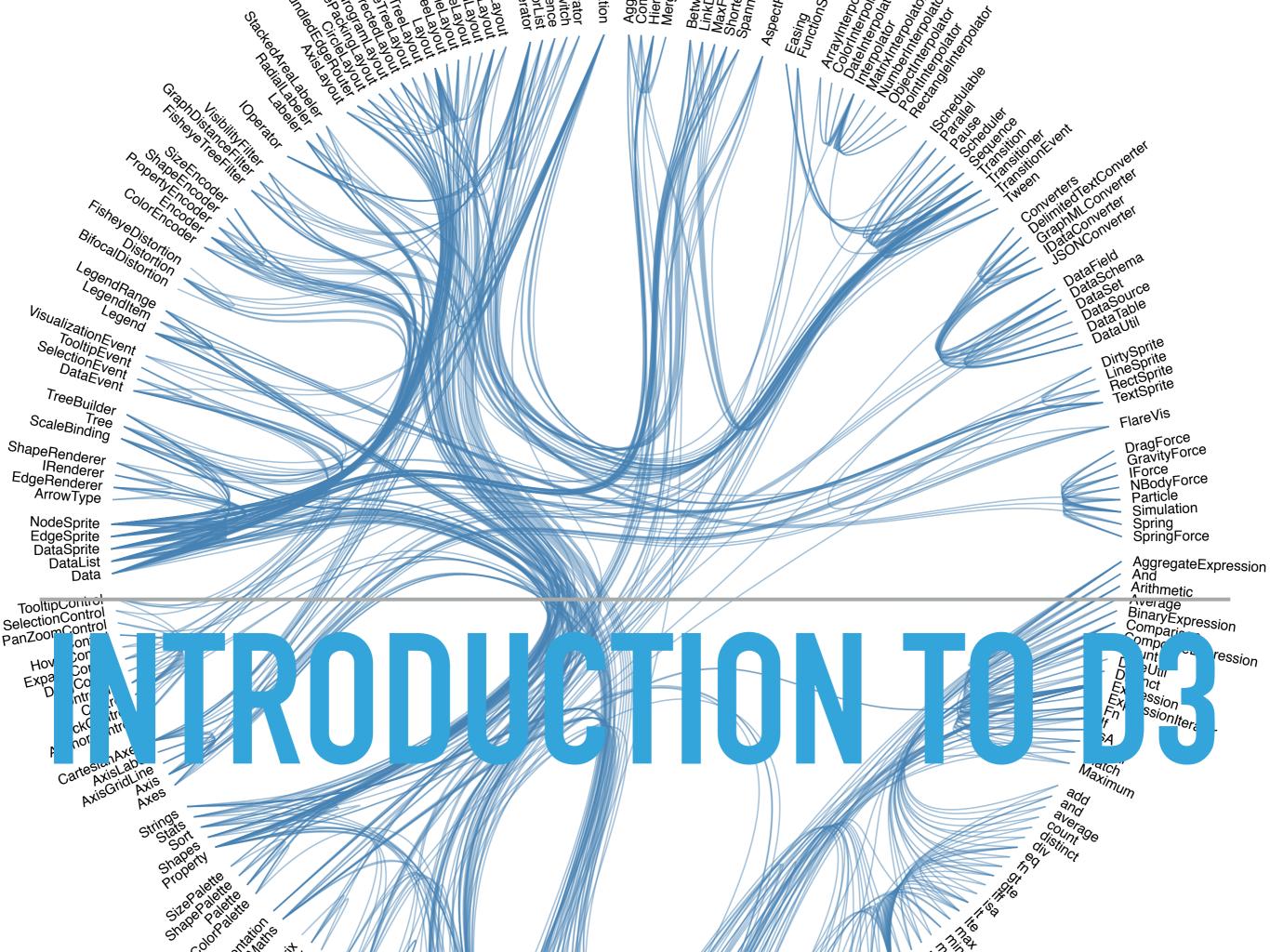


ALICE WITTIG

INTRODUCTION TO D3 AND VACMAP



D3 = DATA DRIVEN DOCUMENTS

- Created by Mike Bostock, Vadim Ogievetsky and Jeff Heer
- out of Protovis
- JS library
- D3 Paper
- ▶ all slides and code samples @ GitHub Page

alicewi.github.io/IntroToD3/

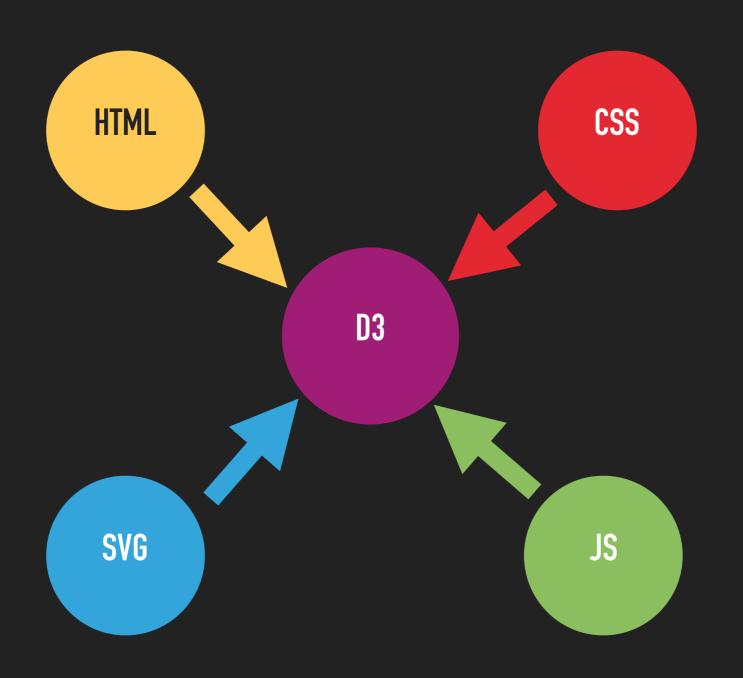


EXAMPLES

- rocs.hu-berlin.de
- flockwork model
- Vax Game (highscore hard mode: 92%)
- VacMap
- d3js.org

EXAMPLES IN THIS TALK

- moving circles
- simple VacMap



HTML AND CSS BASICS

- HTML = HyperText Markup Language
- CSS = Cascading Style Sheets
- selector {property: value;}
- #id
- .class
- ▶ JS bin
- Sublime Text 3
- HTML+CSS Tutorial

```
<!DOCTYPE html>
<html>
<head>
  <meta charset="utf-8">
 <title>My first HTML page</title>
<!-- including D3 -->
 <script src="https://d3js.org/d3.v4.min.js"></script>
  <!-- or link to lokal folder -->
<!-- including CSS -->
 <style>
    body {
        background-color: yellow;
    p {
        color: green;
    .para {
        color: red;
 </style>
  <!-- or link to external style sheet -->
 <link rel='stylesheet' type='text/css' href='stylesheet.css'/>
</head>
<body>
    <div>I'm a division.</div>
    I'm a paragraph.
    I'm a second paragraph.
    <a href="http://rocs.hu-berlin.de/">I'm a link.</a>
    <script>
        // javascript goes here
    </script>
</body>
<!-- you can also outsource your js -->
<script src="script.js"></script>
</html>
```

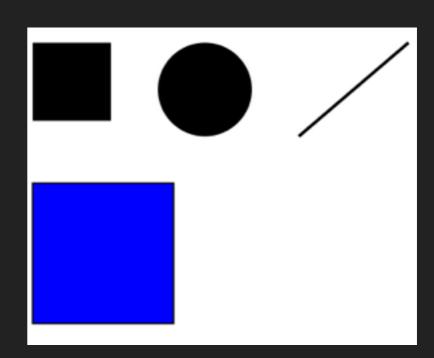
SVG

- SVG = Scalable Vector Graphics
- vector image format
- container for rectangles, circles, lines, paths...
- svg: width, height
- rect: x, y, width, height
- circle: cx, cy, r
- line: x1, y1, x2, y2



PATHS

- attribute d
- upper case letters: absolute coordinates
- lower case letters: relative coordinates
- M: move to
- L: line to
- ▶ H: horizontal line
- V: vertical line
- Z: close path



JAVASCRIPT BASICS

- variables
- arrays []
- objects {}
- console.log

myObject["key1"] = myObject.key1

JSON

- JSON = JavaScript Object Notation
- to store data
- like object but keys in quotation marks
- When exchanging data between a browser and a server, the data can only be text.
- GeoJSON, TopoJSON for geographical features

D3 OBJECT AND METHODS

- console.log(d3);
- ▶ D3 API

myObject["key1"] = myObject.key1

KEYNOTES D3

- selections
- data joins and key functions
- update, enter, exit
- method chaining
- event handlers and listeners
- filter, each
- transitions

D3 SELECTIONS AND METHOD CHAINING

- How Selections Work
- d3 selections are arrays of groups and each group is array of elements
- important for data join
- d3.select("body"): one group with one element
- ▶ d3.selectAll("h2"): one group with multiple elements
- ▶ d3.selectAll("tr").selectAll("td").selectAll("p"):
 this is method chaining multiple groups with multiple elements each
- selection.nodes(): gives all elements

DATA BINDING

- 1. Data join = joined to groups via selection.data
- 2. assigned to single elements via selection.datum
- 3. inherited from parent via append, insert, etc.
- data stored in property __data___

```
d3.select("body").datum(42);
```

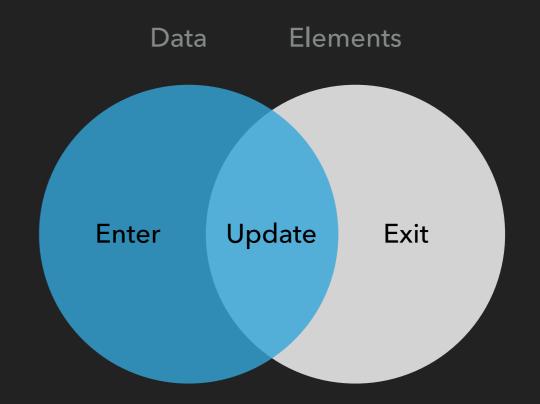
```
d3.select("body").datum(42).append("h1");
```

DATA JOIN

- great for dynamic visualizations
- selection.data(array[, key function])
- e.g. array of JSON objects
- if key function is not specified: joining by index
- key function is called for each old element and each new data
- if multiple groups, data should be function
- What happens when number of elements and data doesn't match?

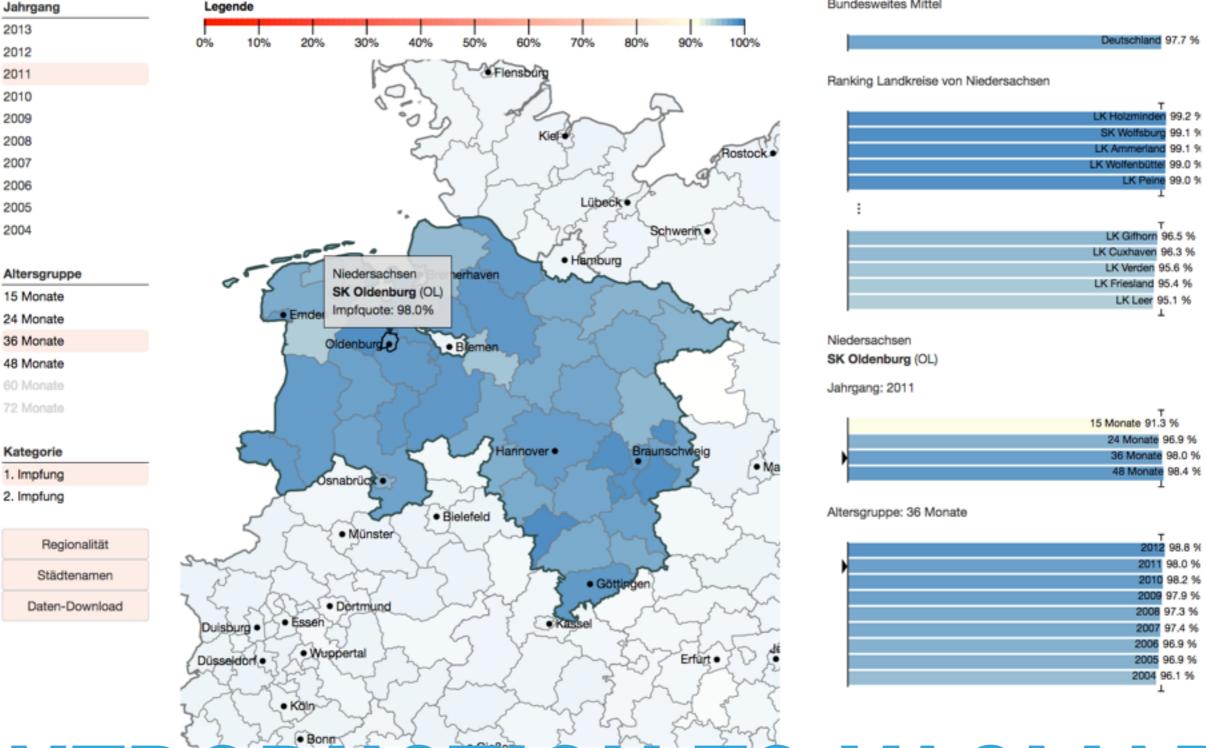
UPDATE, ENTER, EXIT

- Update There was a matching element for a given datum.
- Exit There was no matching datum for a given element.
- Enter There was no matching element for a given datum.
- enter selection contains placeholders rather than DOM elements
- placeholders: objects with __data__
 property



NOW SOME EXCITING MOVING CIRCLES!

Alice



INTRODUCTION TO VACMAP

Bundesweites Mittel





VacMap: Interaktive Online-Karte zum Impfquoten-Monitoring in Deutschland

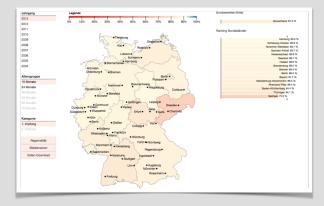
Alice Wittig1, Thorsten Rieck2

1. Brockmann Lab, Humboldt Universität zu Berlin & Robert Koch-Institut; 2. Impfprävention, Robert Koch-Institut

VacMap ist eine interaktive Visualisierung des Impfstatus in Deutschland. VacMap ist modular konzipiert und kann um die Darstellung weiterer Surveillance-Kontexte erweitert werden.

VacMap nutzt als Datengrundlage die KV-Impfsurveillance. Die KV-Impfsurveillance wird vom Robert Koch-Institut koordiniert und gemeinschaftlich mit allen Kassenärztlichen Vereinigungen (KVen) durchgeführt. In der KV-Impfsurveillance wird der Impfstatus aus ambulanten Abrechnungsdaten der gesetzlich Krankenversicherten ermittelt. Am Beispiel der Masern-Impfung wurde mithilfe einer Kombination aus den modernen

Technologien HTML5, CSS, SVG, JavaScript und dem besonders erfolgreichen open-source Paket D3.js ein Werkzeug entwickelt, das Impfquoten jahrgangs- und altersgruppenübergreifend auf einer interaktiven Online-Karte darstellt und qualitative, quantitative und regionale Aspekte zugänglich macht.



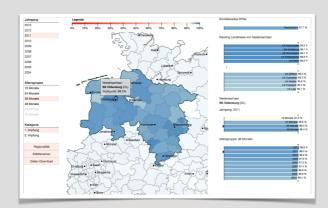
Das Menü (links) ermöglicht die Auswahl der Datensätze nach Jahrgang, Altersgruppe und Dosis, den Wechsel der Darstellung von Kreis- auf Bundeslandebene, das Ein-/ Ausblenden von Städtenamen sowie den Download als .csv-Datei.



In der **Gesamtansicht** auf Kreisebene finden sich Vergleiche über Jahrgänge und Altersgruppen des gewählten Kreises (rechts unten).



Die **Balkendiagramme** (rechts) stellen bundesweite Gesamtwerte und regionale Ranglisten dar (hier: auf Bundeslandebene).



Die **Zoom-Funktion** vergrößert ein Bundesland und stellt eine Rangliste seiner Kreise auf (rechts).

Kontakt: VacMap@rki.de Webseite: www.VacMap.de

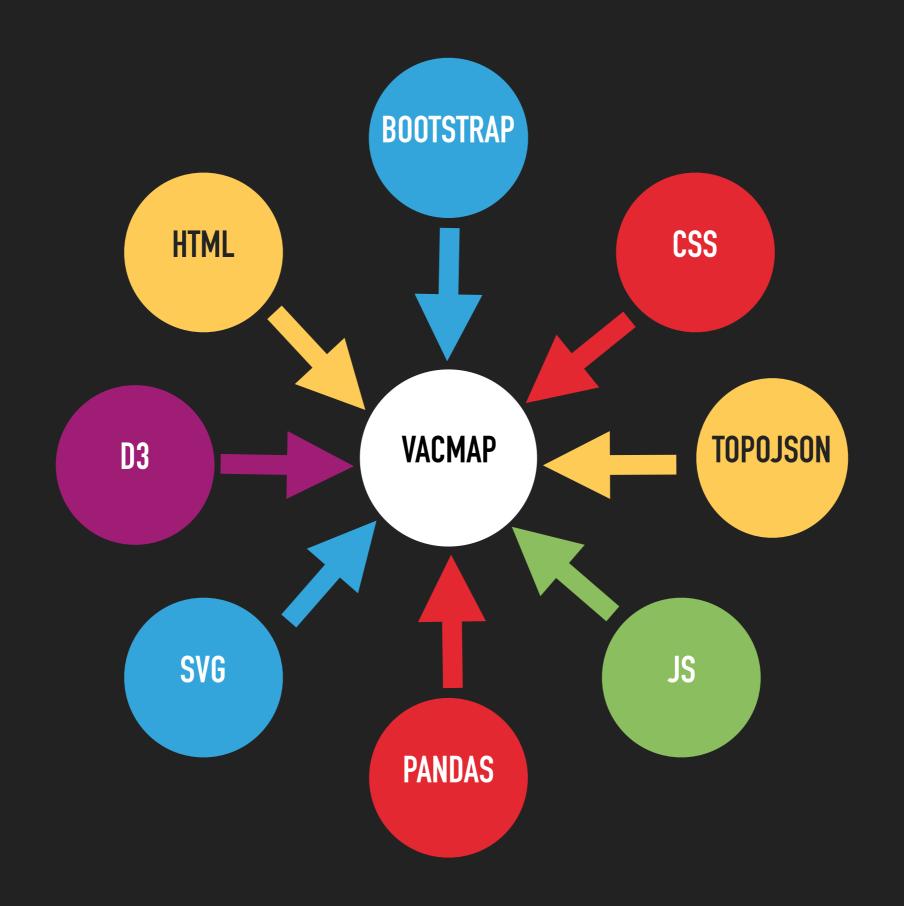
Gewinner des Posterpreises auf der Nationalen Impfkonferenz 2017 in Oldenburg



POSTER AWARD

NATIONALE IMPFKONFERENZ 2017 IN OLDENBURG





GEO- AND TOPOJSON

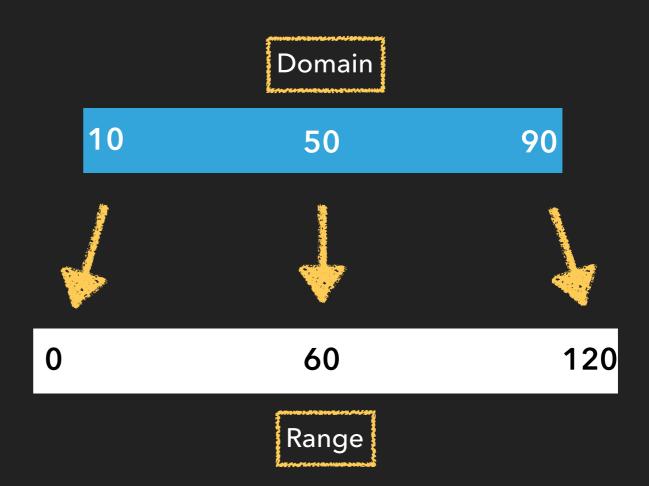
- <u>TopoJSON</u> is extension of GeoJSON
- GeoJSON has coordinates
- ▶ TopoJSON has arcs
 - encodes geospatial topology
 - arcs: shared line segments
 - improves shape simplification
 - removes redundant coordinates
 - has much smaller file sizes
 - useful applications like map coloring and selective meshing

```
var dataJSON = {"x": 1.0, "y": 1.1};
```

```
"type": "Topology",
"transform": { "scale": [0.0009170486546988356, 0.0007794992965075303],
"translate": [5.852489868512635,47.27112091110115]},
"objects":{
  "states":{"type":"GeometryCollection",
   "geometries":[
    {"", type": "Polygon", "arcs": [[0,1,2,3]], "id": "NW",
       "properties": { "name": "Nordrhein-Westfalen", "postal": "NW" } },
    {"type": "Polygon", "arcs": [[8,9,-6,10,-1,11]], "id": "HE",
       "properties": { "name": "Hessen", "postal": "HE" } },
    {"", type": "MultiPolygon", "arcs": [[[59]], [[60]], [[61]],
       [[-58,-26,-44,62]],[[63]],[[64]]],"id":"MV",
       "properties": { "name": "Mecklenburg-Vorpommern", "postal": "MV" } }
 "arcs":[
    [[3912,5616],[-17,-22],[-7,-6],[-79,-19],[-9,-4], \ldots],
    [[8238,8925],[-31,3],[-35,9],[-38,17],[8,7],[6,15], \ldots]
```

SCALES

- continuous, ordinal, bandscales...
- domain = input
- range = output
- <u>colorbrewer</u>



BOOTSTRAP

- for resizing, arrange, buttons...
- needs jQuery, viewport meta tag, bootstrap, bootstrap stylesheet
- class = container
- class = rows
- xs, sm, md, lg
- ▶ 12 columns
- col-lg-8 / col-lg-4
- get bootstrap
- Tutorial Bootstrap

```
<!DOCTYPE html>
<html lang="en">
 <head>
    <meta charset="utf-8">
    <meta name="viewport" content="width=device-width, initial-scale=1">
    <title>Bootstrap</title>
    <link href="D3lib/bootstrap.min.css" rel="stylesheet">
    <script src="D3lib/jquery.min.js"></script>
   <script src="D3lib/bootstrap.min.js"></script>
 </head>
 <body>
    <div class="container"> <!-- container-fluid -->
      <h1>My First Bootstrap Page</h1>
     This part is inside a .container class.
      <div class="row">
        <div class="col-xs-3 col-sm-5 col-lg-7"</pre>
               style="background-color:lavender;">1</div>
        <div class="col-xs-9 col-sm-7 col-lg-5"</pre>
               style="background-color:lavenderblush;">2</div>
   </div> <!-- first row -->
    <div class="row">
        <div class="col-sm-4"</pre>
               style="background-color:lavender;">A</div>
        <div class="col-sm-4"</pre>
               style="background-color:lavenderblush;">B</div>
        <div class="col-sm-4"</pre>
               style="background-color:lavender;">C</div>
     </div> <!-- second row -->
    </div> <!-- .container -->
 </body>
</html>
```

FINALLY THE COOL STUFF!

Alice

USEFUL

- ▶ <u>D3 Paper</u>
- www.d3js.org
- ▶ D3 API
- rocs.hu-berlin.de
- ▶ Tutorial Lets Make A Map
- ▶ Tutorial Lets Make A Bar Chart
- **►** Tutorial Curran
- http://getbootstrap.com/
- ▶ Tutorial Bootstrap
- ▶ mapshaper
- ▶ jsbin
- ▶ Sublime Text 3

D3.EXPRESS

coming soon