

# PBO Workshop

## Getting Excited About Data-Driven Documents With d3

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# Outline

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2 Background

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- The Author's Tour
- Repository Examples
- My Tour

4 The Philosophy of d3

- Why d3?
- The Cruxes of Visualization
- Reuse of Existing Standards

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# If you are eager to obtain everything

- Navigate to [github.com](https://github.com)
- Search for [benracine](#)
- This repo should be the first hit, i.e. "[d3\\_cisnet\\_tutorial](#)"

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# Background

- d3.js is a small, free JavaScript library for manipulating documents based on data.
- d3 allows you to bind arbitrary data to a Document Object Model (DOM), and then apply data-driven transformations to the document.
- For example:
  - You can use d3 to generate a basic HTML table from a matrix of numbers.
  - You could use the same data to create an interactive SVG bar chart with smooth transitions and interaction.

# Ecosystem

- It largely targets the SVG element
- SVG is being increasingly supported:
  - IE, 9+
  - Chrome
  - Firefox
  - Safari
  - Opera, 9.5+
  - iOS
  - Android, 3.0+
- A few additional JavaScript libraries can be useful for minor data transformations and persistence
  - Underscore.js
  - Backbone.js
  - JSONSelect.js
  - Science.js
- JavaScript performance has recently increased

## Background (cont.)

- d3.js is loosely associated with the [Stanford Visualization Group](#)
- Supersedes the ProtoVis project
- Mike Bostock is the primary author, but it is open source on Github.com
- Only a year or two old

# The Author's Tour

## A Tour

- The author uses "layouts"
- Association / adjacency representations are addressed with chord layout
  - Chord - produce a chord diagram from a matrix of relationships.
- A whole collection of hierarchical layouts
  - Bundle - apply Holten's hierarchical bundling algorithm to edges.
  - Cluster - cluster entities into a dendrogram.
  - Hierarchy - derive a custom hierarchical layout implementation.
  - Histogram - compute the distribution of data using quantized bins.
  - Pack - produce a hierarchical layout using recursive circle-packing.

# The Author's Tour Continued

- Calendar
- Time-series (note Mike's other project: "Cube")
- Pan and zoom
- Scale elements (with tick, label, title and location options)
- Smooth transitions
- Interaction
- Animation
- Chloropleth / projections
- Force (helpful in solving the non-collision problem)

# Repository Examples

- Bar / column
- Box plot - quintile distribution of a single variable
- Bullet - considered a best-practices replacement for gauge charts
- Histogram - compute the distribution of data using quantized bins.
- Hyperbolic tree
- Pie - compute the start and end angles for arcs in a pie or donut chart.
- QQ plots - compare two probability distributions by graphing their quantiles against each other
- Radial -
- Stack -
- Streamgraph - a generalization of stacked area graphs

# My Tour

- A side project that I consulted on for the [Startup Weekend](#)
- \*\* [My navpane task](#)



# Why d3?

- It is a small and sharp tool
- Kind of in the Unix philosophy, it does "one" thing and does it well
  - i.e. It solves the cruxes of visualization
- Plays well with others
  - i.e. doesn't pollute the global namespace

# The Cruxes of Visualization

## Scales

- Data access by url
  - text
  - json
  - xml
  - html
  - csv
- Scales define the mapping between the data and pixel/color space
- A reverse function can be used to map the other direction too
- Linear, log, power, discrete/continuous, banded, ordinal and user defined

# Reuse of Existing Standards

- Takes advantage of existing w3 standards instead of reinventing the wheel
- Authors can take their new depth of knowledge of modern web standards with them