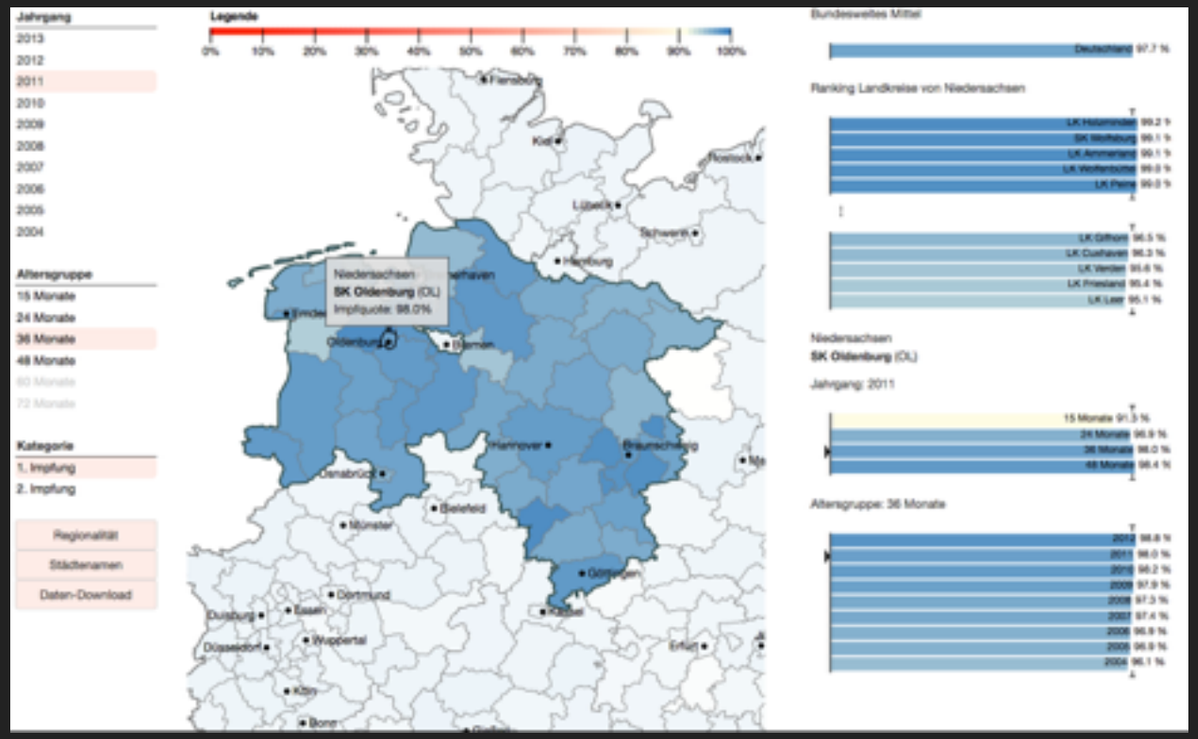
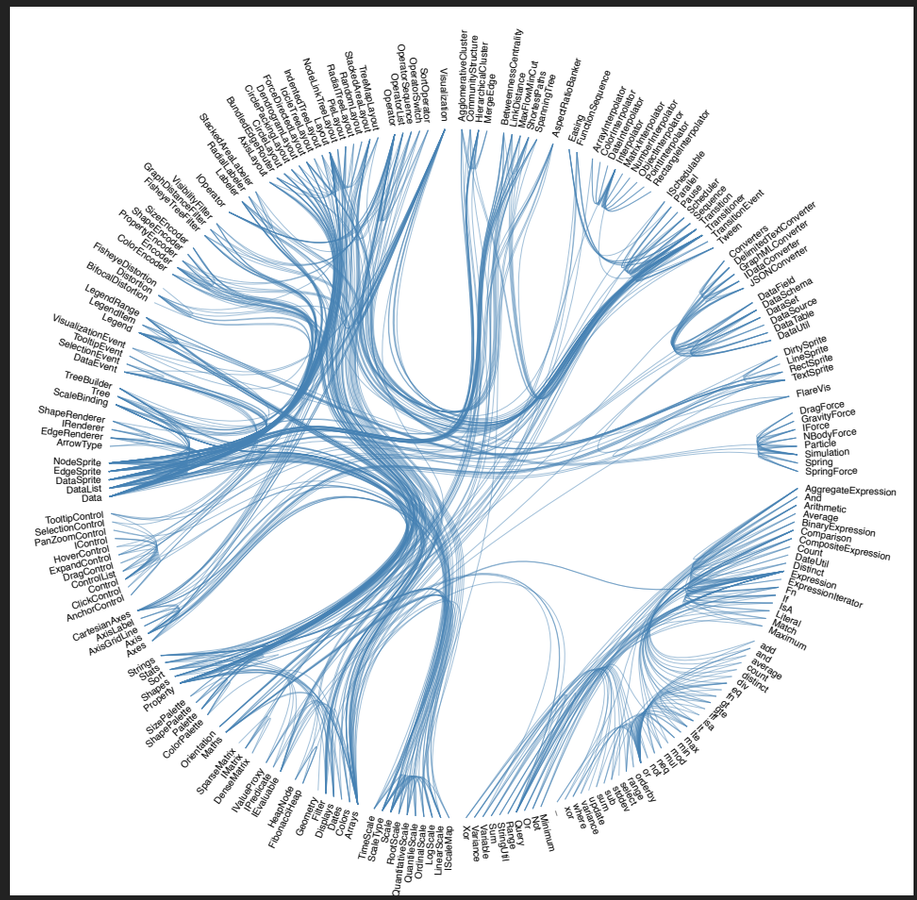




ALICE WITTIG

INTRODUCTION TO D3 AND VACMAP

INTRODUCTION TO D3

source

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/

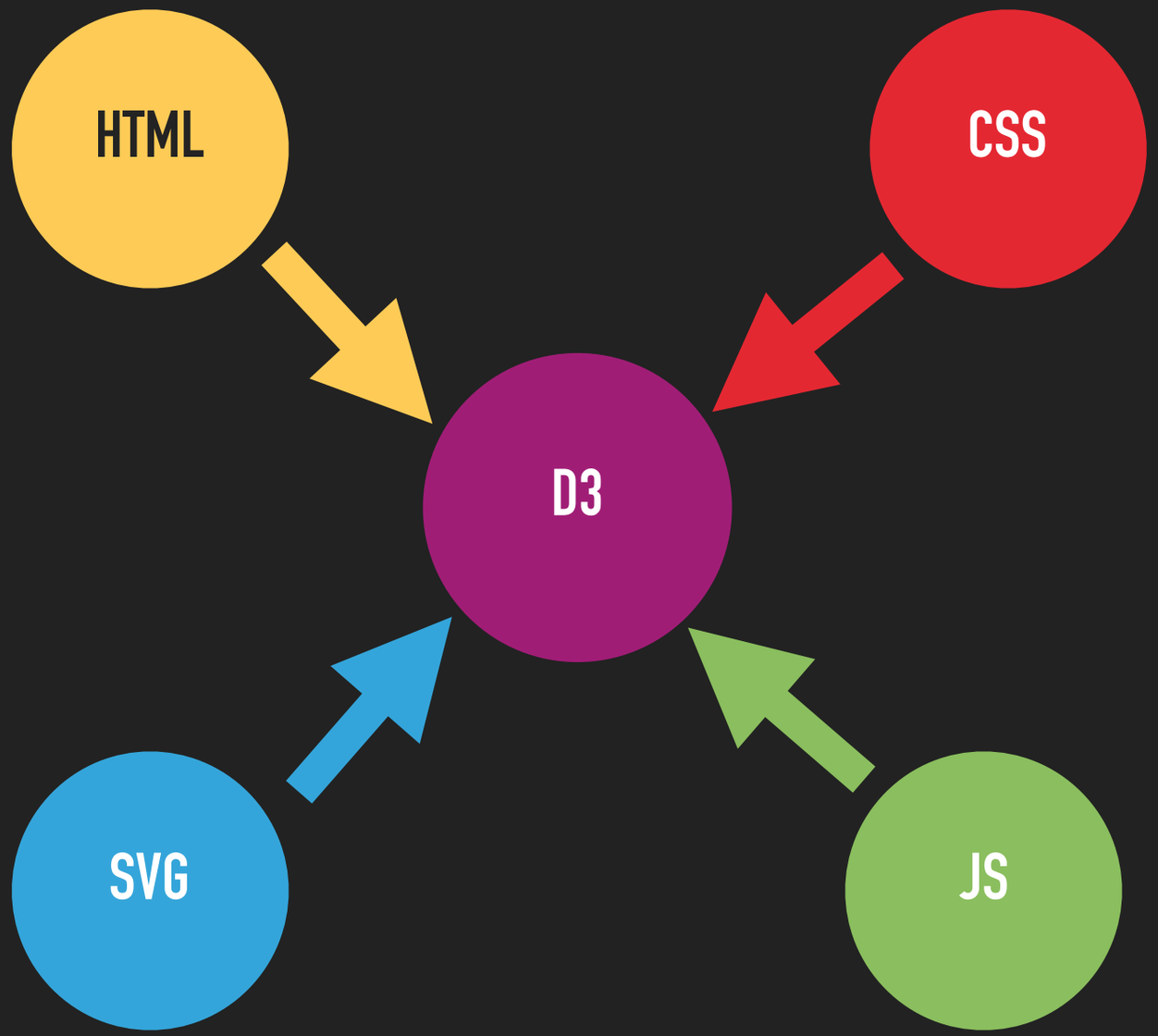
source

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
CSS
D3
SVG
JS

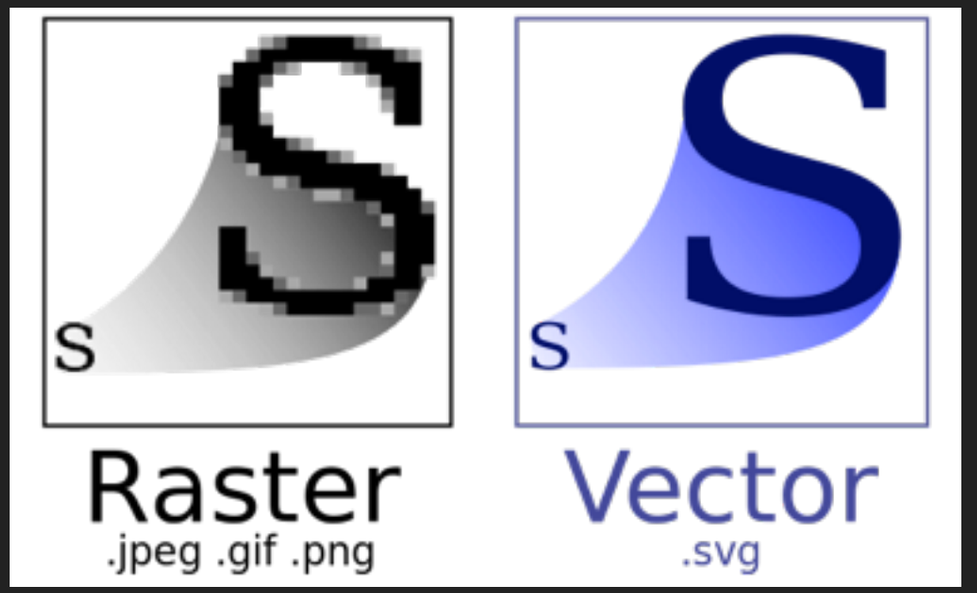
HTML AND CSS BASICS

- 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>
    <p>I'm a paragraph.</p>
    <p class="para">I'm a second paragraph.</p>
    <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

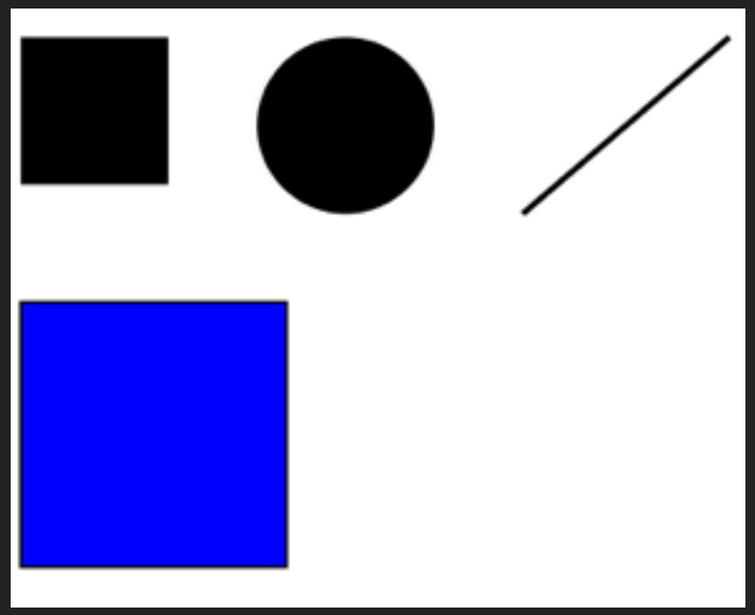


source

```
<svg width="300" height="300">

   <rect x="10" y="10" width="50" height="50"/>
   <circle cx="120" cy="40" r="30"/>
   <line x1="180" y1="70" x2="250" y2="10"
         stroke-width="2" stroke="black"/>
   <path d="M10 100 h 90 v 90 h -90 Z"
         fill="blue" stroke="black"/>

</svg>
```

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

```
<svg width="300" height="300">

   <rect x="10" y="10" width="50" height="50"/>
   <circle cx="120" cy="40" r="30"/>
   <line x1="180" y1="70" x2="250" y2="10"
         stroke-width="2" stroke="black"/>
   <path d="M10 100 h 90 v 90 h -90 Z"
         fill="blue" stroke="black"/>

</svg>
```

JAVASCRIPT BASICS

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

```
var vari1 = „String";
var vari2 = 5;
var vari3 = true;
var myObject = {key1: "value1", key2: "value2"};
var myArray =  [5, false, "hi", {}, []];

console.log(4,"hello", myArray[0],
            myObject["key1"], myObject.key1);
```

```
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

```
var data = [{"x": 1.0, "y": 1.1},
            {"x": 2.0, "y": 2.5},
            {"x": 1.0, "y": 1.1},
            {„x": 2.0, "y": 2.5}];
```

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“): multiple groups with multiple elements each

this is method chaining

- 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.

```
d3.select(„body").datum(42);
```

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

- data stored in property __data__

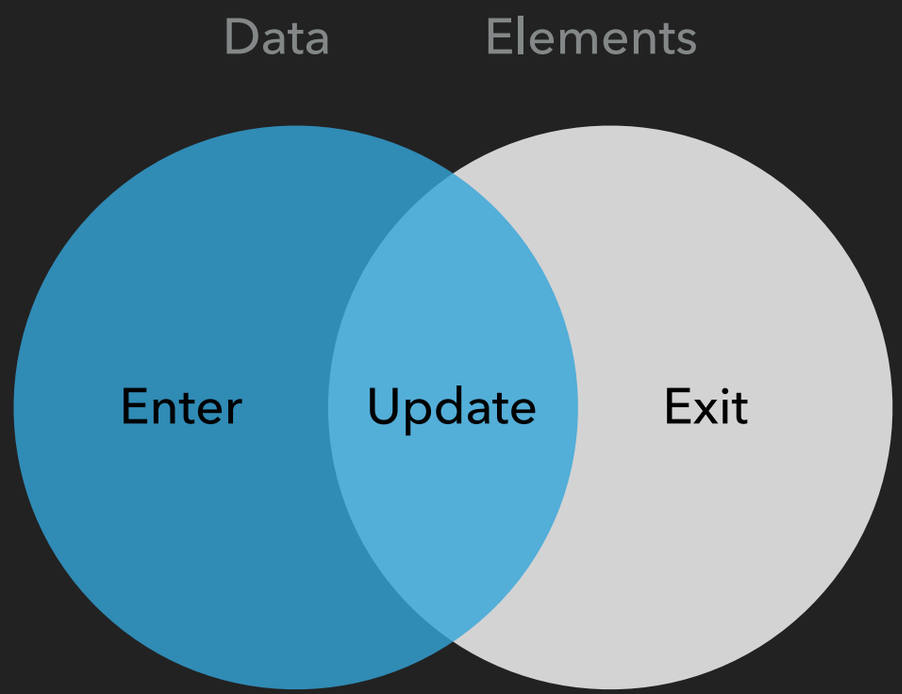
DATA JOIN

```
var data = [{"x": 1.0, "y": 1.1},
            {"x": 2.0, "y": 2.5},
            {"x": 1.0, "y": 1.1},
            {„x": 2.0, "y": 2.5}];
```

- 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

Jahrgang

- 2013
- 2012
- 2011
- 2010
- 2009
- 2008
- 2007
- 2006
- 2005
- 2004

Altersgruppe

- 15 Monate
- 24 Monate
- 36 Monate
- 48 Monate
- 60 Monate
- 72 Monate

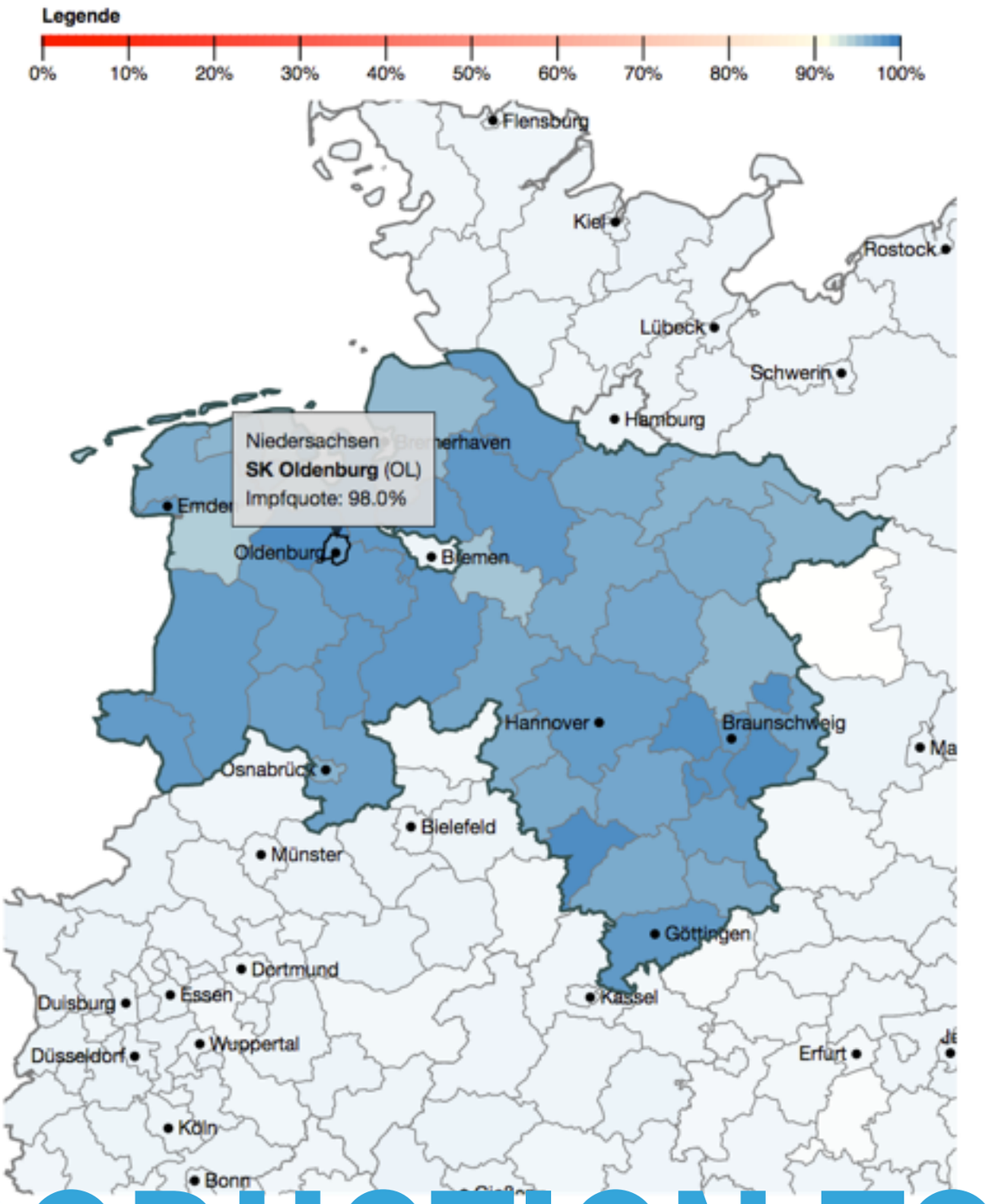
Kategorie

- 1. Impfung
- 2. Impfung

Regionalität

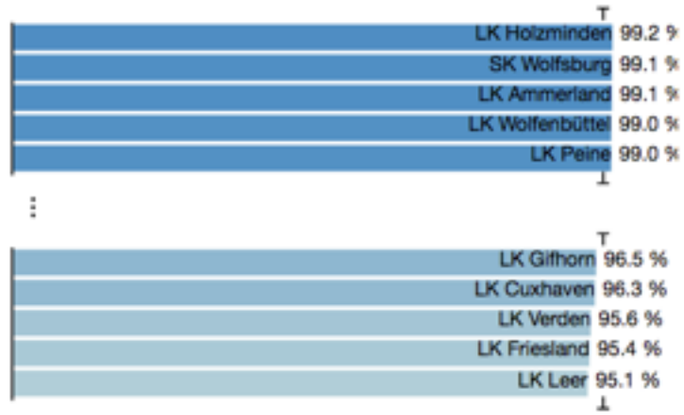
Städtenamen

Daten-Download



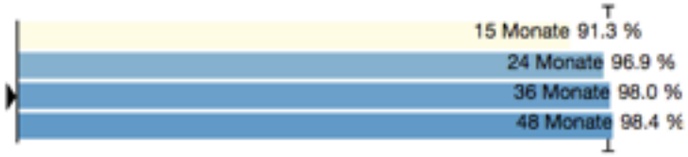
Bundesweites Mittel

Ranking Landkreise von Niedersachsen



Niedersachsen
SK Oldenburg (OL)

Jahrgang: 2011



Altersgruppe: 36 Monate

INTRODUCTION TO VACMAP

GESUNDHEIT SCHÜTZEN
RISIKEN ERFORSCHEN
DAS PUBLIC HEALTH INSTITUT 125

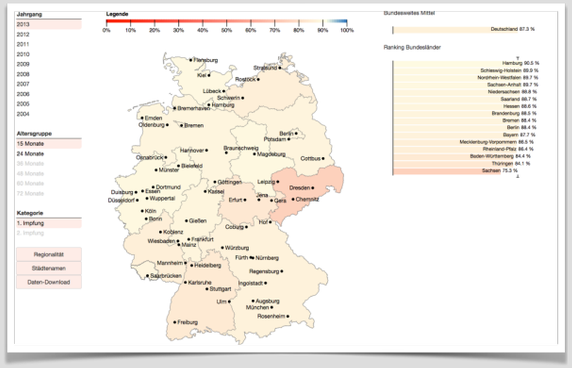
ROBERT KOCH INSTITUT

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

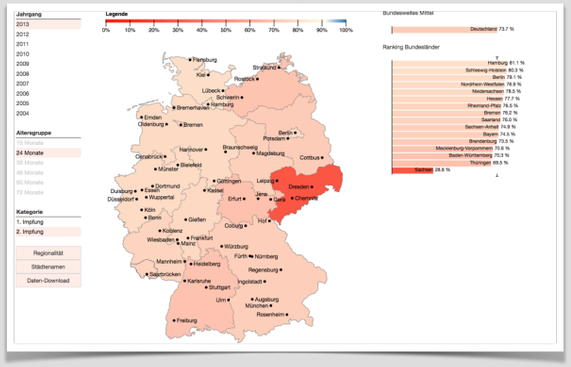
Alice Wittig[1], Thorsten Rieck[2]
1. Brockmann Lab, Humboldt Universität zu Berlin & Robert Koch-Institut; 2. Impfprävention, Robert Koch-Institut

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

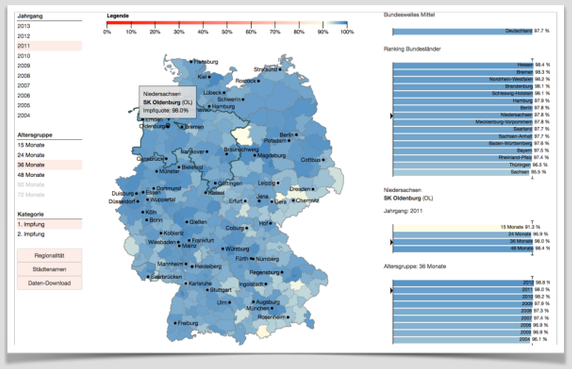
VacMap nutzt als Datengrundlage die KV-Impfsurveillance. Die KV-Impfsurveillance wird vom Robert Koch-Institut koordiniert und gemeinschaftlich mit allen Kassenärztlichen Vereinigungen (KVen) durchgeführt. In der KV-Impfsurveillance wird der Impfstatus aus ambulanten Abrechnungsdaten der gesetzlich Krankenversicherten 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.



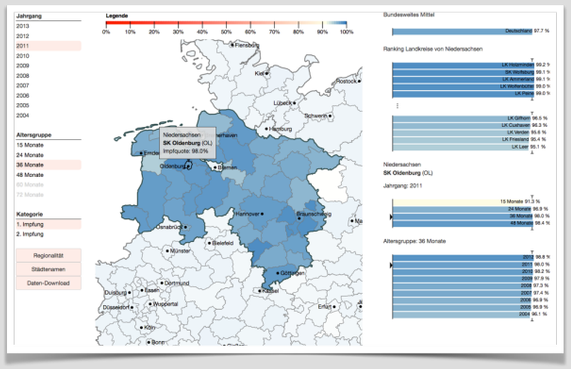
Das **Menü** (links) ermöglicht die Auswahl der Datensätze nach Jahrgang, Altersgruppe und Dosis, den Wechsel der Darstellung von Kreis- auf Bundeslandebene, das Ein-/Ausblenden von Städtenamen sowie den Download als .csv-Datei.



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



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



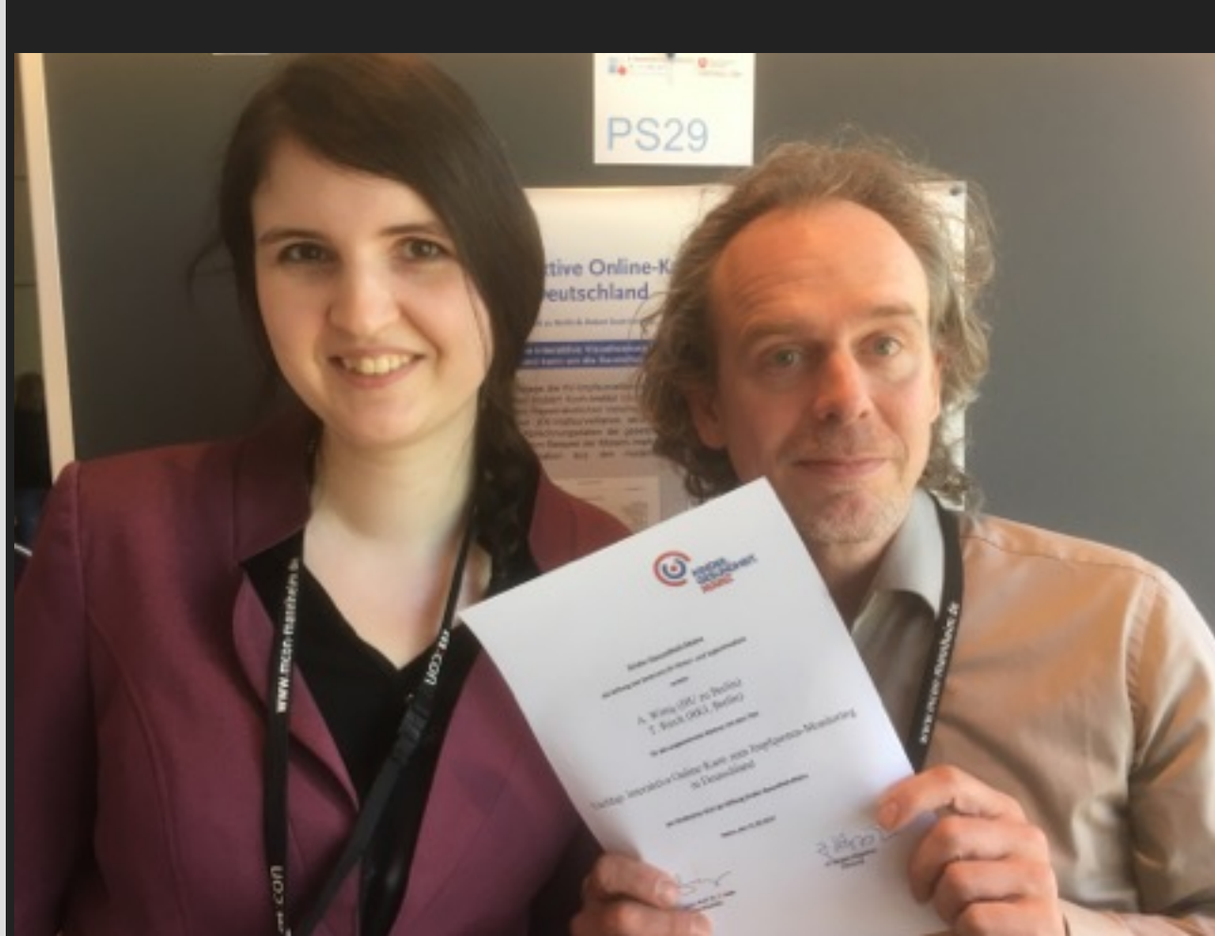
Die **Zoom-Funktion** vergrößert ein Bundesland und stellt eine Rangliste seiner Kreise auf (rechts).

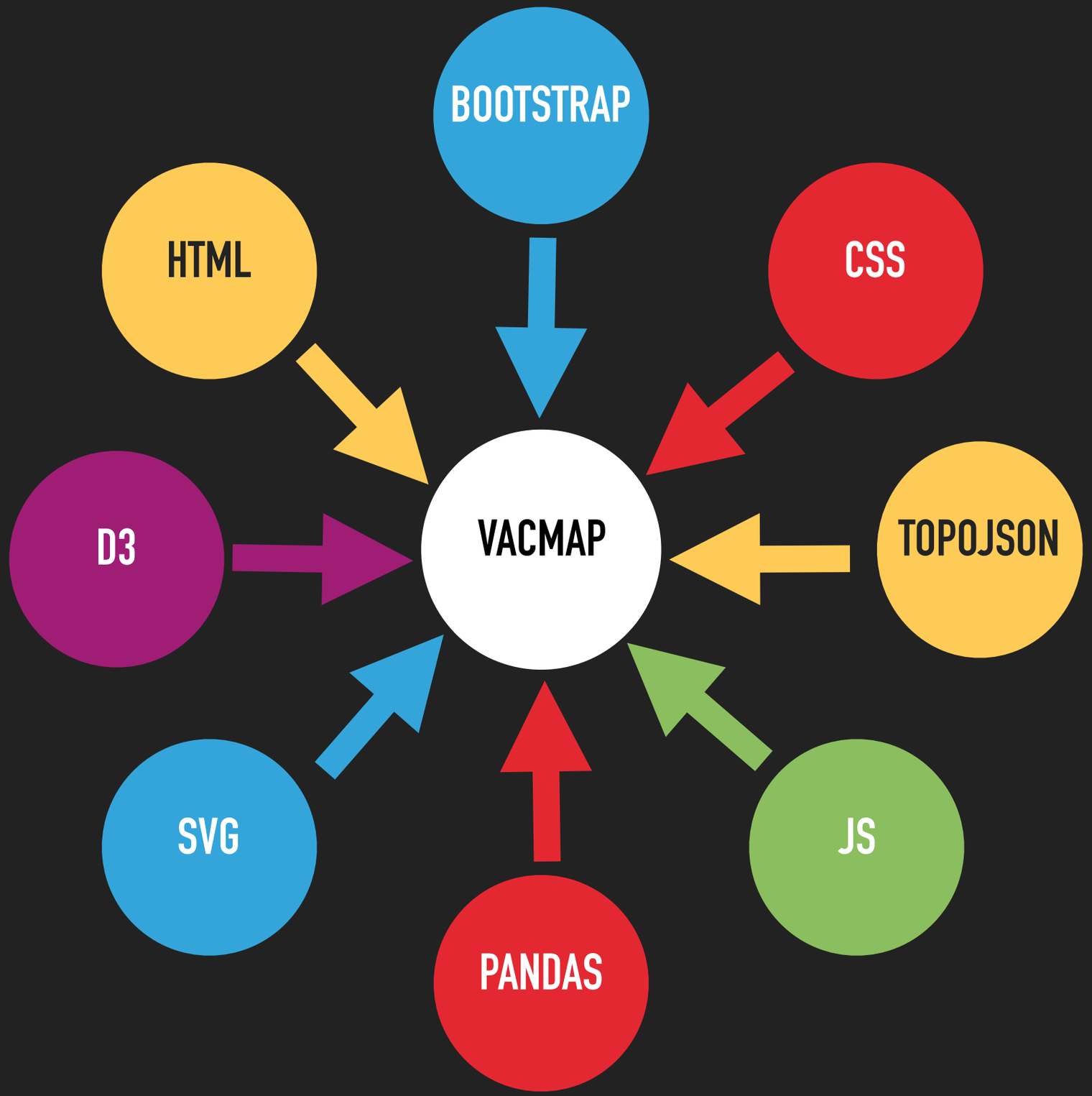
Gewinner des Posterpreises auf der Nationalen Impfkonferenz 2017 in Oldenburg

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

POSTER AWARD

NATIONALE IMPFKONFERENZ 2017 IN OLDENBURG




BOOTSTRAP
HTML
CSS
D3
VACMAP
TOPOJSON
SVG
PANDAS
JS

GEO- AND TOPOJSON

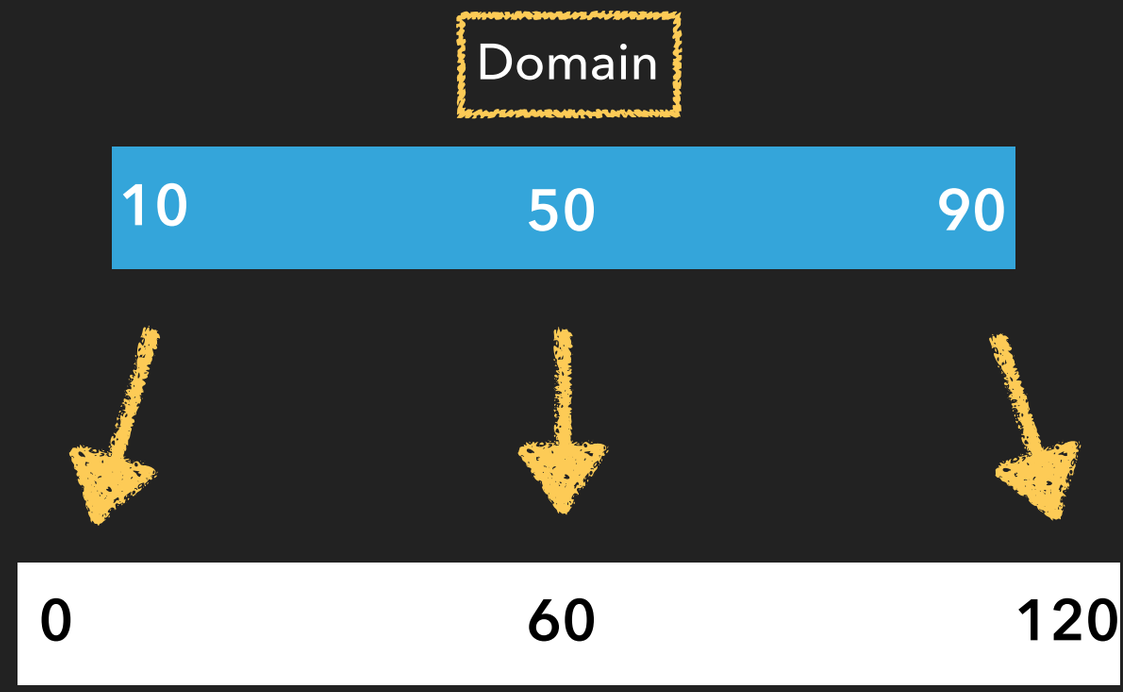
- TopoJSON is extension of GeoJSON
- GeoJSON has coordinates
- TopoJSON has arcs
  - encodes geospatial topology
  - arcs: shared line segments
  - improves shape simplification
  - removes redundant coordinates
  - has much smaller file sizes
  - useful applications like map coloring and selective meshing

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


```
{
 "type":"Topology",
 "transform":{"scale":[0.0009170486546988356,0.00077949929650753 03],
 "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], ... ],
     ...
     [[8238,8925],[-31,3],[-35,9],[-38,17],[8,7],[6,15], ... ]
  ]
}
```

SCALES

- continuous, ordinal, band [scales]...
- domain = input
- range = output
- [colorbrewer]




```
var colorScale = d3.scaleLinear()
                   .domain([0, 92, 100])
                   .range(["#ff0000","#fffee7", "#3182bd"]);
```

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>
      <p>This part is inside a .container class.</p>

      <div class="row">
        <div class="col-xs-3 col-sm-5 col-lg-7"
             style="background-color:lavender;">1</div>
        <div class="col-xs-9 col-sm-7 col-lg-5"
             style="background-color:lavenderblush;">2</div>
    </div> <!-- first row -->
    <div class="row">
        <div class="col-sm-4"
             style="background-color:lavender;">A</div>
        <div class="col-sm-4"
             style="background-color:lavenderblush;">B</div>
        <div class="col-sm-4"
             style="background-color:lavender;">C</div>
     </div> <!-- second row -->
    </div> <!-- .container -->

  </body>
</html>
```

FINALLY THE COOL STUFF!

Alice

USEFUL

- D3 Paper
- 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

COMING SOON

- d3.express