ICSSR Research Methodology Workshop
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Data Visualisation:
Types, Principles, and Tools

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THE CENTRE FOR internet & society

The Centre for Internet and Society
cis-india.org

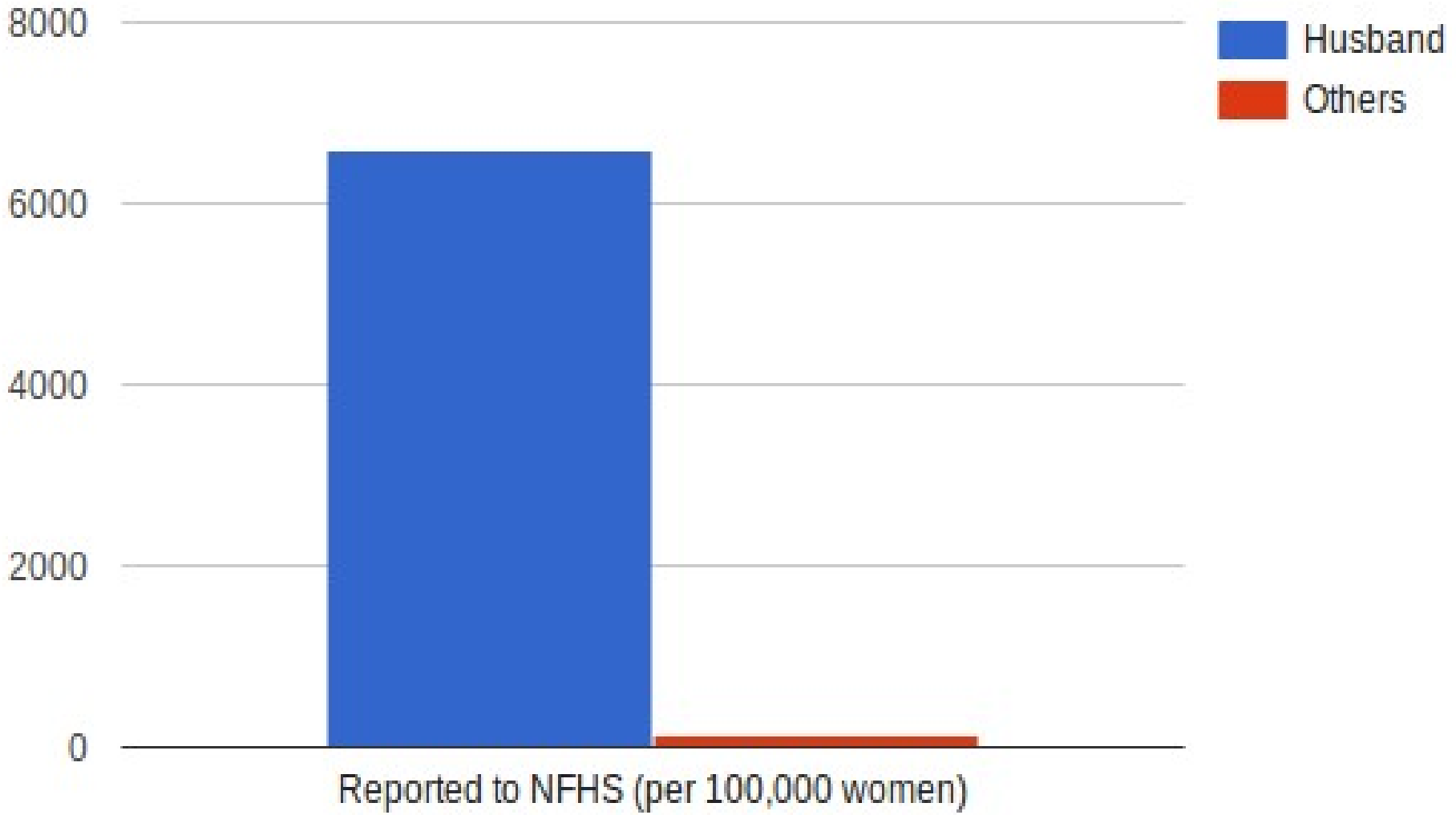
Established in 2008. Offices in Bengaluru and Delhi.

Works on issues of Internet governance and telecommunication policy, open knowledge and accessibility, privacy and cyber-security.

My work focuses on openness and e-governance policies, and critical research on internet and society in India.

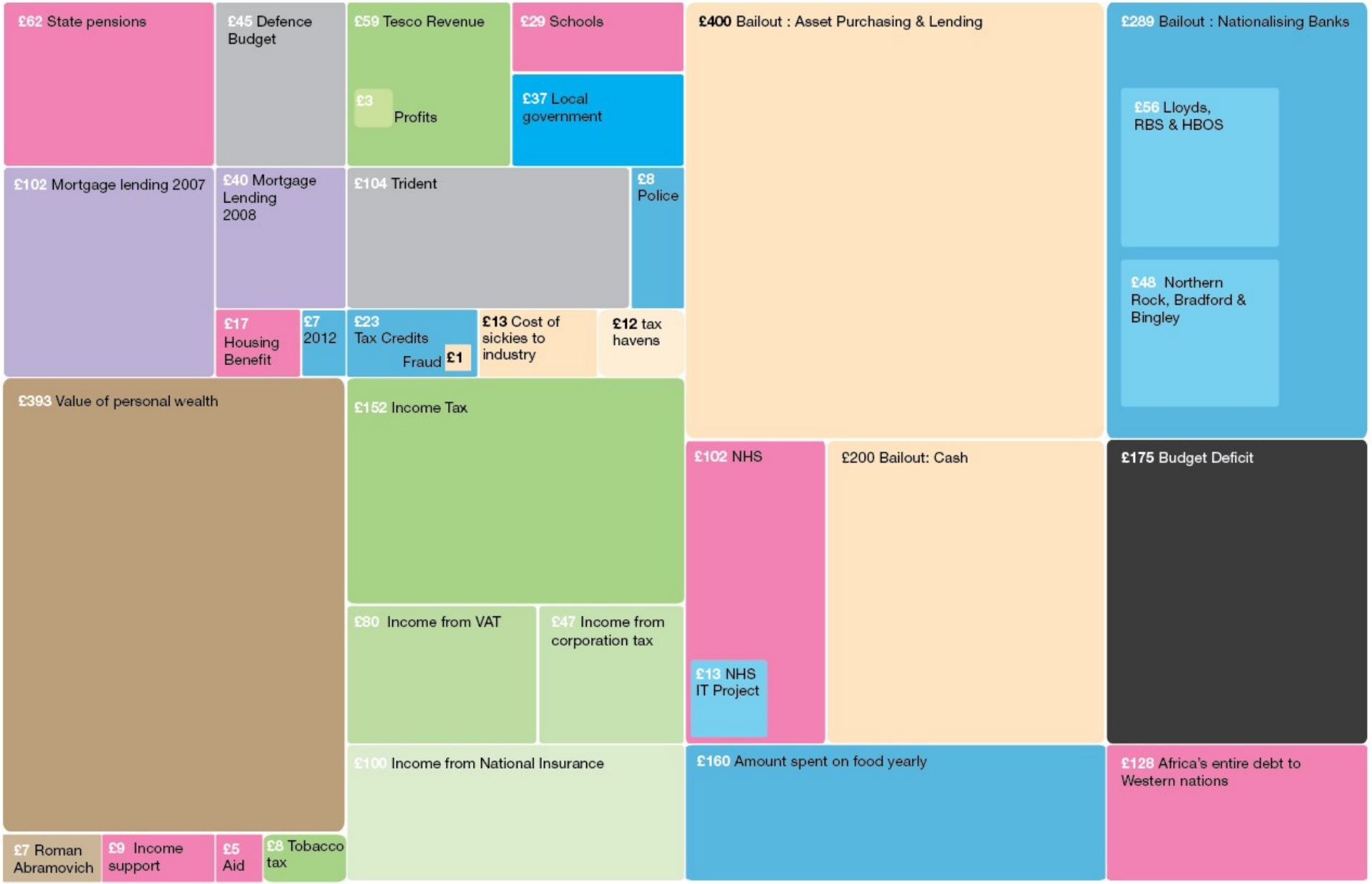
Sexual Violence in India

Rukmini S, The Hindu



The Billion Pound-o-Gram

David McCandless

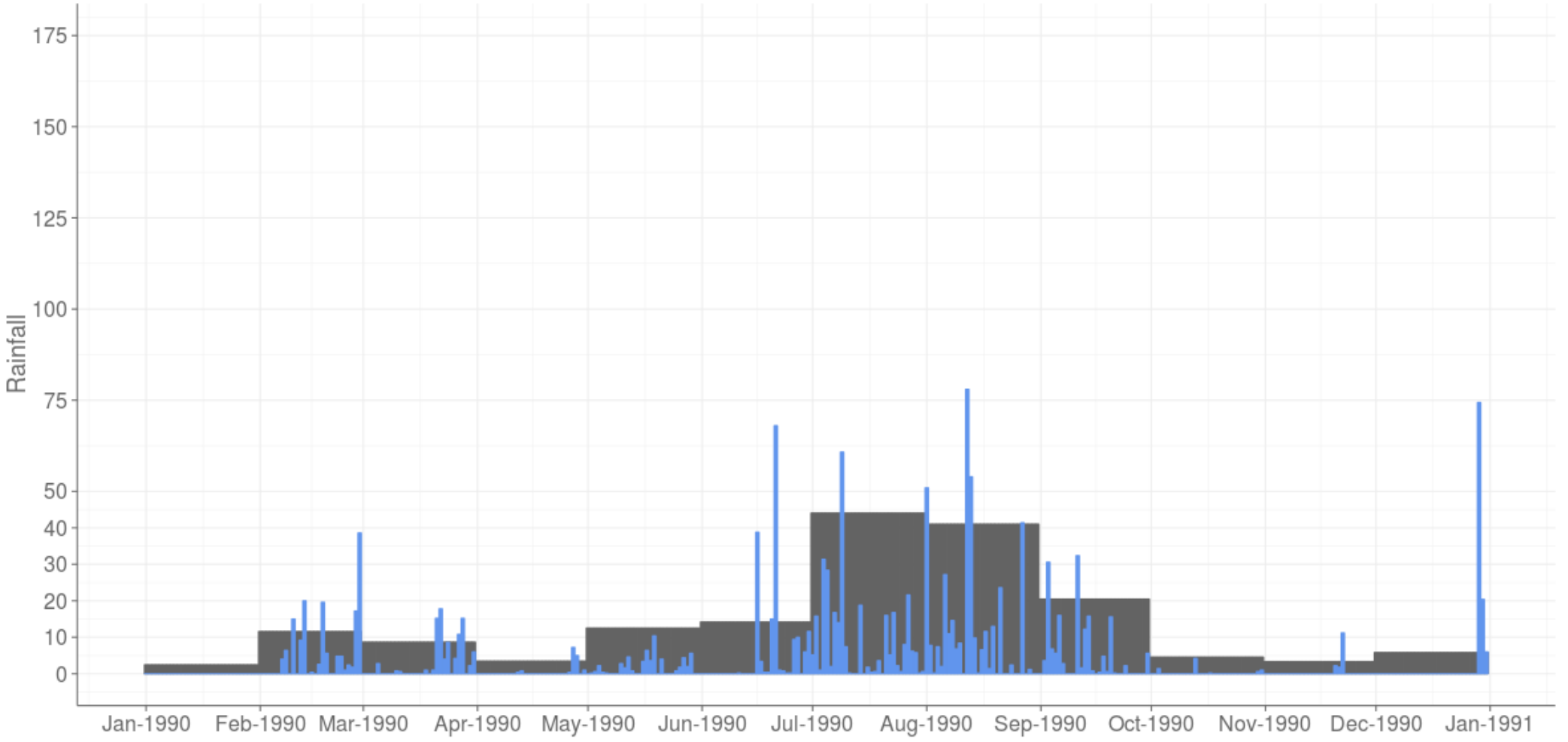


Cholera Map, London, 1854

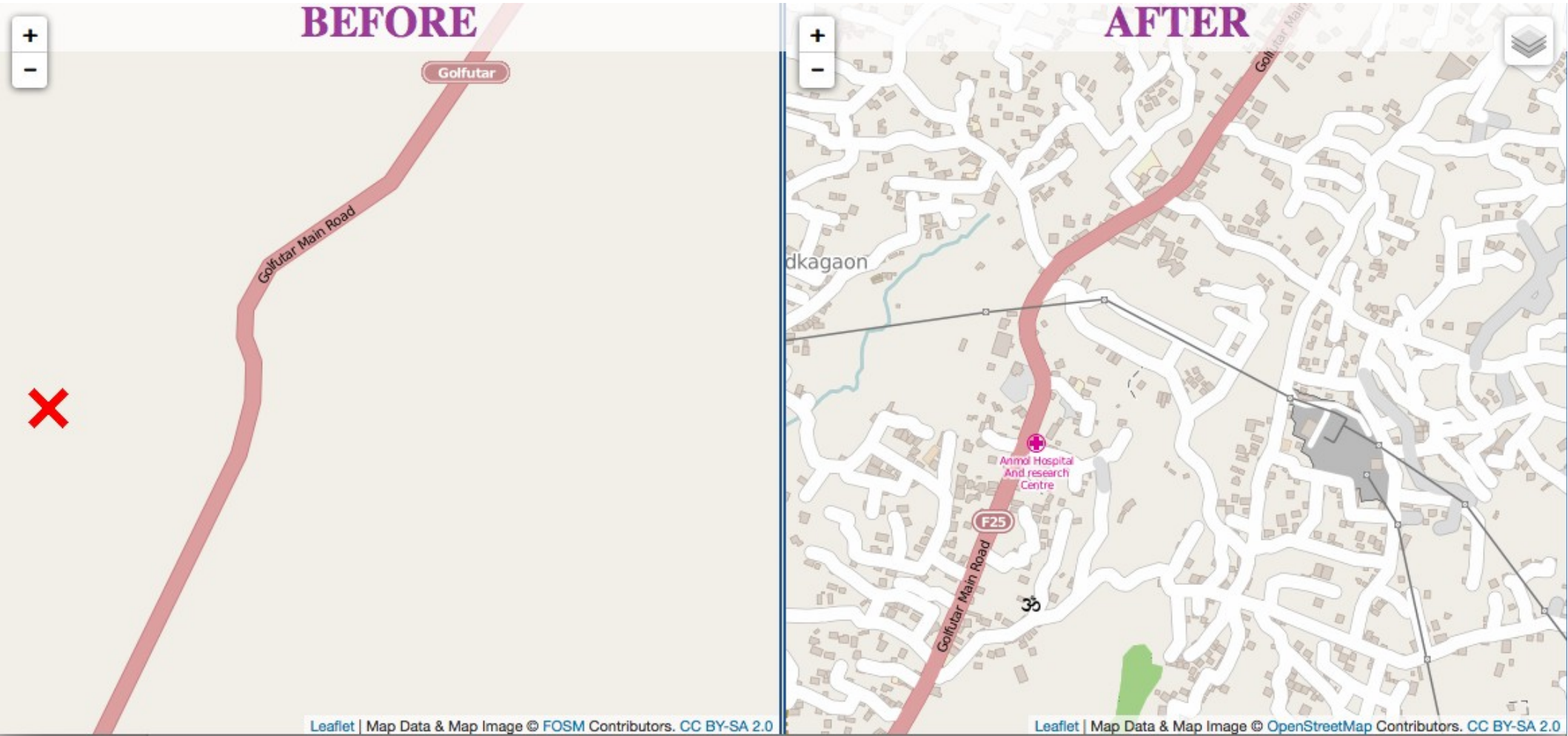
John Snow

Rainfall in Kausani, 1990

India Water Portal



OpenStreetMap - Kathmandu
Contributions by Volunteers



What is Data?

- It depends on the context
- It depends on the question
- It depends on the (hypothetical) answer

Types of Data

- **Quantitative**
  - Discrete
  - Continuous
  - Categorical
- **Qualitative**
  - Quantified
  - Not-quantified
- **Spatial**
  - Rastar
  - Vector

Types of Data Relationship

- Comparison
- Ranking
- Part-to-Whole
- Distribution
- Time Series
- Map
- Correlation

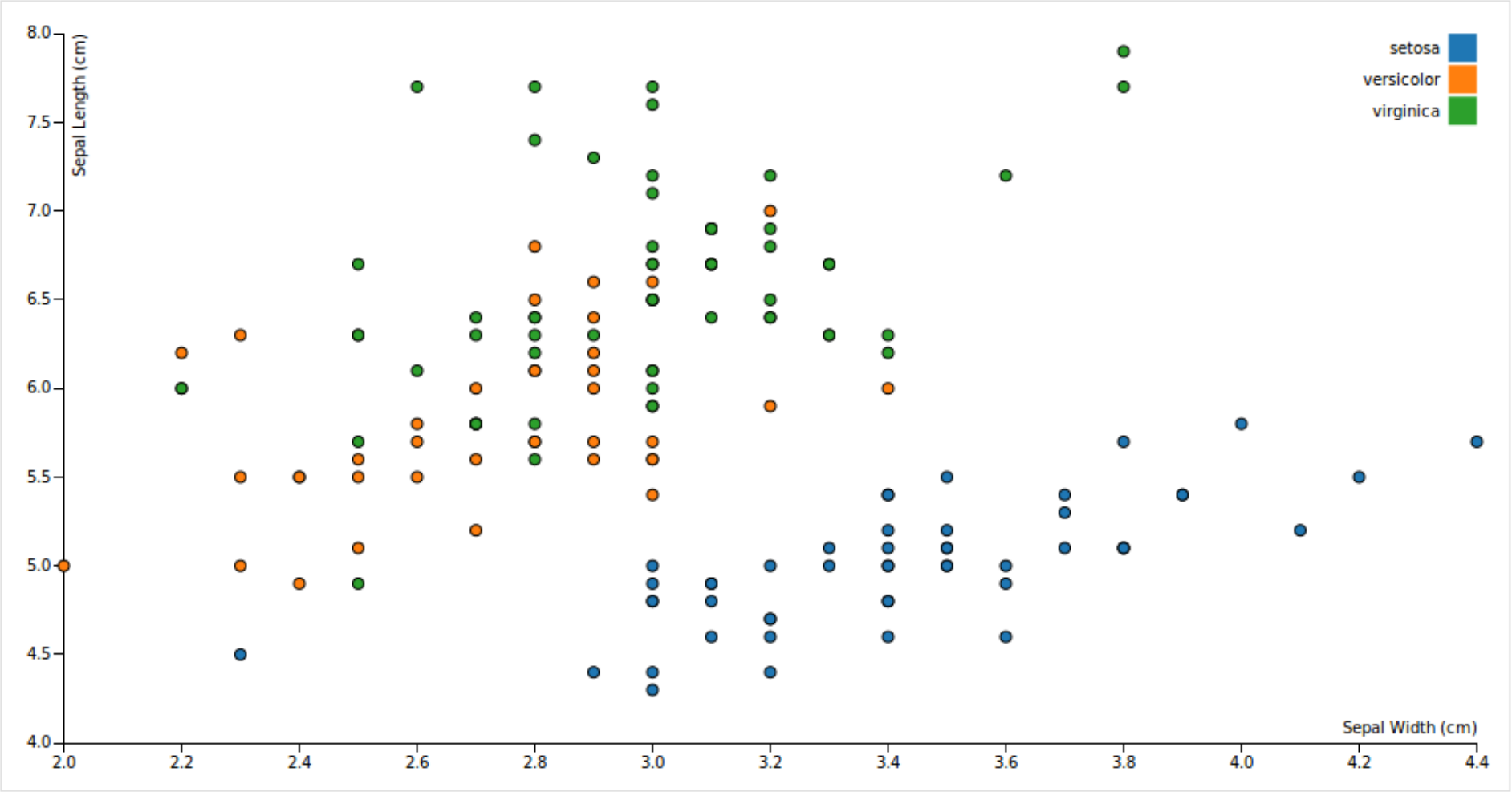
Types of Data Visualisation

- **Various:** Scatterplot, Line Chart, Area Chart, and Bar Chart
- **Part-to-Whole:** Pie Chart, Tree Map, and Parallel Sets
- **Multiple Variables:** Radar Chart and Bubble Chart
- **Time:** Time Line, Flow Chart, and Steam Graph
- **Space:** Choropleth, Heatmap, Flow Map, and Cartogram

Types of Data Visualisation

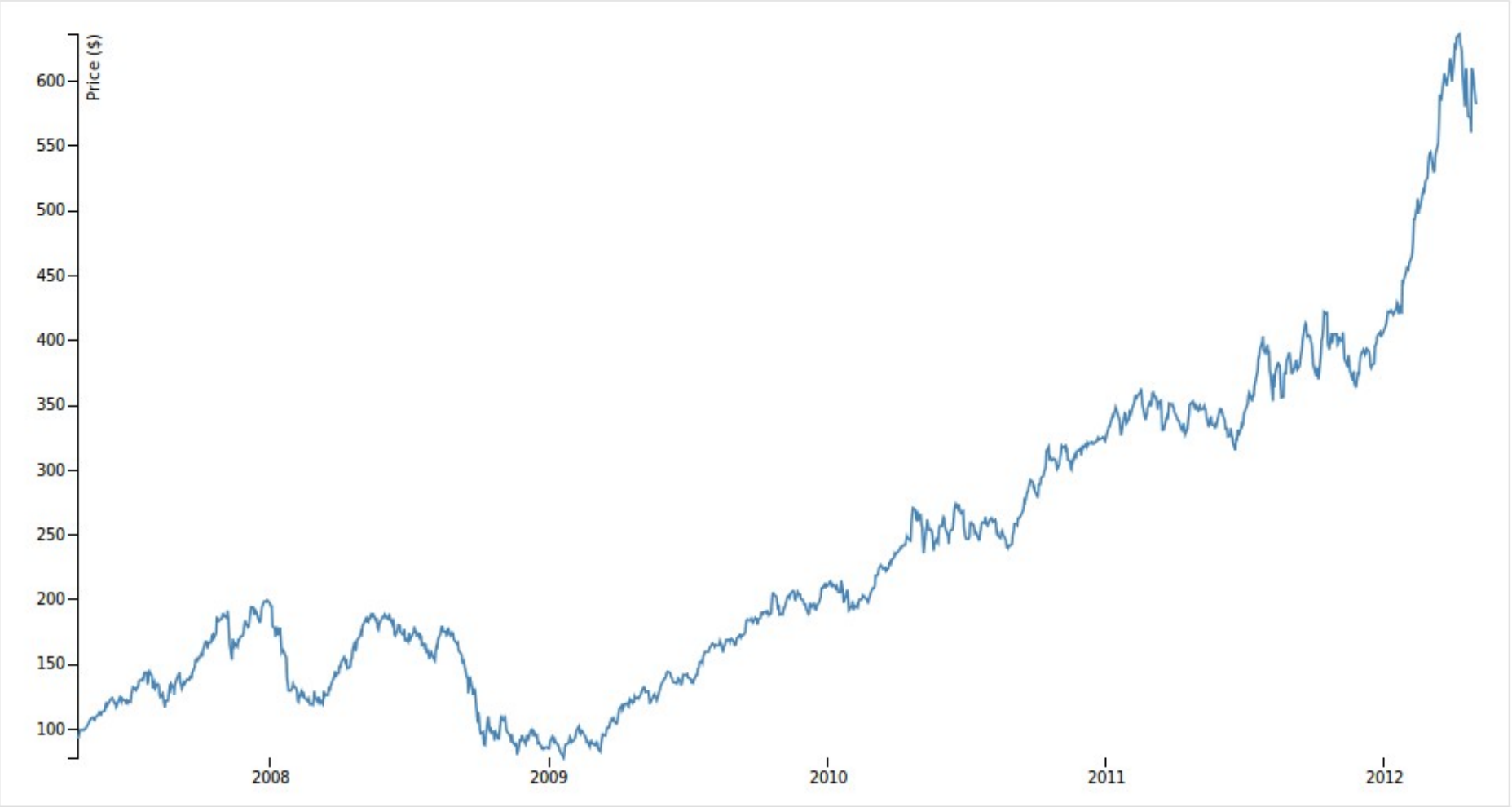
Various

Types of Data Visualisation
Scatterplot



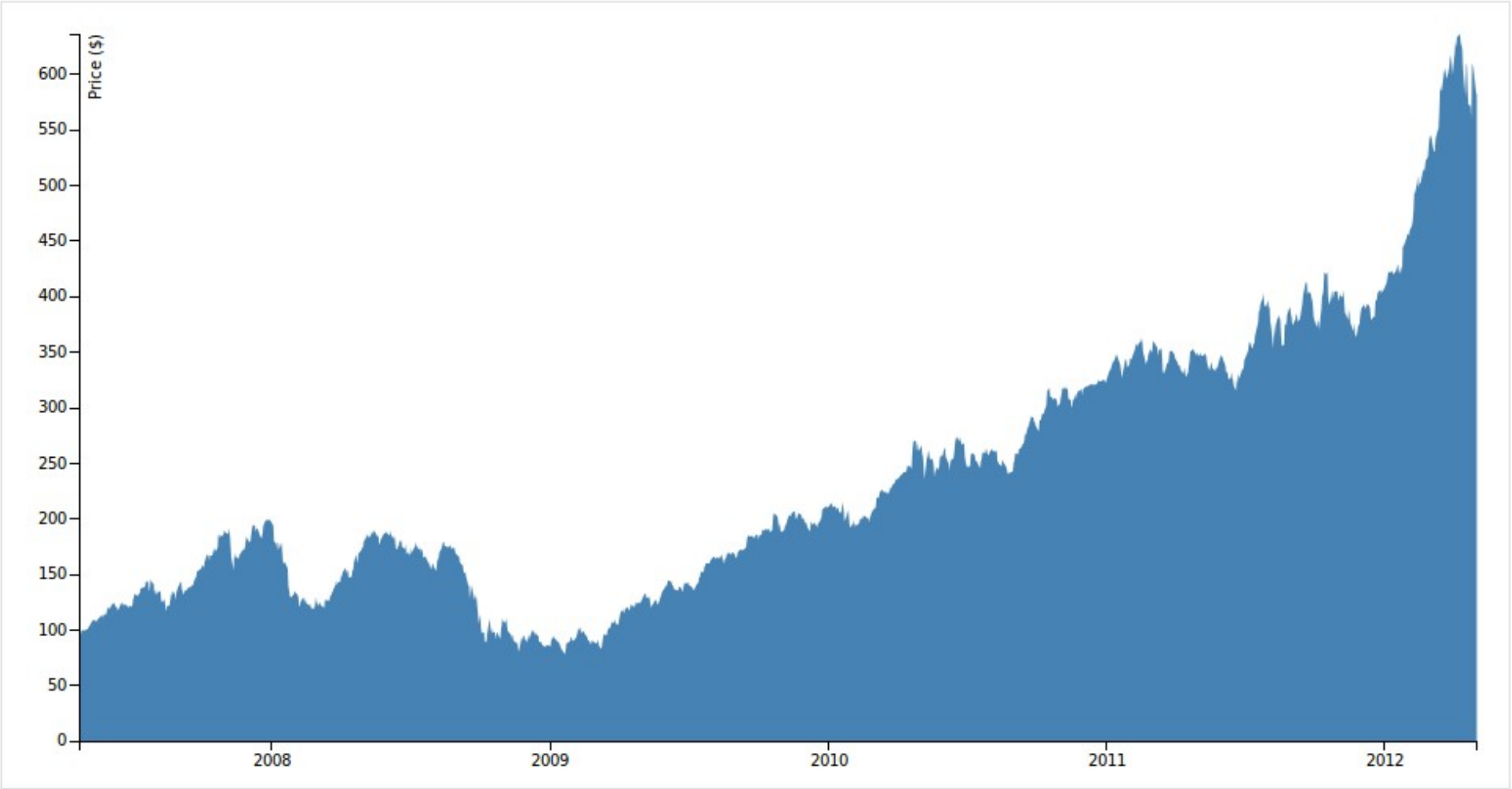
Types of Data Visualisation

Line Chart



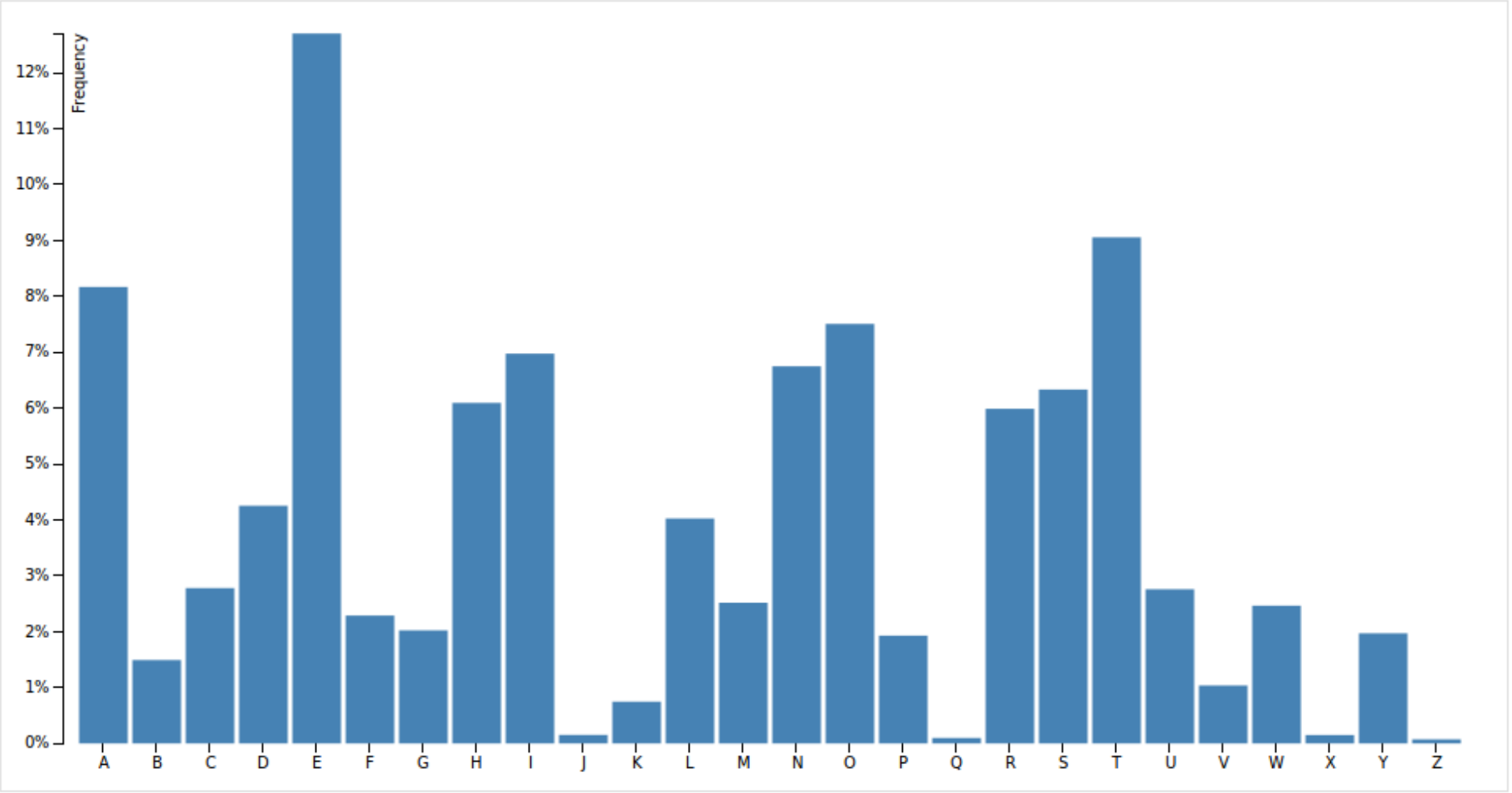
Types of Data Visualisation

Area Chart



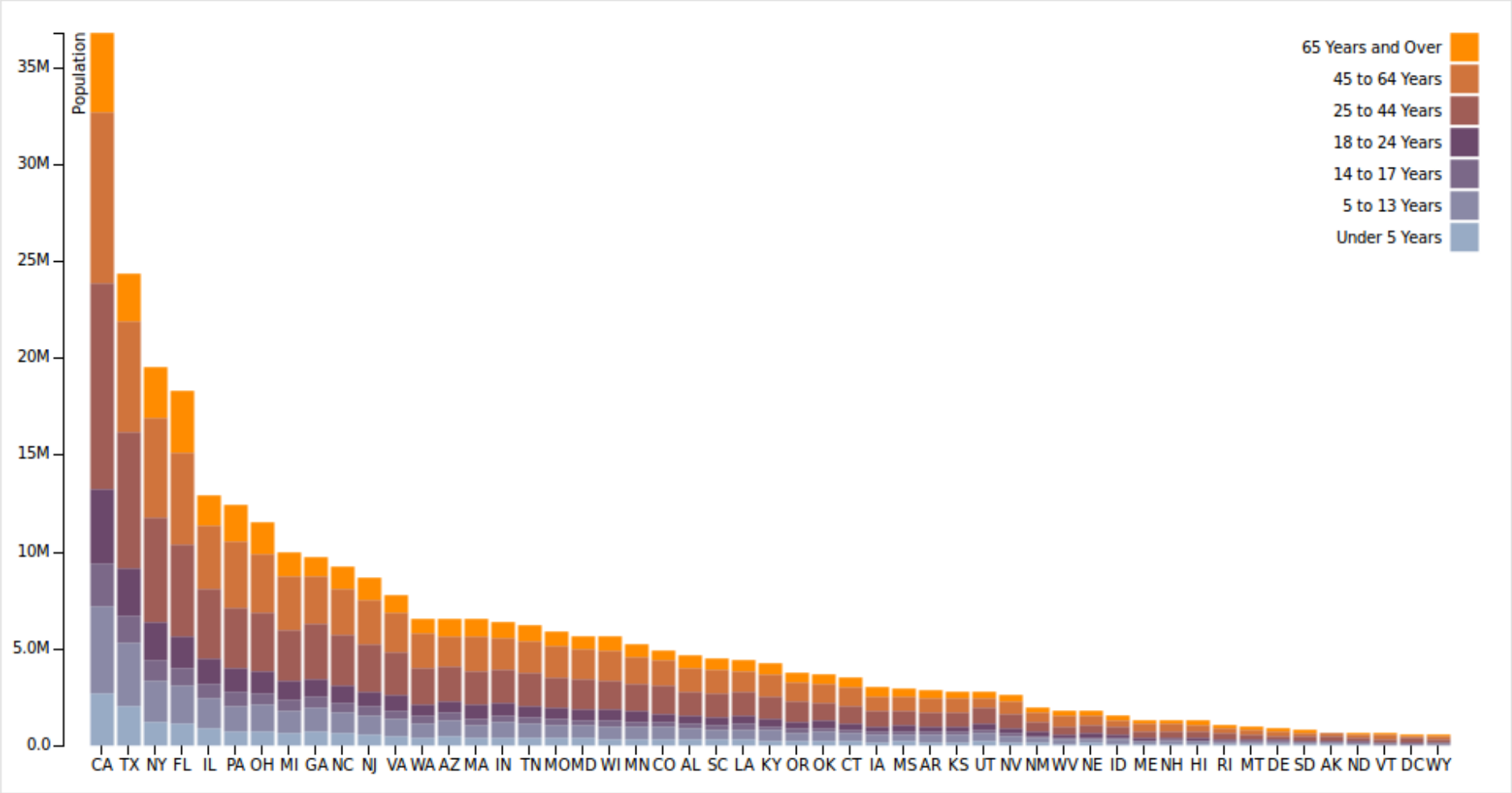
Types of Data Visualisation

Bar Chart

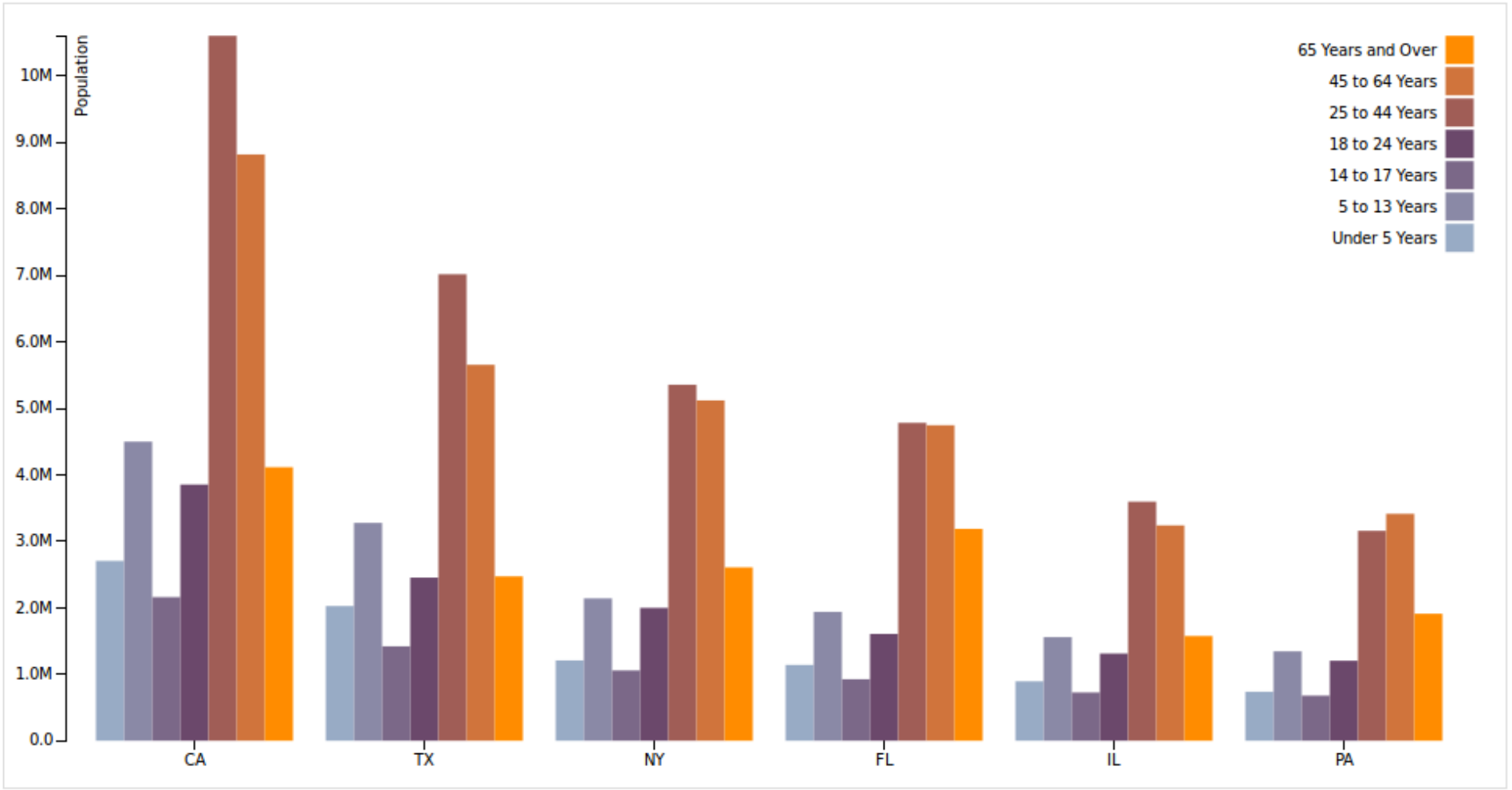


Types of Data Visualisation

Stacked Bar Chart



Types of Data Visualisation
Grouped Bar Chart

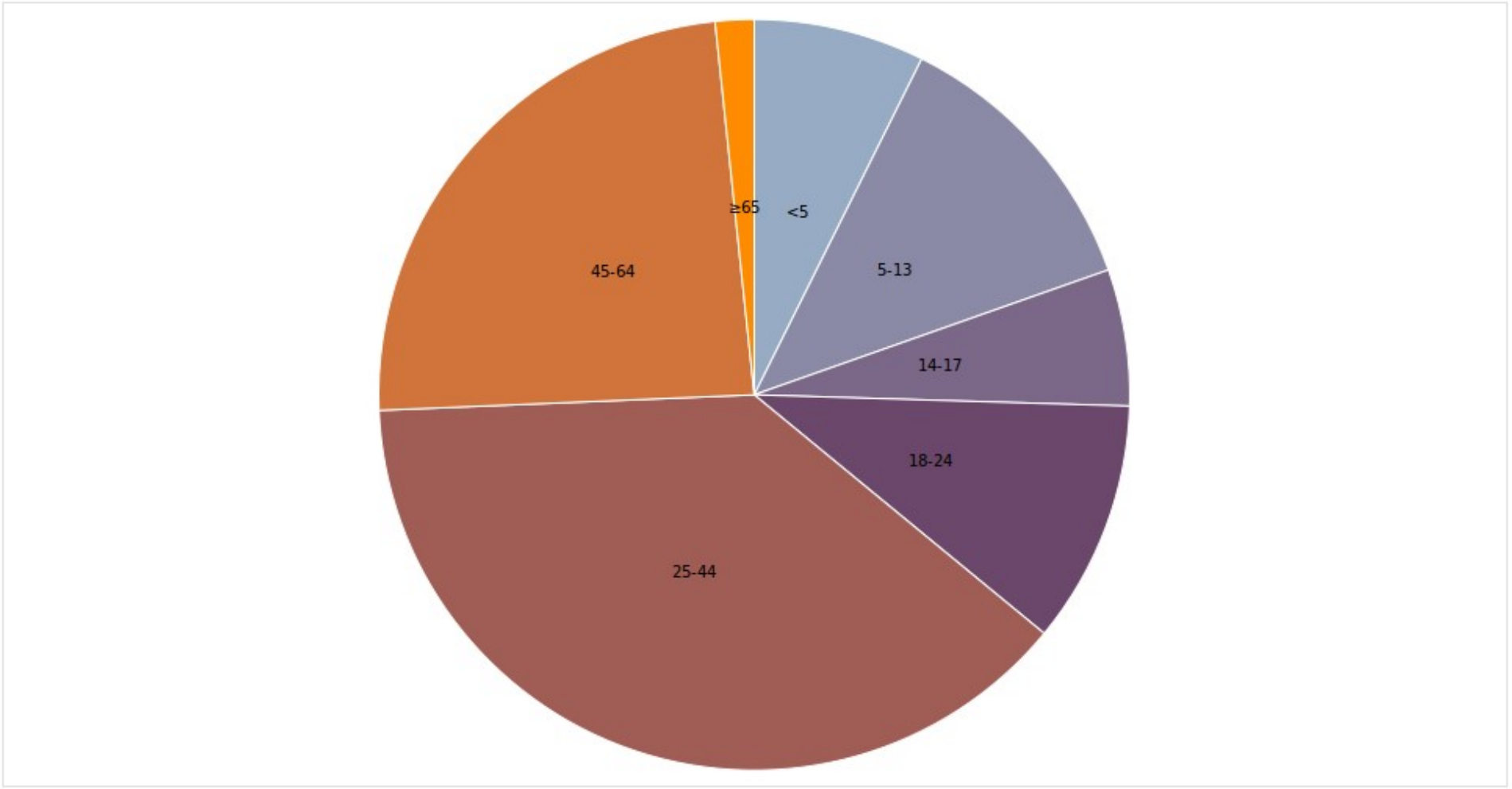


Types of Data Visualisation

Part-to-Whole

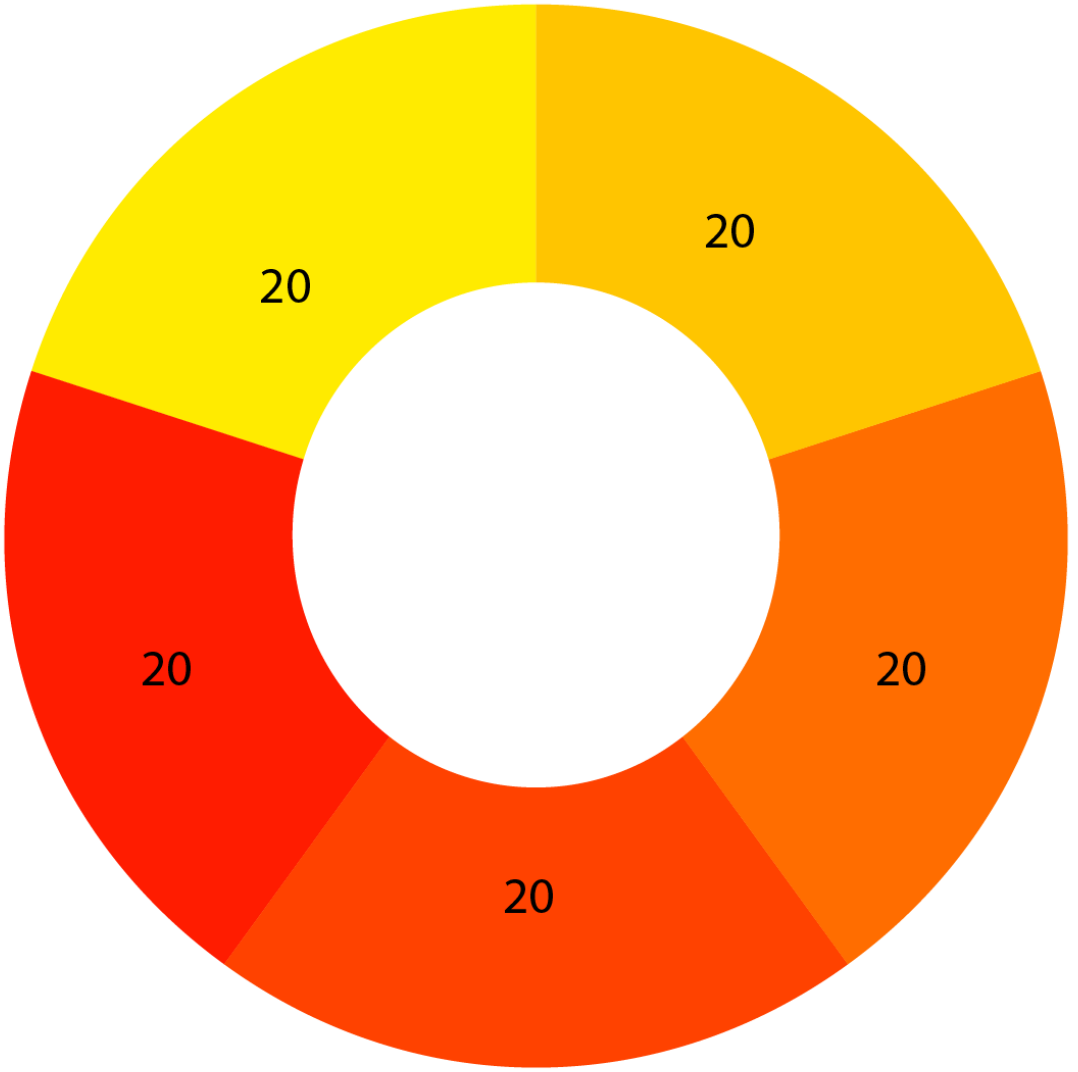
Types of Data Visualisation

Pie Chart

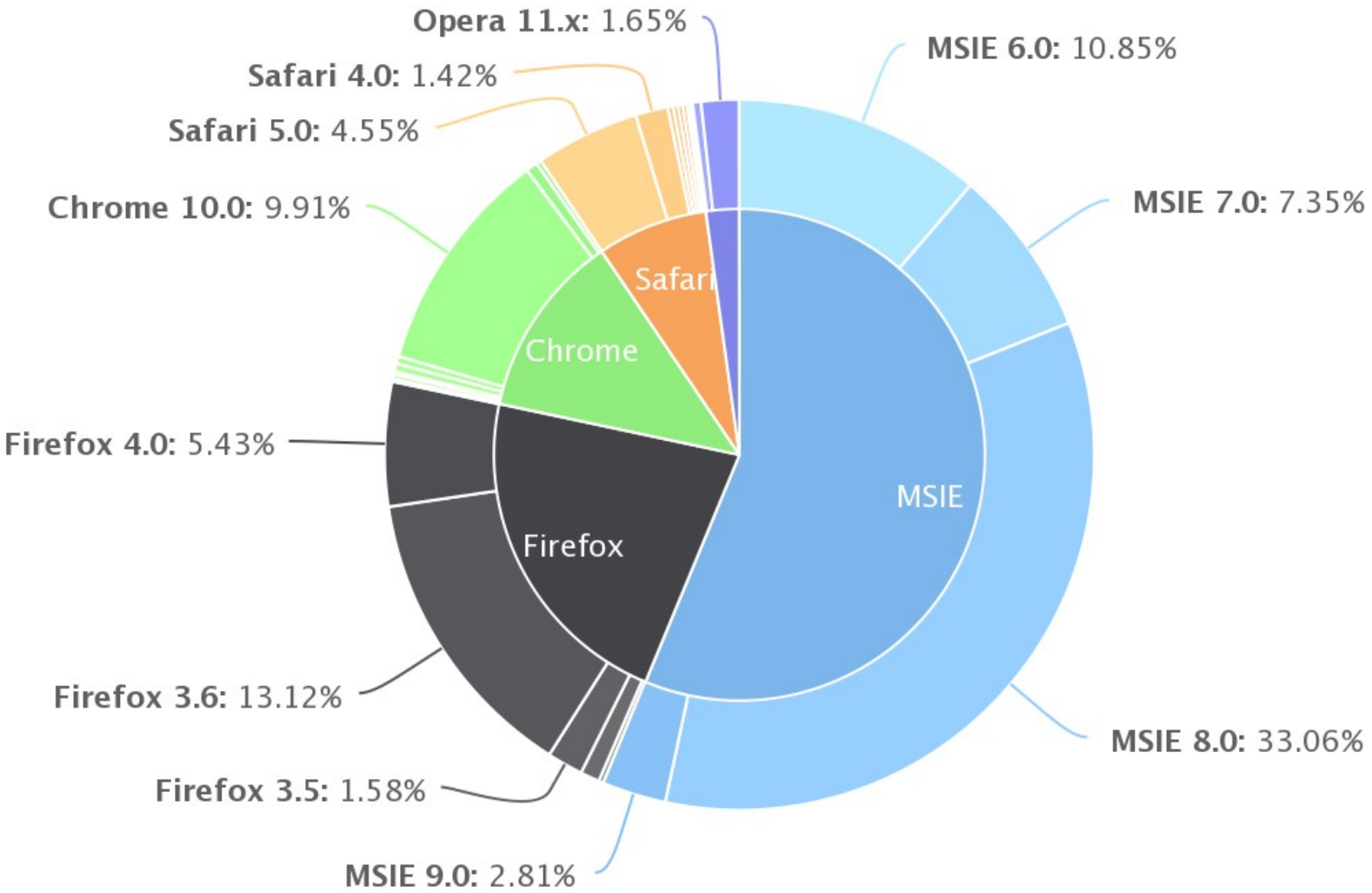


Types of Data Visualisation

Doughnut Chart

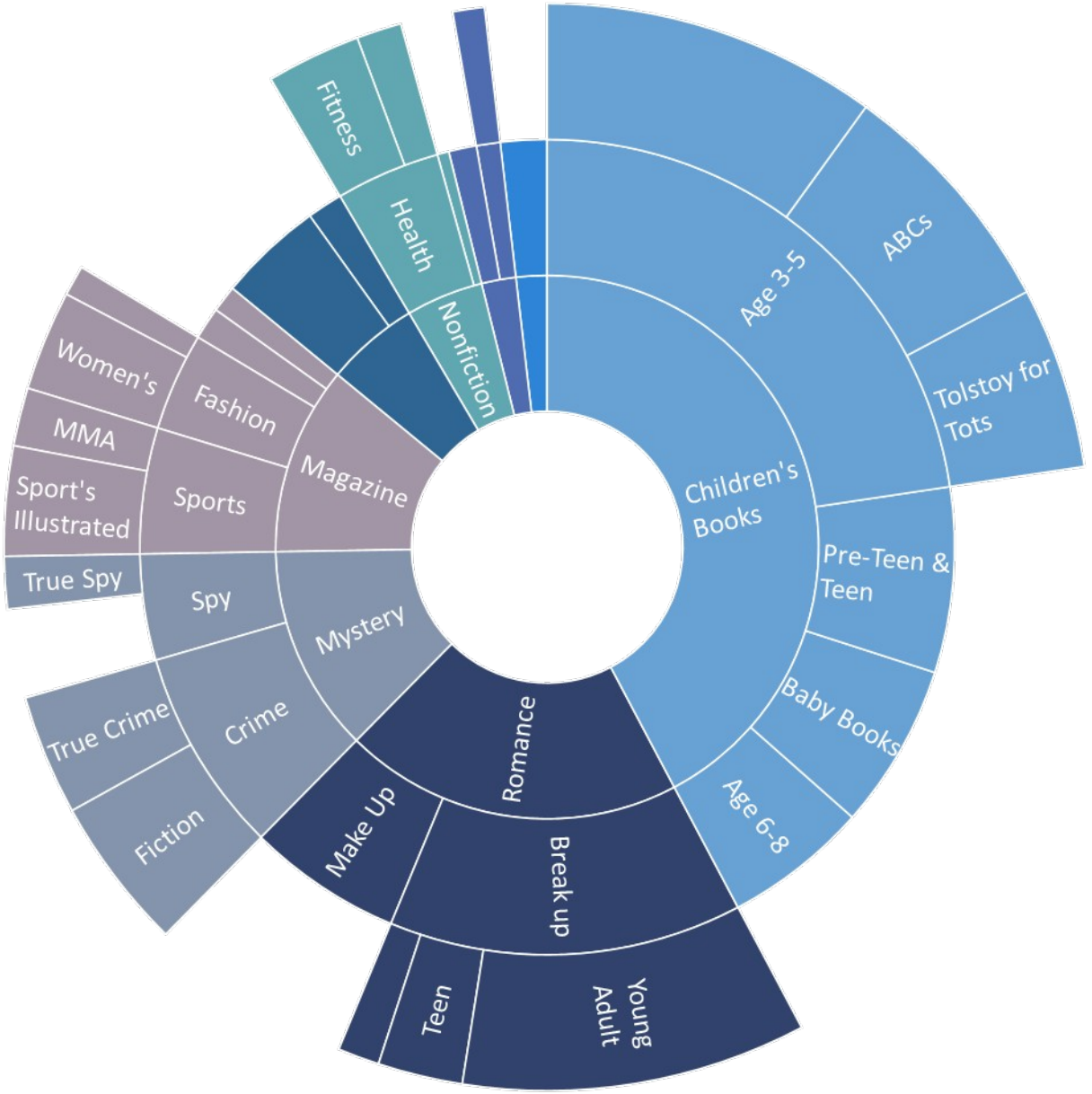


Types of Data Visualisation
Pie Chart (Two Layers)



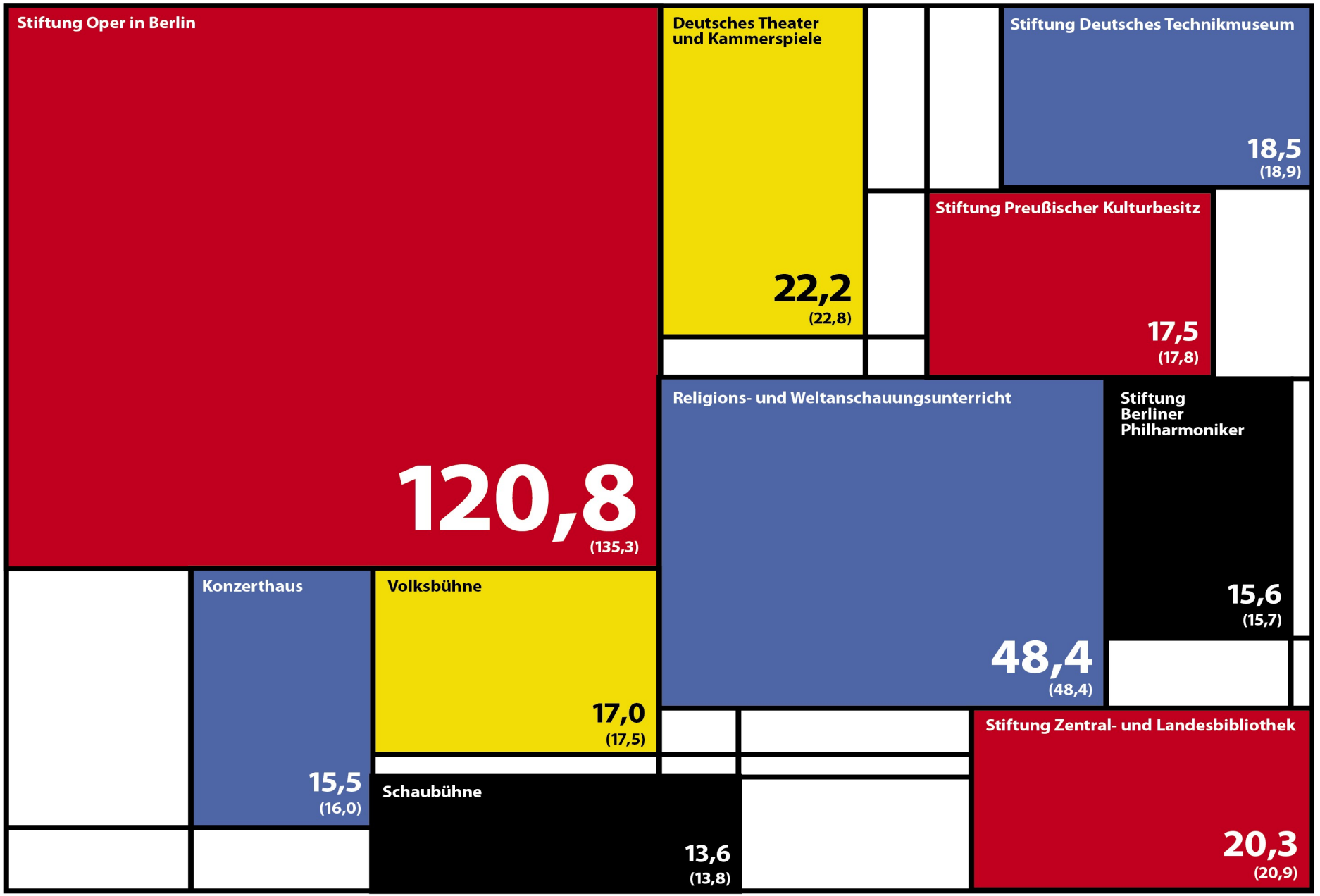
Types of Data Visualisation

Sunburst



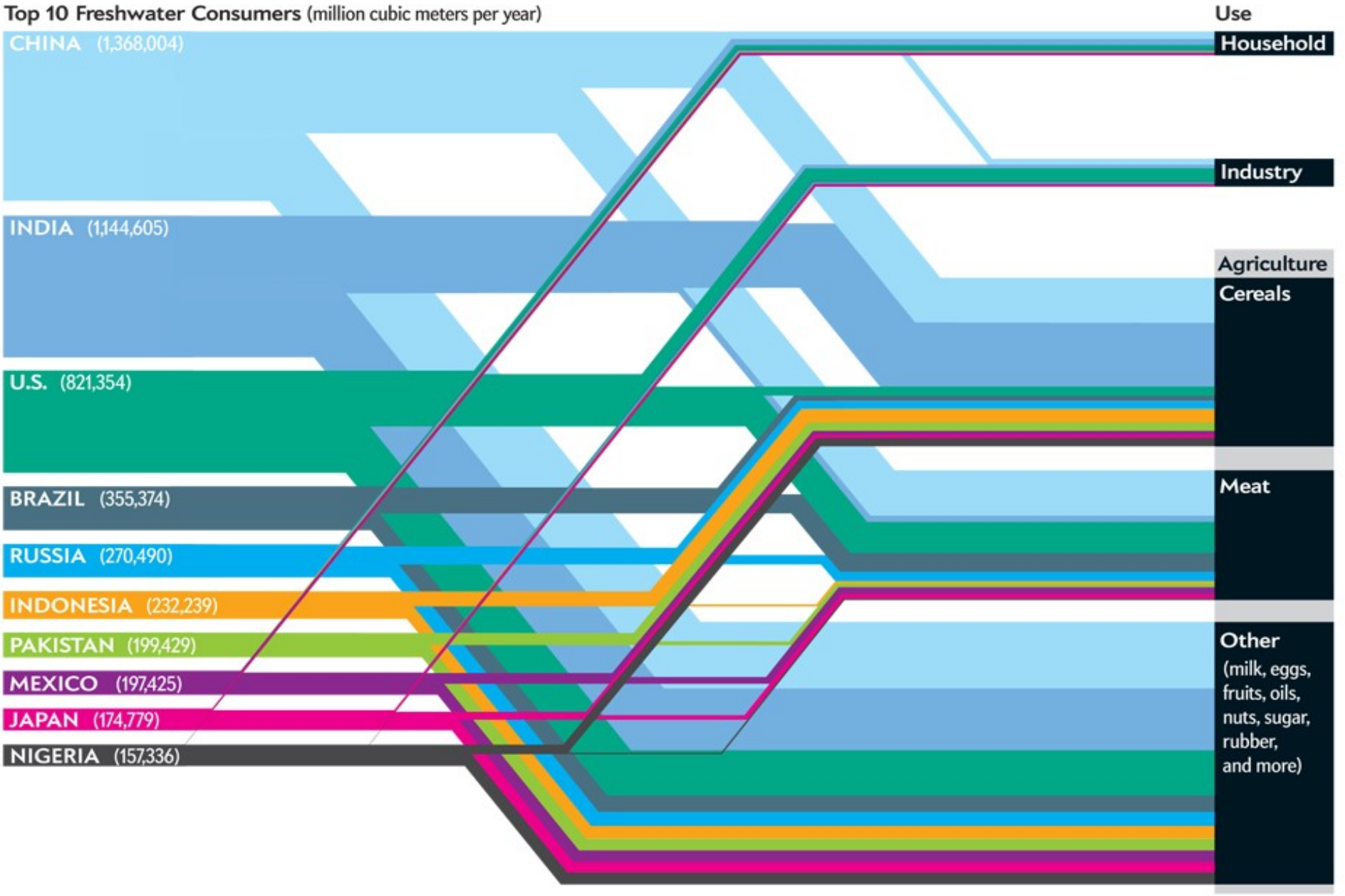
Types of Data Visualisation

Treemap



Types of Data Visualisation

Parallel Sets

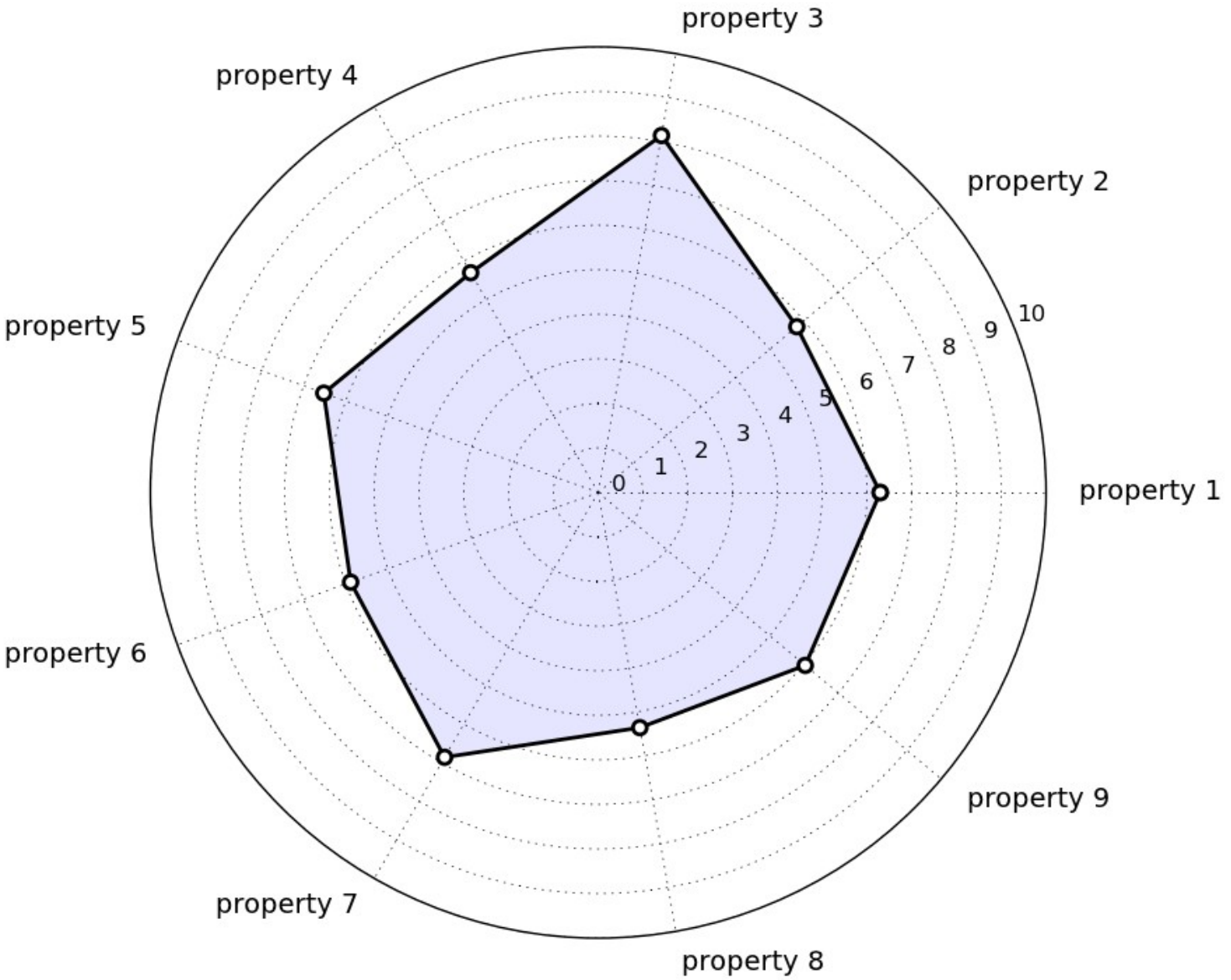


Types of Data Visualisation

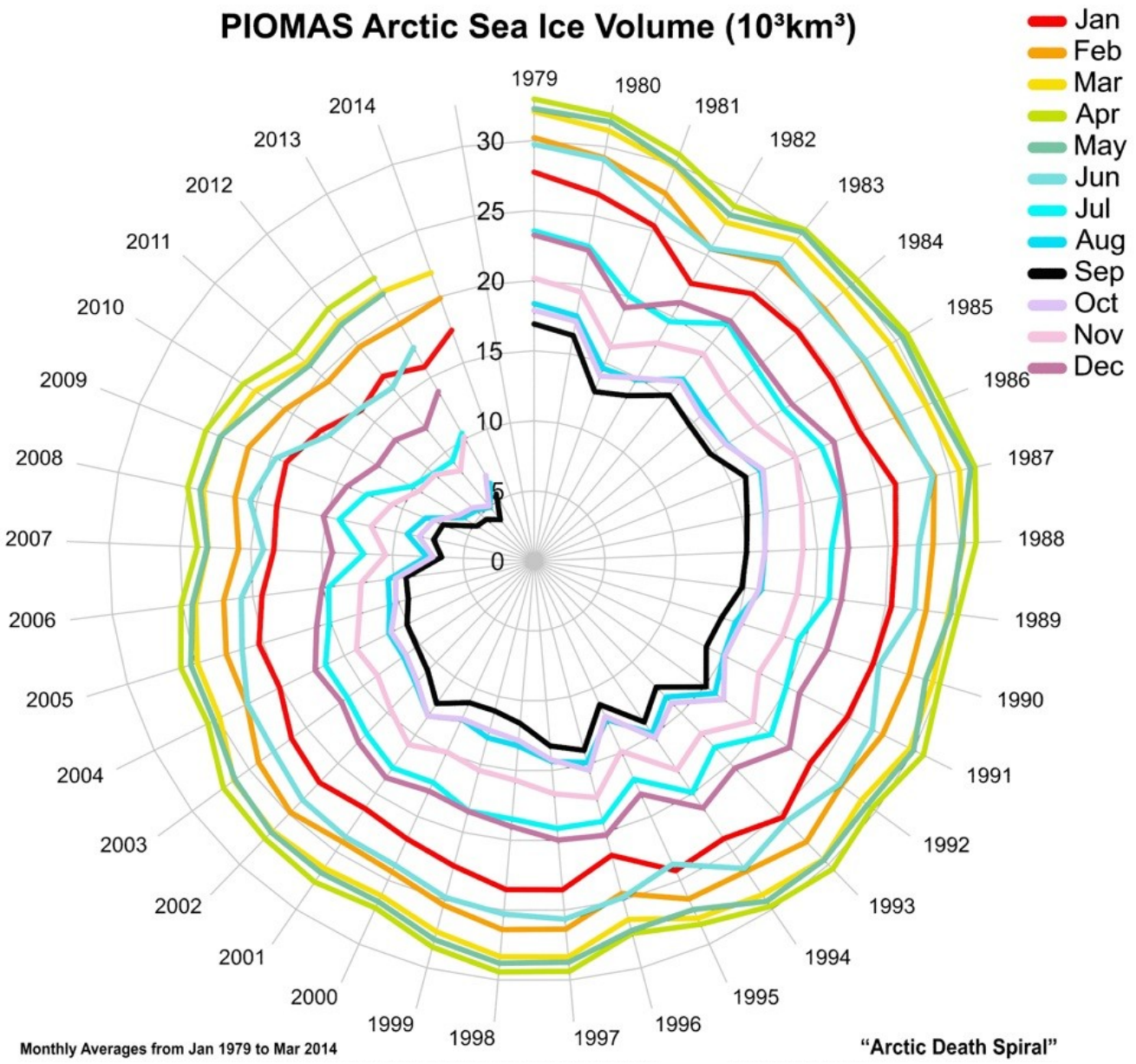
Multiple Variables

Types of Data Visualisation

Radar Chart (Discrete)

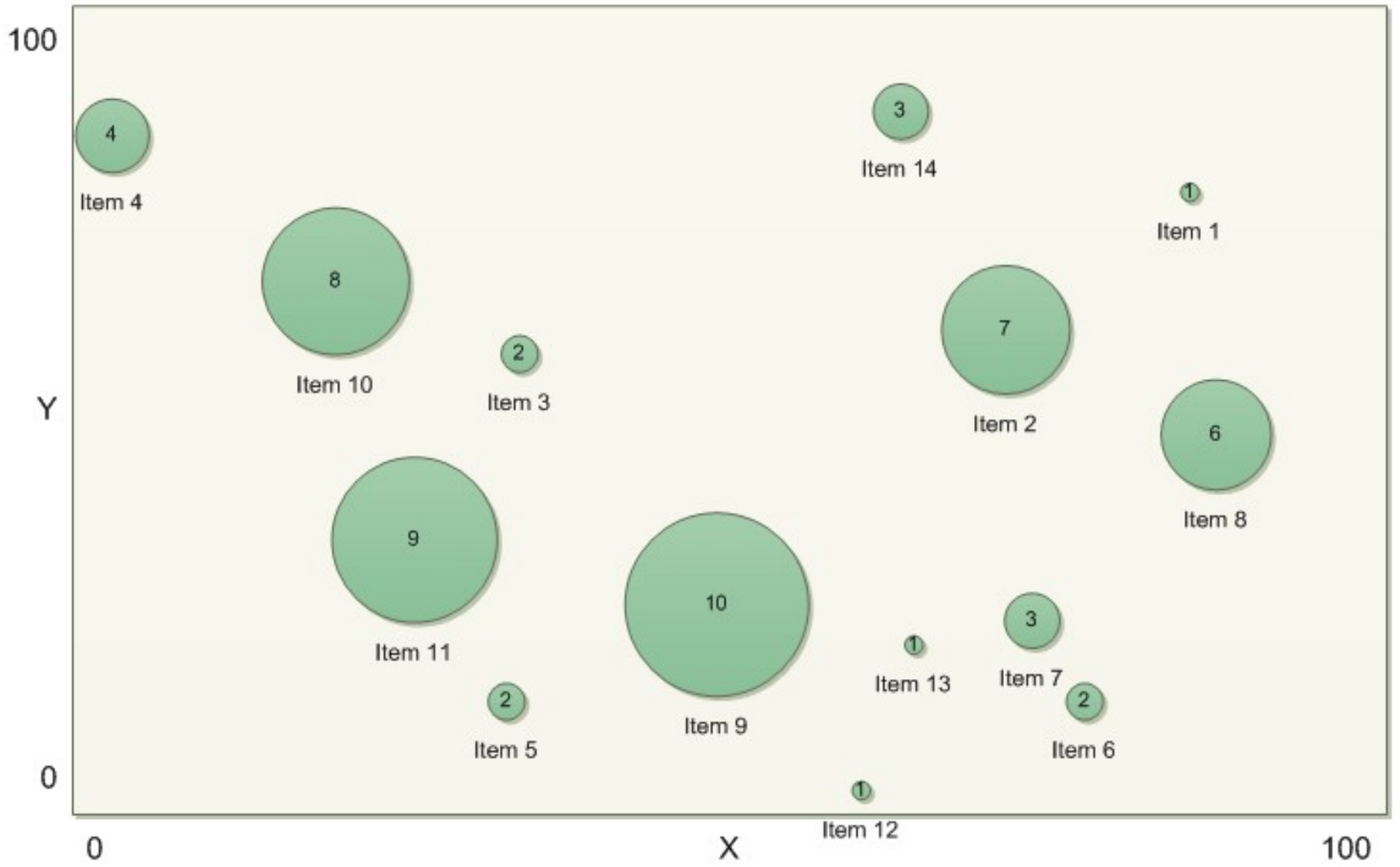


Types of Data Visualisation
Radar Chart (Continuous)



Types of Data Visualisation

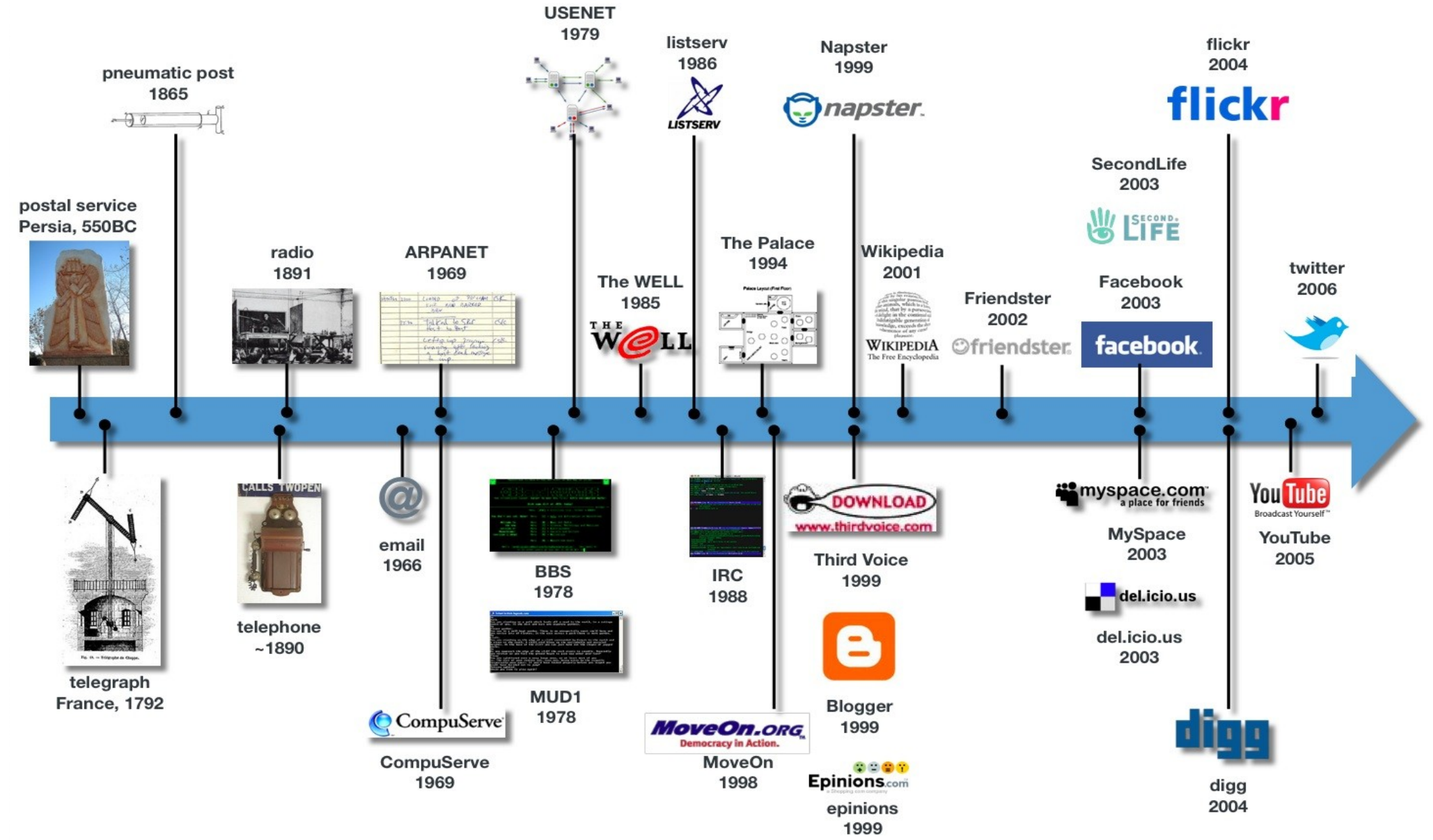
Bubble Chart



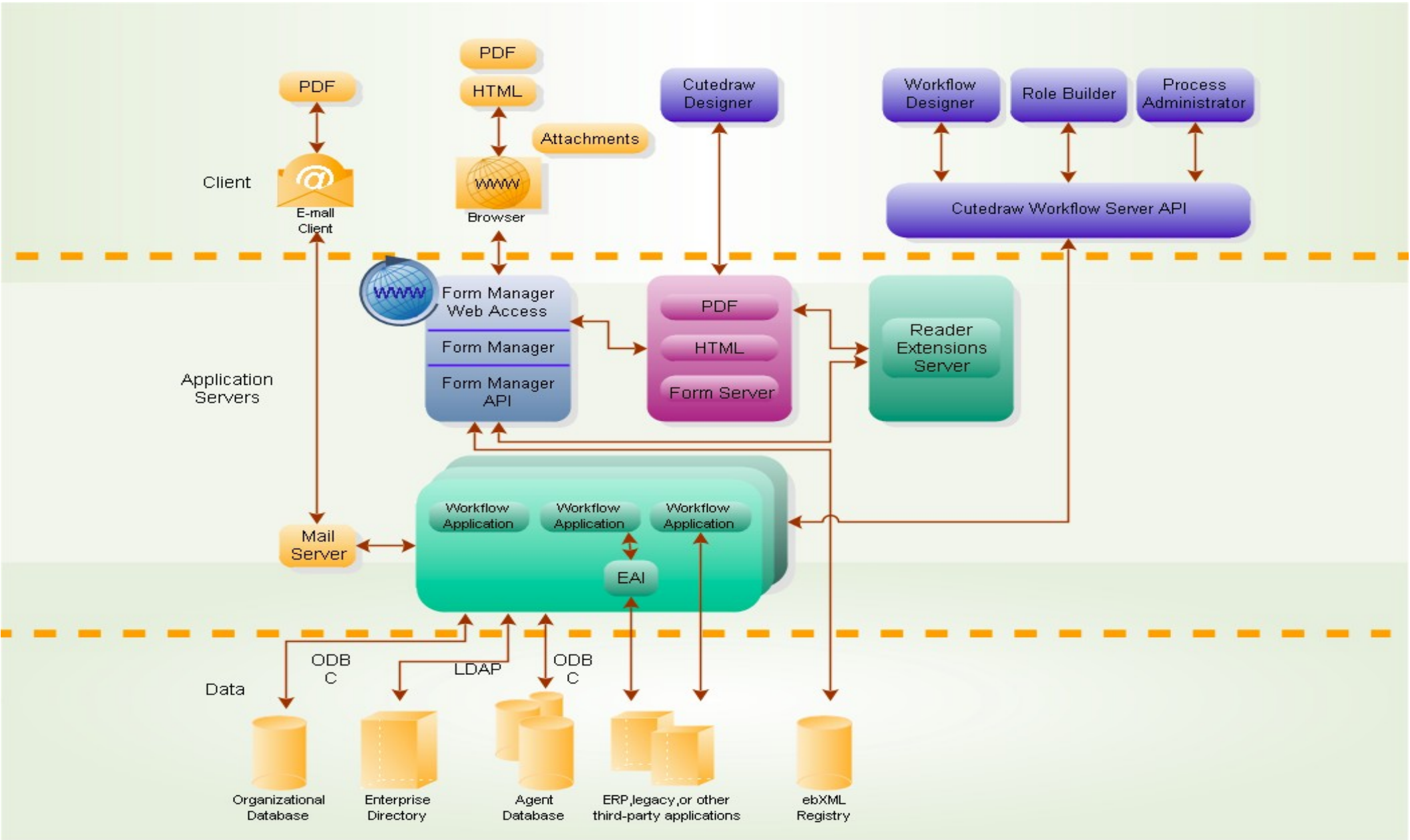
Types of Data Visualisation

Time

Types of Data Visualisation
Time Line

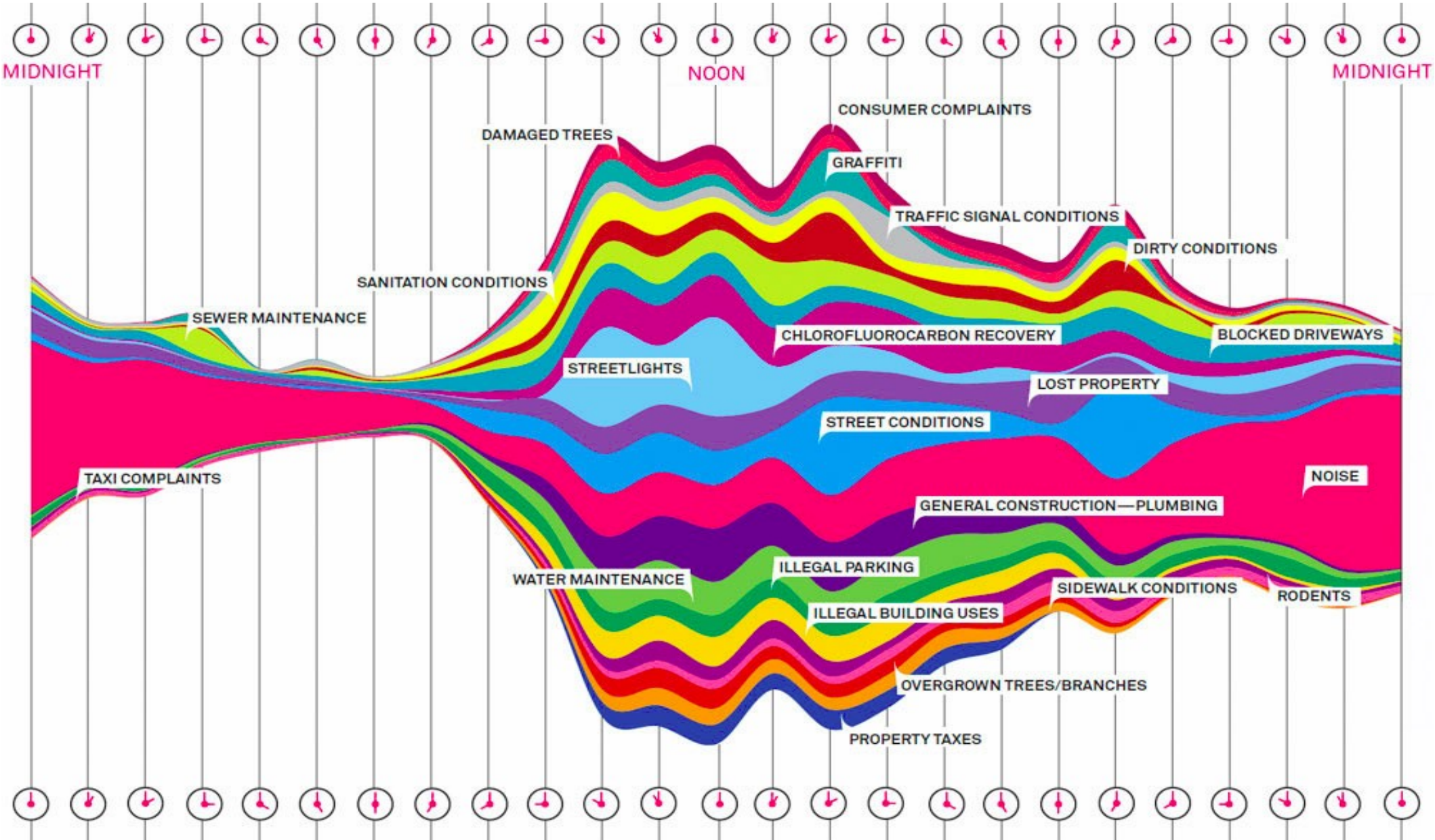


Types of Data Visualisation
Flow Chart



Types of Data Visualisation

Steam Graph

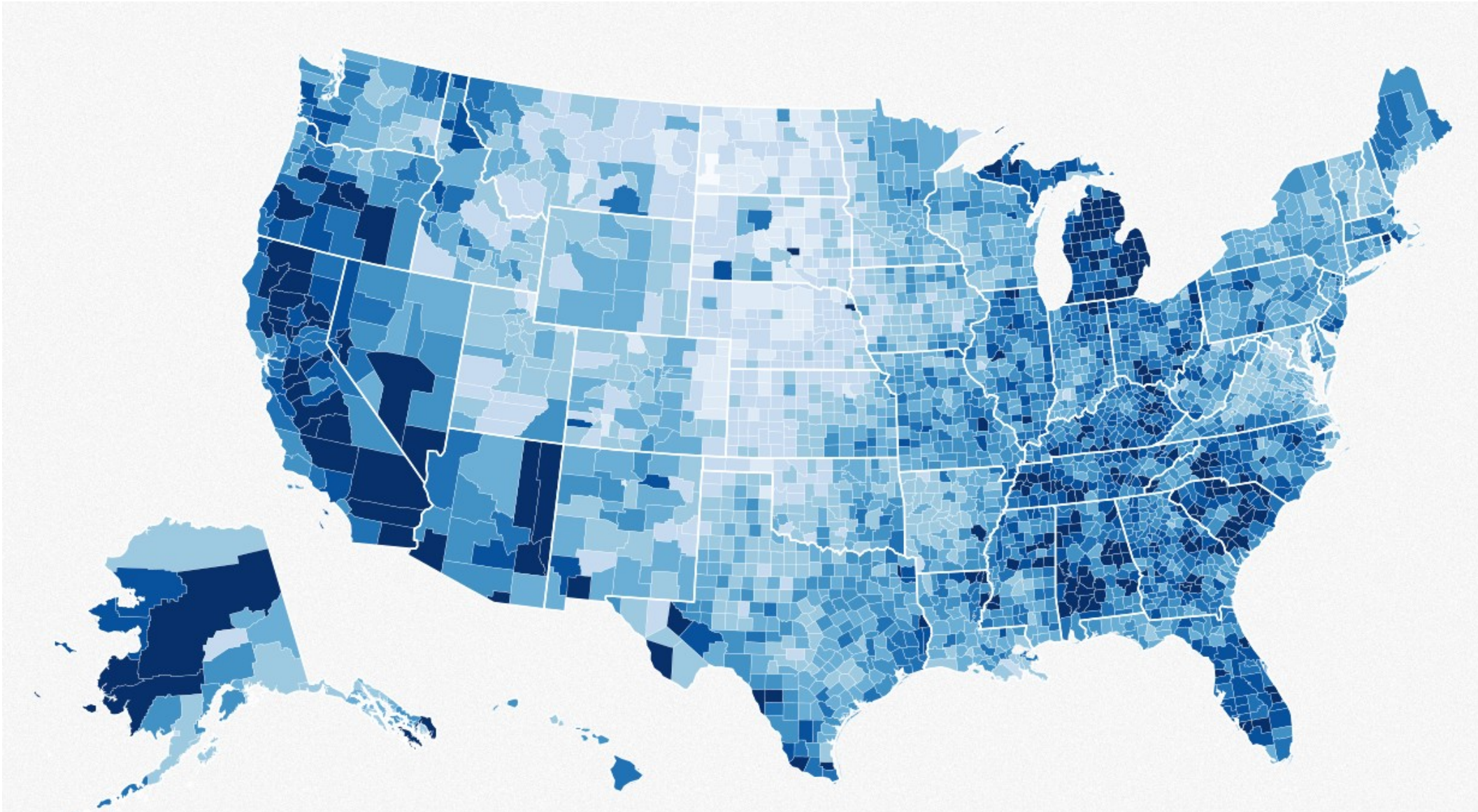


Types of Data Visualisation

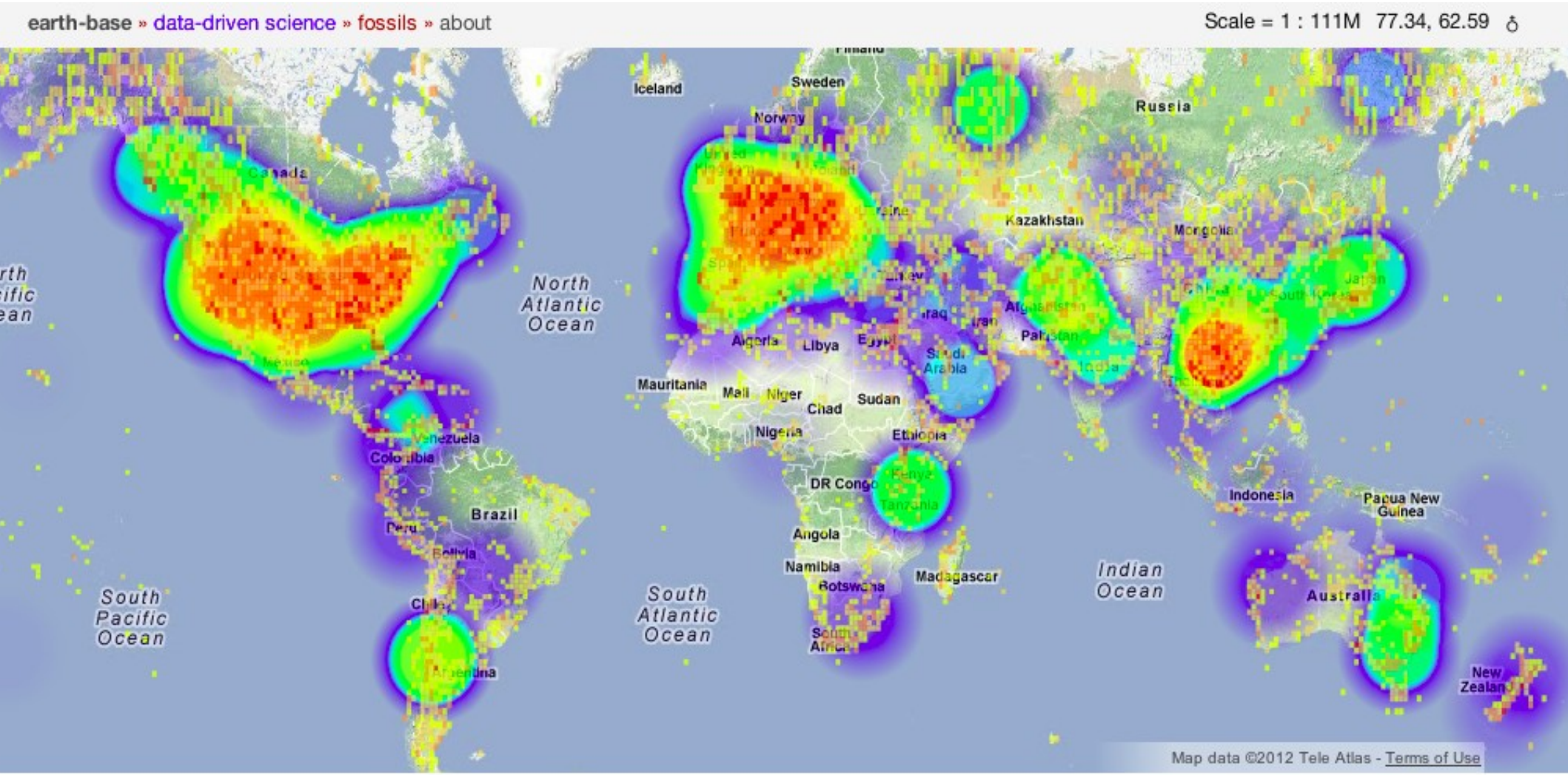
Space

Types of Data Visualisation

Choropleth

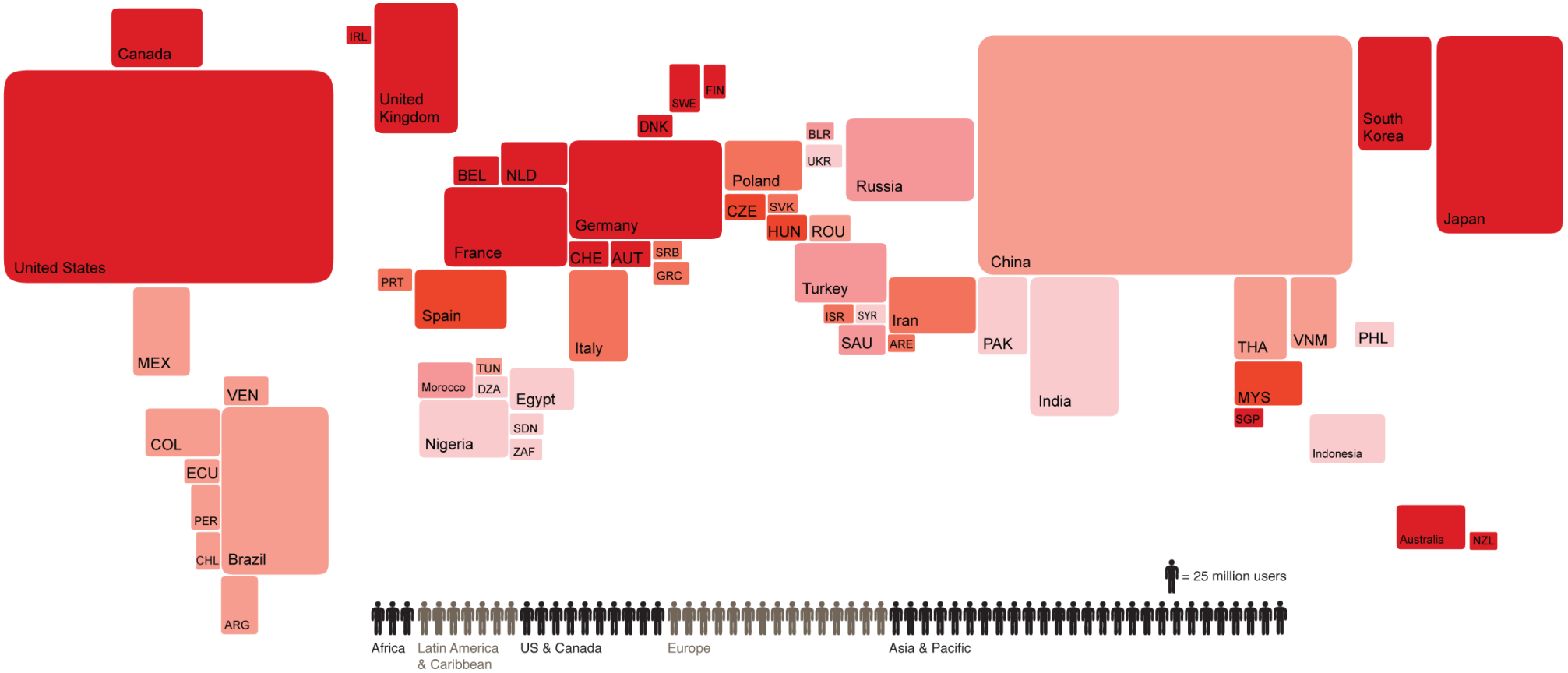


Types of Data Visualisation
Heatmap

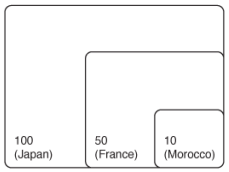


Types of Data Visualisation

Cartogram



Total number of Internet users (in millions), 2008



Internet penetration (% population)

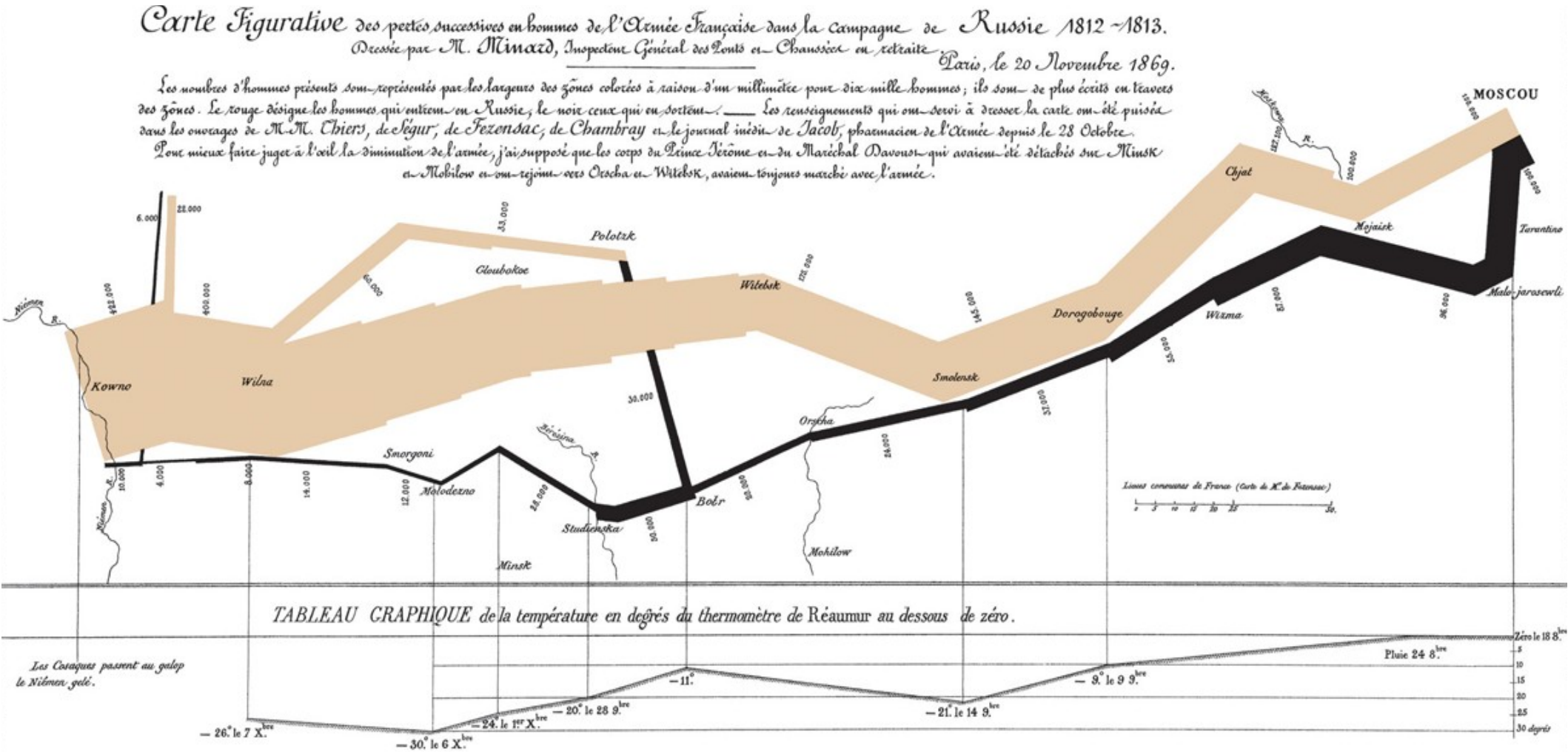
- Under 20%
- 20% - 40%
- 41% - 50%
- 51% - 60%
- Over 60%

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/

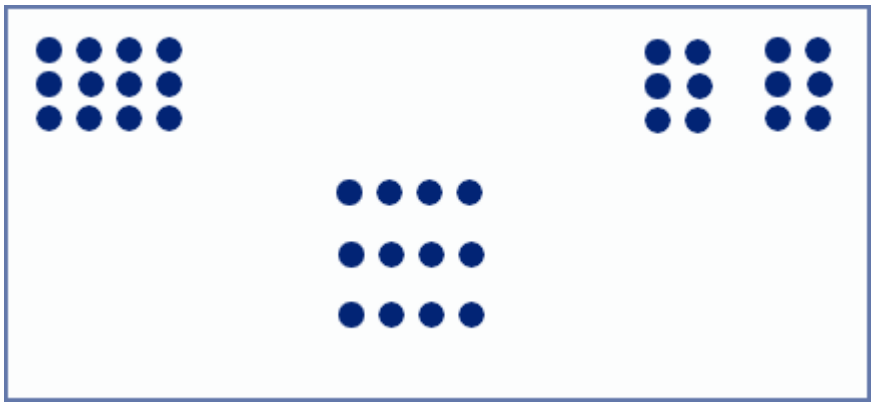
Types of Data Visualisation
Flow Map



Principles of Data Visualisation

Gestalt Principles

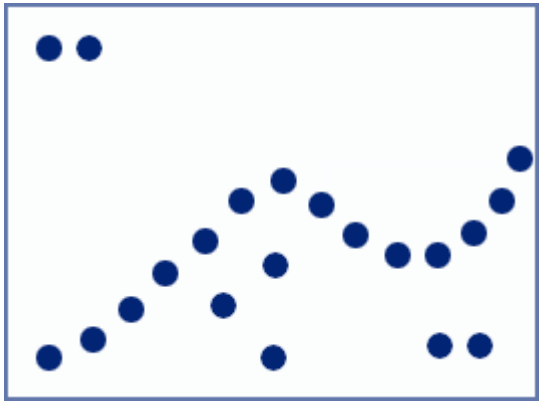
Law of Proximity



Law of Familiarity

Law of Enclosure

Law of Closure



Law of Continuity

Principles of Data Visualisation

Edward Tufte: Principles of Graphic Excellence (Excerpt)

- **Show the data**
- **Induce the viewer to think about the substance of the findings rather than the methodology, the graphical design, or other aspects**
- **Avoid distorting what the data have to say**
- **Encourage the eye to compare different pieces of data**
- **Reveal the data at several levels of detail, from a broad overview to the fine structure**
- **Serve a clear purpose**
- **Be closely integrated with the statistical and verbal descriptions of the data set**

Principles of Data Visualisation

Manuel Lima: Information Visualization Manifesto (Excerpt)

- **Form follows function**
- **Start with a question**
- **Interactivity is key**
- **Cite your source**
- **The power of narrative**
- **Do not glorify aesthetics**
- **Embrace time**
- **Avoid gratuitous visualisations**

Tools for Working with Data

- **Collection**
- **Organisation**
- **Analysis**
- **Visualisation**

Tools for Working with Data
Collection

- **Nokia Data Gathering**
- **Open Data Kit**
- **RapidSMS**
- **OpenStreetMap and Field Papers**
- **Ushahidi and Crowdmap**
- **Google Earth**
- **Tabula**

Tools for Working with Data
Organisation

- **Open Refine**
- **Mr. Data Converter**
- **CKAN**
- **GitHub and GitLab**

Tools for Working with Data
Analysis

- **Microsoft Excel and Libre Office Calc**
- **SPSS and Stata**
- **R and R Studio**
- **GRASS and Quantum GIS**

Tools for Working with Data
Visualisation

- **ManyEyes and Tableau**
- **Google Fusion Tables and Google Chart Tools**
- **Datawrapper and RAW**
- **D3.js, Recline.js, Raphaël, and Tangle**
- **Graph Commons, Gephi, Arbor.js, and Sigma.js**
- **Leaflet.js, GeoCommons, CartoDB, and MapBox Studio**
- **Timeline JS and StoryMap JS**
- **Processing**
- **ColorBrewer**

What is Open Data?

- Open for studying
- Open for using
- Open for making products and services
- Open for sharing

What is the 'Open Data Movement'?

- **A movement for open data practices by everyone – government, non-government / civil society organisations, international organisations, researchers, everyone.**

- **A movement that recognises that allowing other people to see, use, and share your data is a good thing for everyone**

- **A movement to make data available for decision-making, but also to understand how decisions are made**

- **A movement that is distributed, and took forward by different people in different contexts – no single international leader!**

How to Contribute to Open Data Movement?

- **Open up the data you have**
- **Contribute to open data projects (like OpenStreetMap)**
- **Ask the government to open up data (via data.gov.in)**
- **Ask all organisations you work with to open up data**
- **Help organisations to open up their data**

(and join DataMeet: datameet.org)

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Thank you.

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