Universitat de Girona
Fundació UdG: Innovació i Formació

ViT

Visualization for
Transparency
Foundation

MVT
EC

Data Visualization Programming Anton Bardera Data Visualization Programming Anton Bardera Data Visualization Programming Anton Bardera **Data Visualization Programming** Anton Bardera Data Visualization Programming Anton Bardera Data Visualization Programming Anton Bardera Data Visualization Programming Anton Bardera Data Visualization Programming Anton Bardera Data Visualization

Course syllabus

- **W1.** Course Presentation
  - Basic tools (Observable, HTML, JavaScript,…)
- **W2.** Introduction to D3
  - Visual encoding
  - Scales
  - Axis
  - *Examples: bar chart, scatter plot*
- **W3.** Temporal data
  - Paths
  - Dates
  - *Examples: line chart, area chart*

Course syllabus

- **W4.** Interaction
  - Filtering
  - Animation/transitions
  - Tooltips
- **W5.** Node-link data
  - Hierarchical data
  - Graphs
  - Force Layout
- **W6.** Multidimensional data
  - Layouts
  - Linked views
  - Final Project presentation

Course syllabus

- **W7-10.** 3 Invited projects and project session
  - Will Franklin
  - Apple Chan
  - Nico Komenda

Evaluation

- Weekly tasks
- Final project

Information Visualization

- Visualization is the process that **transforms** (abstract) **data** into **interactive graphical representations** for the purpose of **exploration, confirmation, or presentation**.
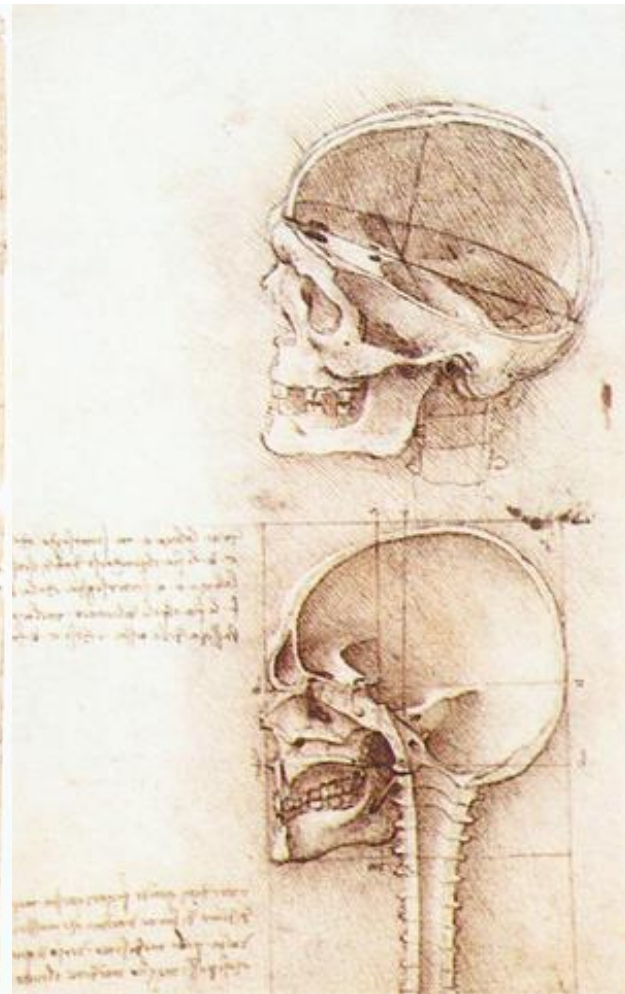
- Why visualization?

Why Visualize?

- To inform humans: **Communication**
  - *How did the unemployment and labor force develop over the last years?*

- When questions are not well defined: **Exploration**
  - *Which combination of genes causes cancer?*
  - *Which drug can help patient X?*
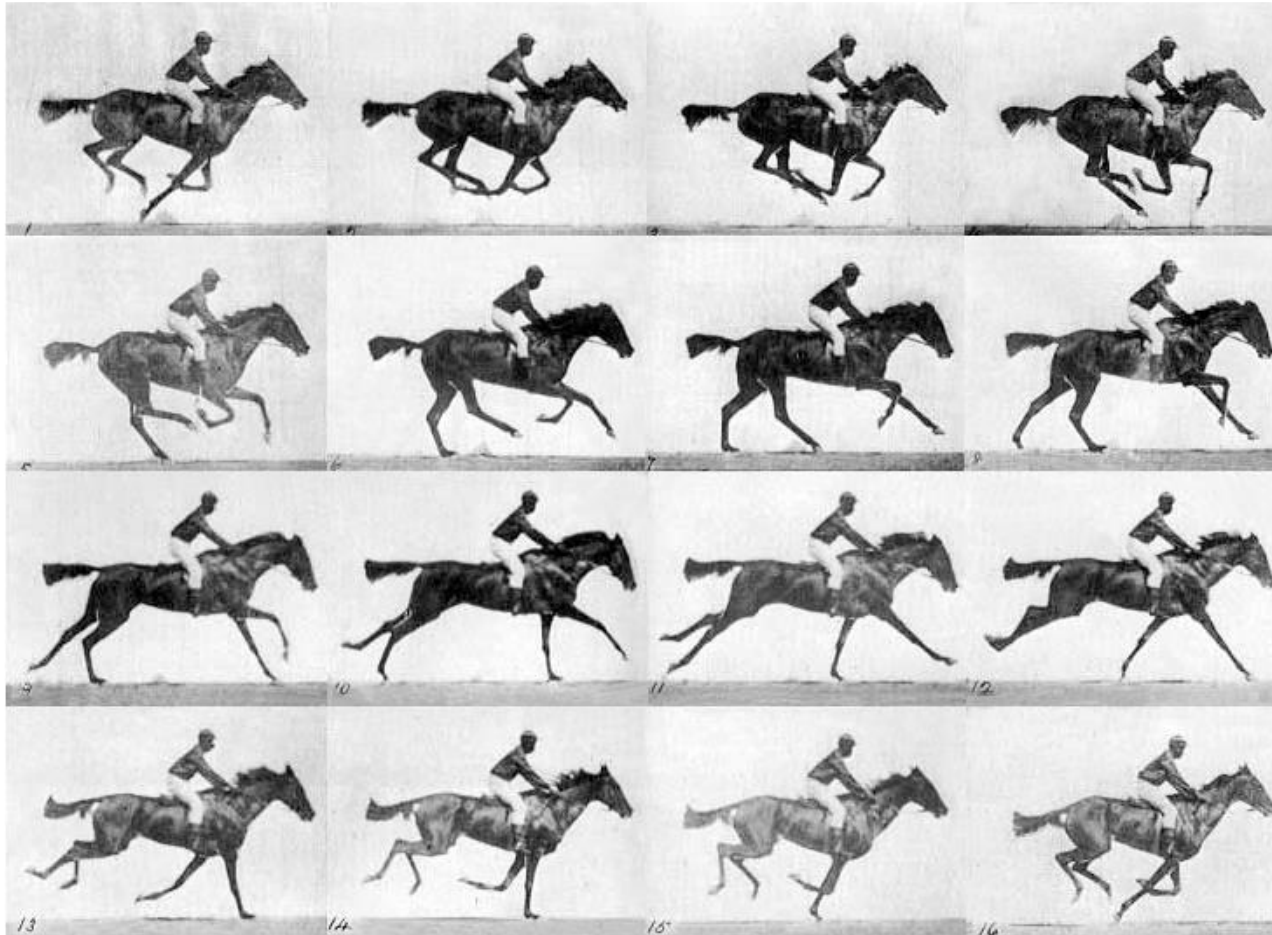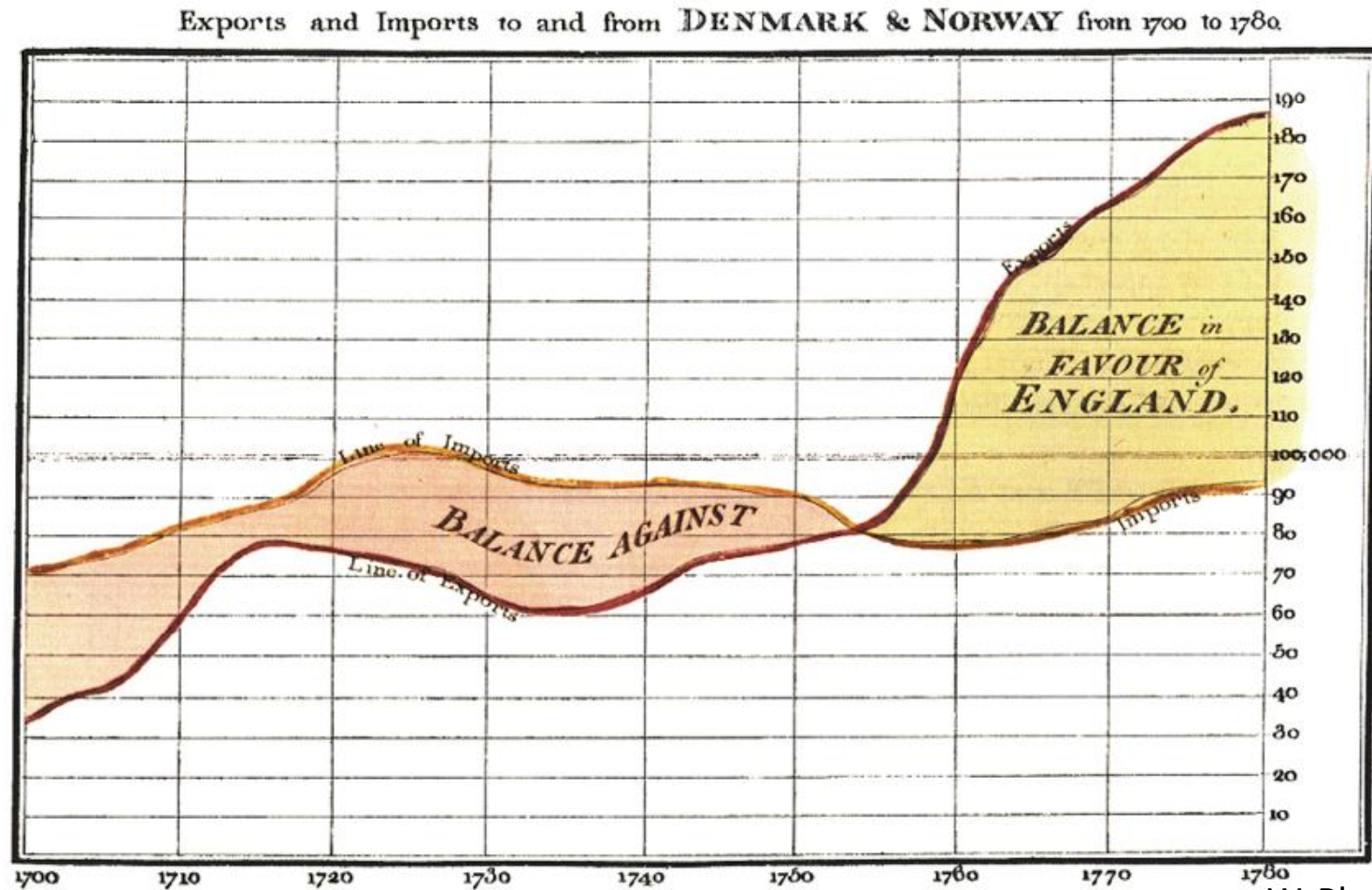
Information Visualization

- Record

Information Visualization

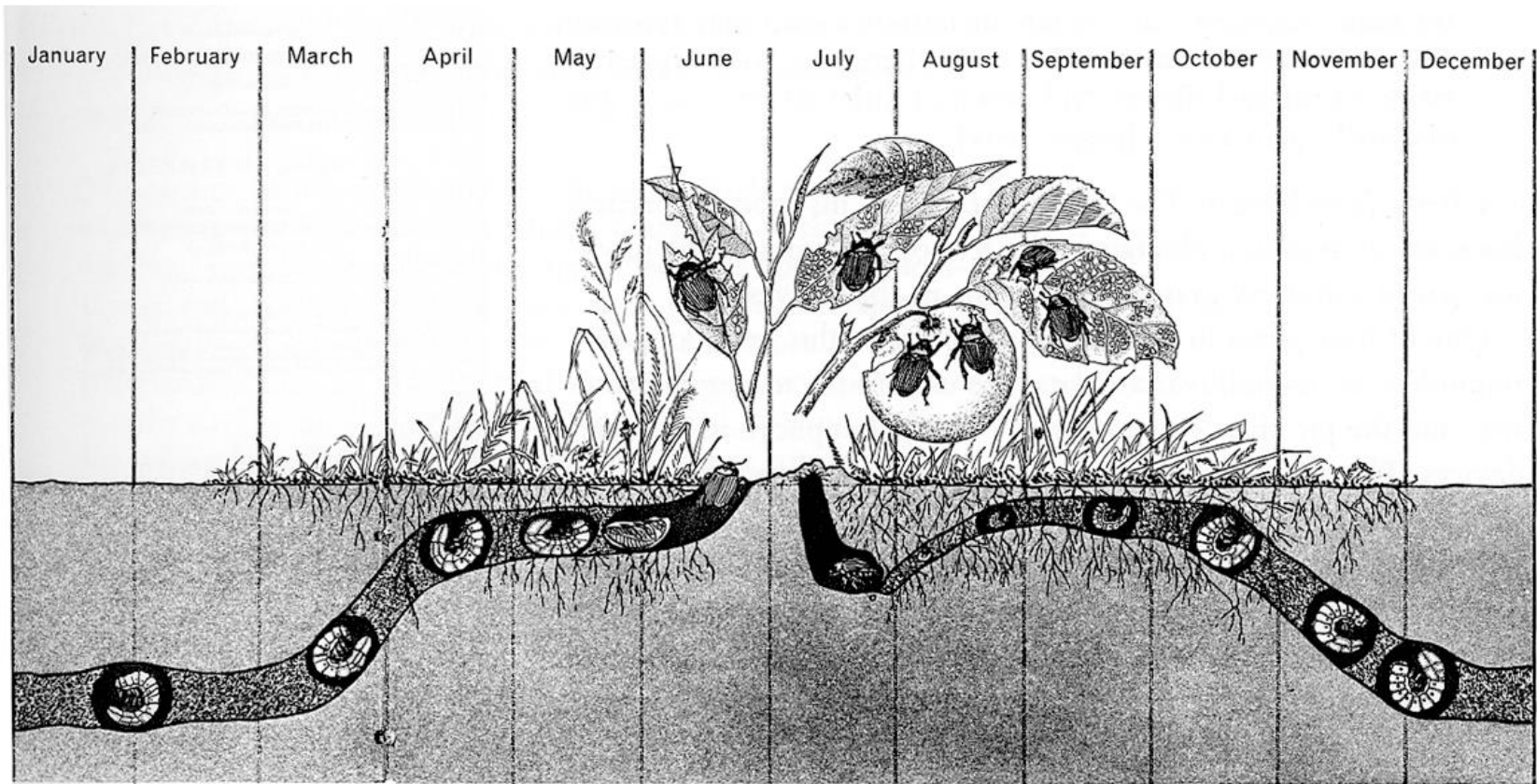- Record

Information Visualization

- Communicate

Exports and Imports to and from DENMARK & NORWAY from 1700 to 1780.
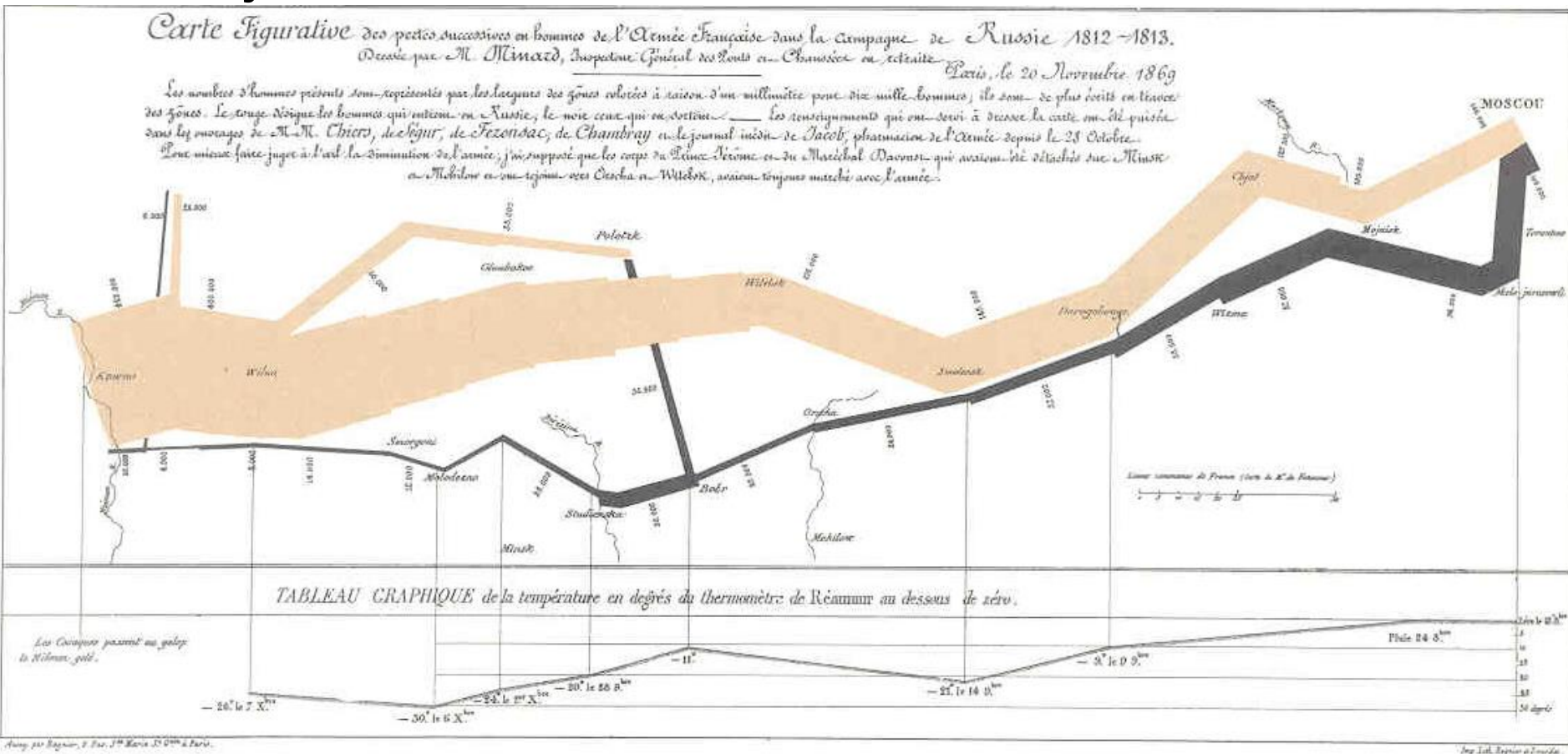
W. Playfair, 1786

Information Visualization

- Communicate

Information Visualization

- Analyze

C.J. Minard, 1869

Information Visualization

- Analyze

John Snow, 1854

STEVEN JOHNSON
bestselling author of *EVERYTHING BAD IS GOOD FOR YOU*

THE
GHOST MAP

The Story of London's
Most Terrifying Epidemic—
and How It Changed Science,
Cities, and the Modern World
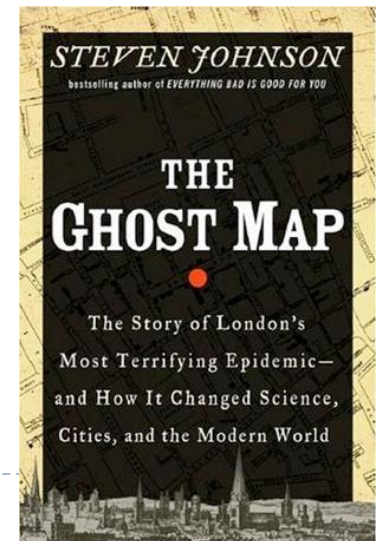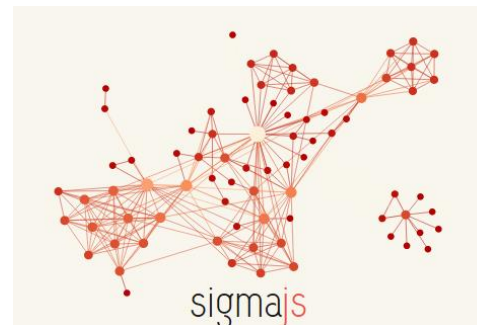
Information Visualization

- There are a lot of information visualization software and tools:

D3.js

- Created by Mike Bostock
- JavaScript library for manipulating documents based on data
- Allows you to bind arbitrary data to a Document Object Model (DOM)
- Uses HTML, SVG, and CSS
- Assumes a modern browser, without giving importance to compatibility with old browsers
- It's not a simple charting library

HyperText Markup Language (HTML)

- HTML is the standard markup language used to create web pages

- Web browsers can read HTML files and render them into web pages

- HTML describes the structure of a website semantically along with cues for presentation, making it a markup language, rather than a programming language

Javascript

- JavaScript is the scripting language that enables interactive web pages and is an essential part of web applications
- D3 provides functions in JavaScript to abstract the process of creating and modifying web page elements
- D3 examples use method chaining extensively. Method chaining is facilitated by returning the method itself with the successful completion of functions associated with a method

Scalable Vector Graphics (SVG)

- SVG allows for simple mathematical representation of images that scale and are amenable to animation and interaction

- SVG is fully supported by HTML5

- D3 provides an abstraction layer for drawing SVG

- `<SVG>` tag is a canvas on which everything is drawn

- SVG provides a set of common shapes, each of which has *attributes* that determine their size and position, such as `<CIRCLE>, <RECT>, <LINE>, <POLYGON>`

Scalable Vector Graphics (SVG)

- SVG example (from the book D3.js in action):

```
<body>
  <div id="infovizDiv">
    <svg style="width:500px;height:500px;border:1px lightgray solid;">
      <path d="M 10,60 40,30 50,50 60,30 70,80"
        style="fill:black;stroke:gray;stroke-width:4px;" />
      <polygon style="fill:gray;" points="80,400 120,400 160,440 120,480
        60,460" />
      <g>
        <line x1="200" y1="100" x2="450" y2="225"
          style="stroke:black;stroke-width:2px;"/>
        <circle cy="100" cx="200" r="30"/>
        <rect x="410" y="200" width="100" height="50"
          style="fill:pink;stroke:black;stroke-width:1px;" />
      </g>
    </svg>
  </div>
</body>
```

Scalable Vector Graphics (SVG)

- From the book D3.js in action:
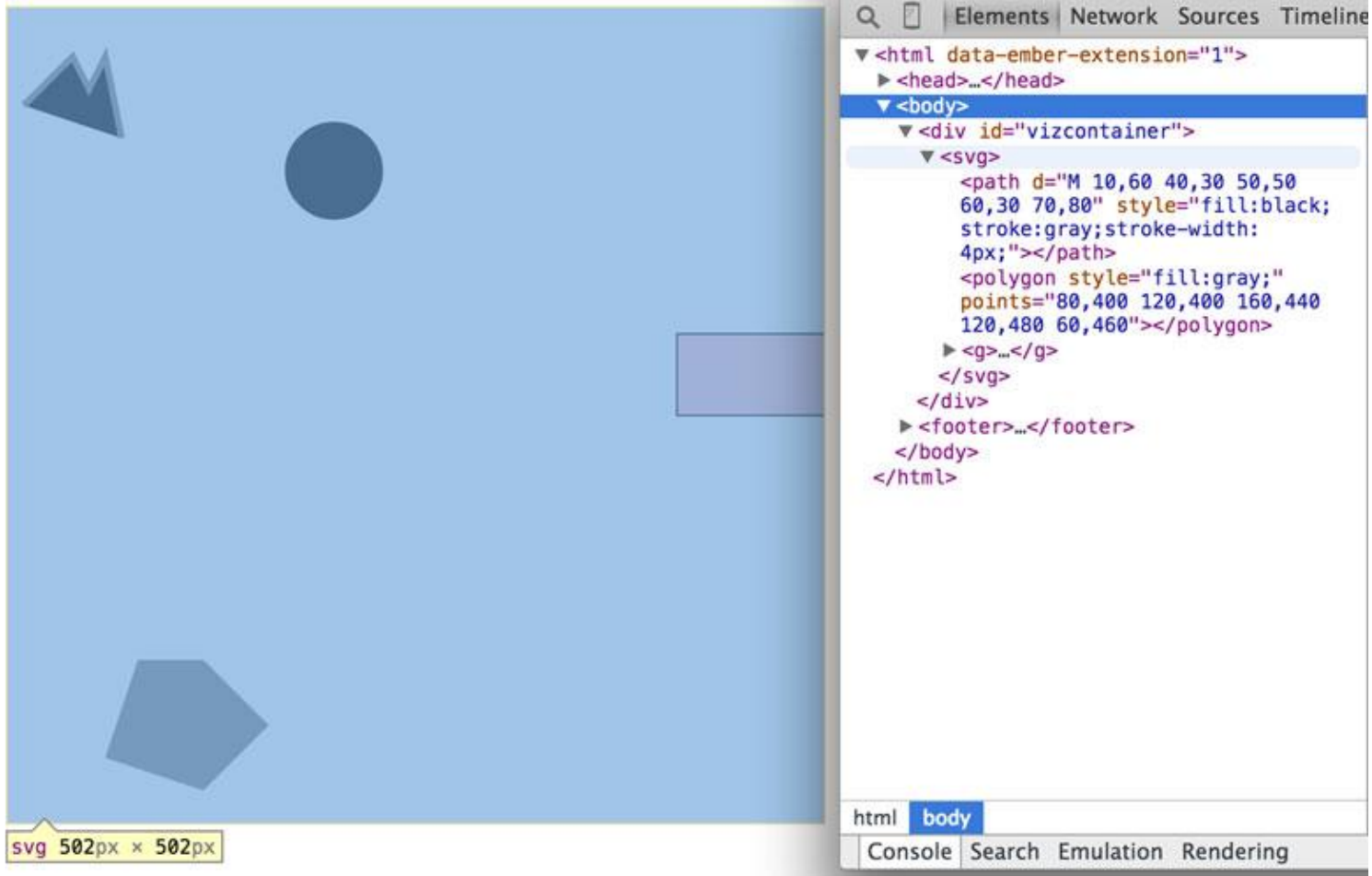
Observable

- [Observable](#) helps you sketch with live data and prototype visualizations
- Many users share their notebooks
- A notebook is made up of a series of cells, and each cell is defined by its JavaScript source code
- Simple
- Allows an easy prototyping
- Easy to share with your colleagues
- Created by Mike Bostock (again!!)