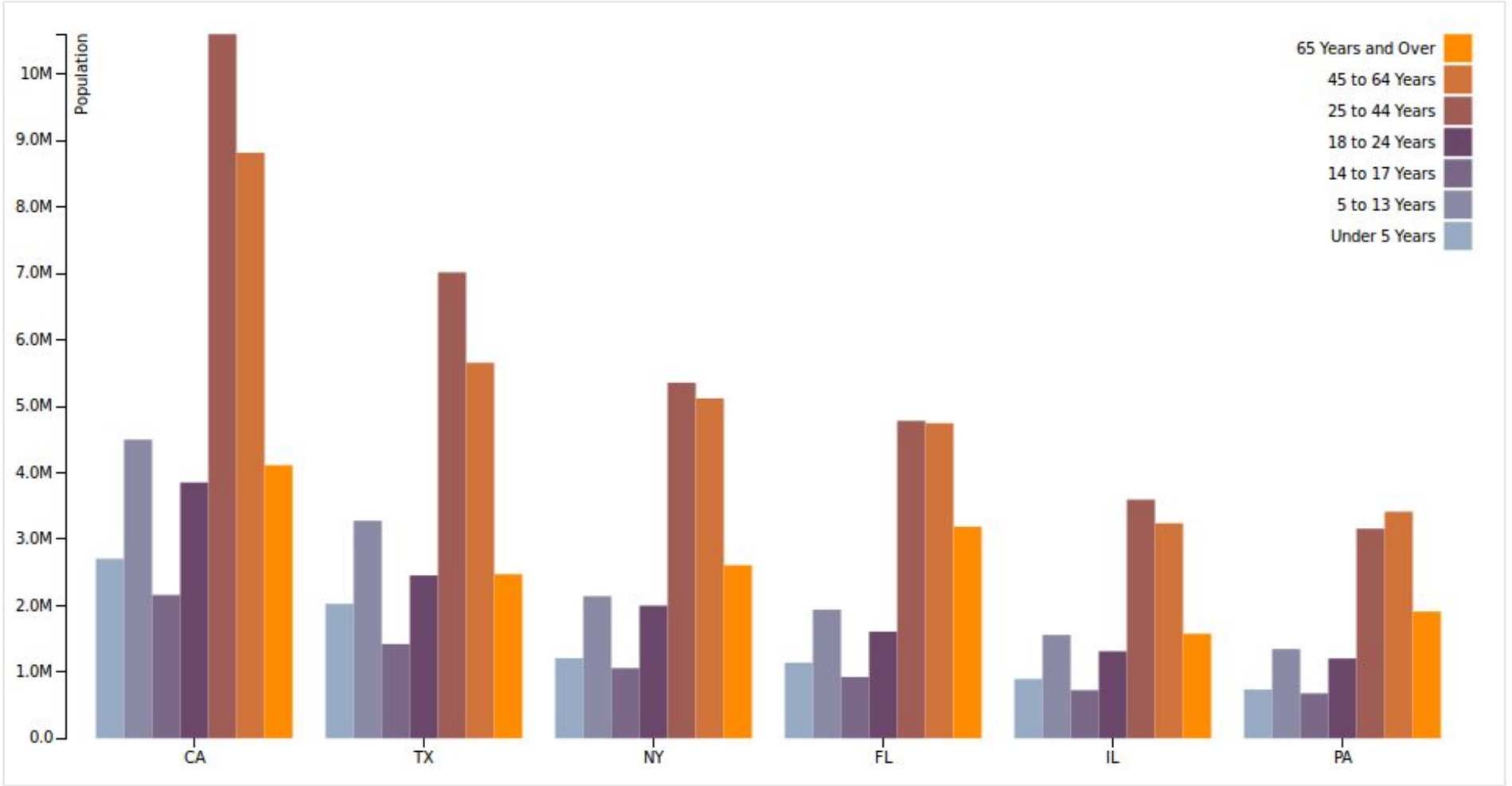
## Bar Chart



# Introduction to Data Visualisation: Types

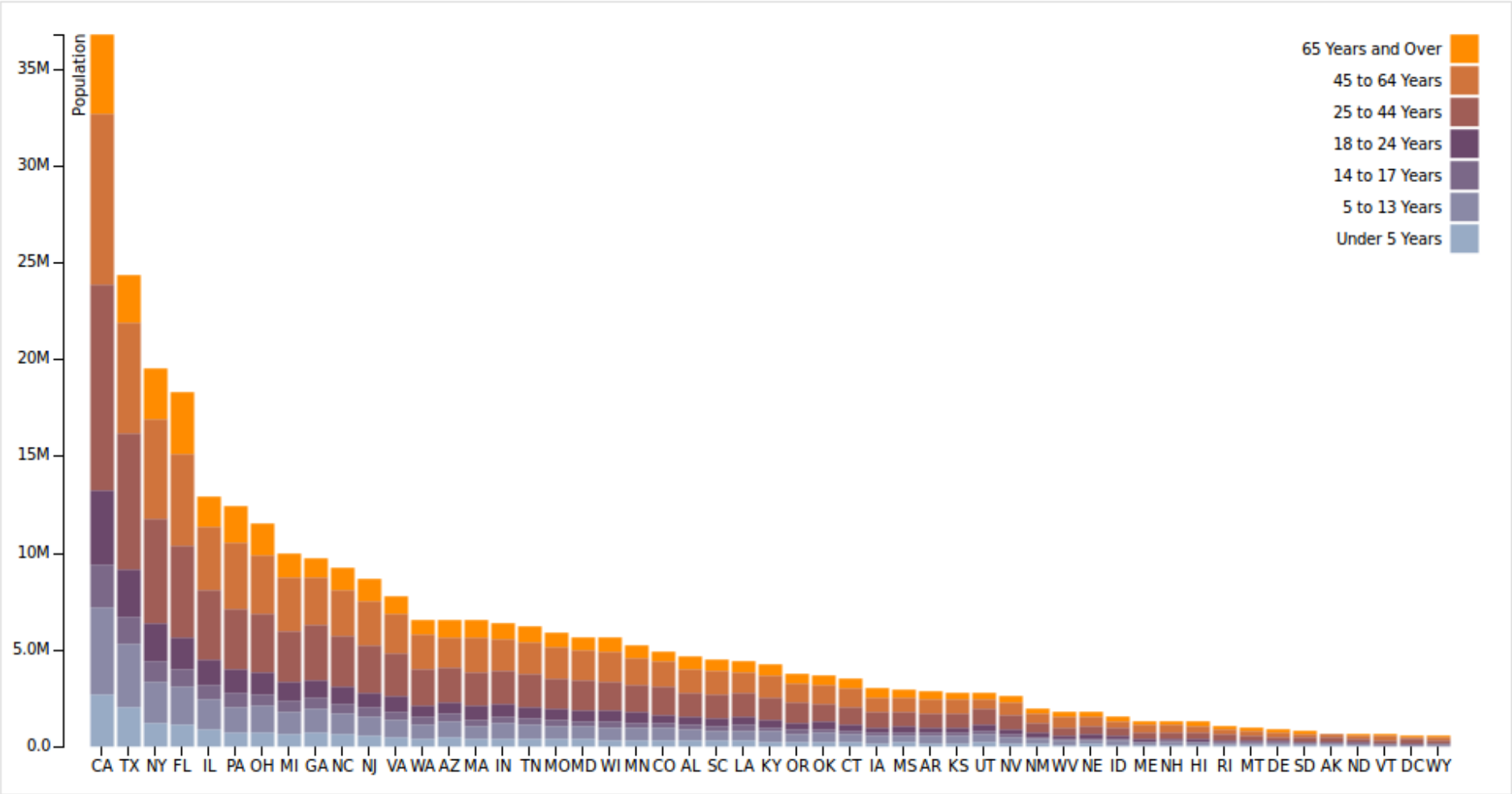
Grouped Bar Chart

## Types



# Introduction to Data Visualisation: Types

## Stacked Bar Chart



# Introduction to Data Visualisation: Types

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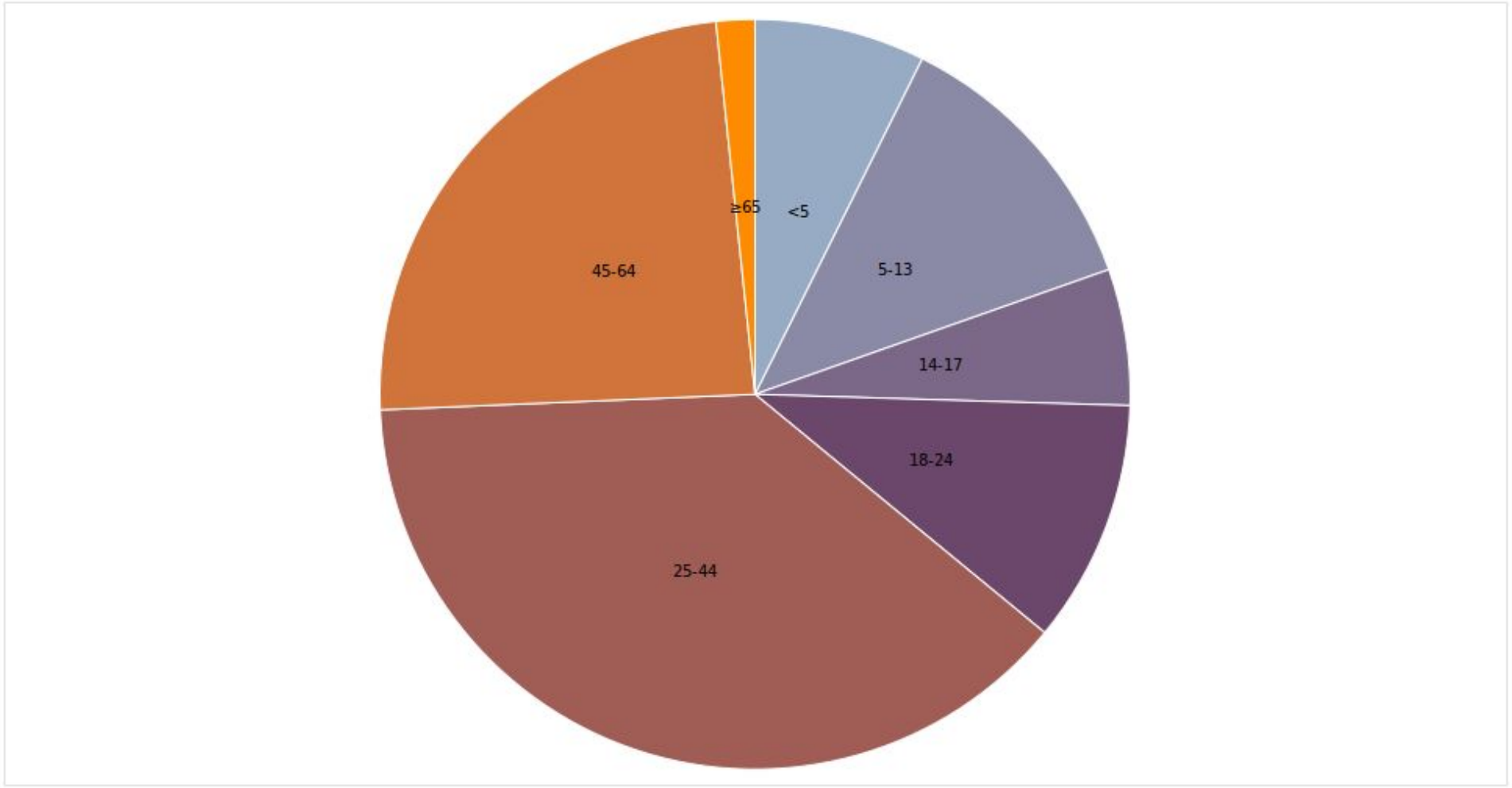
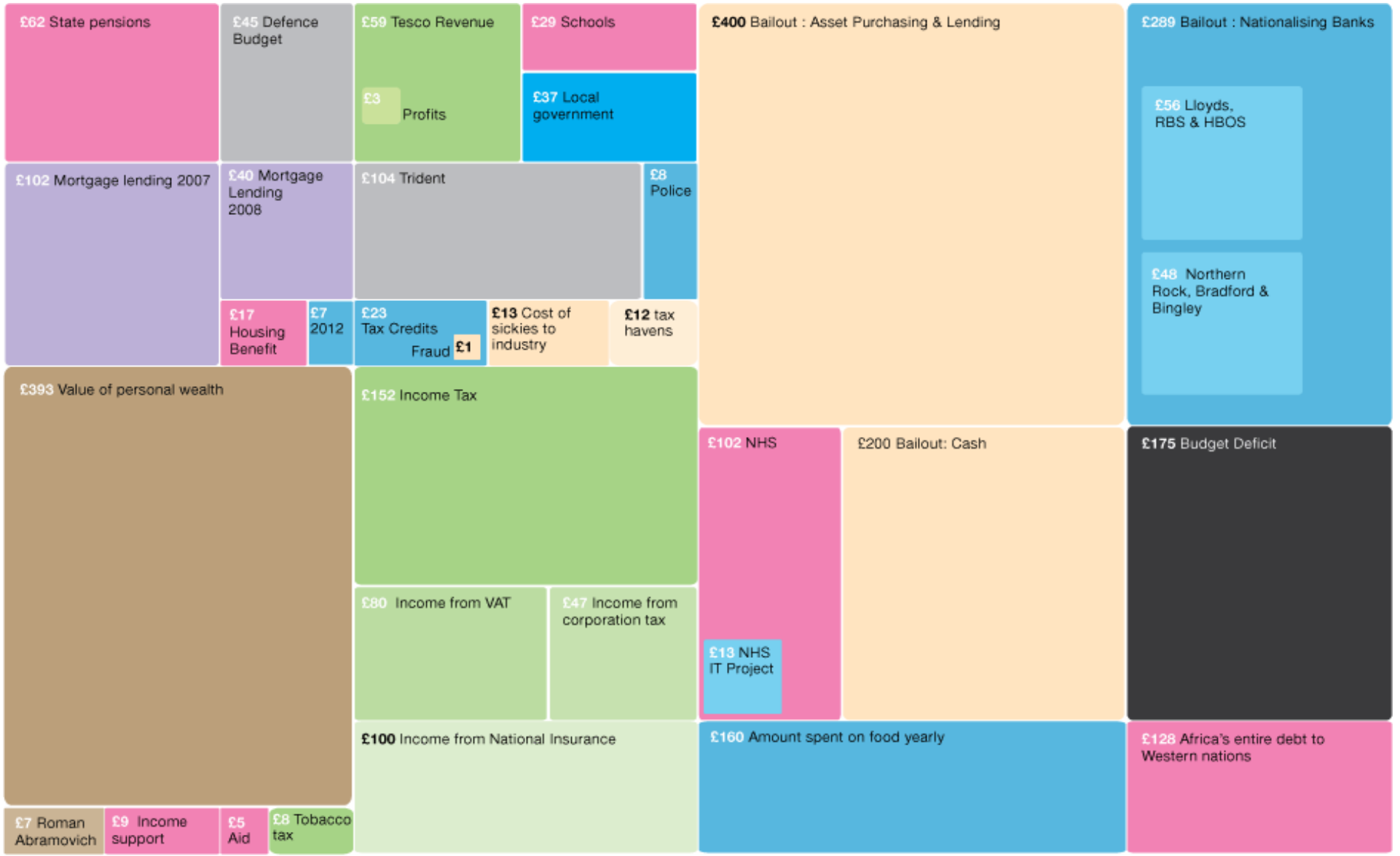
# Introduction to Data Visualisation: Types

Pie Chart



# Introduction to Data Visualisation: Types

## Tree Map




The Billion Pound-O-Gram

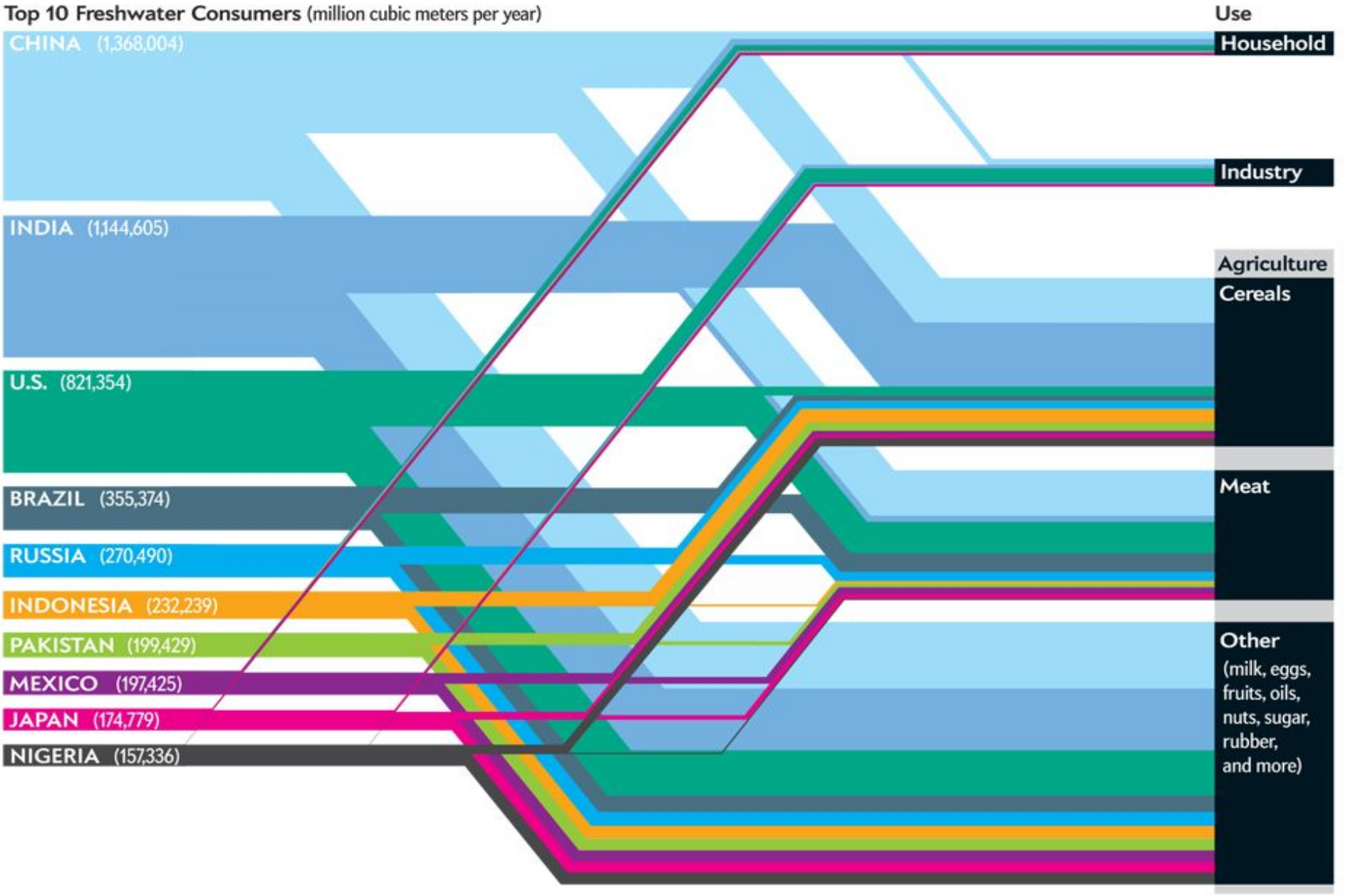
Giving Spending Fighting Hoarding Lending Bailing Earning

David McCandless / InformationIsBeautiful.net

Source: UK Treasury, Guardian

# Introduction to Data Visualisation: Types

## Parallel Sets



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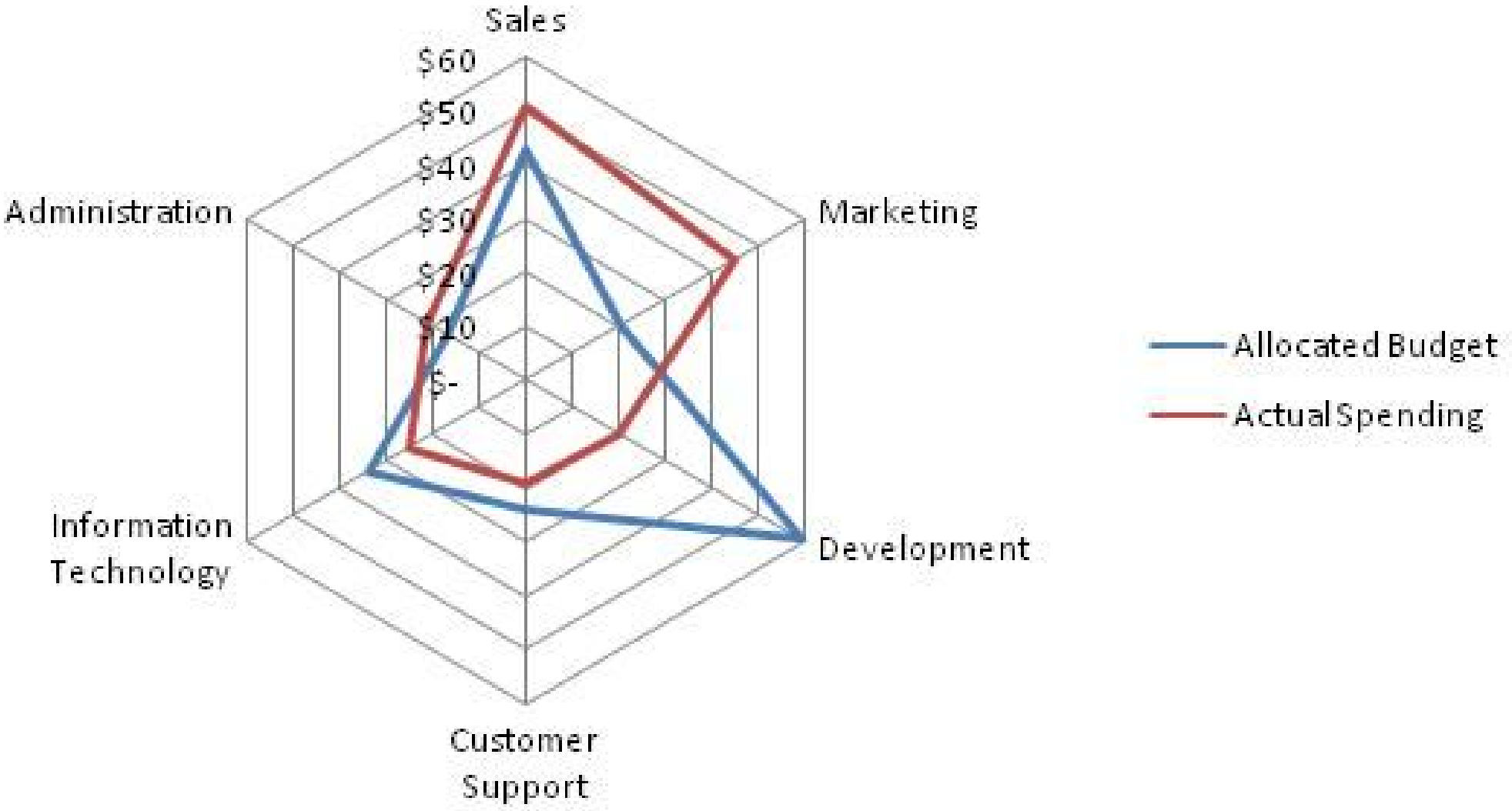
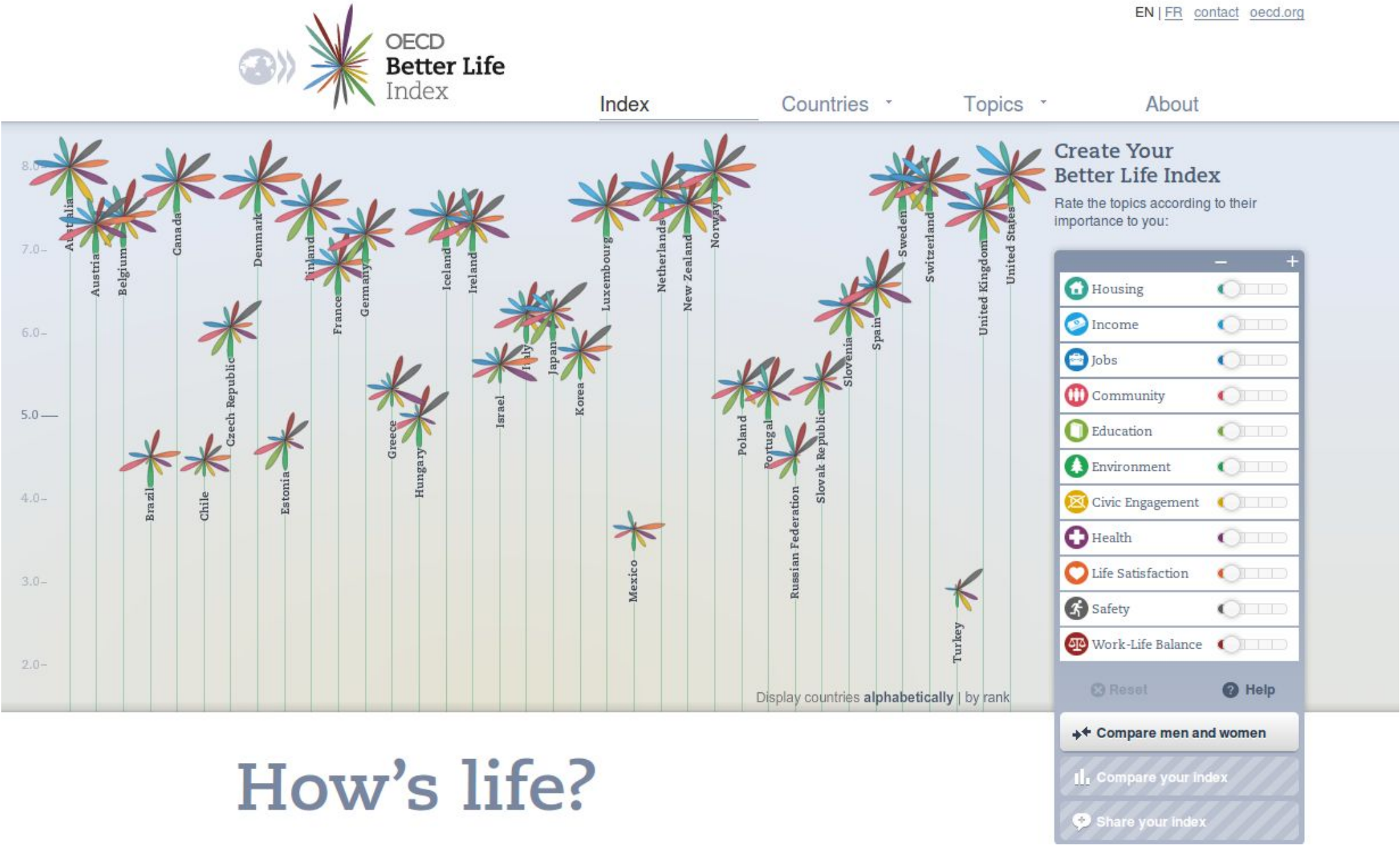
# Introduction to Data Visualisation: Types

## Radar Chart



# Introduction to Data Visualisation: Types

## Radar Chart



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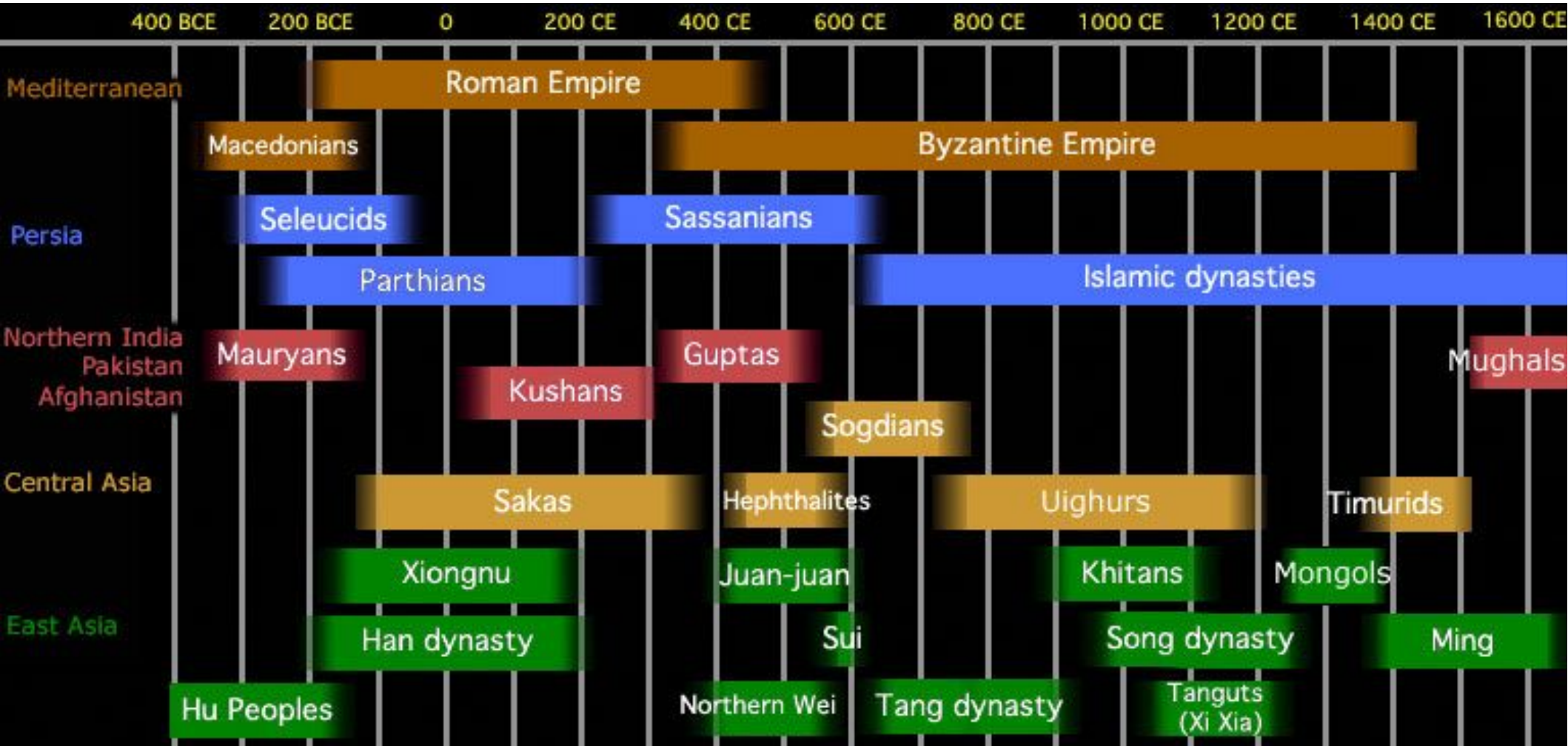
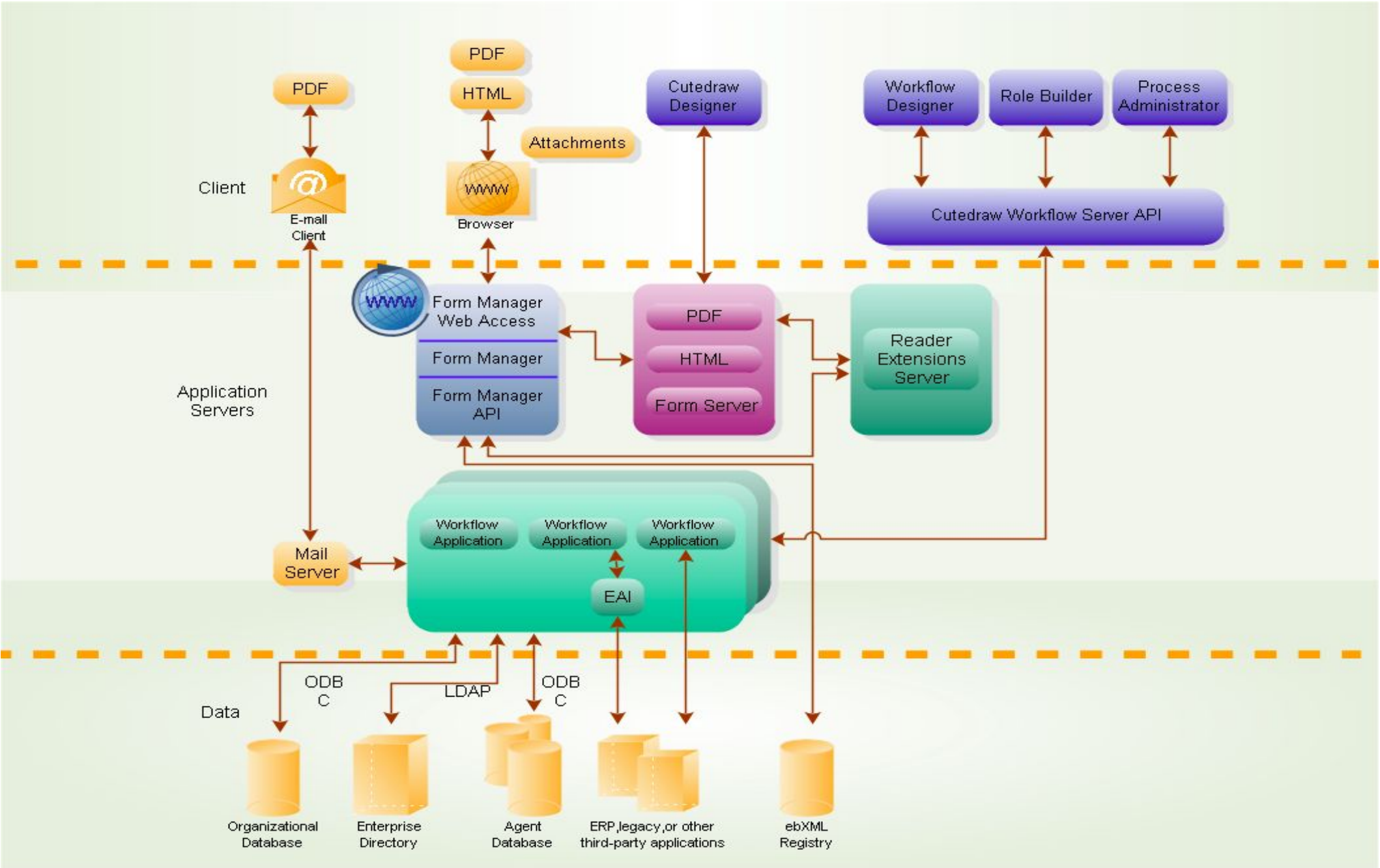
# Introduction to Data Visualisation: Types

Timeline



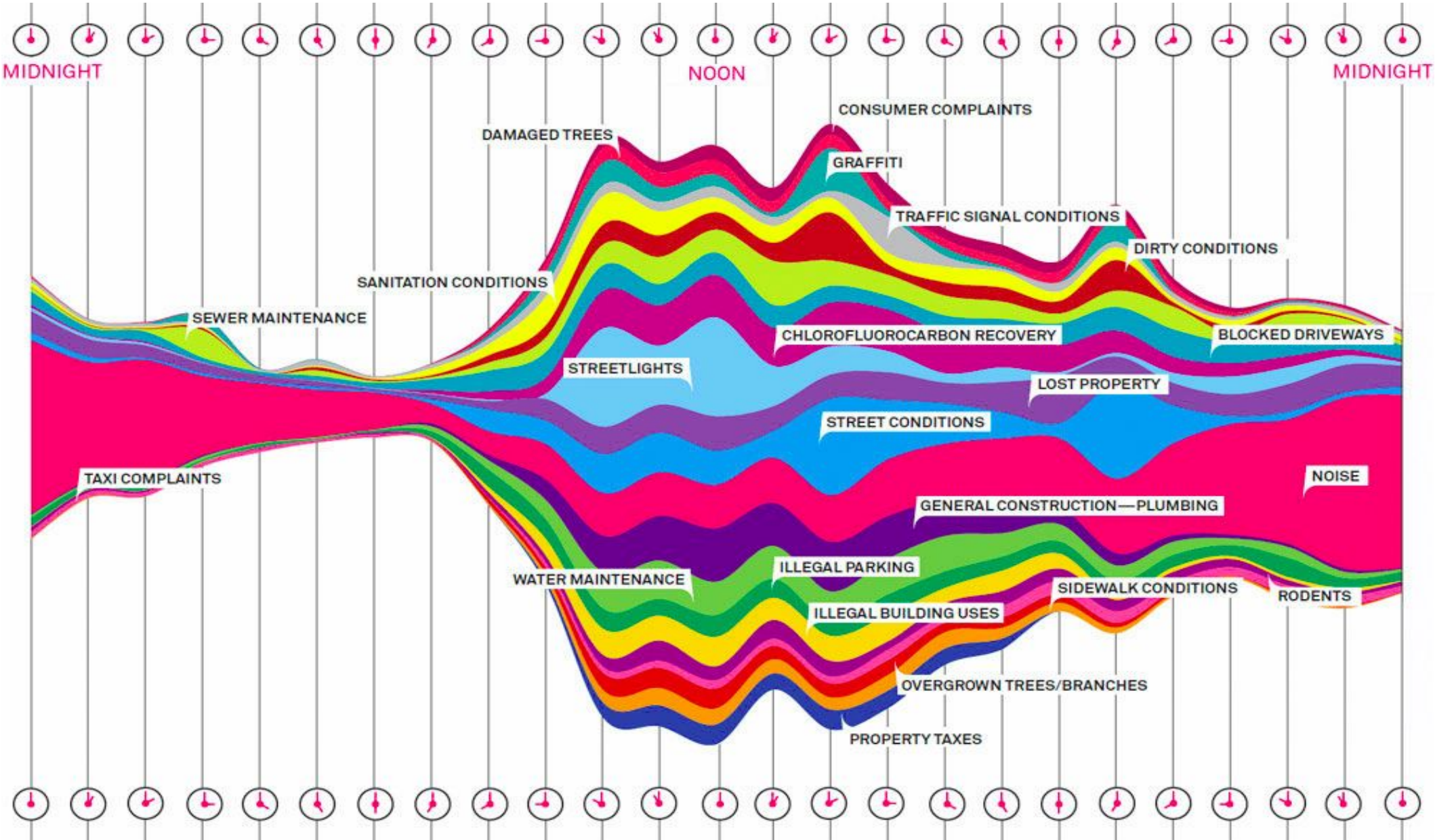
# Introduction to Data Visualisation: Types

## Flow Chart



# Introduction to Data Visualisation: Types

Steamgraph



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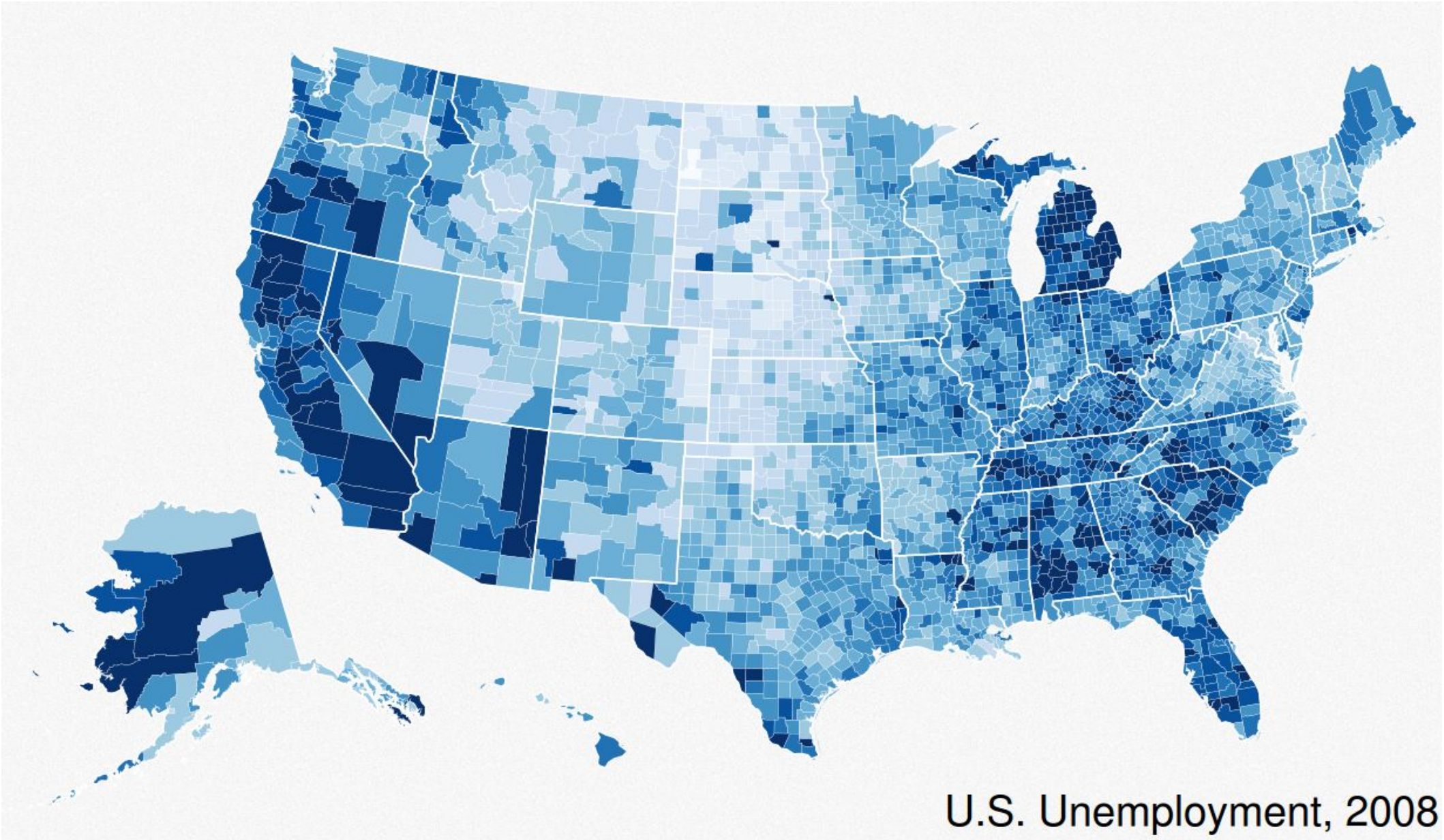
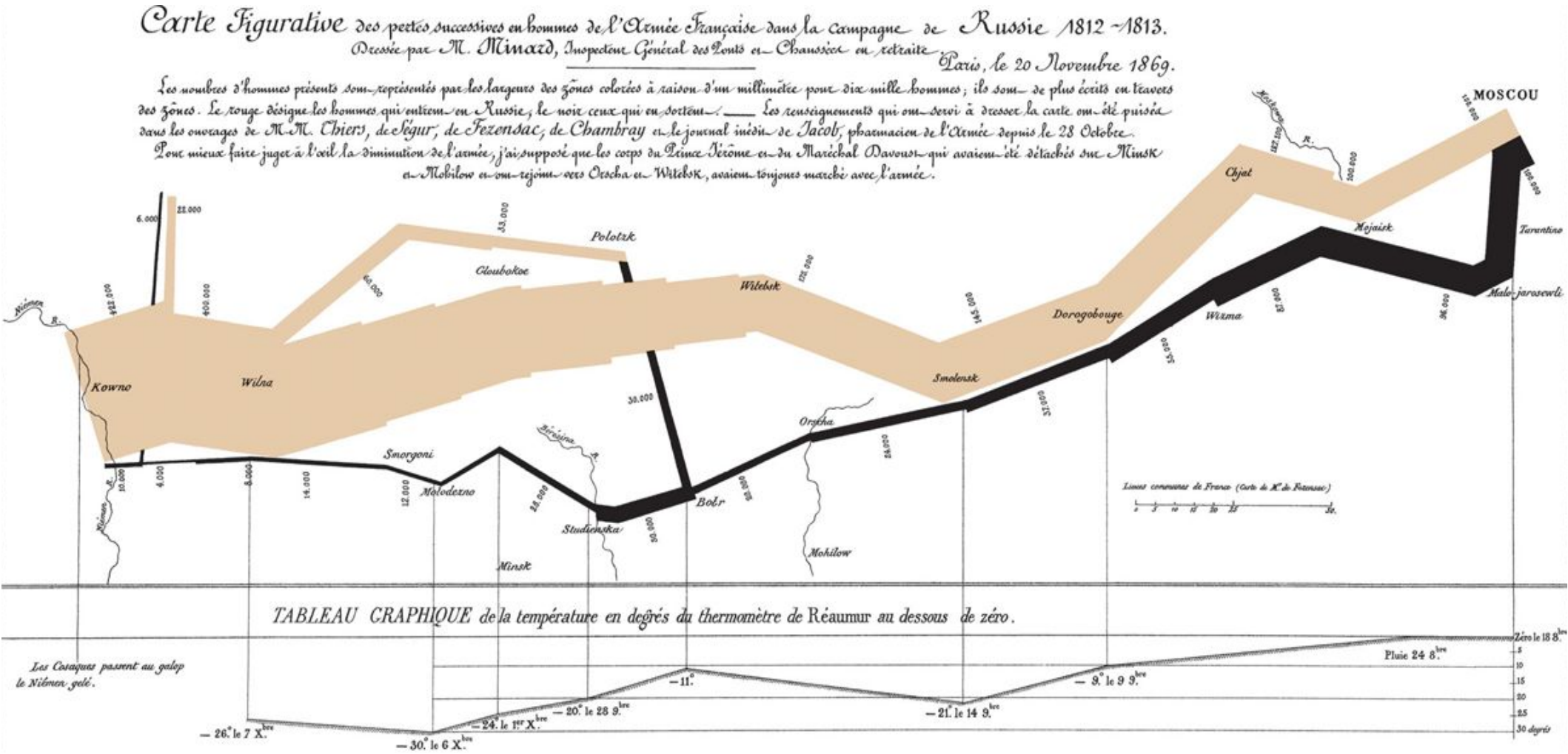
# Introduction to Data Visualisation: Types

Choropleth



# Introduction to Data Visualisation: Types

## Flow Map



# Introduction to Data Visualisation: Types

Cartogram

# Introduction to Data Visualisation: Principles

## Gestalt principles of visual perception

- law of proximity
- law of similarity
- law of enclosure
- law of closure
- law of continuity

# Introduction to Data Visualisation: Principles

**Manuel Lima's information visualisation manifesto** (selection)

- form follows function
- start with a question
- cite your source
- the power of narrative
- embrace time
- avoid gratuitous visualisations

source: www.visualcomplexity.com

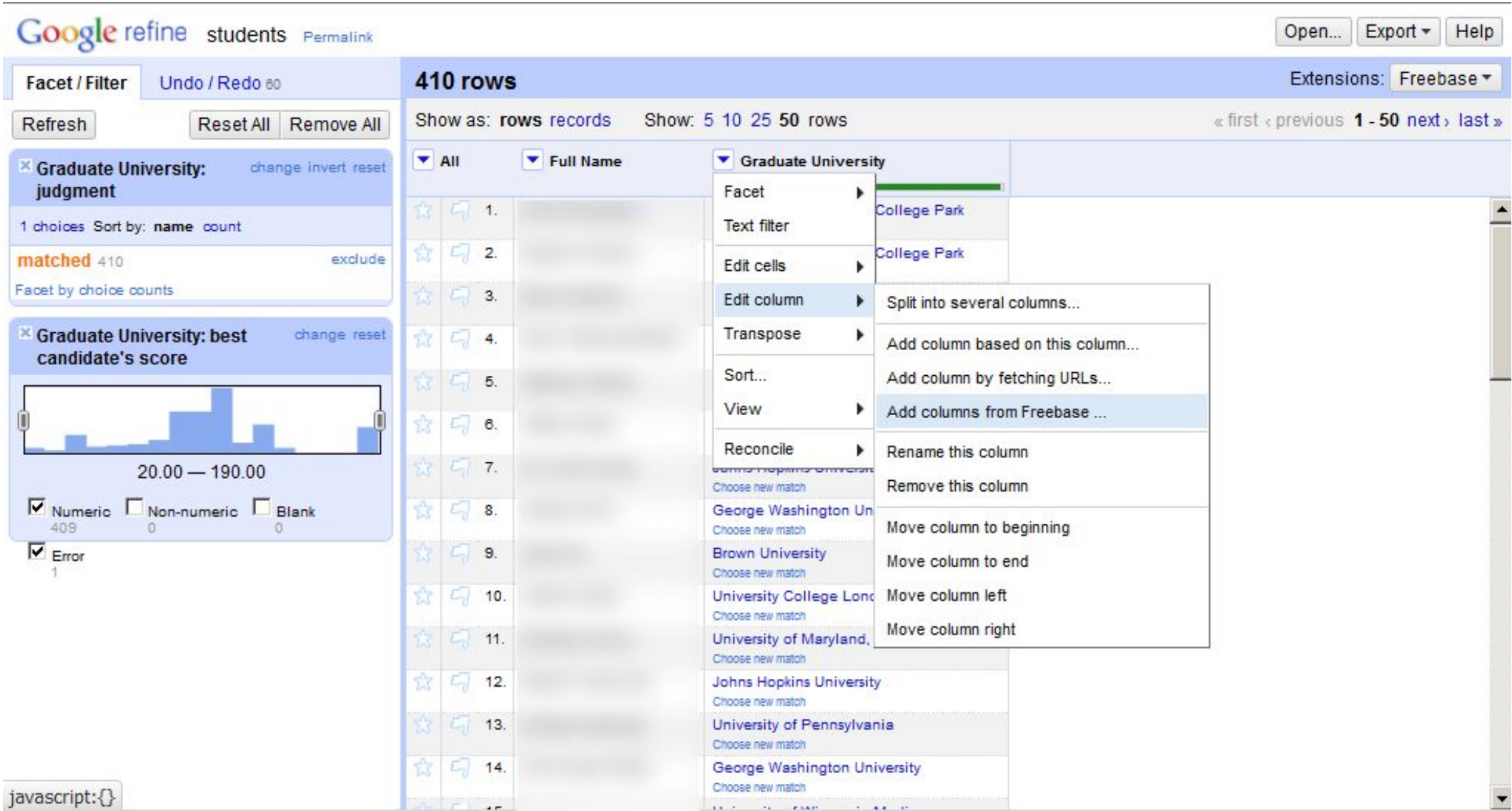
# Introduction to Data Visualisation: Principles

## Subjective guiding principles

- juxtapose, compare and relate
- combine/collect data to challenge existing views
- making complicated visualisation is easy but not effective
- assume that the audience knows the context of the work

# Introduction to Data Visualisation: Tools

## Data Organisation – Google Refine



# Introduction to Data Visualisation: Tools

## Data Organisation – Data Wrangler

Split | Cut | Extract | Edit | Fill | Translate | Drop | Merge | Wrap | Delete | Promote | Fold | Unfold | Transpose

after | before | column | max | on | positions | quote character | result | row

once | column

**Suggestions**

**Script** Export

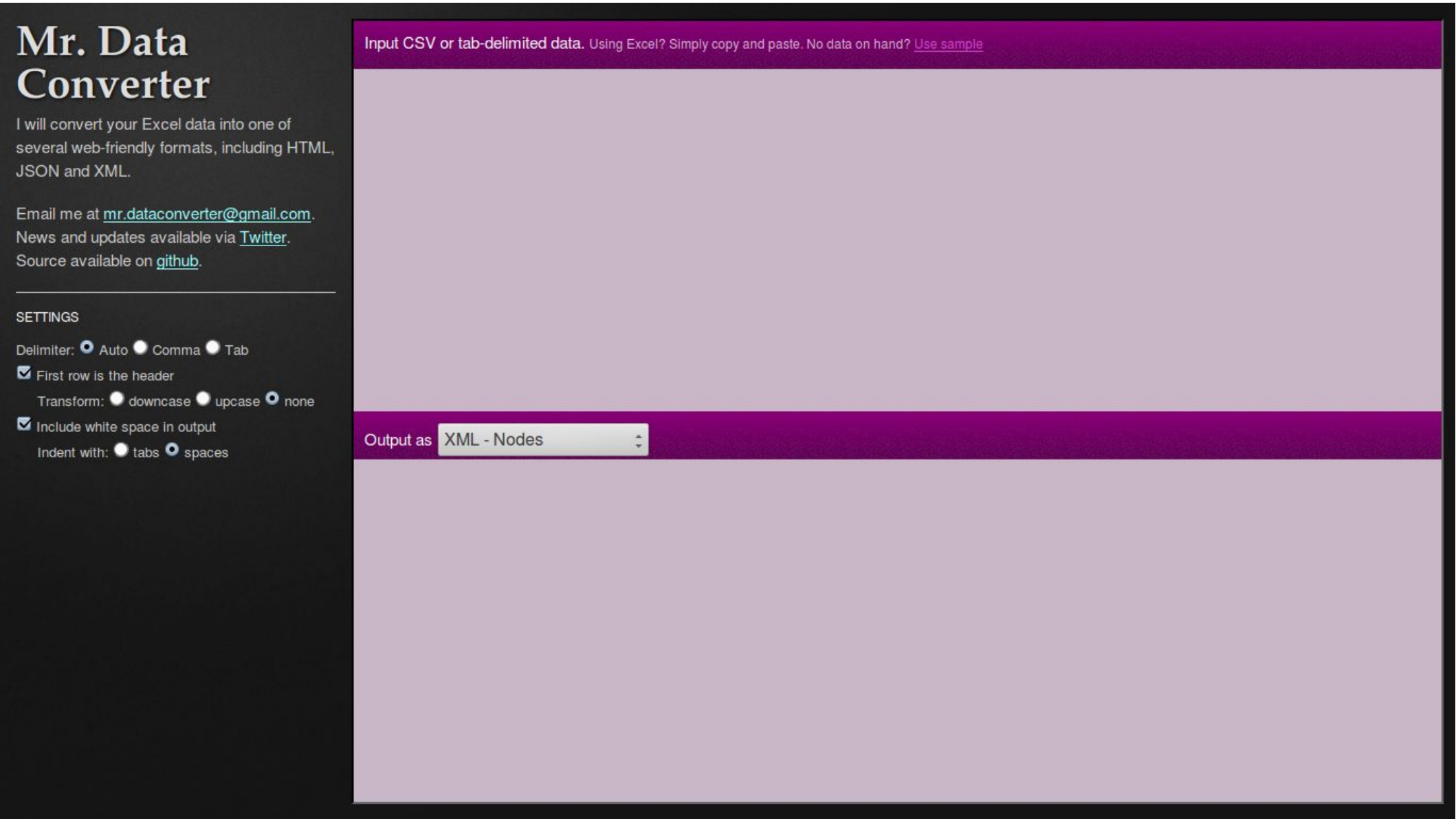
- Split **data repeatedly** on **newline** into **rows**
- Split **data repeatedly** on **','**

rows: 408 prev next

| | split | split1 |
|---|---|---|
| 1 | Reported crime in Alabama | |
| 2 | | |
| 3 | 2004 | 4029.3 |
| 4 | 2005 | 3900 |
| 5 | 2006 | 3937 |
| 6 | 2007 | 3974.9 |
| 7 | 2008 | 4081.9 |
| 8 | | |
| 9 | Reported crime in Alaska | |
| 10 | | |
| 11 | 2004 | 3370.9 |
| 12 | 2005 | 3615 |
| 13 | 2006 | 3582 |
| 14 | 2007 | 3373.9 |
| 15 | 2008 | 2928.3 |
| 16 | | |
| 17 | Reported crime in Arizona | |
| 18 | | |
| 19 | 2004 | 5073.3 |
| 20 | 2005 | 4827 |
| 21 | 2006 | 4741.6 |
| 22 | 2007 | 4502.6 |
| 23 | 2008 | 4087.3 |
| 24 | | |
| 25 | Reported crime in Arkansas | |

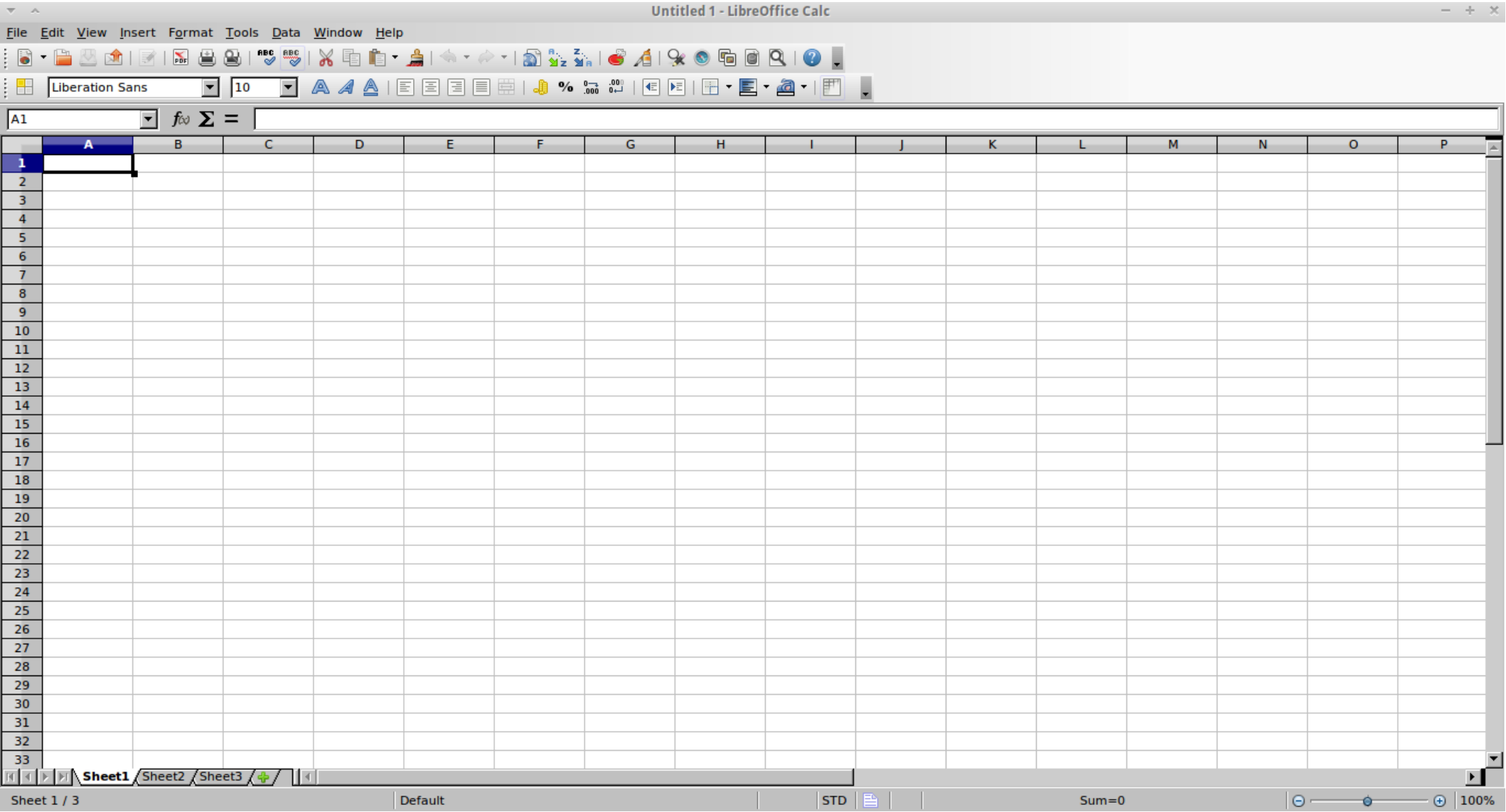
# Introduction to Data Visualisation: Tools

## Data Organisation – Mr. Data Converter



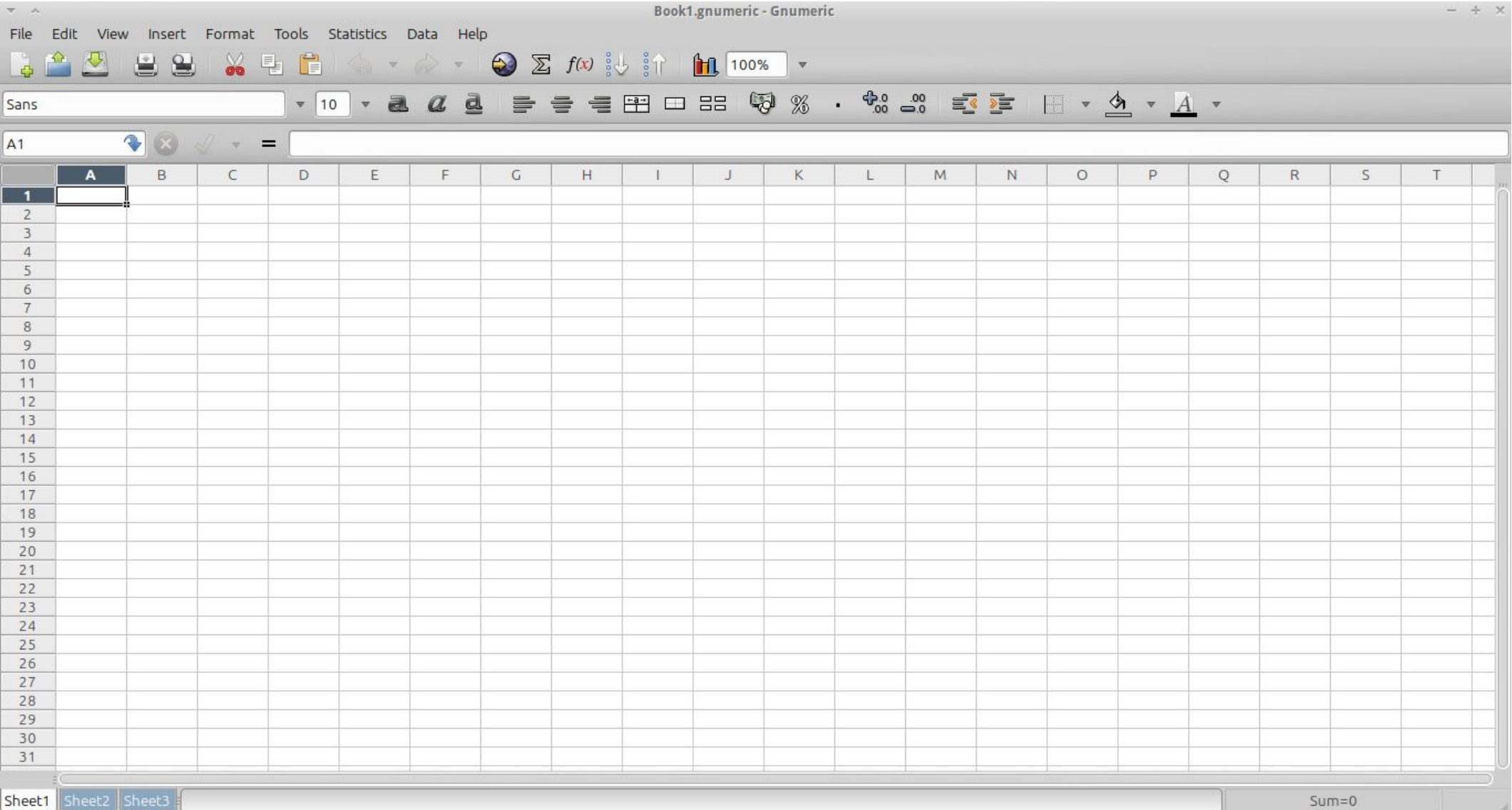
# Introduction to Data Visualisation: Tools

## Analysis – Libre Office Calc



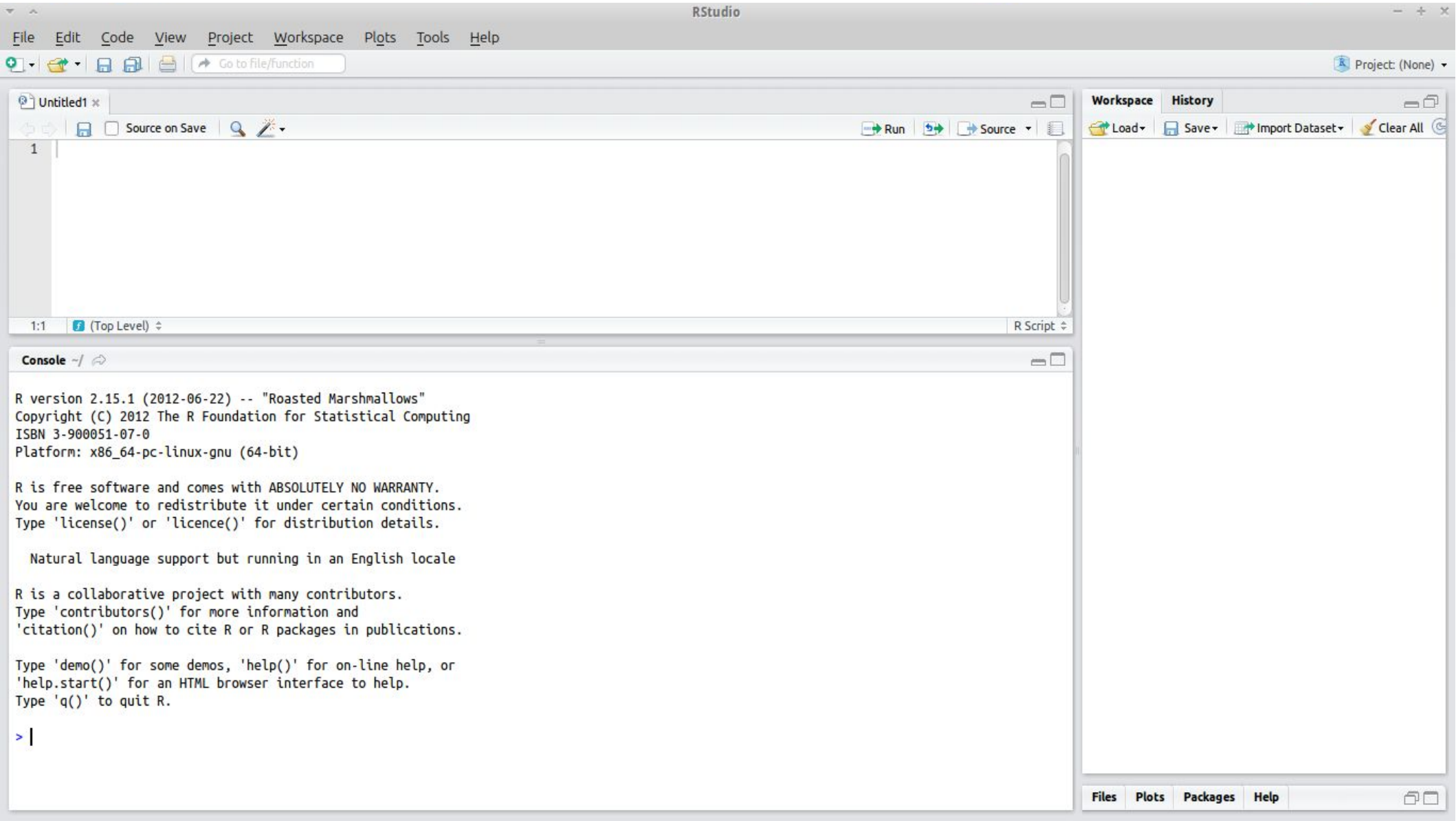
# Introduction to Data Visualisation: Tools

## Analysis – Gnumeric



# Introduction to Data Visualisation: Tools

## Analysis – R (and R Studio)



# Introduction to Data Visualisation: Tools
## Visualisation – Many Eyes

Many Eyes

Log in IBM.

**Explore**
- Visualizations
- Data sets
- Comments
- Topic centers

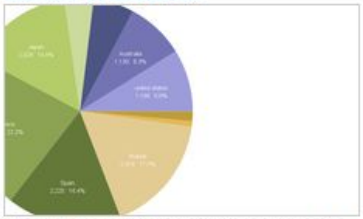
**Participate**
- Create a visualization
- Upload a data set
- Create a topic center
- Register

**Learn more**
- Quick start
- Visualization types
- About Many Eyes
- Privacy
- Blog

Visualizations Search

**Try our featured visualizations**

**Amount of people that smoke in a number of countries**



Amount of people that smoke in a number of countries

by Taylah

**Interstate arrivals Australia 1981-1985**

Interstate arrivals Australia 1981-1985

by wyattc

**Policy on Evolution Education**

By state - 2012

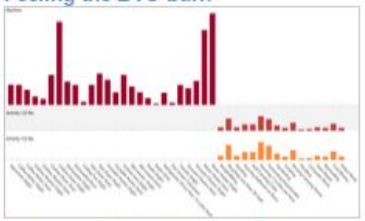
by walkmagazine

**Number of unimmunized infants against DTP3**

By country and continent - 2011

by StuartW

**Feeling the BTU burn**



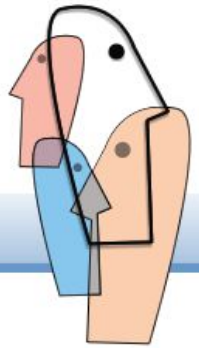
Energy burned by machine and body

by IanS

**Digital Government Strategy 2013**


Phrase Net visualization for Digital Government Strategy - May 2013.

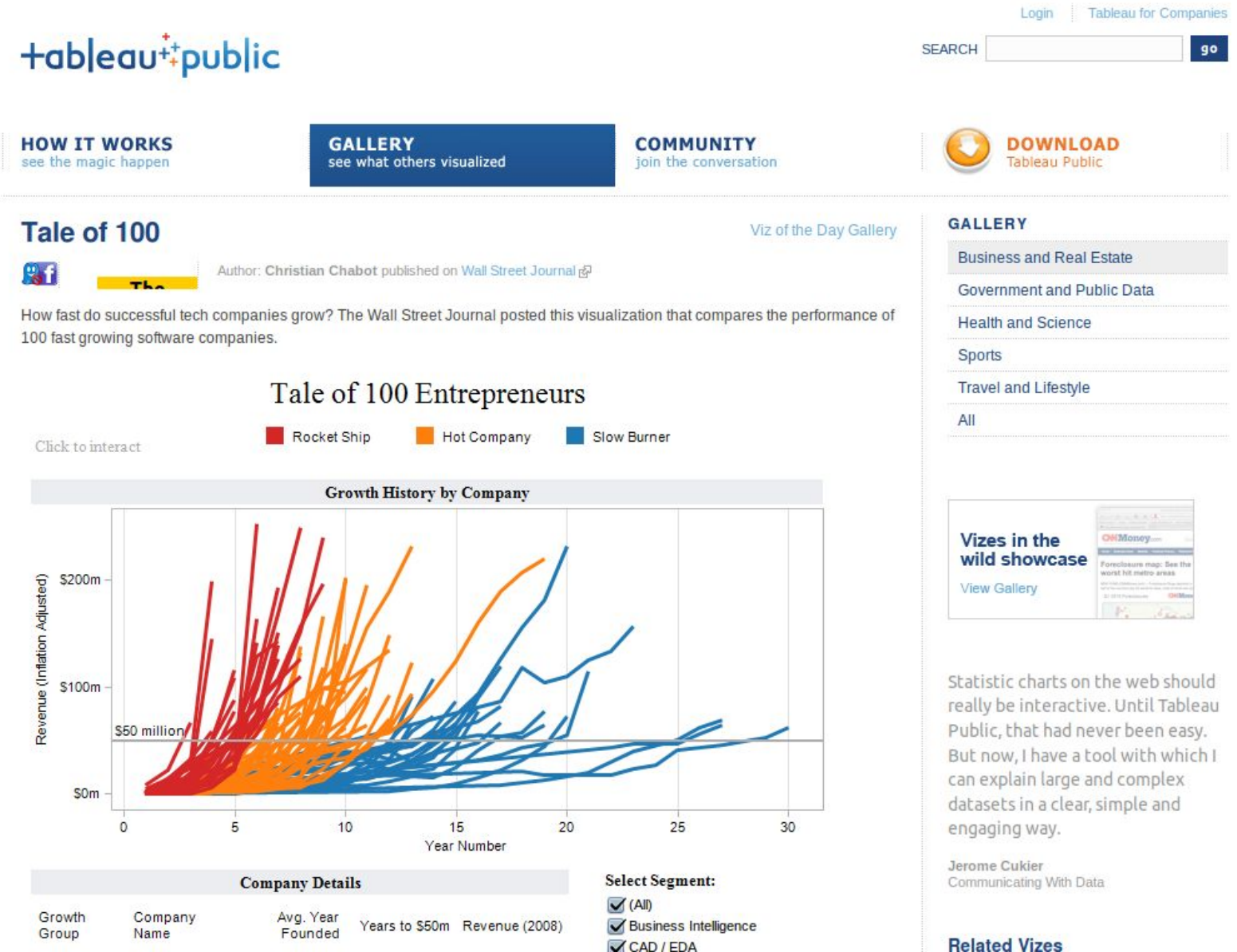
by TLissauer



*An experiment brought to you by* IBM Research *and* the IBM Cognos software group

# Introduction to Data Visualisation: Tools

## Visualisation – Tableau Public



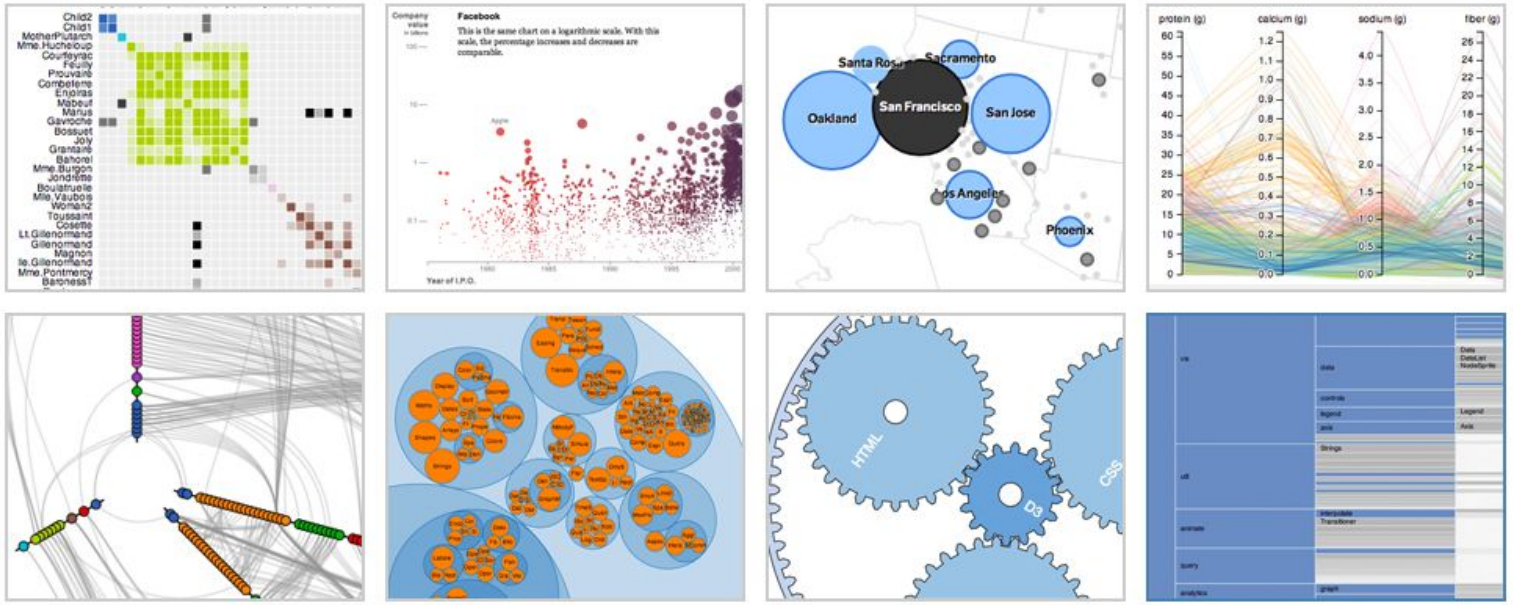
# Introduction to Data Visualisation: Tools

## Visualisation – D3.js

Overview Examples Documentation Source

Fork me on GitHub

# Data-Driven Documents




**D3.js** is a JavaScript library for manipulating documents based on data. **D3** helps you bring data to life using HTML, SVG and CSS. D3's emphasis on web standards gives you the full capabilities of modern browsers without tying yourself to a proprietary framework, combining powerful visualization components and a data-driven approach to DOM manipulation.

See more examples.

Download the latest version here:

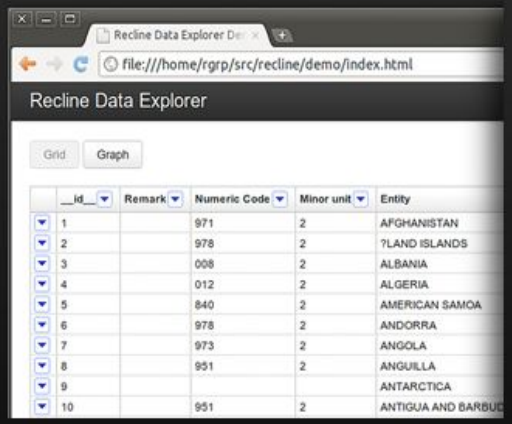
- d3.v2.js - development
- d3.v2.min.js - production (minified)

# Introduction to Data Visualisation: Tools

## Visualisation – Recline.js

Recline.js – relax with your data

Documentation | Tutorials | Demos | Download | GitHub




Recline.js
relax with your data

A simple but powerful library for building data applications in pure Javascript and HTML.

Use the Library »

Recline.js is freely redistributable under the terms of the MIT license.

SHUTTLEWORTH FUNDED

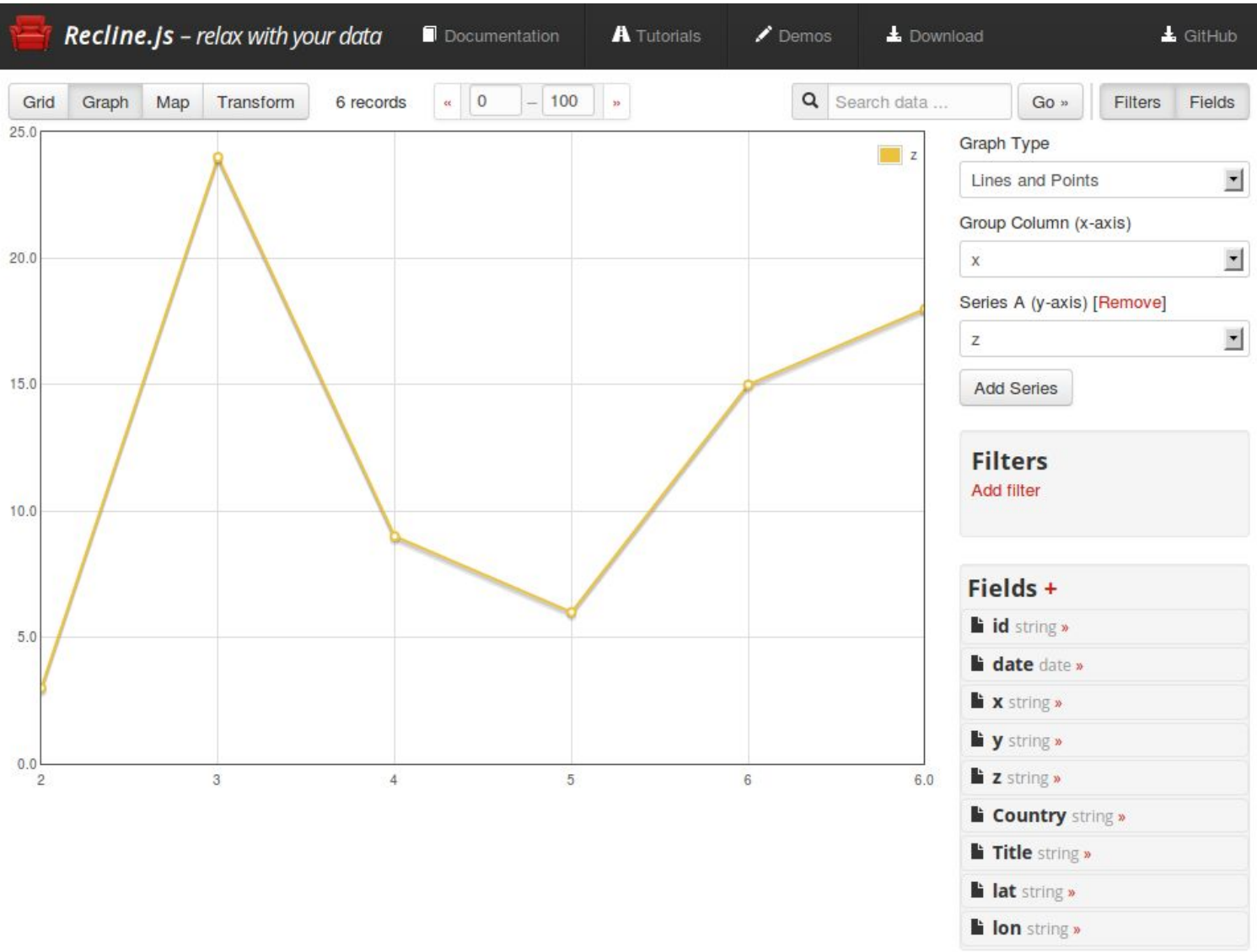
- The DataHub
- OpenSpending.org
- DataCouch.com

- Open Knowledge Foundation Labs
- Open Definition
- Open Knowledge Foundation

**Contacts**
@ReclineJS
@maxogden
@rufuspollock

# Introduction to Data Visualisation: Tools

## Visualisation – Recline.js



# Introduction to Data Visualisation: Tools
## Visualisation – Google Chart Tools

Home **Products** Events Showcase Live Groups

Google Chart Tools

- Overview
- Examples and Tools
- Community
- About Chart Tools
- Related Chart Tools

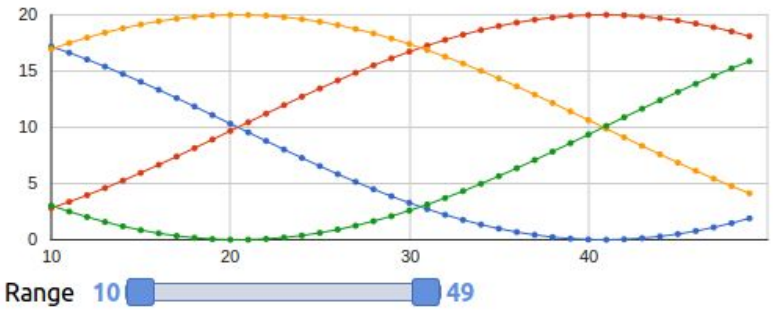
Terms of Service

**Display live data on your site**

Google chart tools are powerful, simple to use, and free. Try out our rich gallery of interactive charts and data tools.

Get Started

**Controls and Dashboards** - view source




more

### Rich Gallery

Choose from a variety of charts. From simple scatter plots to hierarchical treemaps, find the best fit for your data.

### Customizable

Make the charts your own. Configure an extensive set of options to perfectly match the look and feel of your website.

### HTML5 / SVG

Cross-browser compatibility (adopting VML for older IE versions) and cross-platform portability to iOS and new Android releases. No plugins are needed.

# Introduction to Data Visualisation: Tools

## Visualisation – Wordle

# Introduction to Data Visualisation: Tools

## Visualisation – Inkscape