OPEN DATA APPS

Creating Apps Using Open Data

May 17, 2013

PCATT IT SUMMIT

“The State of the Web”

USING OPEN DATA in HAWAII

HELLO

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@mudphone
http://facebook.com/WhatNoChoco

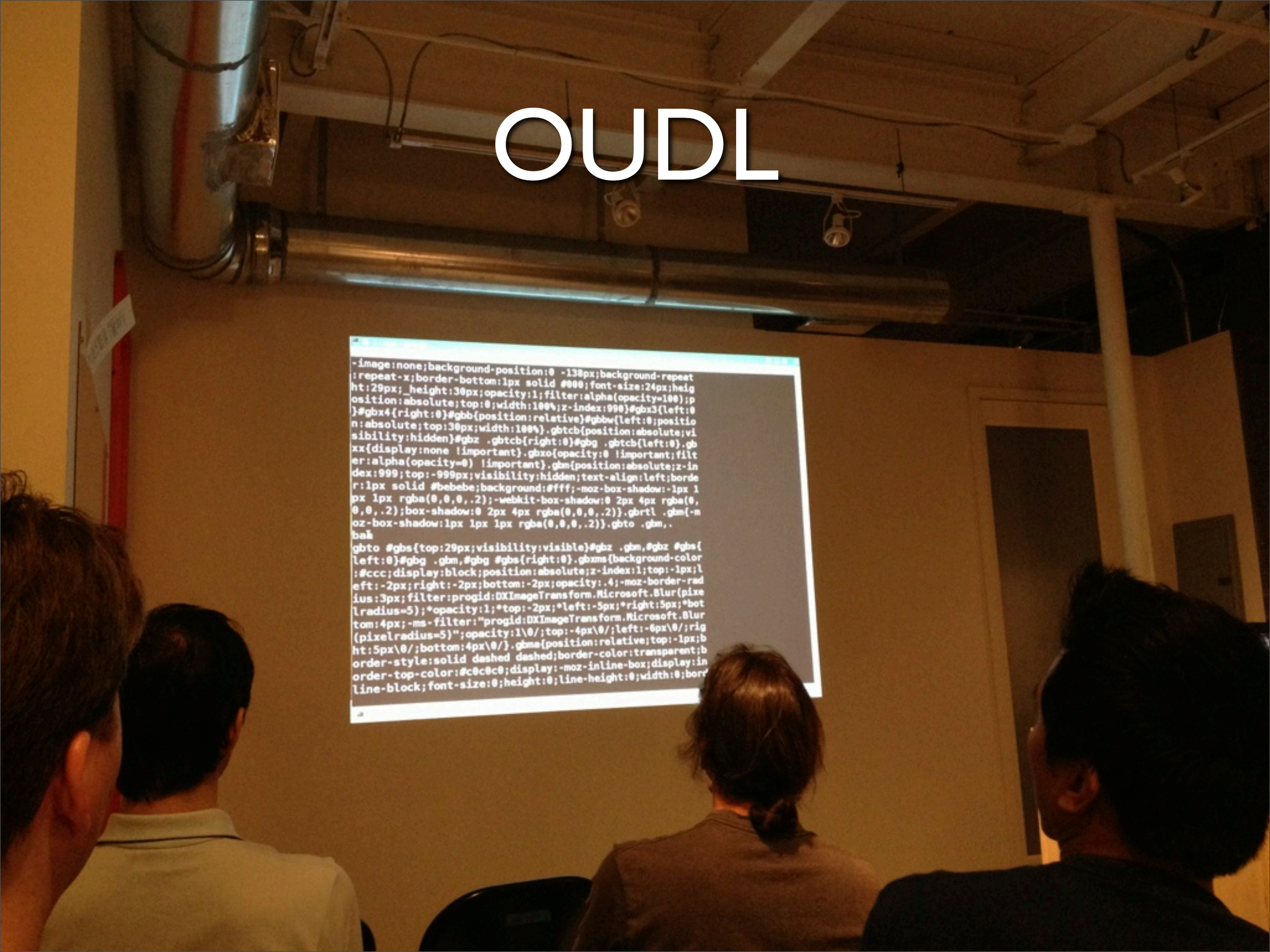
OUDL*

http://meetup.com/dynamic/

*Organization for the Understanding of Dynamic Languages

OUDL

OUDL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OutOfOffice

OutOfOffice

OutOfOffice

TODO

- ☐ Prerequisites
- ☐ Philosophical Underpinnings
- ☐ Hawaii Data Pipeline Tool
- ☐ Ruby & IRB Live-Coding Demo
- ☐ Data Visualizations with D3.js
- ☐ Maps with D3.js & TopoJSON

PREREQUISITES

- ☐ Ruby (version >= 1.9.3)
- ☐ Sense of humor

WAT?

- http://github.com/PasDeChocolat/HawaiiDataPipeline
  - List of tutorials, which this is roughly based on.
  - All the code.
  - All the slides.
  - Press the “ZIP” download button.
- http://pasdechocolat.com/blog/list/

WAT?

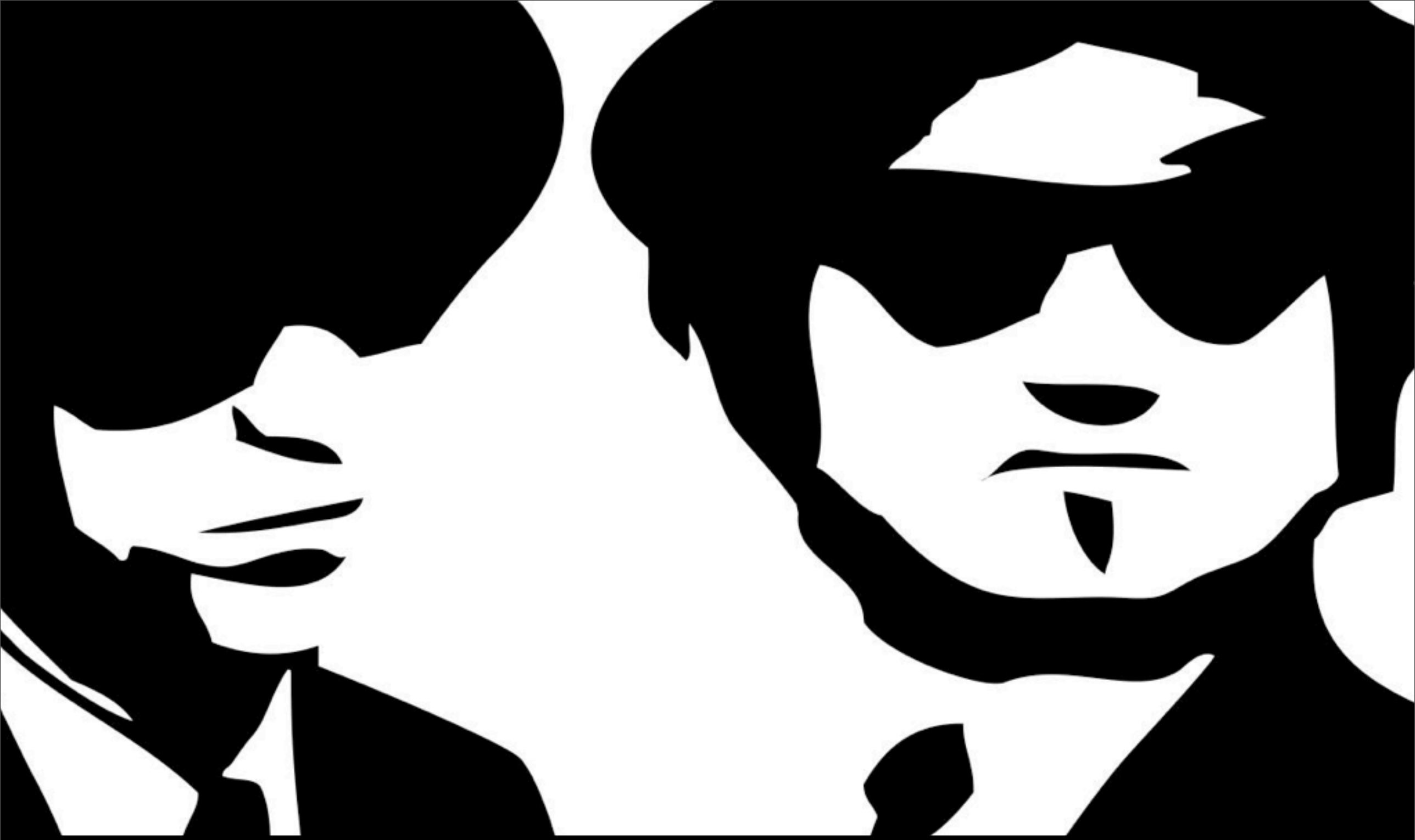
- http://pasdechocolat.com/blog/list/
- http://pasdechocolat.com/2013/04/06/introducing-the-hawaii-data-pipeline/
- http://pasdechocolat.com/2013/04/07/pipeline-for-honolulu-too/
- http://pasdechocolat.com/2013/04/08/using-d3-in-hawaii/
- http://pasdechocolat.com/2013/05/03/mapping-hawaii/

NEW

TOOLS

- ☐ Google Drive (Docs, Presentations, Spreadsheets)
- ☐ Dropbox
- ☐ CampfireNow.com
- ☐ KanbanFlow.com
- ☐ GitHub.com
- ☐ MindMeister.com
- ☐ GiveaBrief.com
- ☐ Treed (disclaimer we built this)

http://pasdechocolat.com/2013/05/04/design_school_cheats_process/



We’re on a mission from God.

NEW

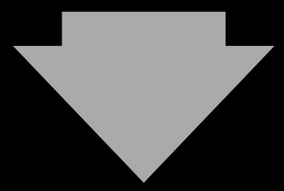
Drawing Dynamic Systems

Bret Victor:

"thinkers think in pictures, not symbols"

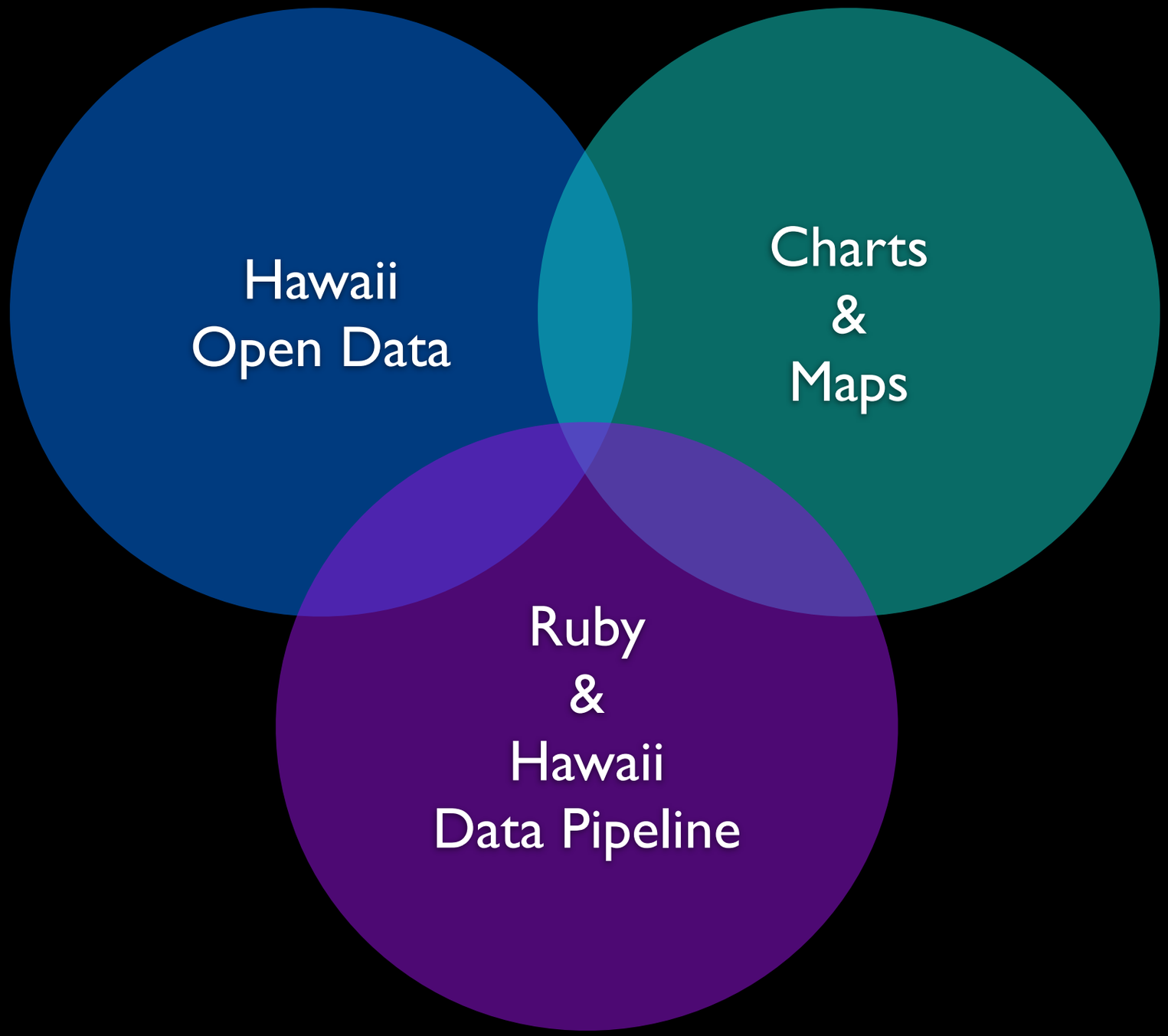
https://vimeo.com/66085662

we need better tools

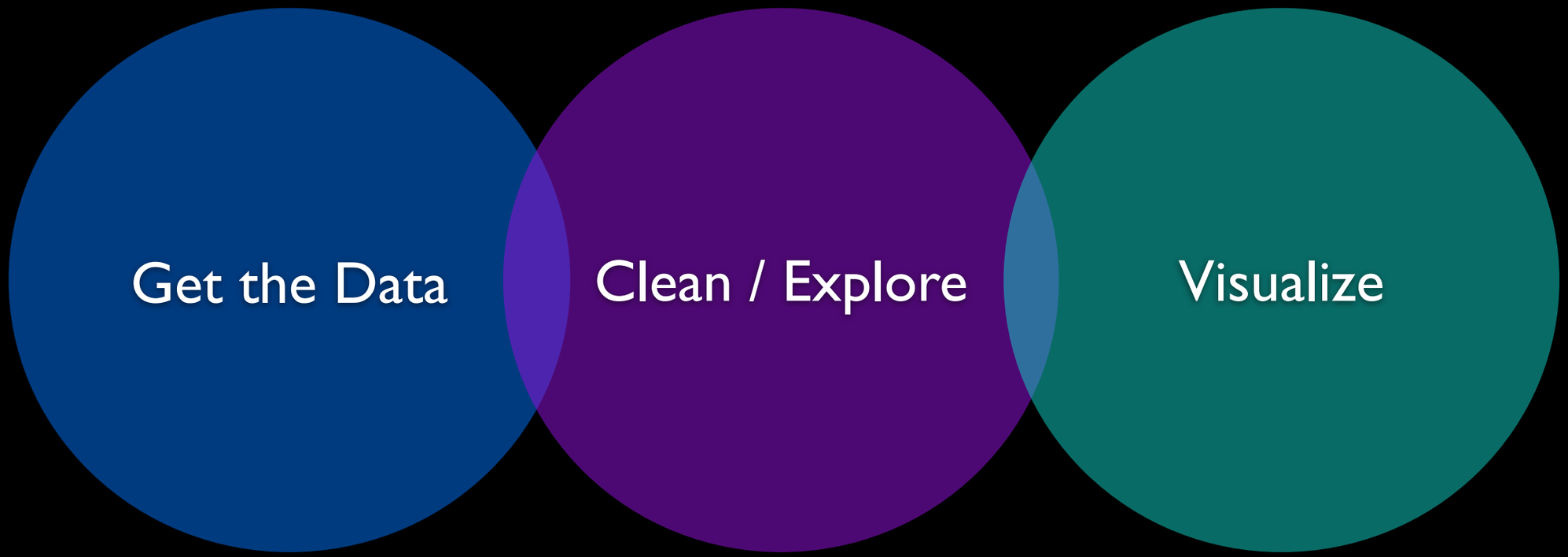


don't want to just use what the tool provides

Philosophy



How does this work?



Get the Data

Find the Source

Filter / Search

Extract the Data

Clean / Explore

Load the Data

Apply Functions
Sort / Filter /
Map / Reduce

Organize

Visualize

Charts

Maps

DataVis

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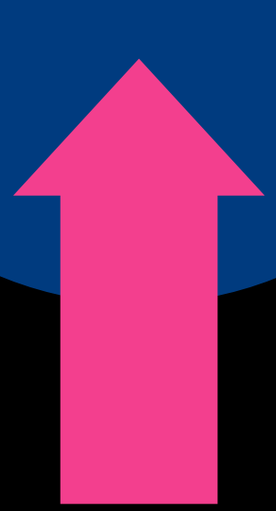
Extract the Data



Welcome to data.hawaii.gov

Leading public sector innovators are leveraging cloud, platform and social technologies to deliver better citizen access to information, modernize online service delivery and improve internal efficiencies.

Culture and Recreation

To enrich the lives of people of all ages by providing and preserving

Read more >>

Go to Culture and Recreation page >>

Employment

To assure all workers full and equal opportunity to work, decent working

Read more >>

Go to Employment page >>

Formal Education

To maximize the realization of each individual's intellectual

Read more >>

Go to Formal Education page >>

Health

To monitor, protect, and enhance the health of all people in Hawai'i by

Read more >>

Go to Health page >>

Public Safety

To protect the individual and property from injury and loss caused by

Read more >>

Go to Public Safety page >>

Transportation Facilities

To facilitate the rapid, safe and economical movement of people and

Read more >>

Go to Transportation Facilities page >>

Most Relevant

Search

	Name	Popularity	Type
1.	**HAWAII'S FARMER'S MARKET** Buy Local It Matters at one of many neighborhood farmer's market throughout	5,732 views	
2.	**LICENSED PESTICIDES LISTING** List is of pesticides products licensed for distribution and sale. Any pesticide not	5,859 views	

Most Relevant

Search

View Types

- Datasets
- Charts
- Maps
- Calendars
- Filtered Views
- External Datasets
- Files and Documents
- Forms

Categories

Community
Culture and Recreation
Economic Development
Employment
Environmental Protection
View All

Topics

campaign contributions
campaign finance
campaign spending
campaign spending commission
candidate
View All

Federated Domains

This site only
explore.data.gov

	Name	Popularity	Type
1.	**HAWAII'S FARMER'S MARKET** Buy Local It Matters at one of many neighborhood farmer's market throughout	5,732 views	
2.	**LICENSED PESTICIDES LISTING** List is of pesticides products licensed for distribution and sale. Any pesticide not	5,859 views	
3.	**Campaign Contributions Received By Hawaii State and County Candidates From November 8, 2006 Through December 31, 2012**	1,068 views	
4.	**Hawaii EV Charging Stations Map** Hawaii EV Charging Stations	1,458 views	
5.	**Hawaii Electricity Consumption**	1,689 views	
6.	**Energy Costs as a Percent of GDP**	1,545 views	
7.	**Average Monthly Regular Gasoline Prices Hawaii (by County) Vs US**	1,537 views	
8.	**Renewable Energy and Efficiency Portfolio Standards**	1,504 views	
9.	**Map of EV Charging Stations in Hawaii**	437 views	
10.	**Hawaii Renewable Energy Portfolio Standard (RPS) Levels by Utility**	734 views	

1 2 3 4 5 6 7 8 9 ...

Showing 10 of 8931

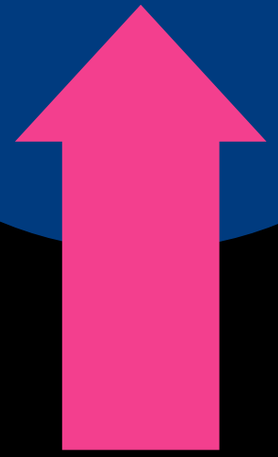
8931 things
10 per page
894 pages

Get the Data

Find the Source

Filter / Search

Extract the Data



Unsaved View Save As... Revert
Based on Data.hawaii.gov catalog of datasets

Find in this Dataset

Manage More Views Filter Visualize Export Discuss Embed About

filterable but, still too large

	Type	Name	Description	Rating	Category	K…ds	Comments	Uid	Table Id
1	Tabular	HAWAII'S FARMER	Buy Local It Matters	0	Economic Develop	…et loca	0	nqfm-3etr	
2	Tabular	LICENSED PESTIC	List is of pesticides	0	Health		0	rzjk-9g6v	
3	Tabular	Campaign Contribu		0	Community	…pending	0	jexd-xbcg	
4	Map	Hawaii EV Chargin	Hawaii EV Chargin	0	Economic Develop		0	6shd-nnez	
5	Chart	Hawaii Electricity C		0			0	mx5j-fw5d	
6	Chart	Energy Costs as a I		0			0	qznv-ikj4	
7	Chart	Average Monthly R		0			0	hm2n-aire	
8	Chart	Renewable Energy		0			0	857n-psp7	
9	Map	Map of EV Chargin		0	Transportation Faci	ev, ev charging stat	1	a4df-teiy	
10	Chart	Hawaii Renewable		0			0	kwy2-quqh	
11	Chart	New Distributed Re		0			0	cej4-p5ee	
12	Chart	Hawaii Renewable		0			0	qqq8-cqfa	
13	Chart	Hawaii Renewable		0			0	uuii-28hg	
14	Chart	Currently Proposed		0			0	rfex-ufmx	
15	Tabular	Public Charging Sta		0	Transportation Faci	ev, ev charging stat	0	95x5-qrxh	
16	Tabular	Hawaii eGov Apps	All Hawaii Portal Ap	0	Government-Wide S	applications app ap	0	y552-5npg	
17	Tabular	Sample OIP Master	Office of Information	0		oip, uipa, records, r	0	emfc-dtj9	
18	Map	EVs		0	Transportation Faci	ev, ev charging stat	0	d6mw-9s8g	
19	Chart	Hawaii Annual Elec		0			0	mdnn-fba5	
20	Filter	2012 Honolulu City		0	Government-Wide S	campaign spending	0	cecx-8mxu	
21	Chart	Hawaii Annual Elec		0			0	grhm-fzd2	
22	Tabular	CIP Expenditures	CIP Expenditures. M	0	Government-Wide S	famis, dags	2	54sf-nz6w	
23	Map	Map - 2012 Honolu		0	Government-Wide S	campaign spending	0	wfey-ay8x	

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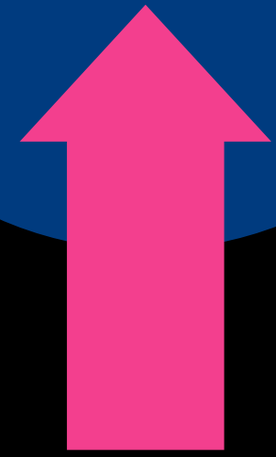
Extract the Data



DATA. HAWAII. GOV

Unsaved View Save As... Revert
Based on Data.hawaii.gov catalog of datasets

Find in this Dataset

Manage More Views Filter Visualize Export Discuss Embed About

	Type	Name	Description	Rating	Category	Keywords	Comm	Uid	Table Id
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2	Tabular	LICENSED PESTIC	List is of pesticides	0	Health	pesticides		0 rzjk-9g6v	
3	Tabular	Campaign Contribu		0	Community	campaign spendinç		0 jexd-xbcg	
4	Map	Hawaii EV Chargin	Hawaii EV Chargin	0	Economic Develop			0 6shd-nnez	
5	Chart	Hawaii Electricity C		0				0 mx5j-fw5d	
6	Chart	Energy Costs as a I		0				0	
7	Chart	Average Monthly R		0				0 hm2n-aire	
8	Chart	Renewable Energy		0				0 857n-psp7	
9	Map	Map of EV Chargin		0	Transportation Faci	ev, ev charging stat		1 a4df-teiy	
10	Chart	Hawaii Renewable		0				0 kwy2-quqh	
11	Chart	New Distributed Re		0				0 cej4-p5ee	
12	Chart	Hawaii Renewable		0				0 qqq8-cqfa	
13	Chart	Hawaii Renewable		0				0 uuii-28hg	
14	Chart	Currently Proposed		0				0 rfex-ufmx	
15	Tabular	Public Charging Sta		0	Transportation Faci	ev, ev charging stat		0 95x5-qrxh	
16	Tabular	Hawaii eGov Apps	All Hawaii Portal Ap	0	Government-Wide S	applications app ap		0 y552-5npg	
17	Tabular	Sample OIP Master	Office of Information	0		oip, uipa, records, r		0 emfc-dtj9	
18	Map	EVs		0	Transportation Faci	ev, ev charging stat		0 d6mw-9s8g	
19	Chart	Hawaii Annual Elec		0				0 mdnn-fba5	
20	Filter	2012 Honolulu City		0	Government-Wide S	campaign spending		0 cecx-8mxu	
21	Chart	Hawaii Annual Elec		0				0 grhm-fzd2	
22	Tabular	CIP Expenditures	CIP Expenditures. M	0	Government-Wide S	famis, dags		2 54sf-nz6w	
23	Map	Map - 2012 Honolu		0	Government-Wide S	campaign spending		0 wfey-ay8x	

export as CSV or JSON but manual

Hawaii Data Pipeline Tool

Hawaii Data Pipeline Tool

Get the Data

Find the Source

Filter / Search

Extract the Data

Hawaii Data Pipeline Tool

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Clean / Explore

Load the Data

Apply Functions
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Organize

Hawaii Data Pipeline Tool

Clean / Explore

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Sort / Filter /
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Organize

DEMO

Get the Data

Find the Source

Filter / Search

Extract the Data

```
> c.list  # => list catalog
> c.list “election”  # => search catalog

# Catalog Metadata
> list = c.catalog_search “election”
> i = list[2]  # => get third catalog item
> i = list.first  # => get first catalog item
> i[:metadata]  # => display metadata

# Show columns
> CI.columns i  # => columns as metadata
> CI.column_names i  # => column names
> CI.column_display_names i  # => friendly!
```

DEMO

Get the Data

Find the Source

Filter / Search

Extract the Data

```
# Interrogate dataset:
> c.list "dqp6-3idi"
> CI.column_names c.catalog_search("dqp6-3idi").first

# Oldest prices:
> c.data_for "dqp6-3idi", max_recs: 10, order_by: "month_of_price"

# Latest prices:
> c.data_for "dqp6-3idi", max_recs: 10, order_by: "month_of_price desc"

# Average fuel price:
> c.data_for "dqp6-3idi", soda_query: "&$select=fuel,avg(price)&$group=fuel"

# Max fuel price:
> c.data_for "dqp6-3idi", soda_query: "&$select=fuel,max(price)&$group=fuel"
```

DEMO

Get the Data

Find the Source

Filter / Search

Extract the Data

```
# Get a dataset (this is the birthrate dataset):
> d = c.data_at 48

# Generate a JSON file from the birthrate data:
> c.export_json d, "temp.json"

# Generate a CSV (comma-delimited) for the birthrate data:
> c.export_csv d, "birthrate.csv"

# Specify a custom delimiter (e.g. the pipe here) for the birthrate data:
> c.export_csv d, "piped_birthrate.csv", "|"
```

Clean / Explore

Load the Data

Apply Functions
Sort / Filter /
Map / Reduce

Organize

Sort
Filter
Map - Transform (not cartography)
Reduce - Sum, Mean, Median

Clean / Explore

Load the Data

Apply Functions
Sort / Filter /
Map / Reduce

Organize

```
> raw_birth_data = c.data_for "padw-q7ep"
...
 => [{"year"=>"1900"...

> raw_birth_data.first.keys
 => ["year", "rate_per_1000_resident_population"]

> birth = raw_birth_data.map { |d| {
   year: d["year"].to_i,
   rate: d["rate_per_1000_resident_population"].to_f } }
 => [{:year=>1900, :rate=>6.7}...
```

Clean / Explore

Load the Data

Apply Functions
Sort / Filter /
Map / Reduce

Organize

```
> birth.first
 => {:year=>1900, :rate=>6.7}

> birth.last
 => {:year=>2011, :rate=>13.8}

> birth[41]
 => {:year=>1941, :rate=>22.0}
```

Clean / Explore

Load the Data

Apply Functions
Sort / Filter /
Map / Reduce

Organize

```
> birth.select { |d| d[:year] == 1944 }
 => [{:year=>1944, :rate=>14.8}]

> birth.select { |d| d[:year] % 2 == 0 }
 => [{:year=>1900, :rate=>6.7}, {:year=>1902, :rate=>14.9},
{:year=>1904...

> birth.reject { |d| d[:year] < 2000 }
 => [{:year=>2000, :rate=>14.5}, ...
{:year=>2011, :rate=>13.8}]

> birth.select { |d| d[:rate] > 39 }.map { |d| d[:year] }
 => [1921, 1922, 1923, 1924]
```

Clean / Explore

Load the Data

Apply Functions
Sort / Filter /
Map / Reduce

Organize

```
> birth.sort { |x,y| y[:rate] <=> x[:rate] }
 => [{:year=>1924, :rate=>41.8}, ...
{:year=>1900, :rate=>6.7}]

> birth.reduce(1000) { |a,d| [a, d[:rate]].min }
 => 6.7

> birth.reduce(0) { |a,d| [a, d[:rate]].max }
 => 41.8
```

Visualize

Charts

Maps

DataVis

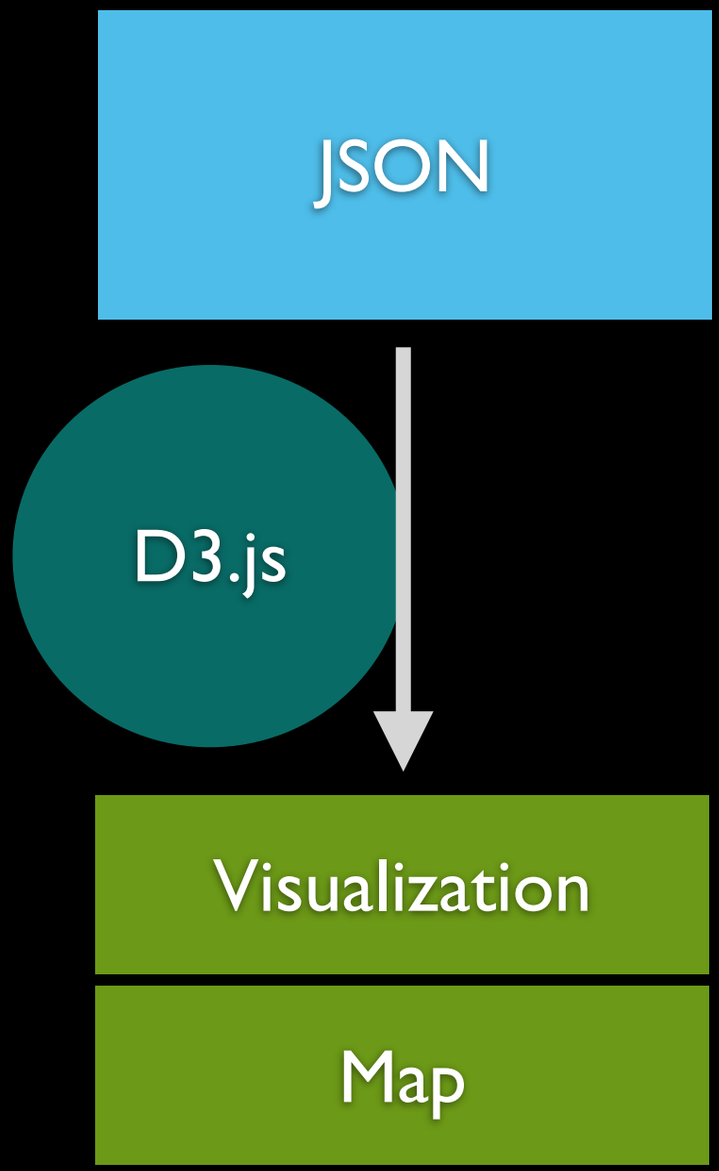
Visualize

Charts

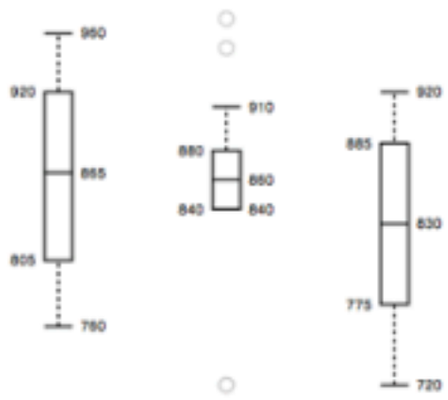
Maps

DataVis

Visualize



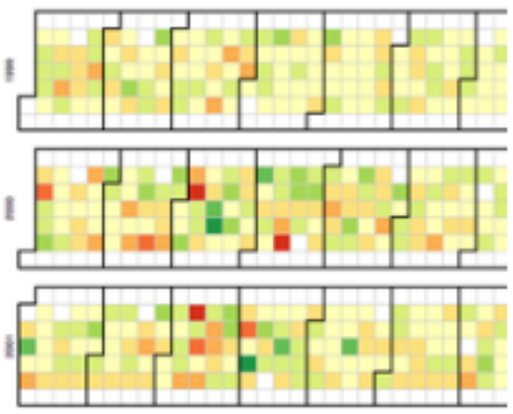
Box Plots



Bubble Chart

Bullet Charts

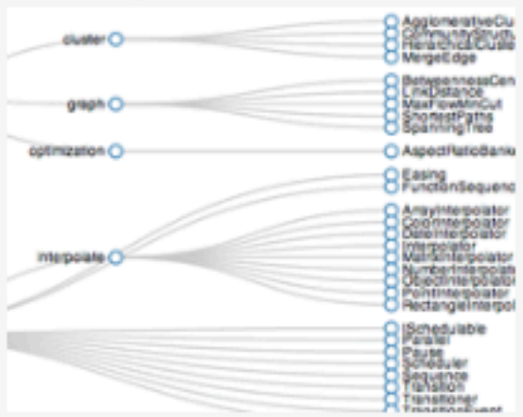
Calendar View



Non-contiguous Cartogram

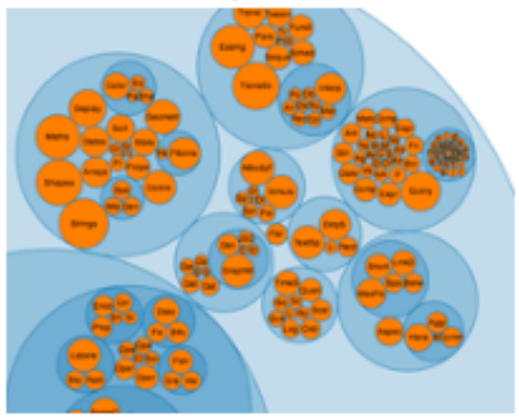
Chord Diagram

Dendrogram

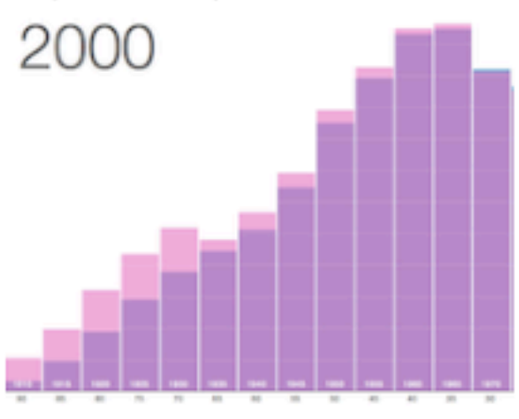


Force-Directed Graph

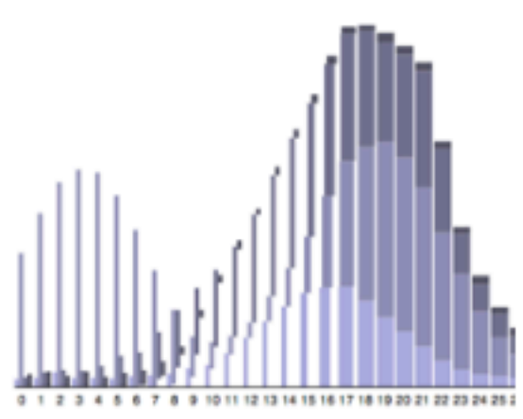
Circle Packing



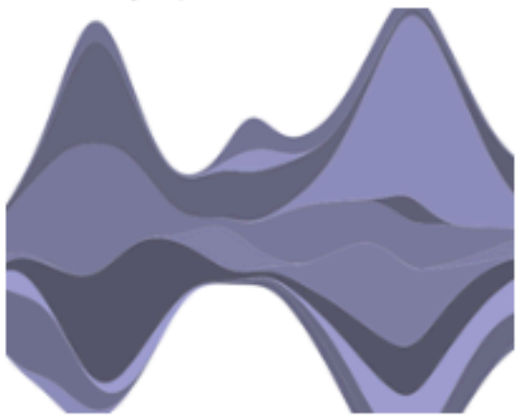
Population Pyramid



Stacked Bars

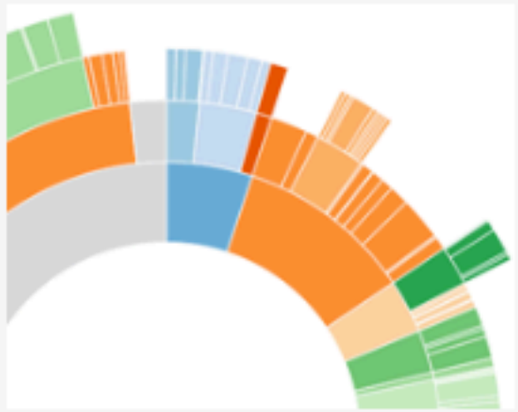


Streamgraph



D3 EXAMPLES

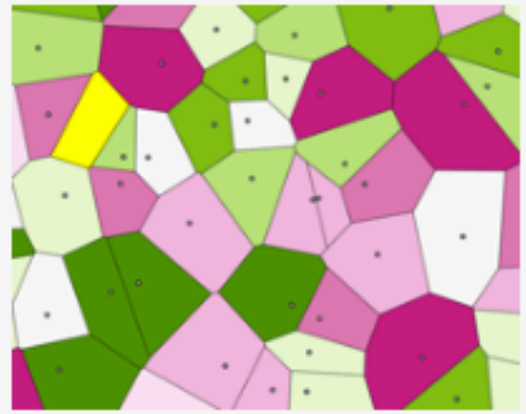
Sunburst



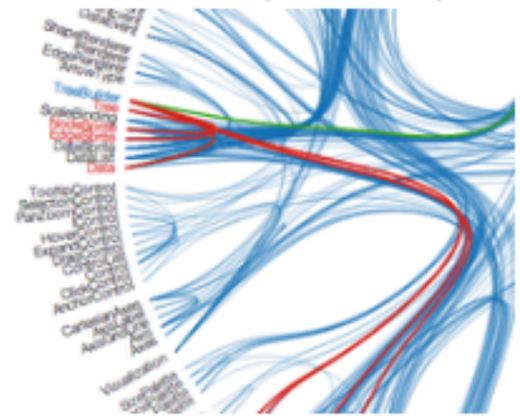
Node-Link Tree

Treemap

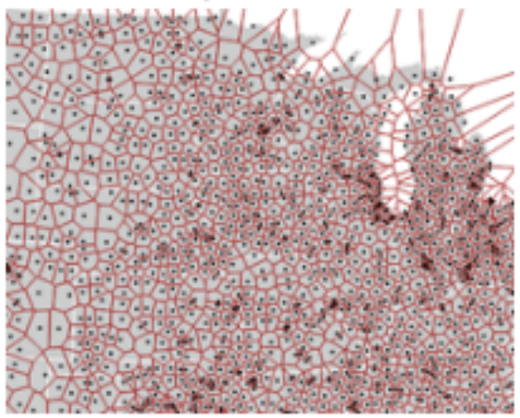
Voronoi Diagram



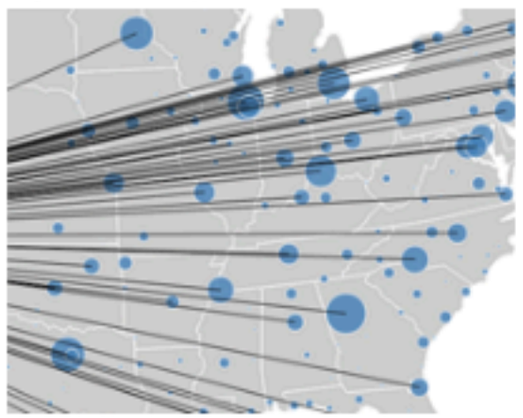
Hierarchical Edge Bundling



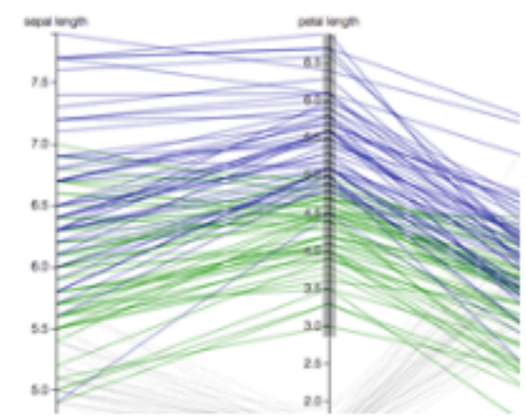
Voronoi Diagram



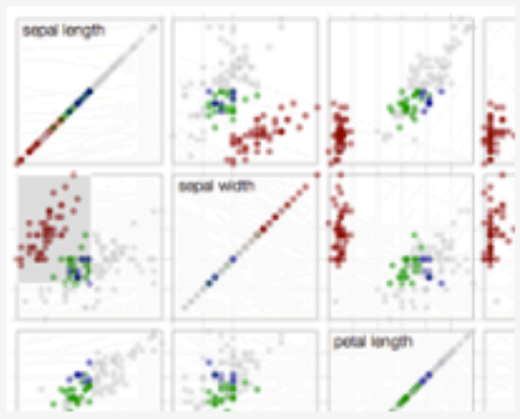
Symbol Map



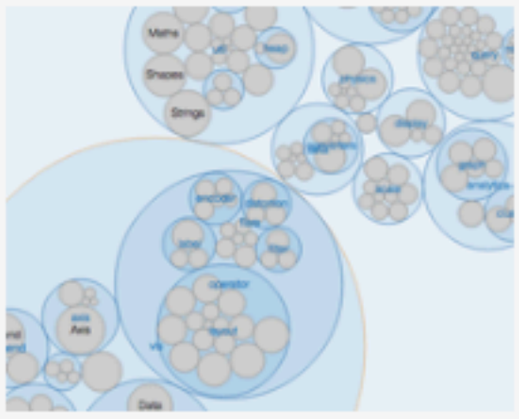
Parallel Coordinates



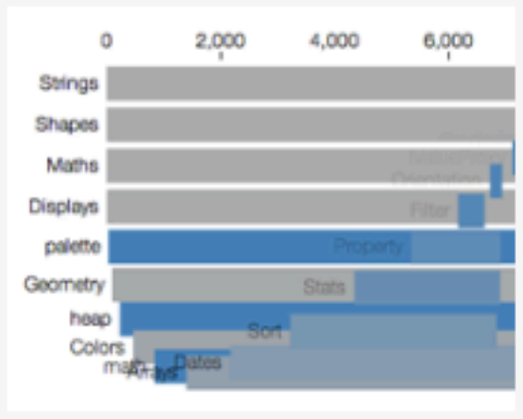
Scatterplot Matrix



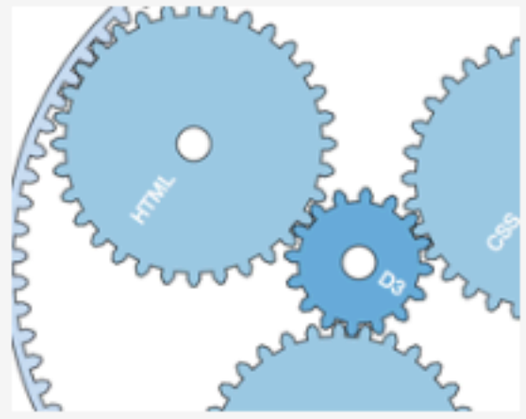
Zoomable Pack Layout



Hierarchical Bars



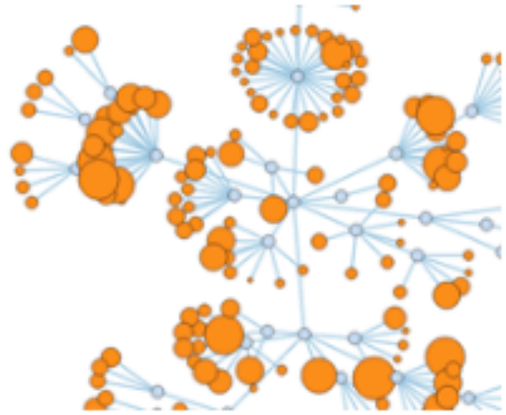
Epicyclical Gears



D3 EXAMPLES

Collision Detection

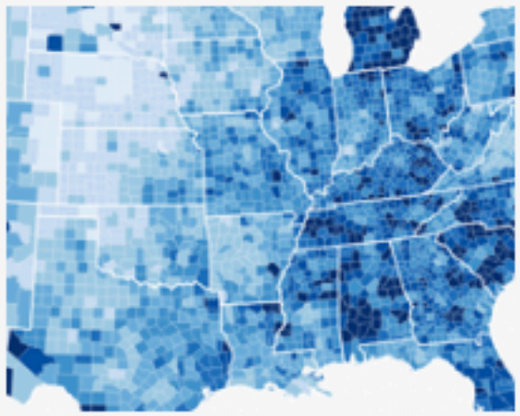
Collapsible Force Layout



Force-Directed States

Azimuthal Projections

Choropleth

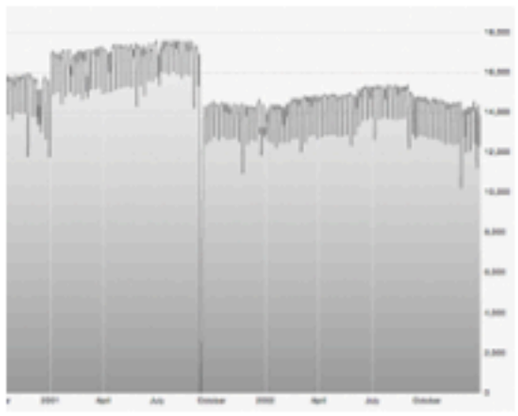


Collapsible Tree Layout

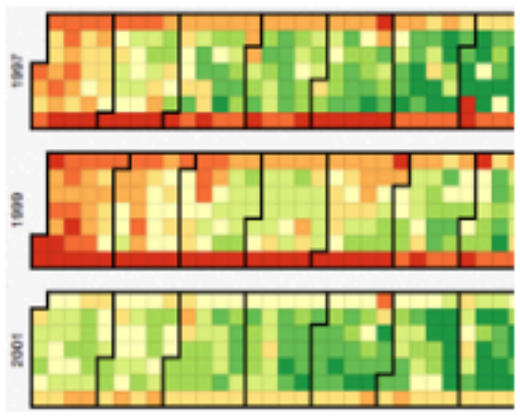
Zoomable Treemap

Zoomable Partition Layout

Zoomable Area Chart

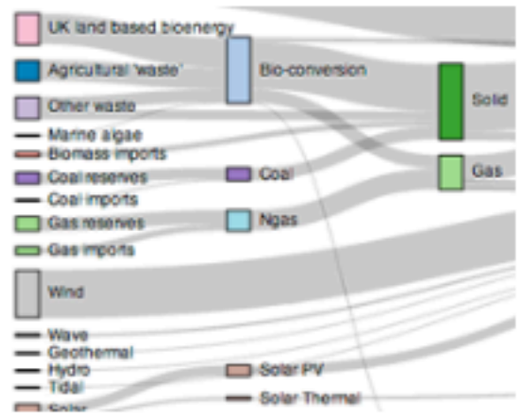


Calendar View



Rotating Cluster Layout

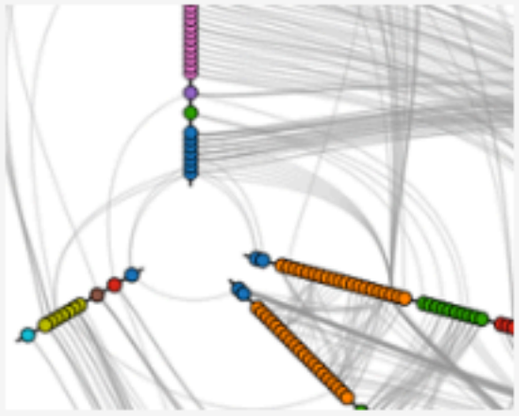
Sankey Diagram



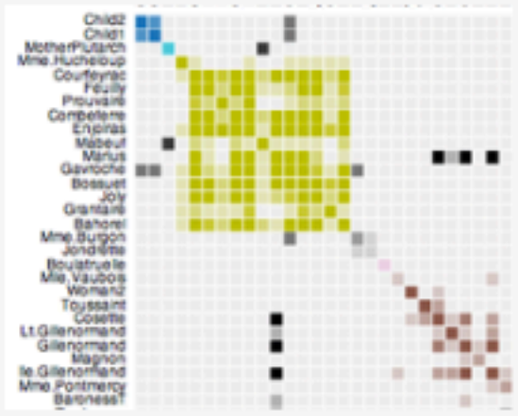
D3 EXAMPLES

Fisheye Distortion

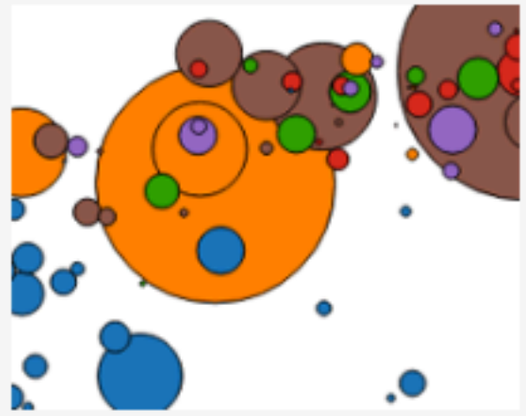
Hive Plot



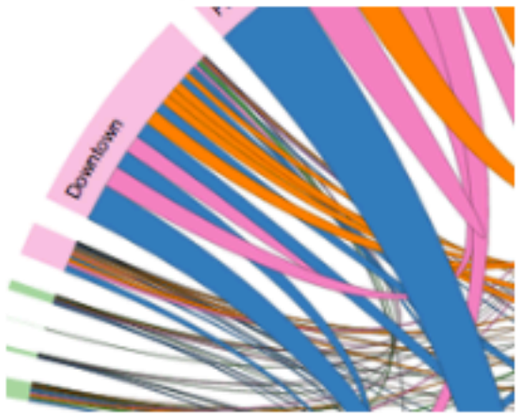
Co-occurrence Matrix



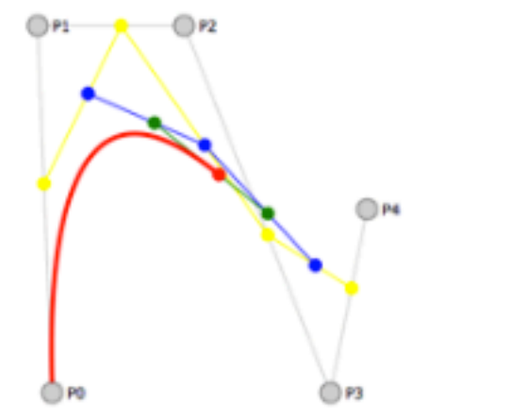
Motion Chart



Chord Diagram



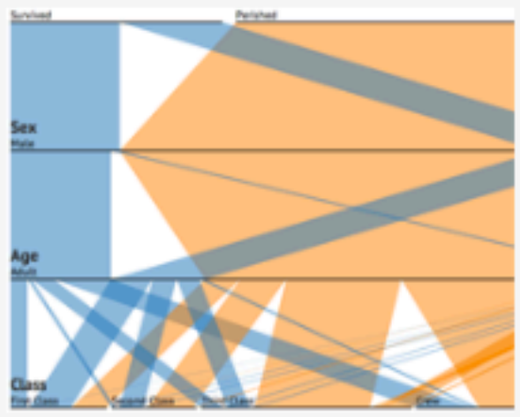
Animated Béziers



Zoomable Sunburst

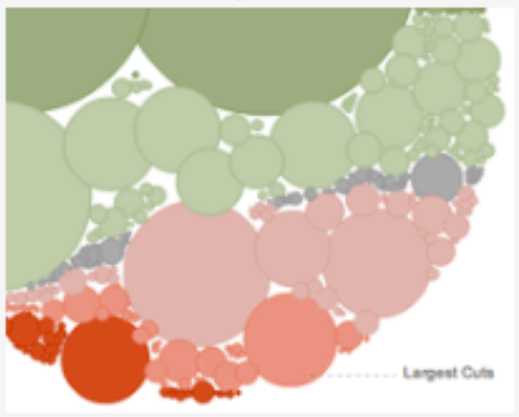
Collatz Graph

Parallel Sets



Word Cloud

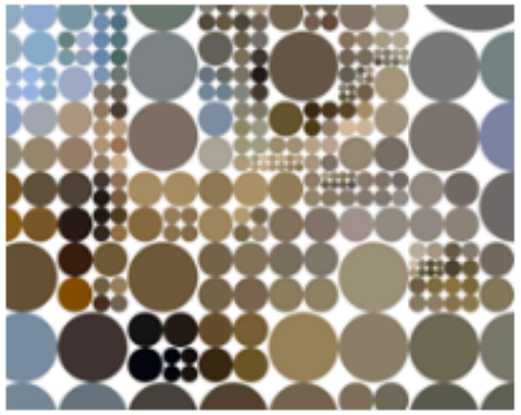
Obama's Budget Proposal



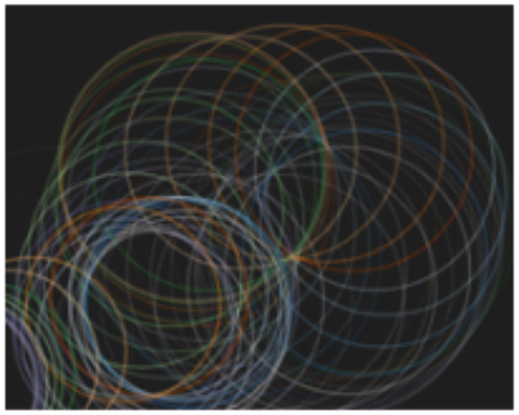
Facebook IPO

D3 EXAMPLES

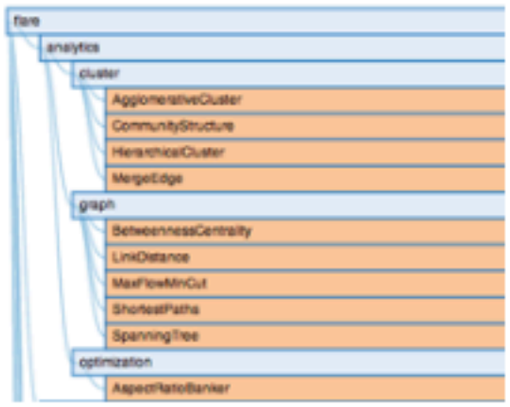
Koalas to the Max



Particles

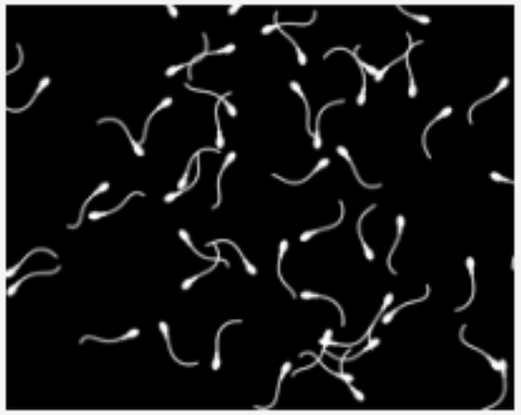


Indented Tree

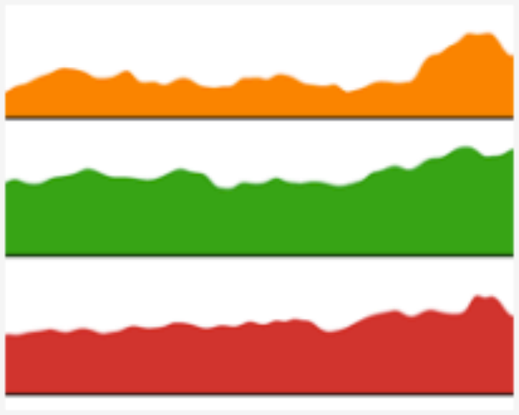


Rounded Rect

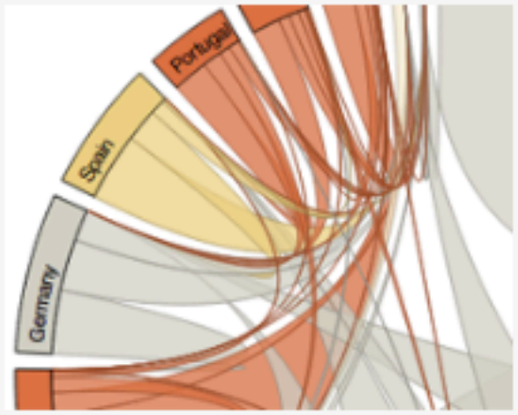
Tadpoles



Showreel

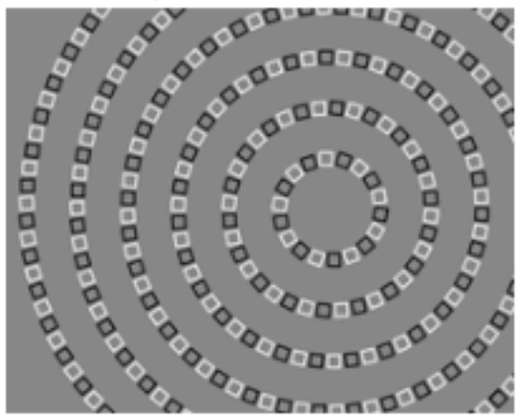


Euro Debt



Labeled Force Layout

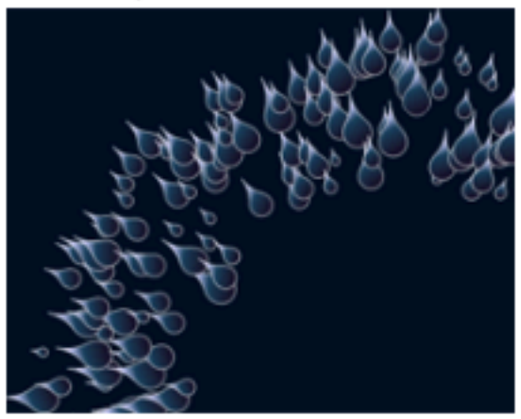
Circle-Square Illusion



Voronoi Picking

Zoomable Map

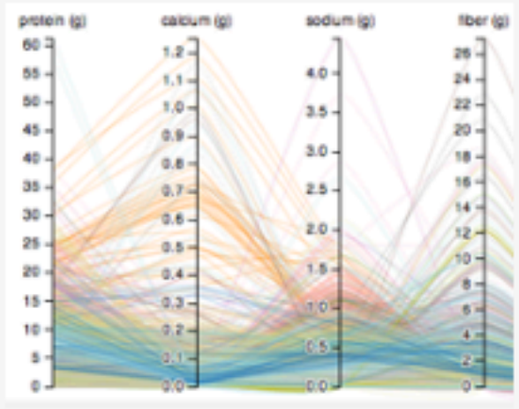
Raindrops



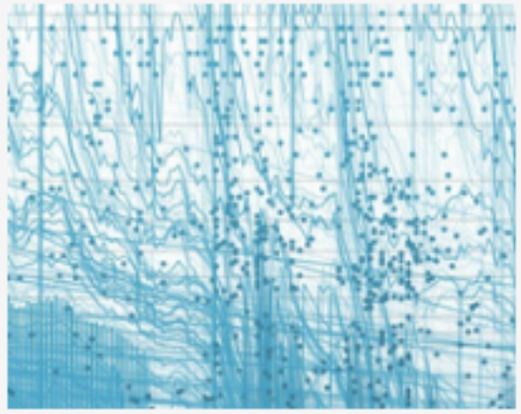
D3 EXAMPLES

Color

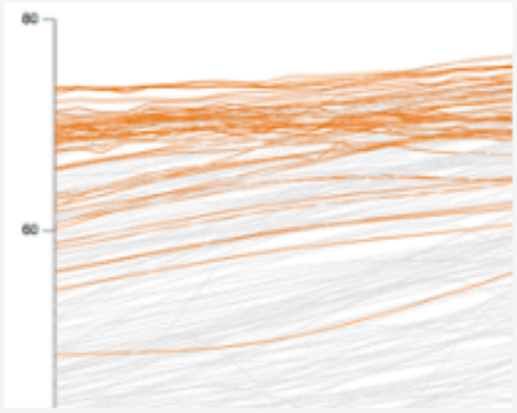
Parallel Coordinates



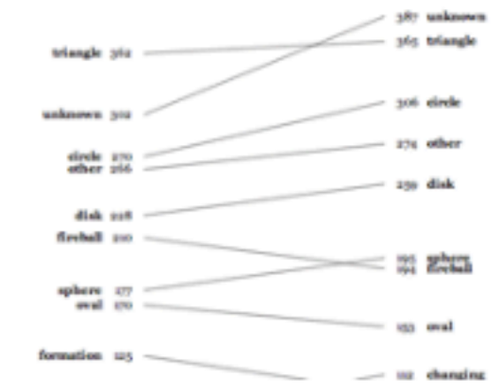
Hacker News Popularity



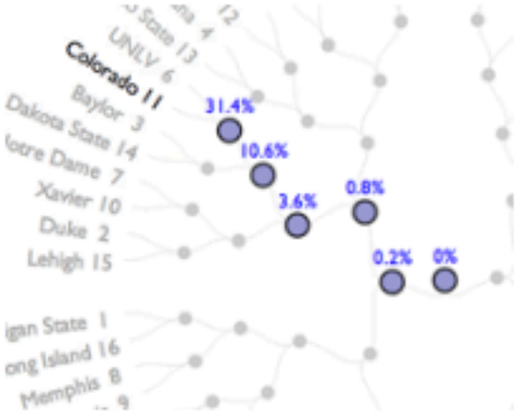
Life Expectancy



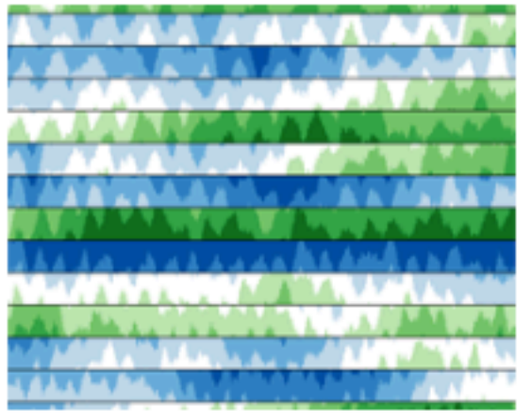
Slopegraphs



NCAA Predictions

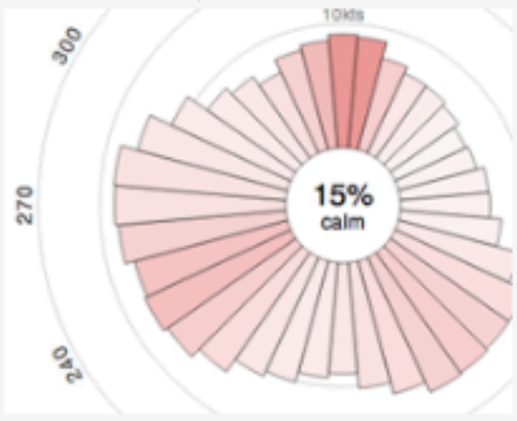


Cubism.js

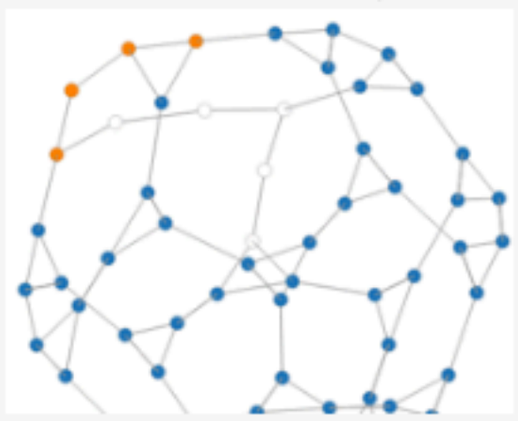


Crossfilter.js

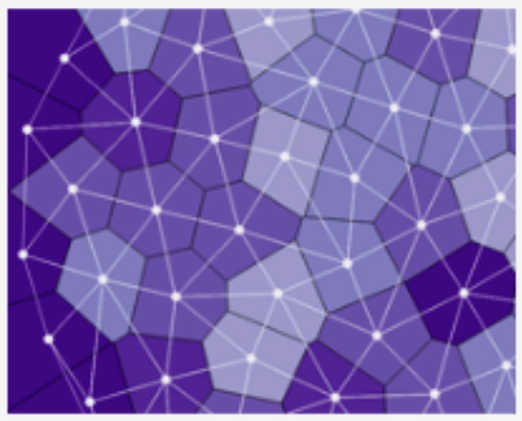
Wind History



Cubic Hamiltonian Graphs



Force-Directed Voronoi

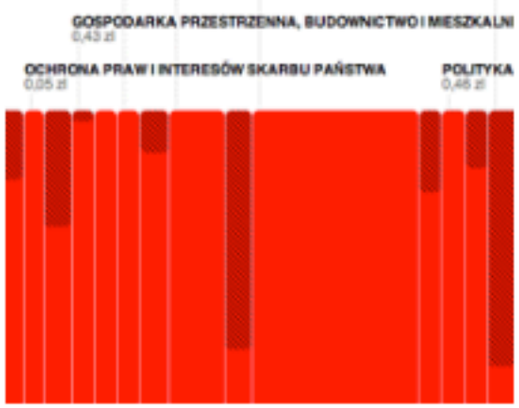


Trulia Trends

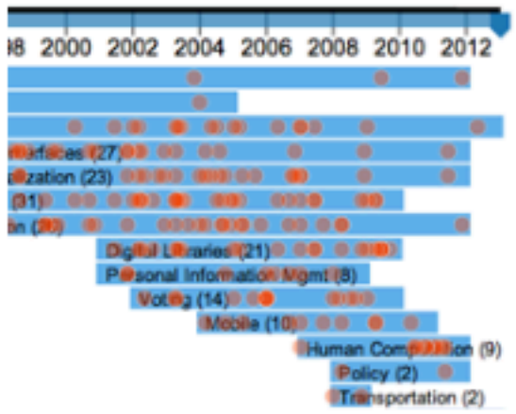
D3 EXAMPLES

Trulia Trends

Open Budget



Bederson Publications

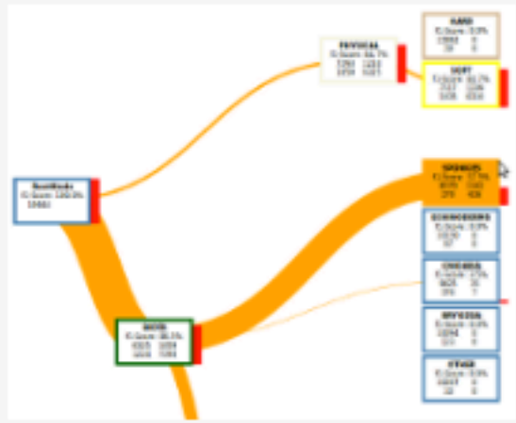


Force Layout Editor

Open Knowledge Festival

Visual Hacker News

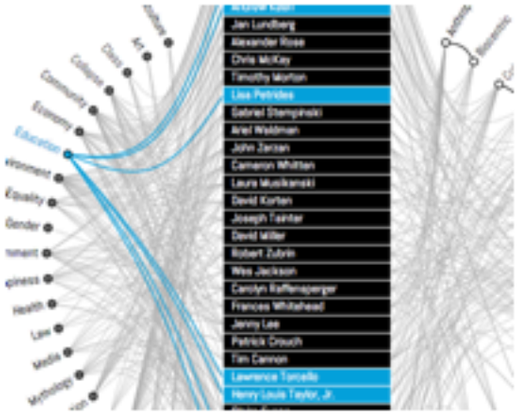
Hierarchical Classification Tree



Gene Expression

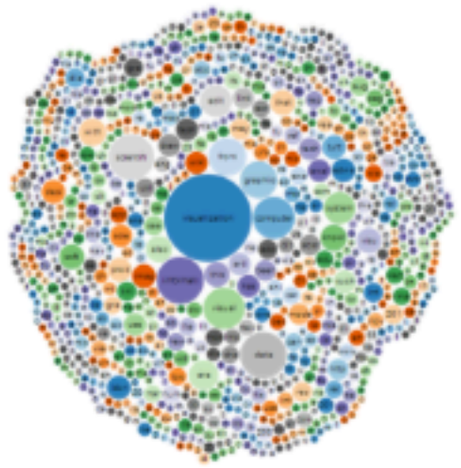
d3 Analog Clock Dashboard

Concept network browser



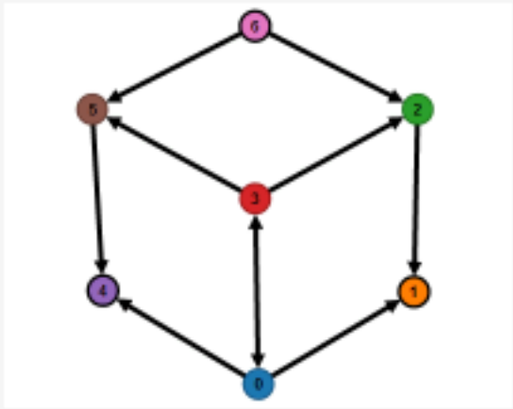
Circular heat chart

Convert any page into bubbles

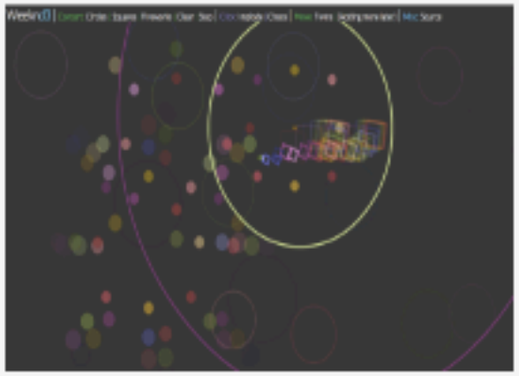


D3 EXAMPLES

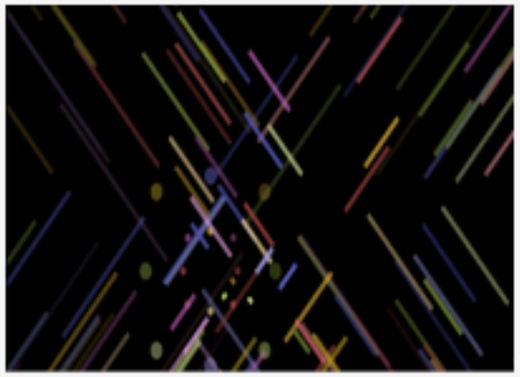
Directed Graph Editor



Weeknd3



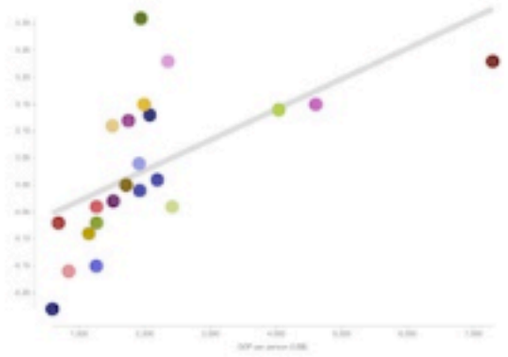
Explosions



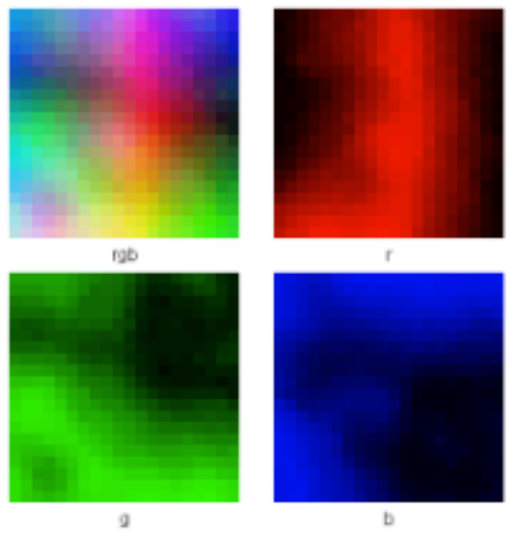
CodeFlowers

Animated wind chart

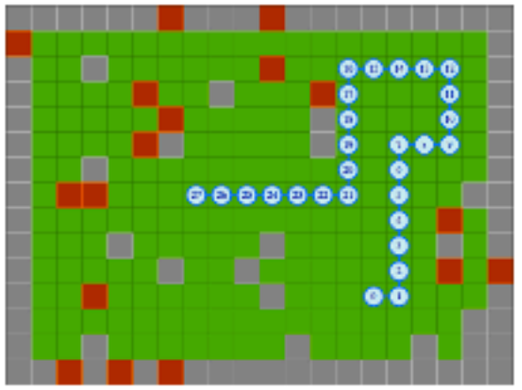
What makes us happy?



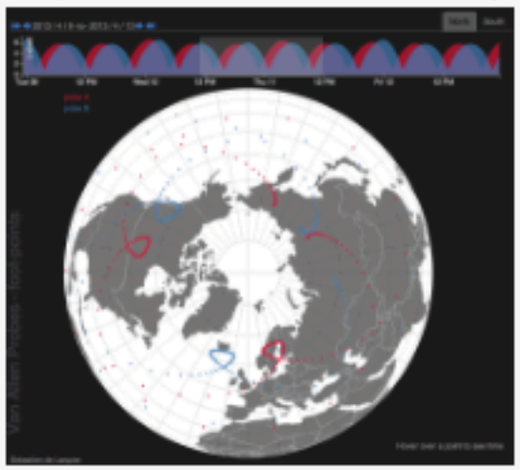
Simple SOM Animation



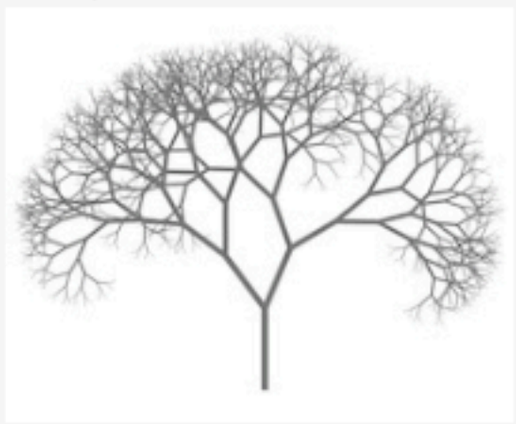
A mower demo



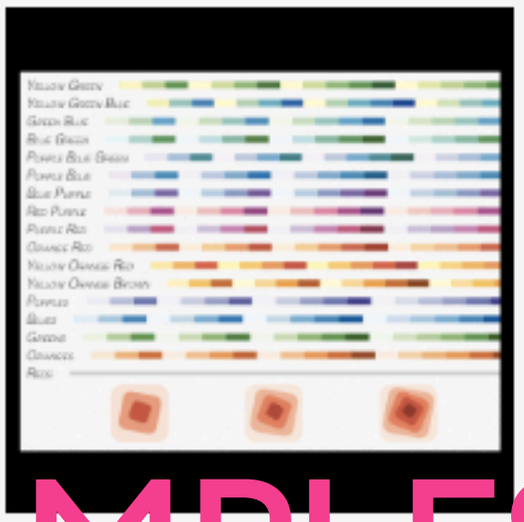
Map and context with brushing



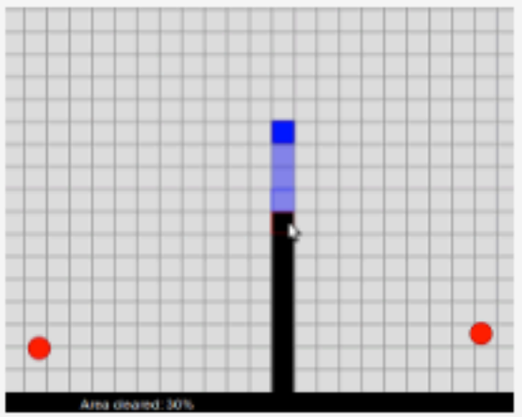
Binary tree with transitions



d3+ColorBrewer

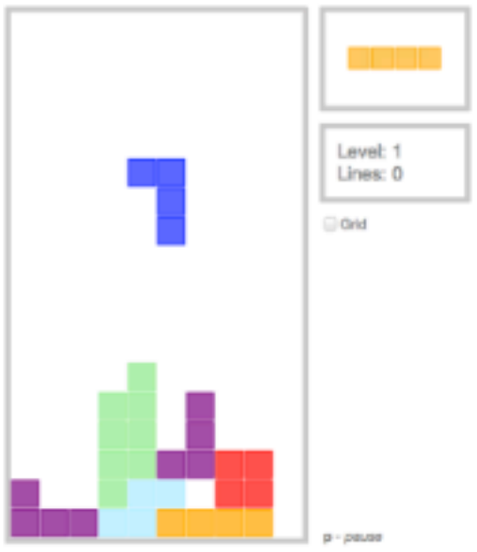


D3 JezzBall

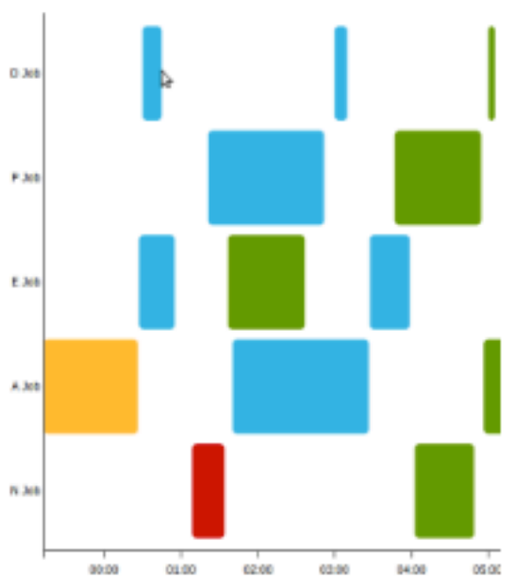


D3 EXAMPLES

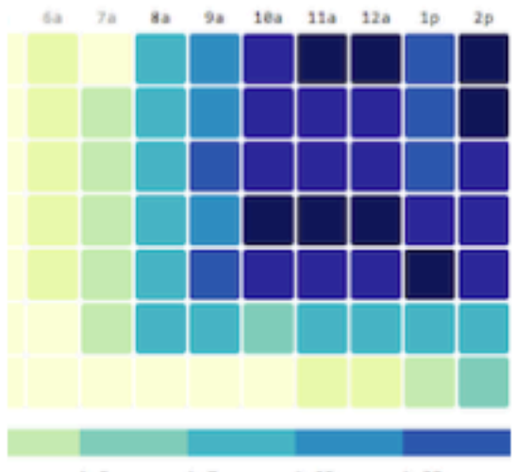
Tetris



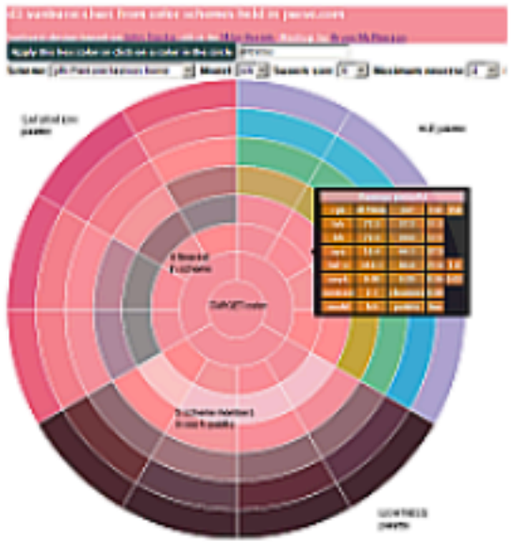
Gantt Chart



Day/Hour Heatmap



Sunburst and parse.com

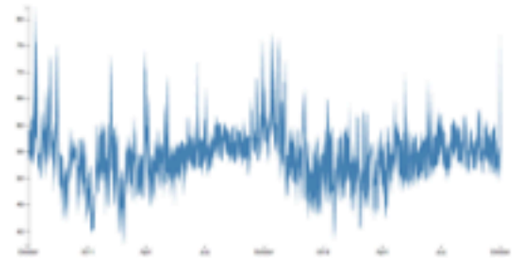


D3 EXAMPLES

Area Chart

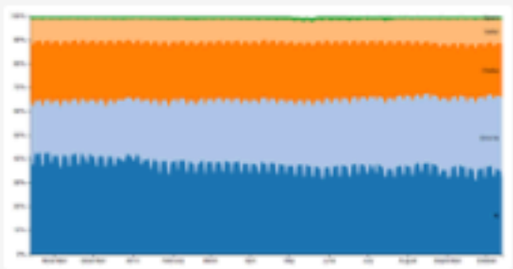
Line Chart

Bivariate Area Chart

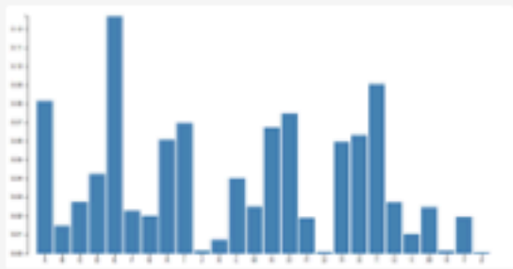


Multi-Series Line Chart

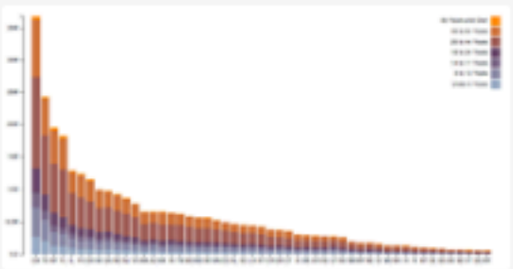
Stacked Area Chart



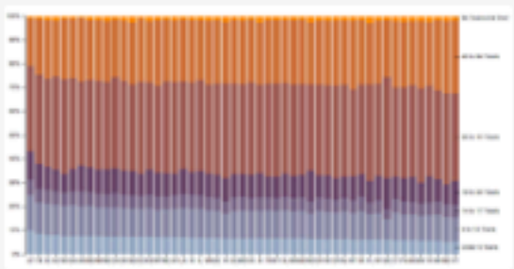
Bar Chart



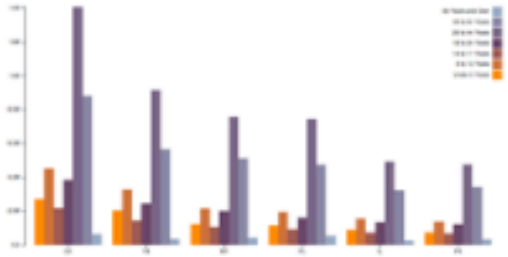
Stacked Bar Chart



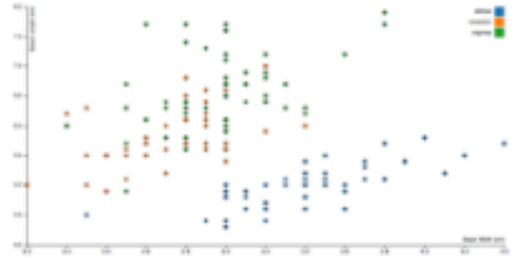
Normalized Stacked Bar Chart



Grouped Bar Chart

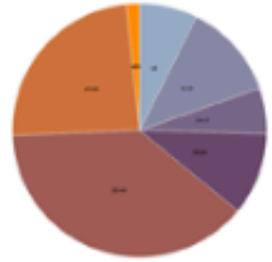


Scatterplot



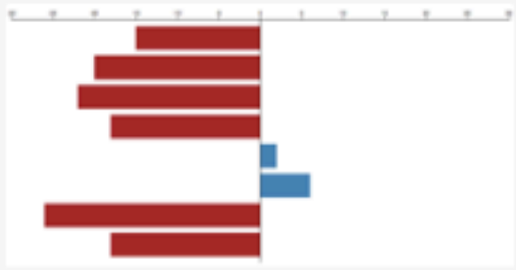
Donut Chart

Pie Chart



Donut Multiples

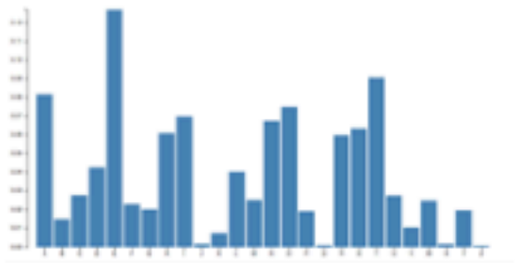
Bar Chart with Negative Values



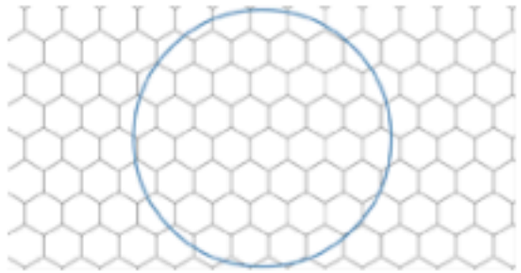
D3 BASIC CHARTS

General Update Pattern

Sortable Bar Chart



van Wijk Smooth Zooming

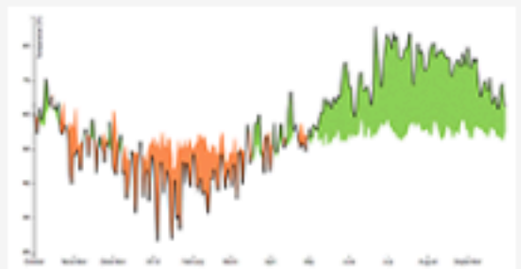


Progress Events

Margin Convention

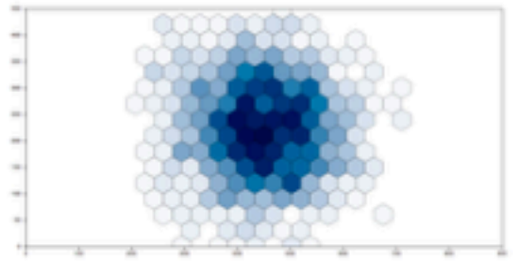
Focus+Context via Brushing

Difference Chart

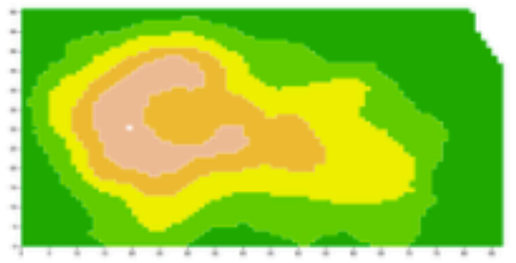


Pie Chart Update

Hexagonal Binning



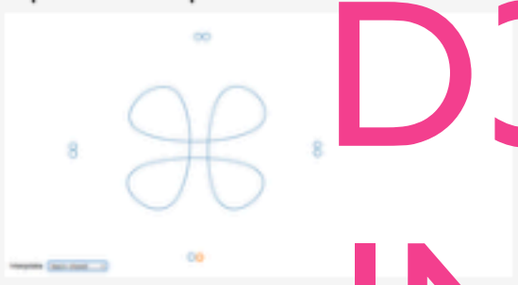
Contour Plot



Build Your Own Graph

Modifying a Force Layout

Spline Interpolation



D3 TECHNIQUES, INTERACTION & ANIMATION

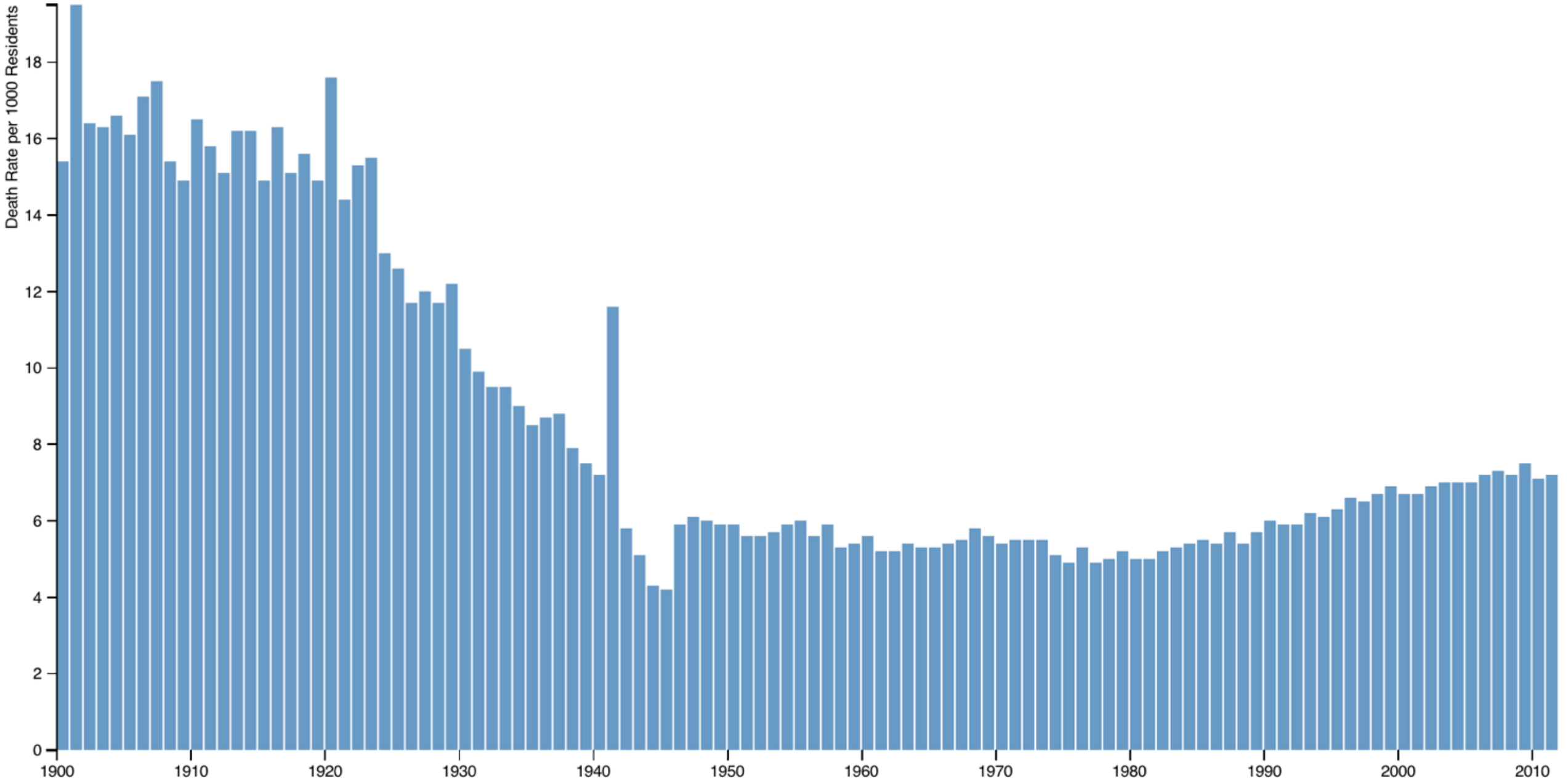
D3 BASICS

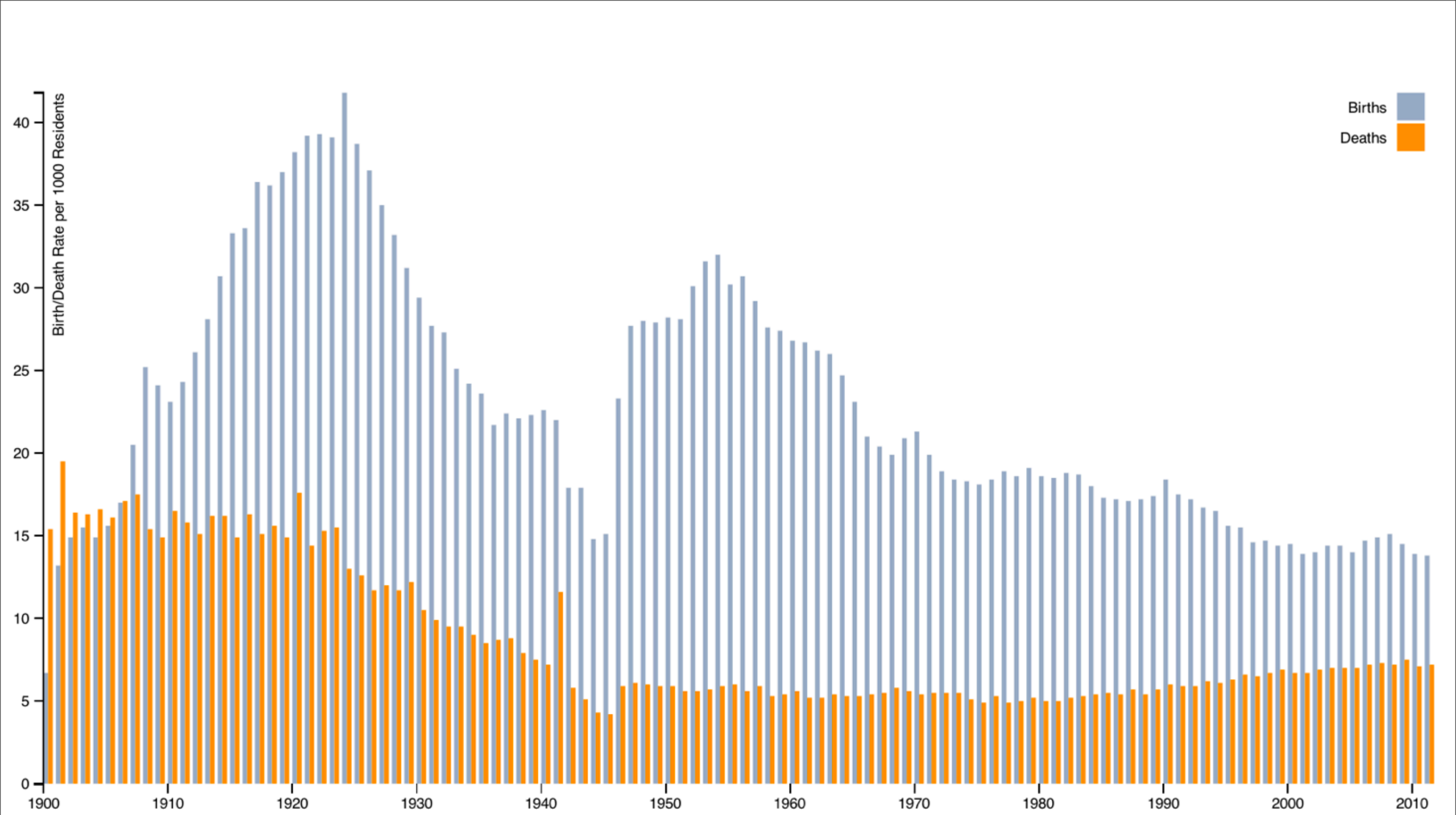
- http://d3js.org
- http://alignedleft.com/tutorials/
- http://livecoding.io/3419316

LiveCoding Demo

WHY D3?

- ☐ Web Standards
- ☐ HTML, SVG, CSS
- ☐ Map Data to Web Elements
- ☐ Open Source

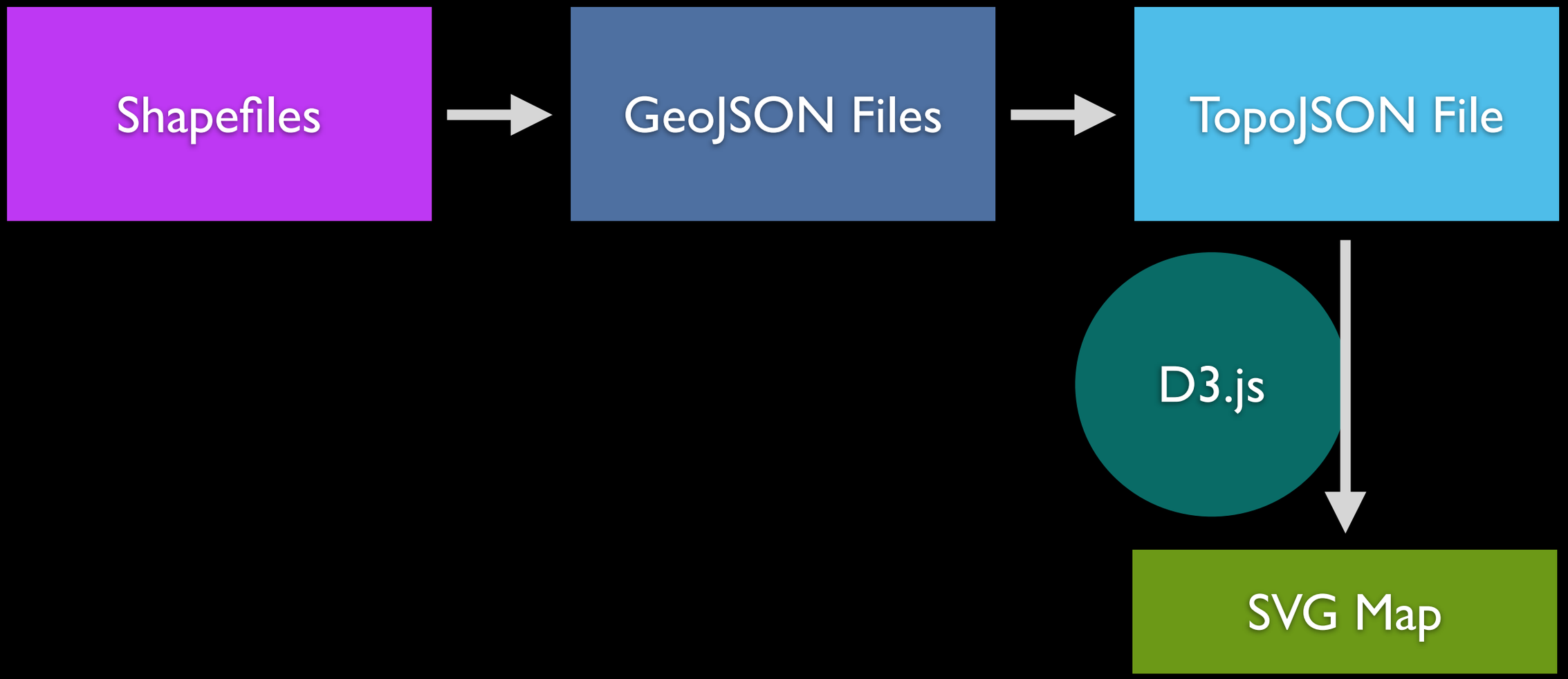

Death Rate per 1000 Residents
0
2
4
6
8
10
12
14
16
18
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

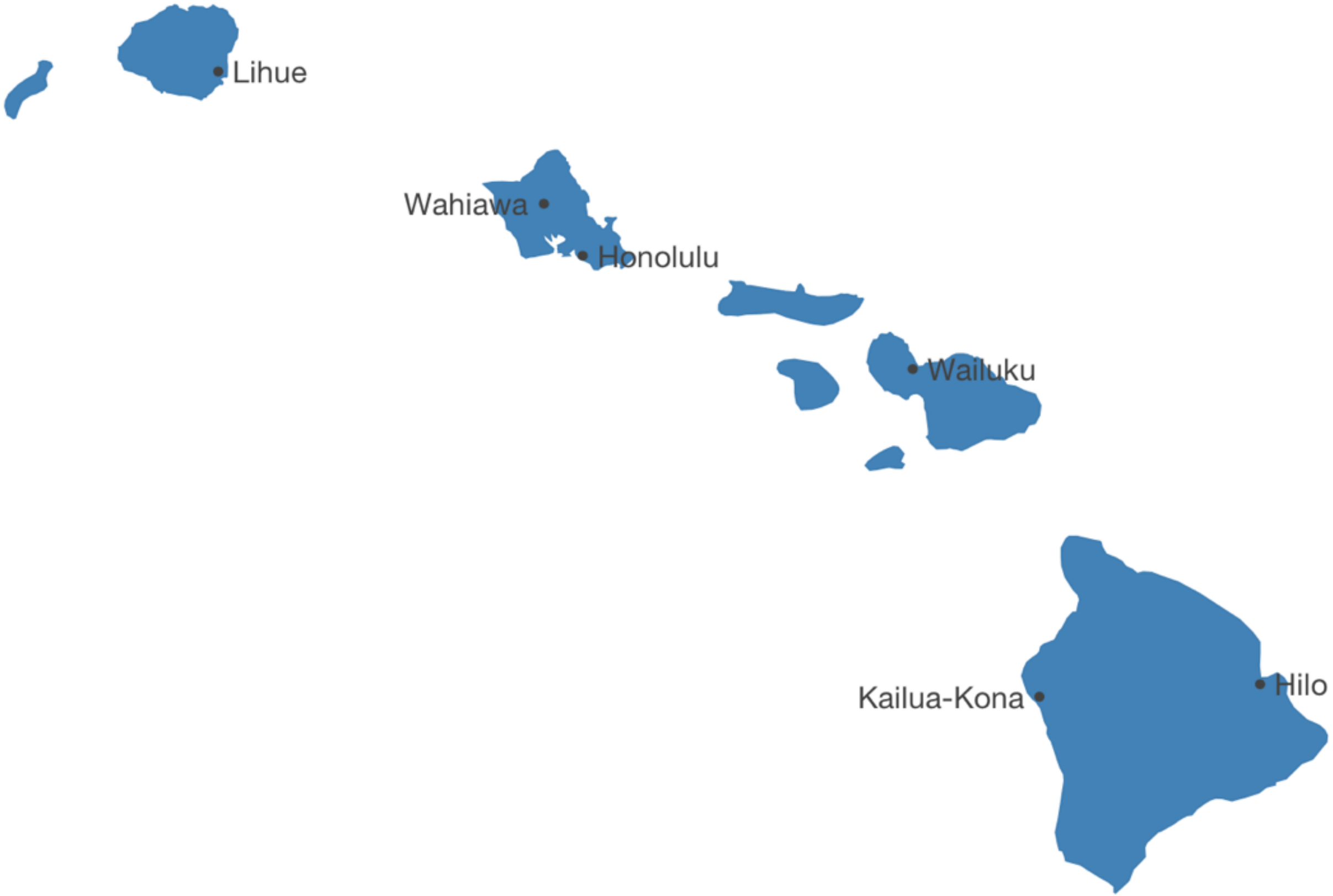

Births
Deaths
Birth/Death Rate per 1000 Residents
40
35
30
25
20
15
10
5
0
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

D3 DEMO

- [ ] Dots Animated
- [ ] Birth Rate

Visualize




Lihue
Wahiawa
Honolulu
Wailuku
Kailua-Kona
Hilo


Wahiawa
Honolulu

D3 DEMO

- EV Charging Stations
- http://pasdechocolat.com/demos/pipeline/charging/

Thank you!