

How to Succeed in Data Visualization

By Trying Very Hard and Practicing a Lot

Phil Henrickson
AE Business Solutions

Goals:

- 1) What is good data visualization?
- 2) How do I make a good dashboard?

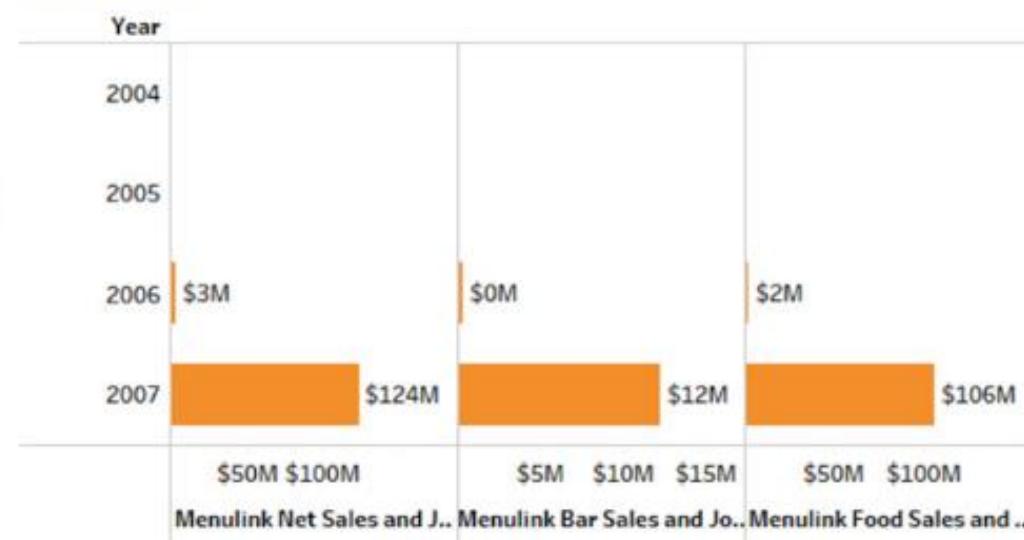
Let's look at examples!

Five second rule.

Net Sales Breakdown



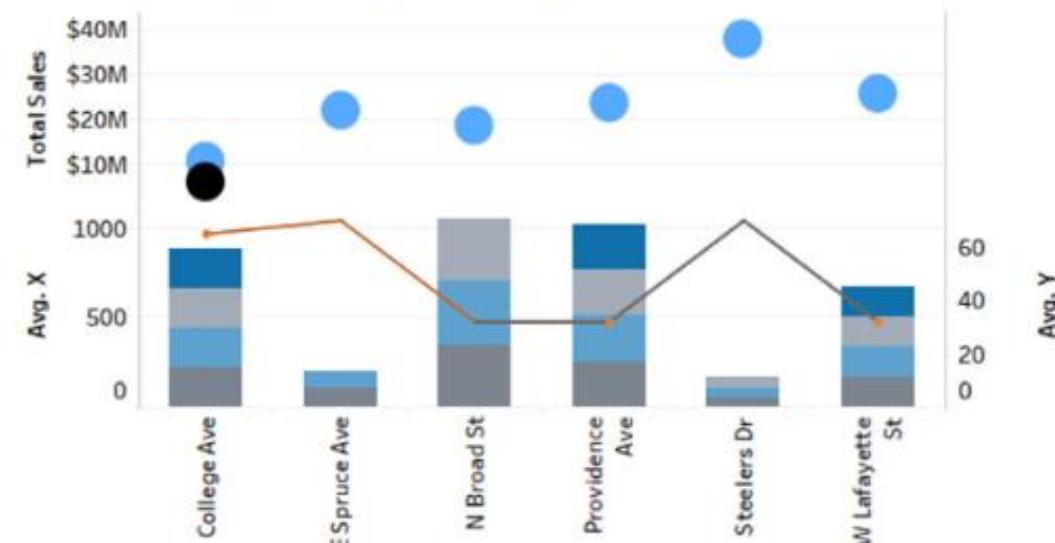
Net Sales



Total Net Sales



Total Sales by Store (State =PA)



Injury Deaths by Locality

This page displays injury death rates by type of injury and residence (health district) at the time of death for the state of Virginia. Use the Indicator, Year, and Health District filters to change the map and trend line.

Indicator

All Cause

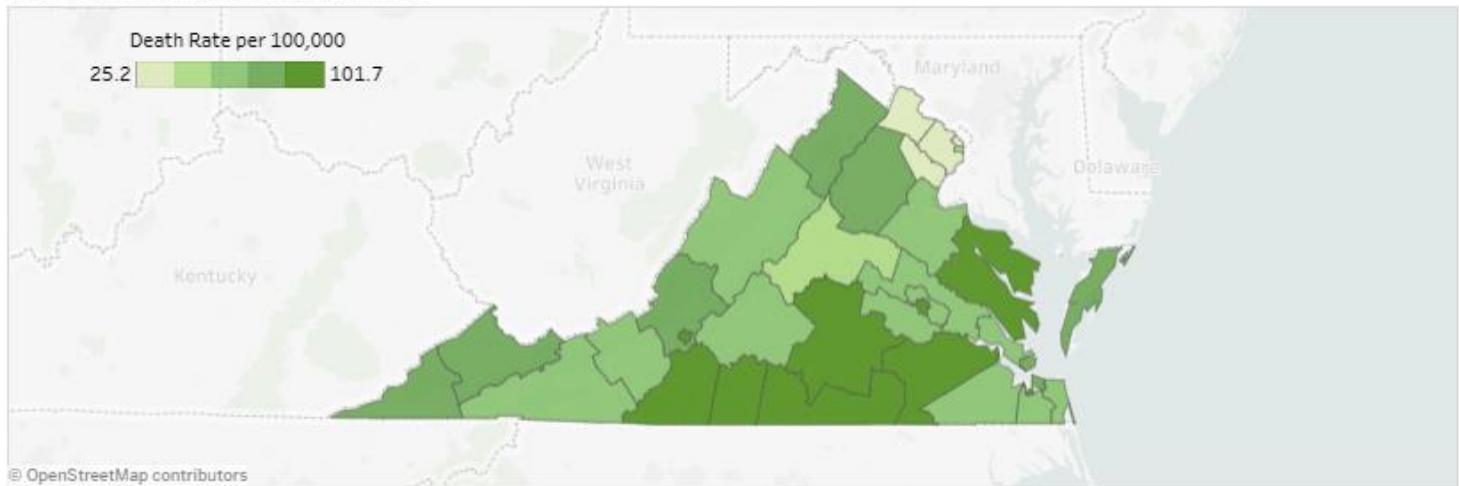
Year

2016

Health District

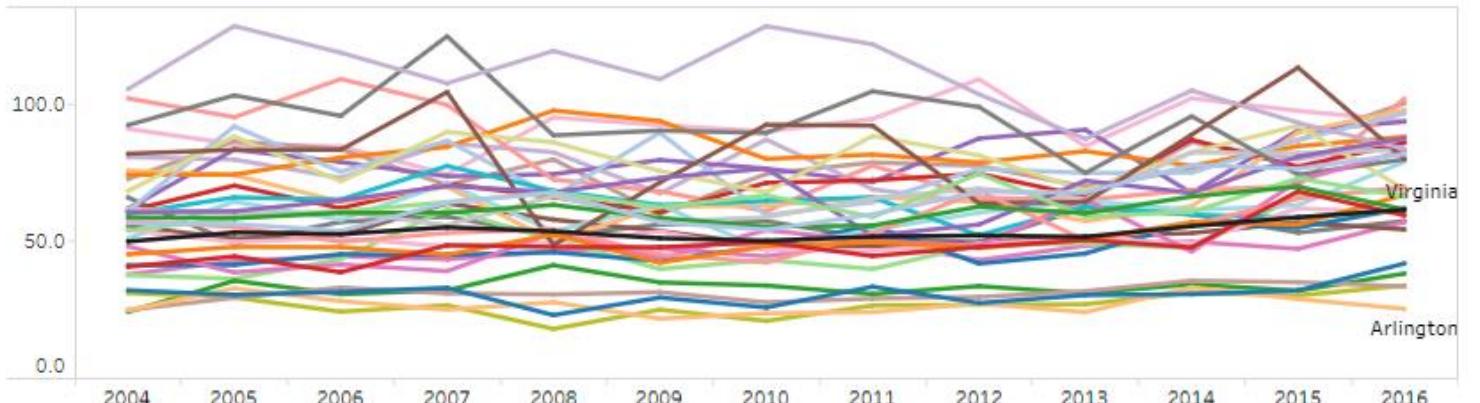
(All)

All Cause Death Rate Map, 2016



All Cause Death Rate Trend - All Health District

Death Rate per 100,000



Filter Regional Cluster

Filter Country / Region

Filter Age

Filter Living Circumstances

Filter Car Ownership

(All)

(All)

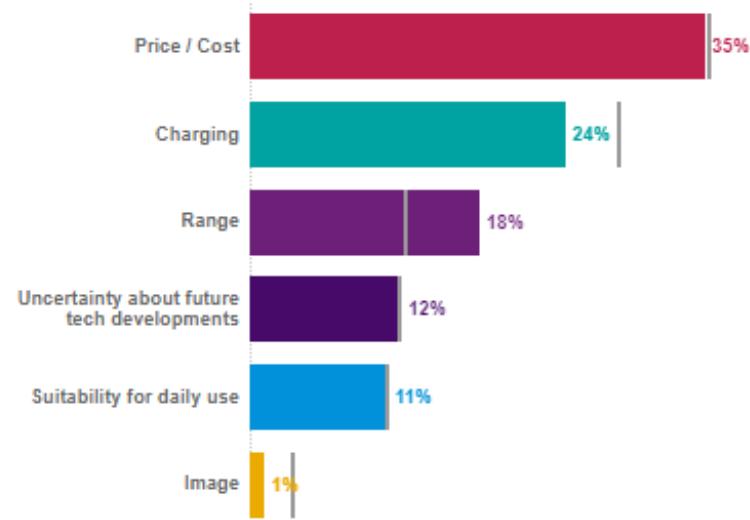
(All)

(All)

(All)



The one thing that really keeps me away from considering a fully electric car is:

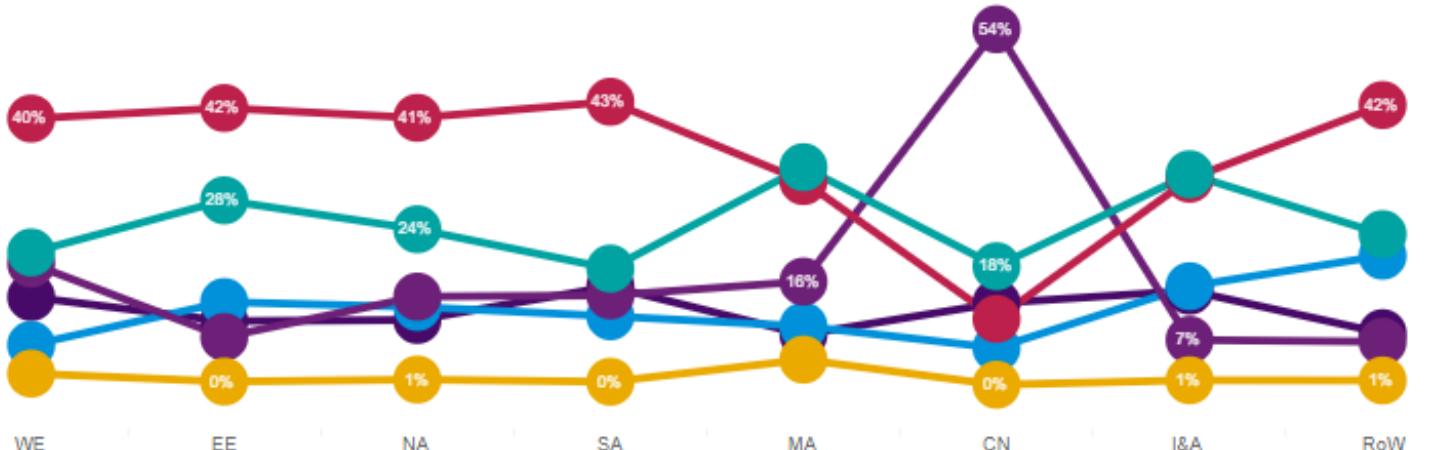


Choose your view by:

Regional Cluster

2018 2019

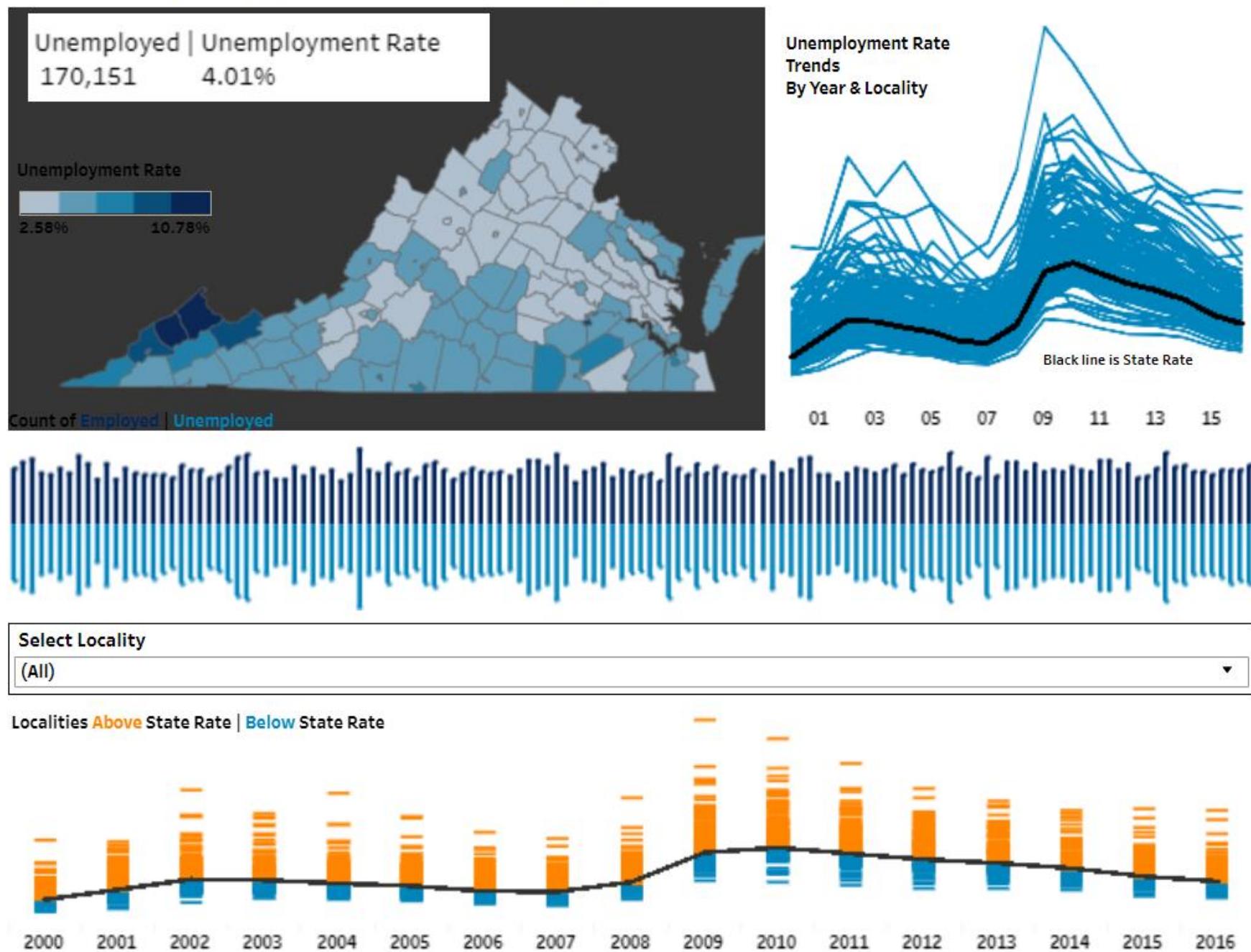
n = 2,154 2,028



Note: Percentages may not add up to 100% due to rounding

Source: KPMG's Global Automotive Executive Survey 2019 | © KPMG Automotive Institute

Unemployment in Virginia - 2016



Tracking the Ruby-Throated Hummingbird

The ruby-throated hummingbird (*Archilochus colubris*) is a species of hummingbird that generally **spends the winter in Central America, Mexico, and Florida**, and **migrates to Eastern North America for the summer to breed**. It is by far the most common hummingbird seen east of the Mississippi River in North America.



Explore the visualizations below to follow the movement of the ruby-throated hummingbird during the year. The data is reported by observers around North America and collected by Journey North, which is owned by the University of Wisconsin Arboretum.

2018 First Sightings

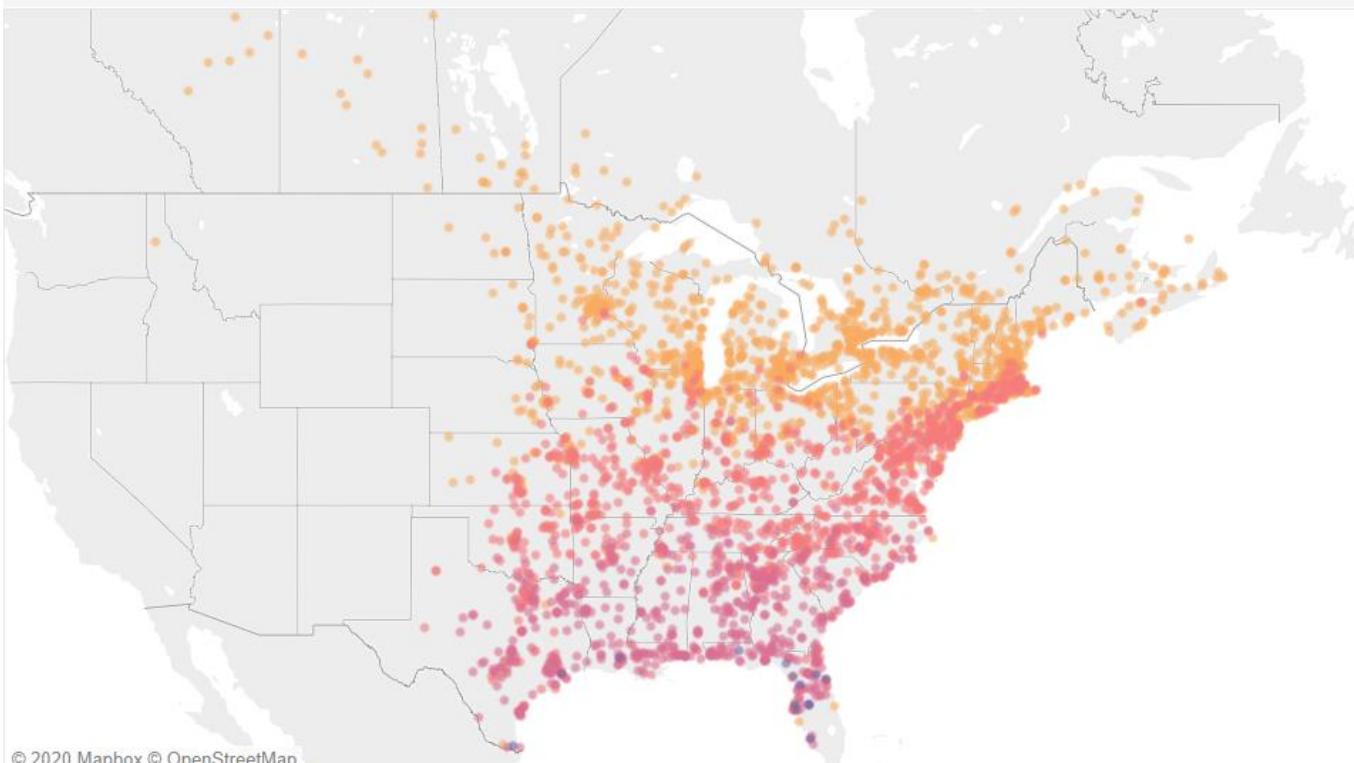
2018 First Sightings by Date

3,291
0%
2%
4%
6%

Feb 4 Feb 19 Mar 6 Mar 21 Apr 5 Apr 20 May 5 May 20 Jun 4 Jun 19 Jul 4 Jul 19 Aug 3 Aug 18 Sep 2 Sep 17

Select a Year
2018

2018 First Sightings by Location



2018 First Sightings by State

ON	190
TX	174
MI	163
IL	159
NY	156
PA	150
NC	145
WI	123
VA	120
MA	118
FL	118
GA	117
MO	116
OH	115
NJ	95
MN	93
IN	87
AL	82
TN	76
SC	63
CT	60
OK	59
KY	59
AR	58
NH	57
MD	56
LA	56
IA	54
MS	53
KS	53
QC	37

Select a Month
(All)

Select a State or Pr...
(All)

Activity Demographics

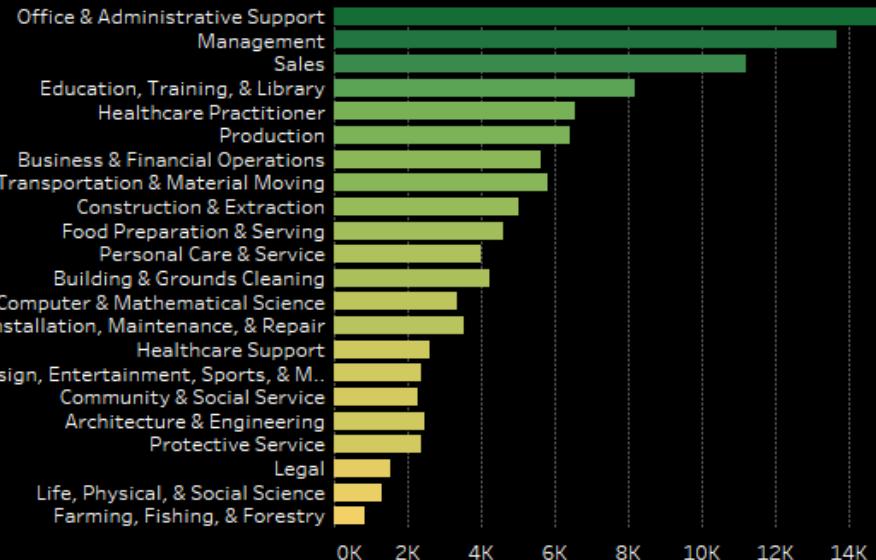
Happiness Score

7.1

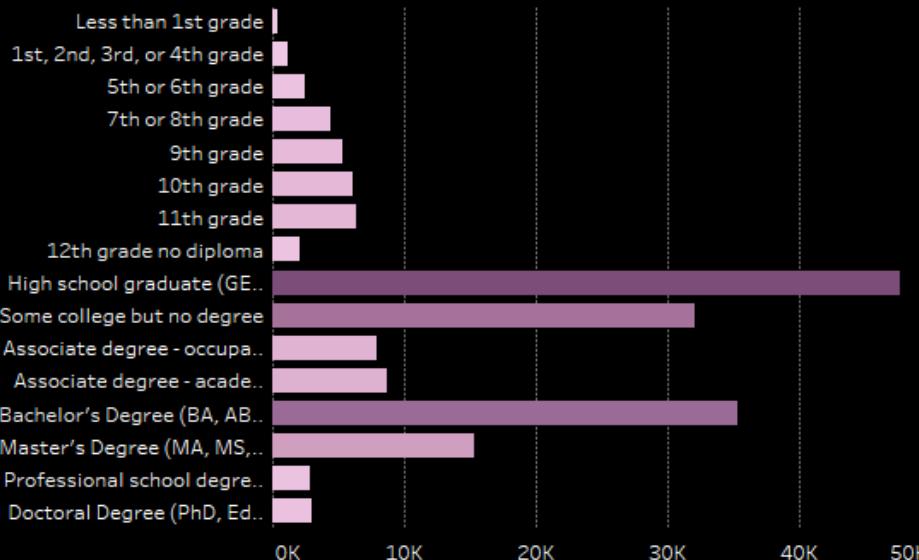
Total # of Respondents

181,335

Occupation



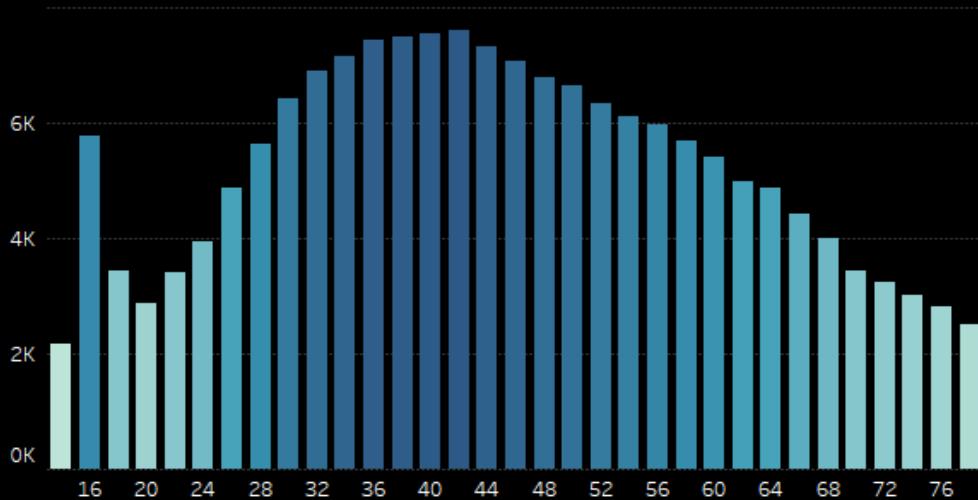
Educational Attainment



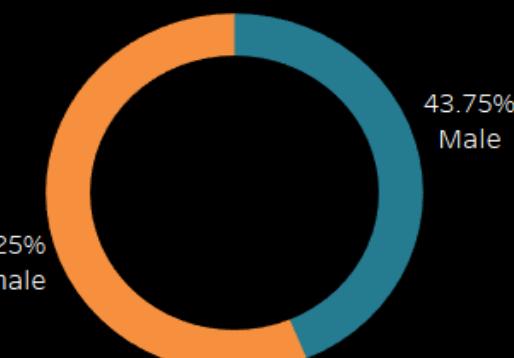
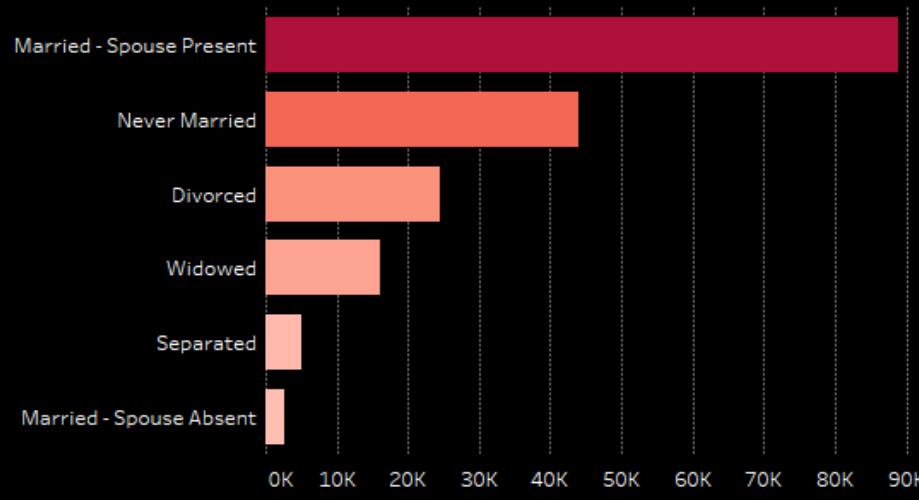
Family Income



Age



Marital Status



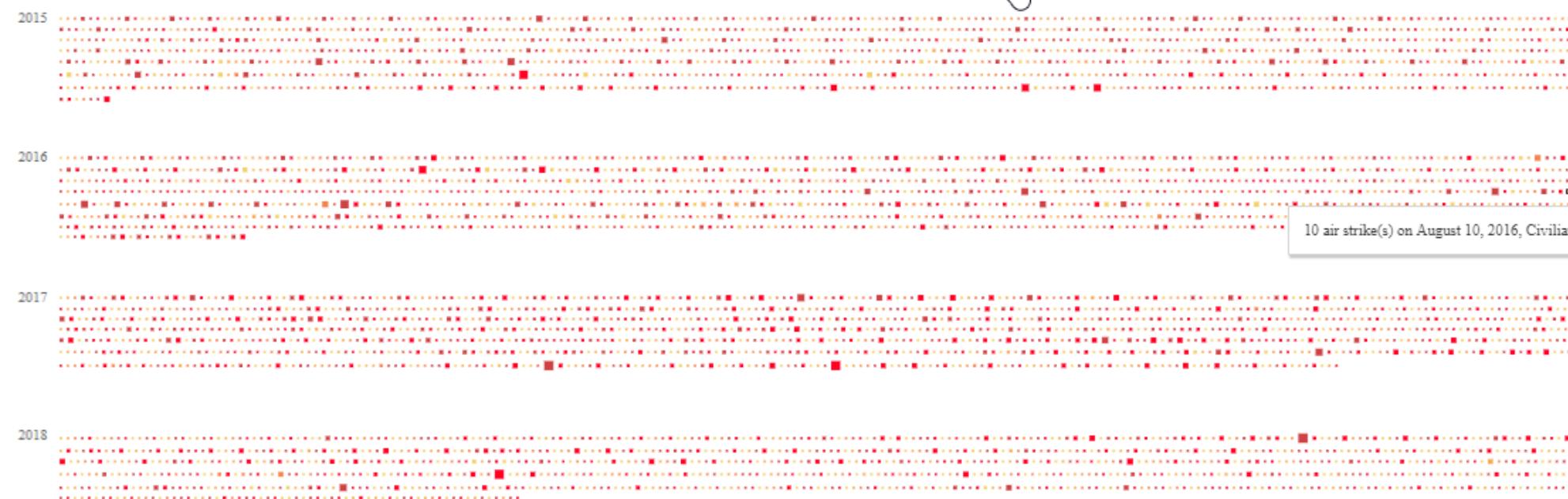
Air Strikes in Yemen



Total Air Strikes by Year



The air strike targets in detail



Data Source: Yemen Data Project | Note: 'The air strike targets in detail' visualization shows the same date multiple times if there are different target types on the same day. The above visualizations use data from March 1, 2015 to October 31, 2016.

Are You a Geek? Finding the Best Board Games for You

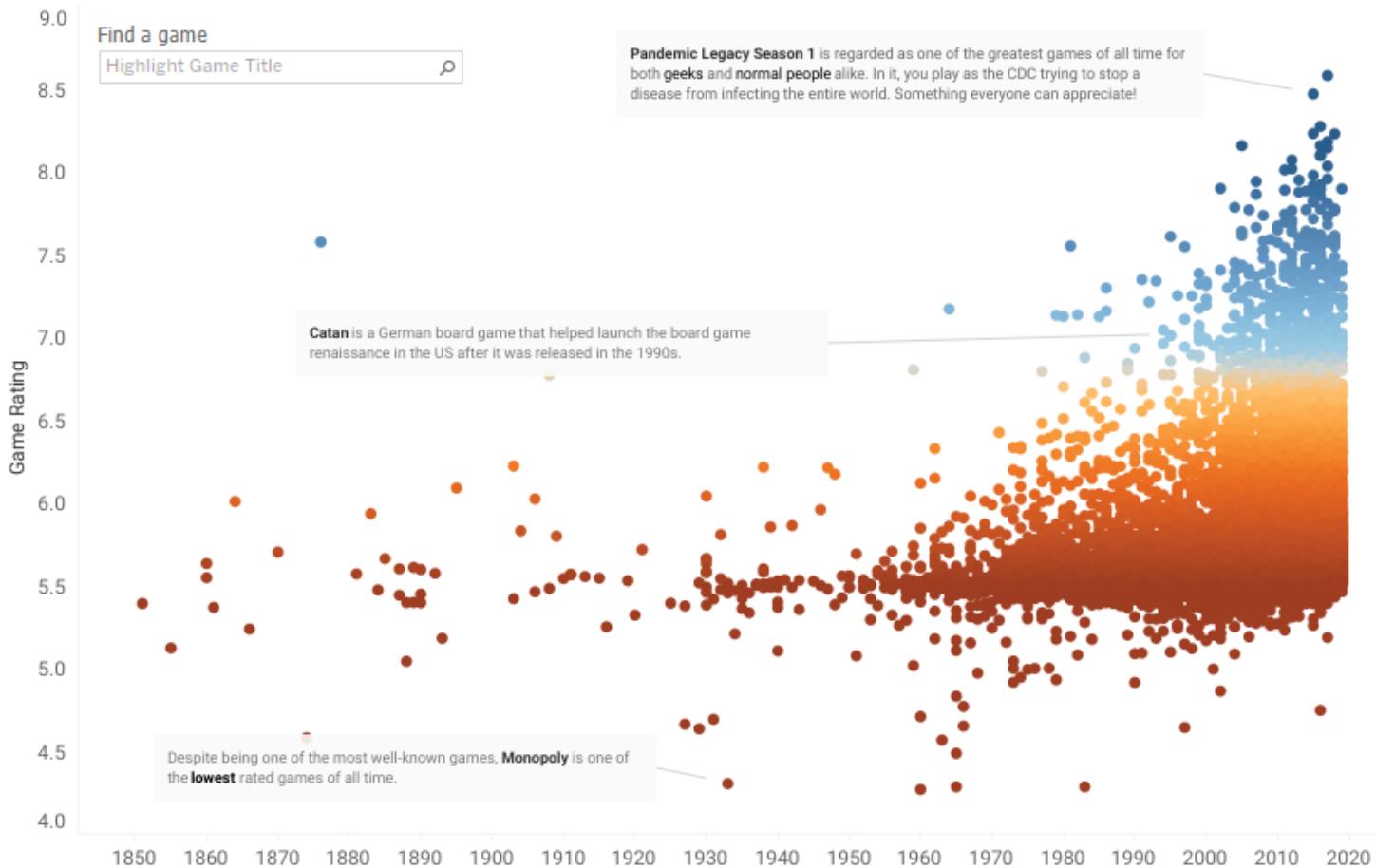
Board games have experienced a renaissance in the last decade. Thousands of new games are released every year, most of which you likely have never heard of. Some of these games (especially more modern ones) are **very good**, while others are **not as good**.

Which games are right for you? Are you a **geek**? Do you like complex games, rich in strategy that take time to learn and sometimes hours to play? Or are you a **normal person**? Would you prefer a game that's easy to learn and quick to play?

Using user ratings from BoardGameGeek.com, I have assembled rankings for games based on whether you are a **geek** (like me*) or a **normal person****.

Use the filters on the right to search for games that might be right for you.

Game Ratings over Time for a Geek



Best Games for a Geek

Gloomhaven	8.58
Pandemic Legacy Season 1	8.47
Terraforming Mars	8.27
Through Ages New Story Civilization	8.23
Brass Birmingham	8.23
Twilight Imperium Fourth Edition	8.18
Star Wars Rebellion	8.16
Twilight Struggle	8.16
Gala Project	8.14
Great Western Trail	8.10
Scythe	8.10
War of the Ring (2nd Edition)	8.07
Spirit Island	8.03
Terra Mystica	8.02
Castles Burgundy	8.01
7 Wonders Duel	7.98
7th Continent	7.96
Concordia	7.95
Brass Lancashire	7.94
Arkham Horror Card Game	7.92
Viticulture Essential Edition	7.92
Puerto Rico	7.90
Wingspan	7.90
Feast Odin	7.89
Mage Knight	7.89
Orleans	7.88
Caverna Cave Farmers	7.88
Food Chain Magnate	7.87
Agricola	7.86
Mansions Madness Second Edition	7.85
Blood Rage	7.83
Kingdom Death Monster	7.82
Pandemic Legacy Season 2	7.81

I am a...

Geek

I am looking for something...

- (All)
- 1: Simple
- 2: Easy to Learn
- 3: Learnable
- 4: Complex
- 5: Very Complex

My ideal player count is...

Any

I want a family game

(All)

I want a strategy game

(All)

I want a party game

(All)

I want a cooperative game

(All)

Year-to-Date Income Statement (In 000s)

Goal met

Goal not met

• Latest month △ to budget

Select a Region

(All)

Select a Channel

(All)

Select a Product

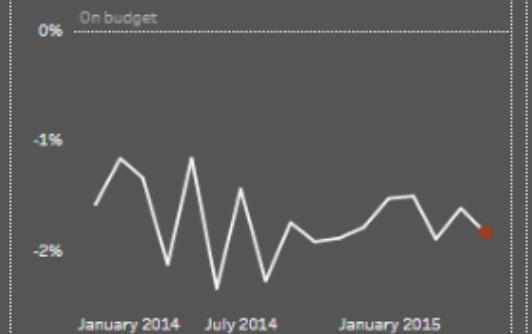
(All)

Gross Sales
vs. YTD PY

10,004

11,386

Monthly Variance to Budget

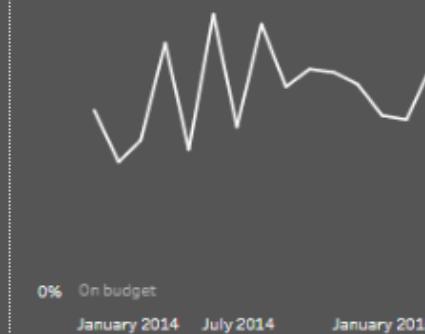


Discounts
vs. YTD PY

573

509

Monthly Variance to Budget

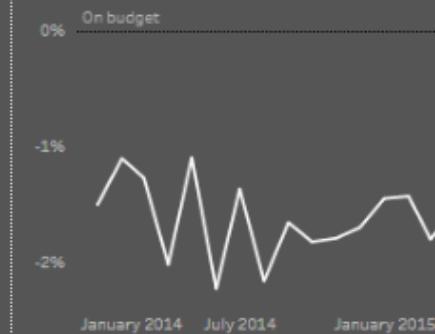


Net Sales
vs. YTD PY

10,813

9,495

Monthly Variance to Budget



Cost of Goods Sold
vs. YTD PY

6,164

5,711

Monthly Variance to Budget

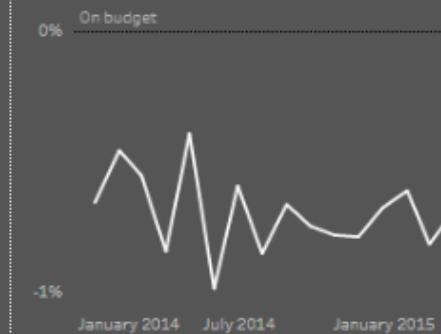


Gross Profit
vs. YTD PY

4,649

3,784

Monthly Variance to Budget



Operating Expenses
vs. YTD PY

1,315

1,502

Monthly Variance to Budget



Operating Income
vs. YTD PY

3,147

2,468

Monthly Variance to Budget



Taxes
vs. YTD PY

385

313

Monthly Variance to Budget

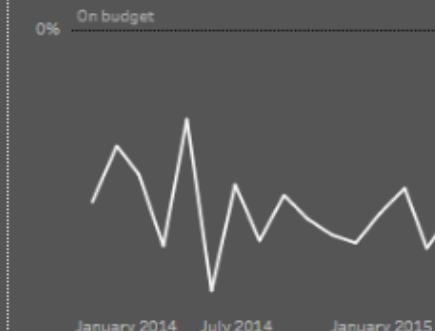


Net Profit
vs. YTD PY

2,762

2,155

Monthly Variance to Budget



Alaska Opioid Data Dashboard

Number of Opioid-Related Emergency Dept Visits by Public Health Region

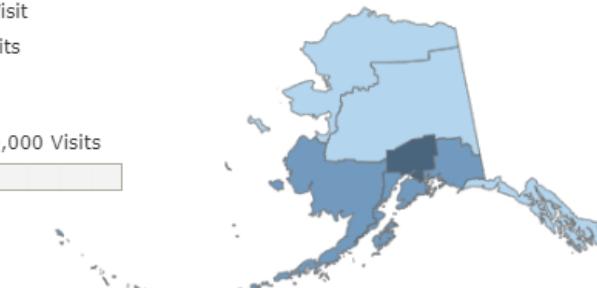
Available ED Visits Data

Number of ED Visits ▾

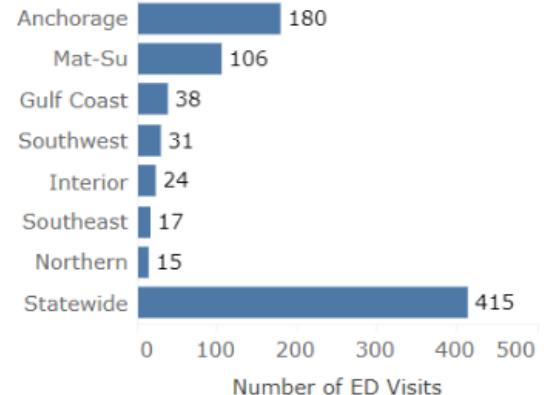
- 11-30 ED Visits
- 31-100 ED Visit
- >100 ED Visits

ED Visits Per 10,000 Visits

Null



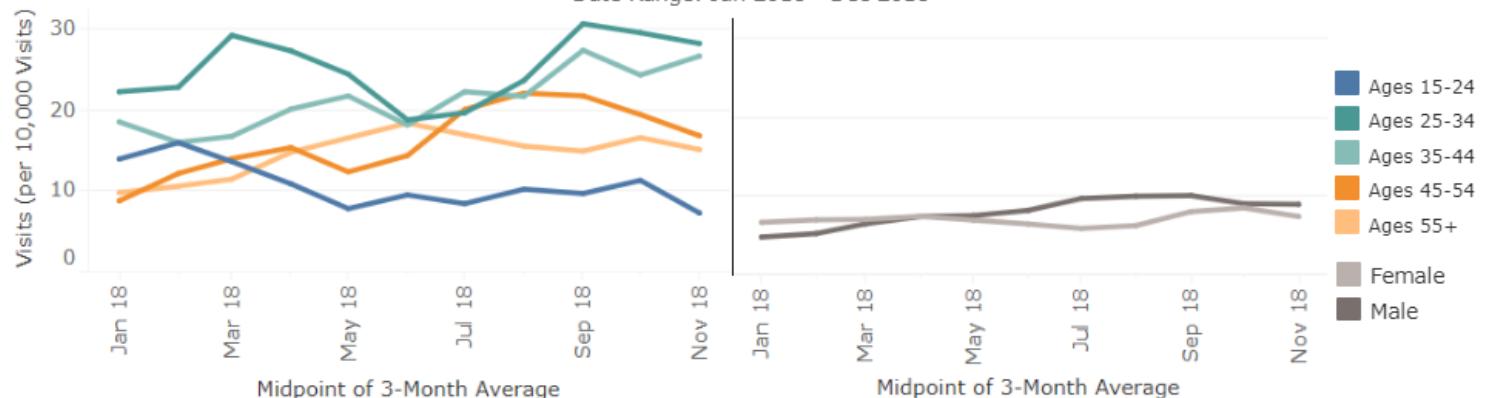
Date Range: Jan 2018 - Dec 2018



Regional estimates do not add up to statewide total because a patient's home address may not be in Alaska

Opioid-Related Emergency Dept Visits by Age Group and Sex, 3-Month Rolling Averages

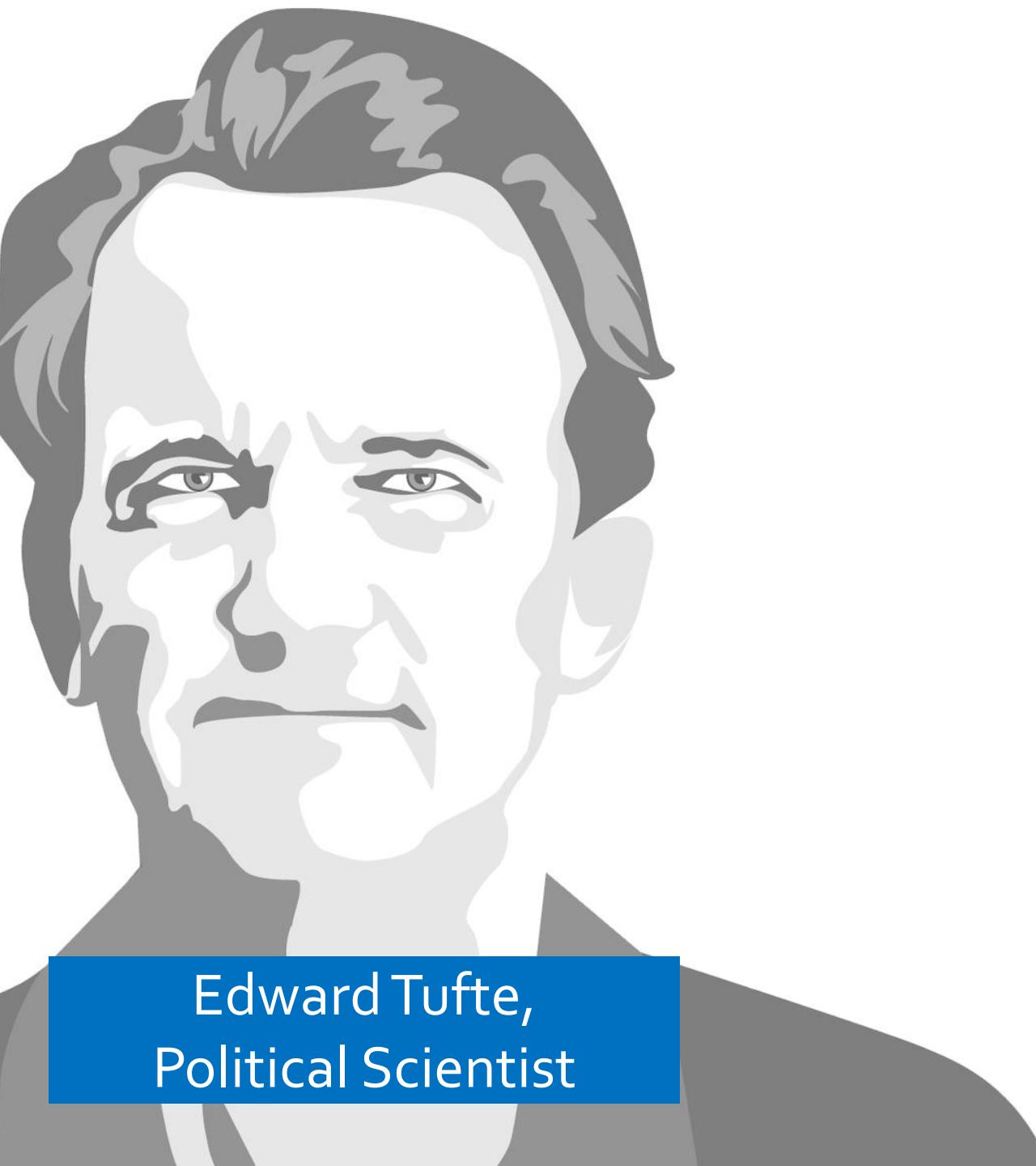
Date Range: Jan 2018 - Dec 2018



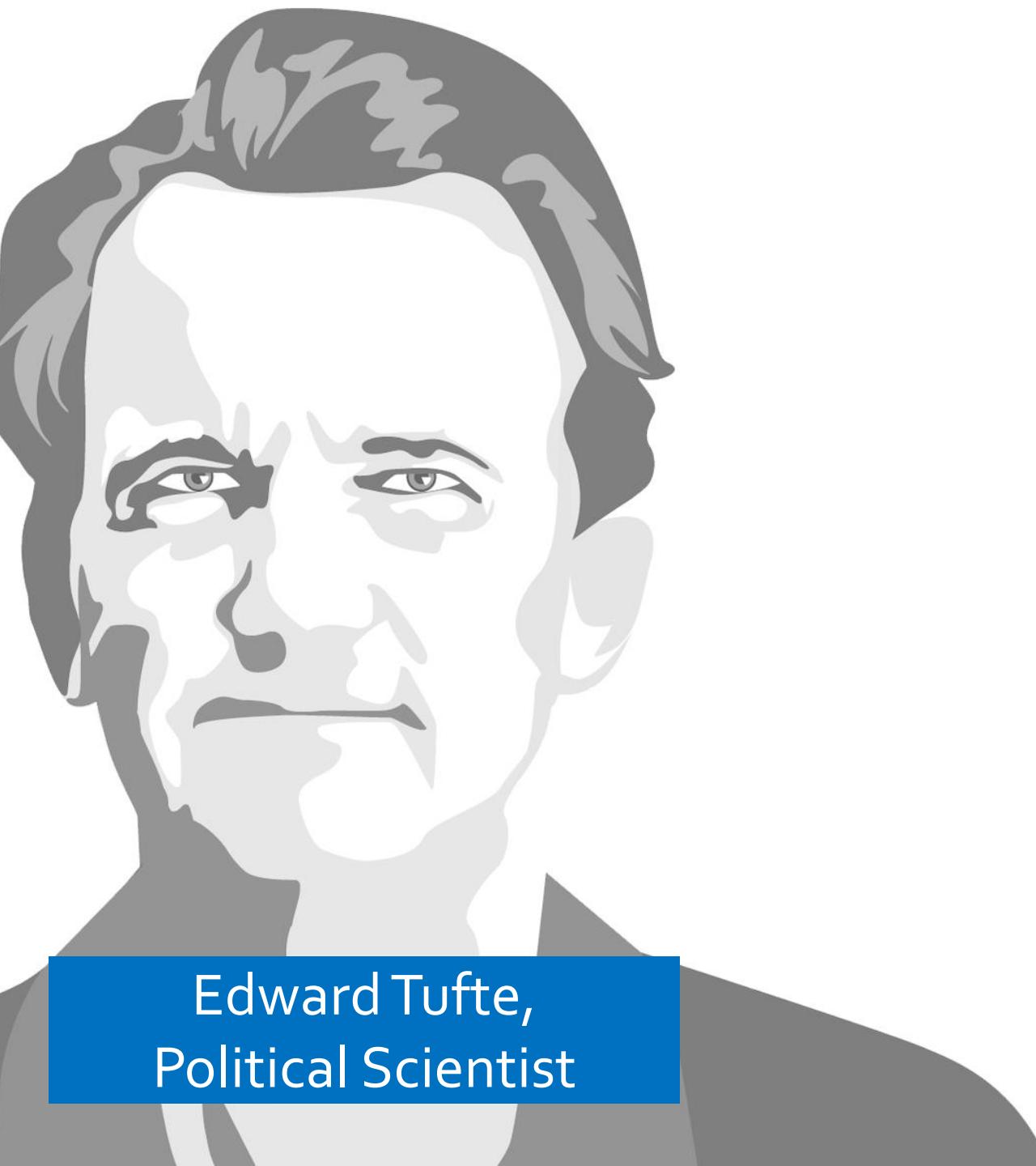
Emergency department data only (no inpatient visits). Patient records can be misclassified by syndromic surveillance system. Not all AK hospitals are participating in the system at this time. As new hospitals are brought on board, large changes in denominators can result. Data should be used to monitor trends and should not be considered for absolute counts.

What makes for effective data visualization?





Edward Tufte,
Political Scientist



Edward Tufte,
Political Scientist

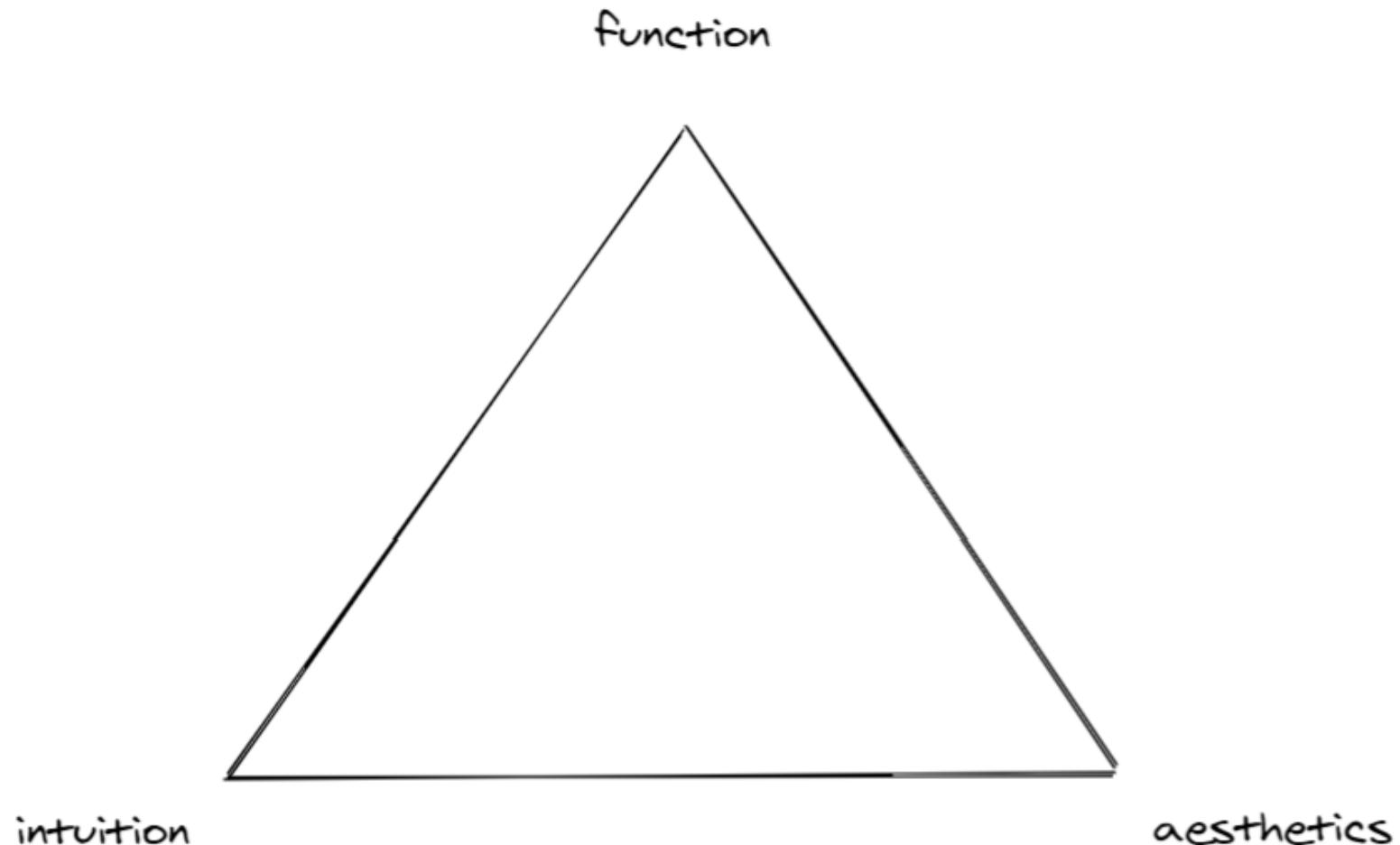
What is to be sought in designs for the display of information is **the clear portrayal of complexity**.

Not the complication of the simple; rather the task of the designer is to give visual access to the subtle and the difficult - that is, **the revelation of the complex**.

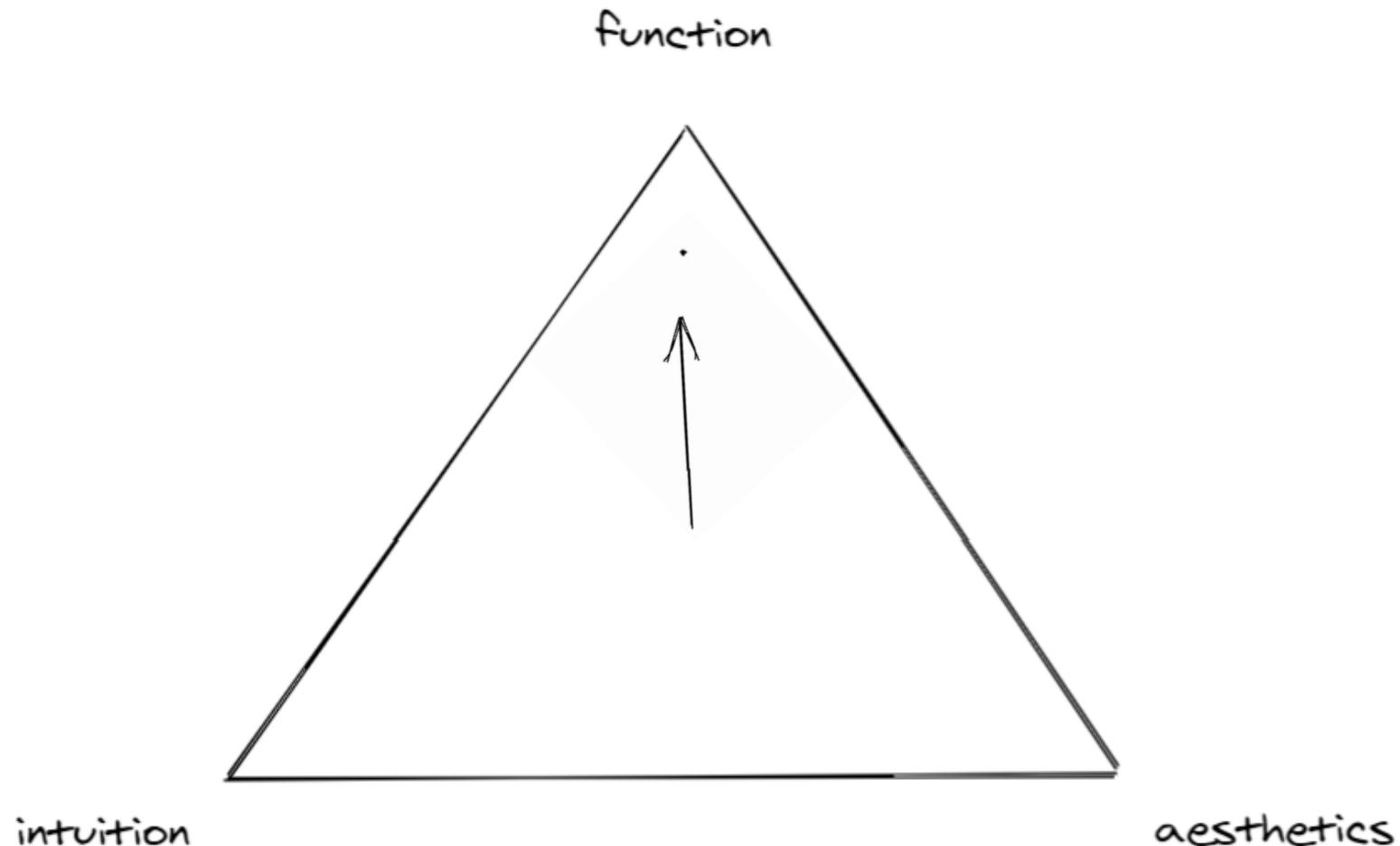
What makes for an effective dashboard?

The Trilemma of Dashboard Design

The Trilemma of Dashboard Design



The Trilemma of Dashboard Design



1

FUNCTIONALITY

Can you use the dashboard to obtain useful information?

useful information

in order to make it easy to understand this,
you need to figure out what this is



useful information

useful information

who is your audience?

useful information

who is your audience?

what questions are they trying
to answer?

useful information

who is your audience?

what questions are they trying
to answer?

what comparisons are they looking
to make?

useful information

who is your audience?

what questions are they trying
to answer?

what comparisons are they looking
to make?

how will they be viewing the dashboard?

useful information

who is your audience?

what questions are they trying
to answer?

what comparisons are they looking
to make?

how will they be viewing the dashboard?

what data do you have?
granularity? temporal? spatial?

useful information

who is your audience?

what questions are they trying
to answer?

what comparisons are they looking
to make?

how will they be viewing the dashboard?

what data do you have?
granularity? temporal? spatial?

useful information

what context do you need
to provide?

who is your audience?

what questions are they trying
to answer?

what comparisons are they looking
to make?

how will they be viewing the dashboard?

what data do you have?
granularity? temporal? spatial?

useful information

what context do you need
to provide?

how often will the data be updated?

before you ever open up + a b | e a u®

before you ever open up + a b | e a u®

- 1) identify your audience
- 2) prioritize their questions
- 3) assess the data you have
- 4) sketch on a notepad/whiteboard



Connect

Search for Data

Tableau Server

To a File

Microsoft Excel

Text file

JSON file

Microsoft Access

PDF file

Spatial file

Statistical file

More...

To a Server

MySQL

Oracle

Amazon Redshift

Microsoft SQL Server

More... >

Saved Data Sources

Orders (Data Connection...)

Sample - Superstore

World Indicators

Open



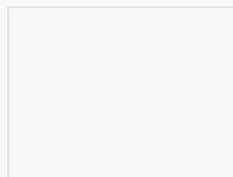
hummingbirds



allSpecies [public.ta...



allSpecies



Ruby-throated Hum...



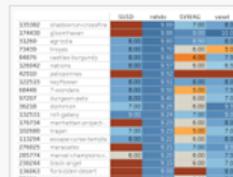
Upset Plot



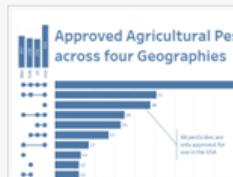
reporting



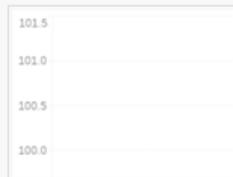
quickViz



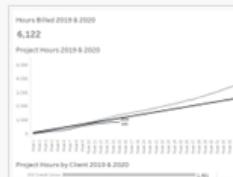
vizReviews



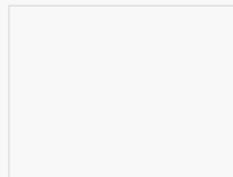
Upset Plot (1)



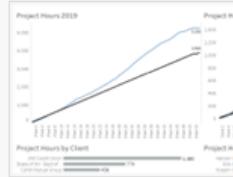
lol



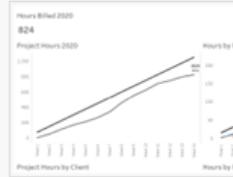
Utilization Combined



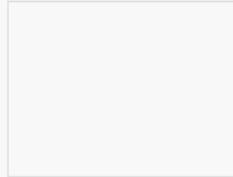
Utilization Combine...



AE Project Hours M...



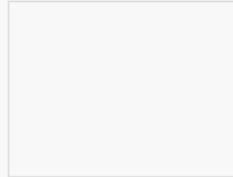
Project Mock Up



Utilization Retro Mo...



AE Project Hours (4)

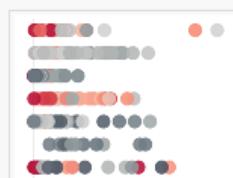


AE Project Hours [ta...



AE Project Hours (3)

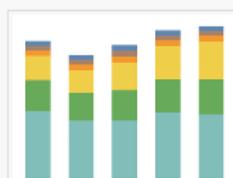
Sample Workbooks



Superstore



Regional



World Indicators

More Samples

[Open a Workbook](#)

Training

Getting Started

Connect

Visual Analytics

Understand

More training

Resources

Get Tableau

Blog - New features, relations, and analytics

Forums

Sample content

See the latest

Access and analyze trusted COVID-19 (Coronavirus) data →

Update



Connect

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Text file

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Sample - Superstore

World Indicators

Open



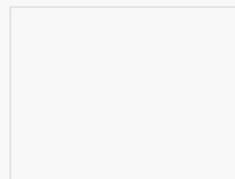
hummingbirds



allSpecies [public.ta...



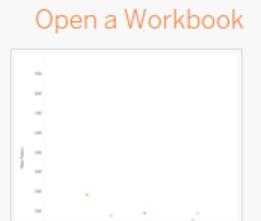
allSpecies



Ruby-throated Hum...



Upset Plot



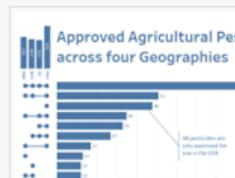
reporting



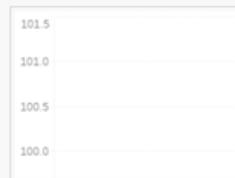
quickViz



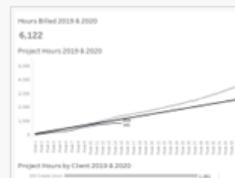
vizReviews



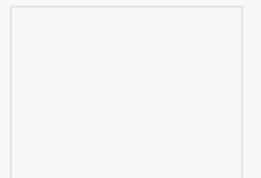
Upset Plot (1)



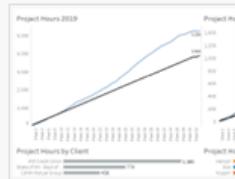
lol



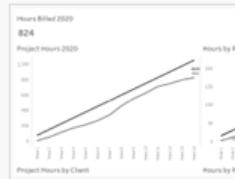
Utilization Combined



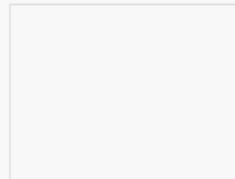
Utilization Combine...



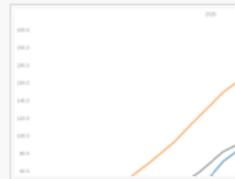
AE Project Hours M...



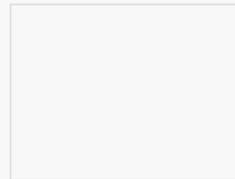
Project Mock Up



Utilization Retro Mo...



AE Project Hours (4)



AE Project Hours [ta...



AE Project Hours (3)

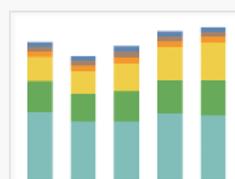
Sample Workbooks



Superstore



Regional



World Indicators

Don't start your work here

[More Samples](#)

See the latest

Access and a trusted COVID-19 (Coronavirus) data →

Upda...

[Open a Workbook](#)

Training

Getting S...

Connecti...

Visual A...

Understa...

More tra...

Resources

Get Table...

Blog - No...
Relations...
analytics

Forums

Sample d...

Score	Score	Score	Score
Not here			
Not here			
Good to			
No			

Birds by Top 10 English Top 10 Amer

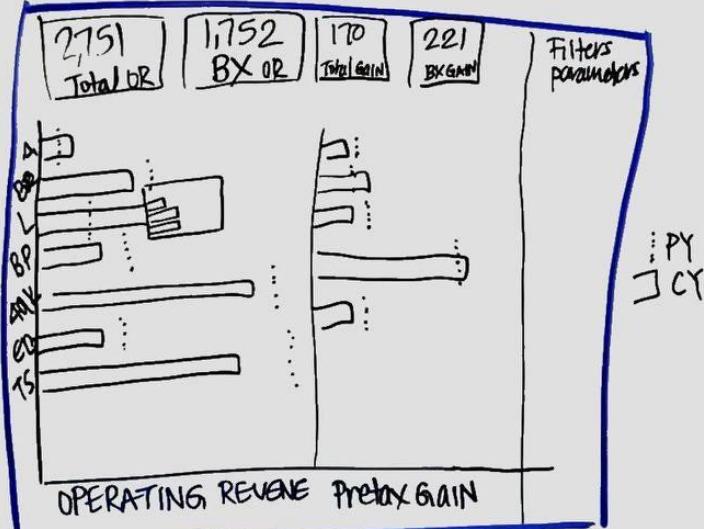
Roberto English Robin 10 Amer

Red

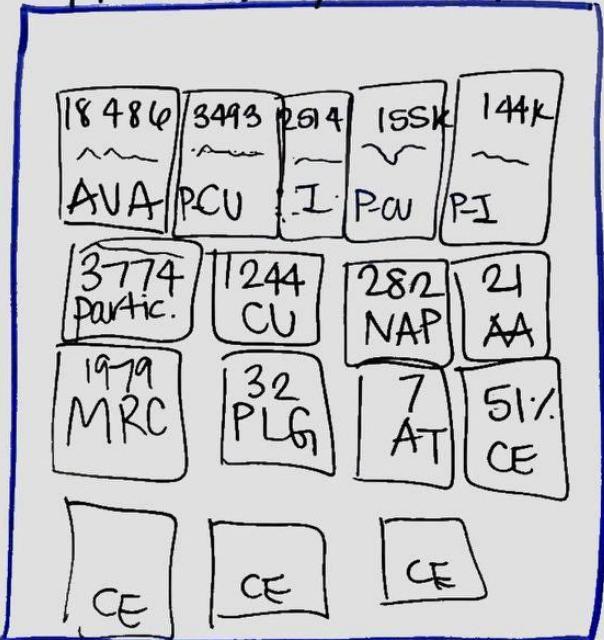
Score			
Not here	#		

Start your work
here

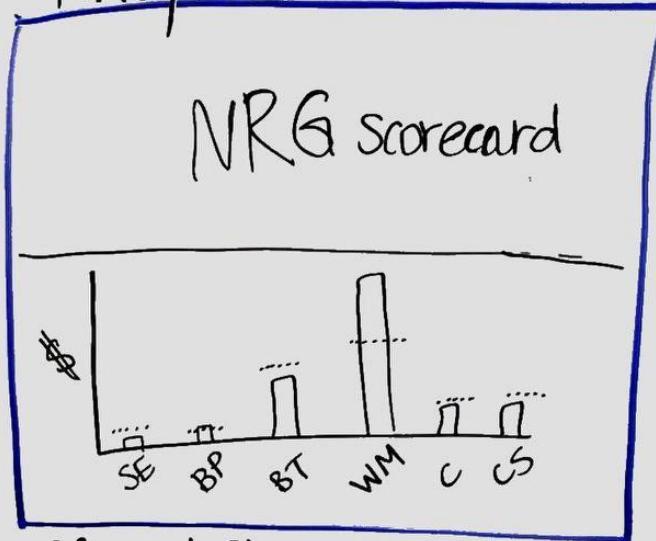
FINANCIAL



PROGRAMS, Grido Mkt, CE



NRG/EXPENSES



Market Share



Start your work here

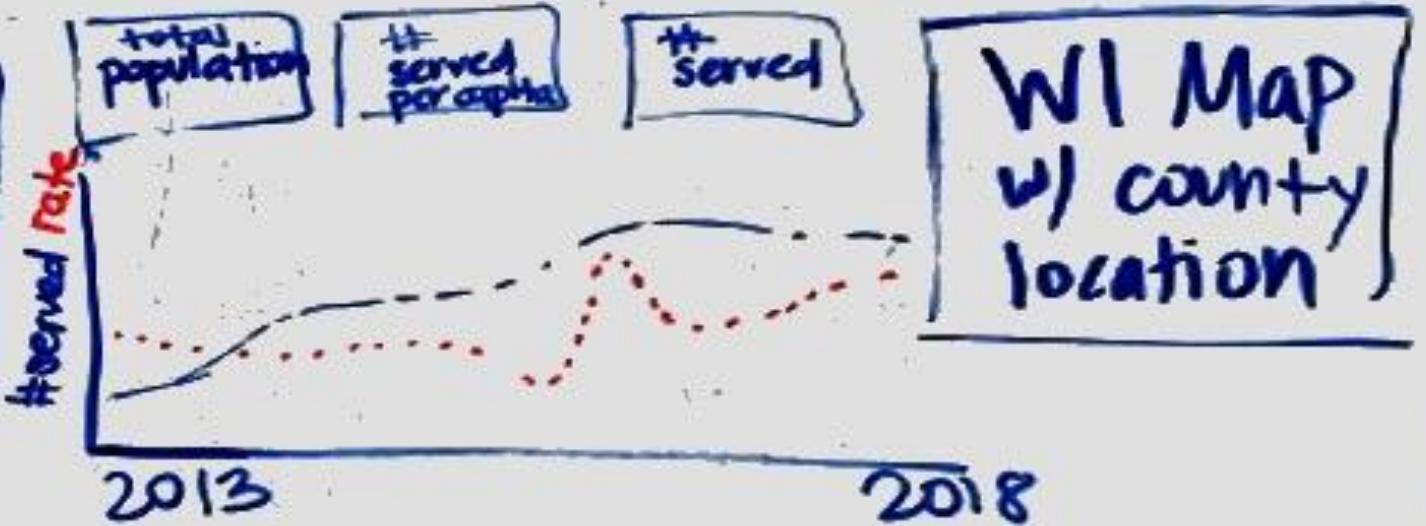
DANE COUNTY

Filters

Age

Sex

Race



Parameter

Raw #
per capita
Rate



WI Map
WI county
location

TOP 5 Diagnosis



TOP 5 C.I.

Start your work
here

a notepad or whiteboard enables you to quickly develop (and throw away) different visualizations

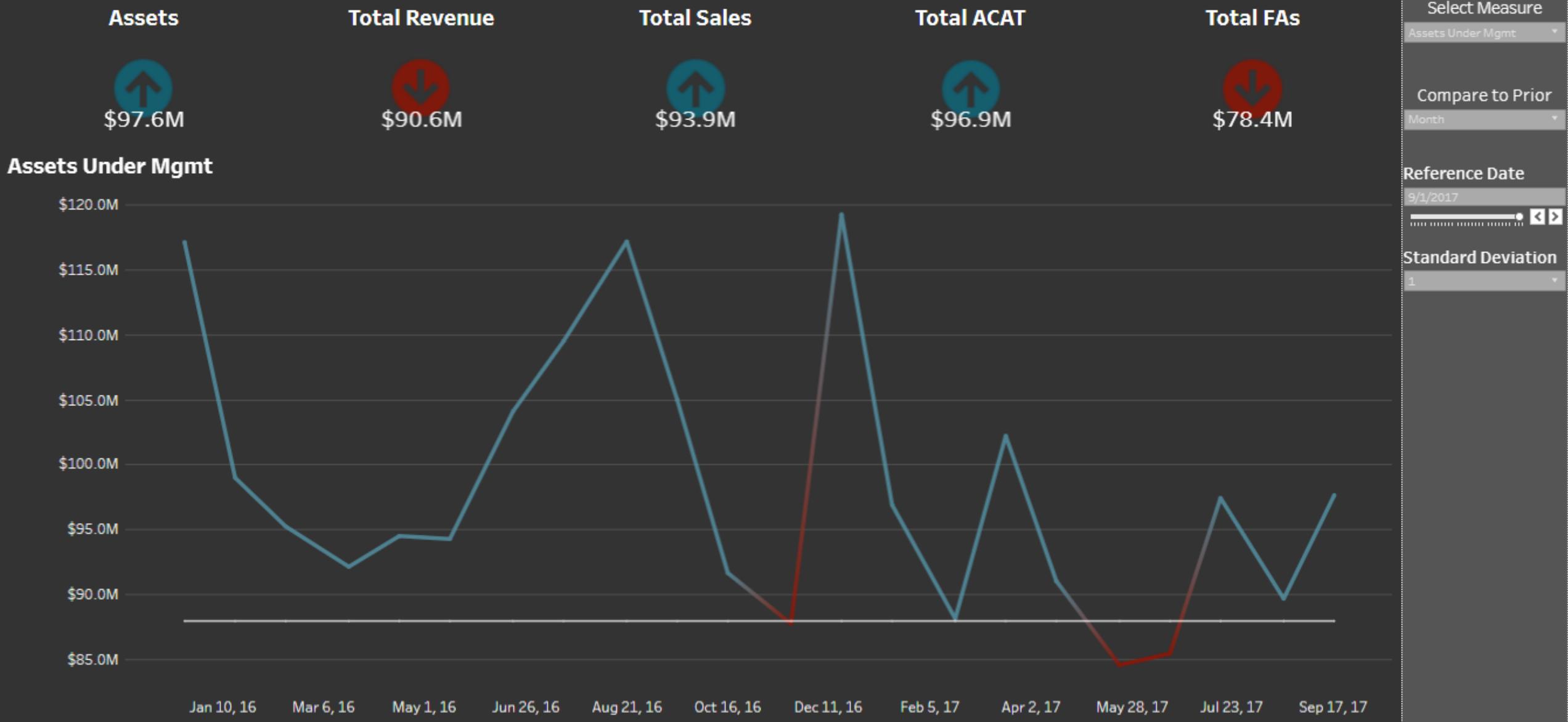
a notepad or whiteboard enables you to quickly develop (and throw away) different visualizations

you will understand what you want to develop far faster than fiddling around in **+ a b | e a u[®]**

what do you want to develop?

- 1) executive
- 2) analytical
- 3) operational

Executive Trends



US MONTHLY SALES

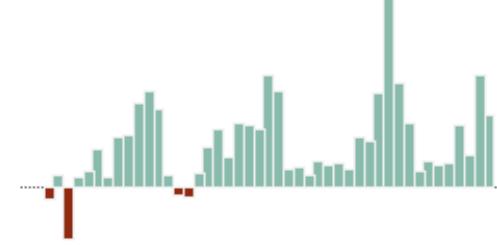
\$267,567 SALES



4,778 ORDERS



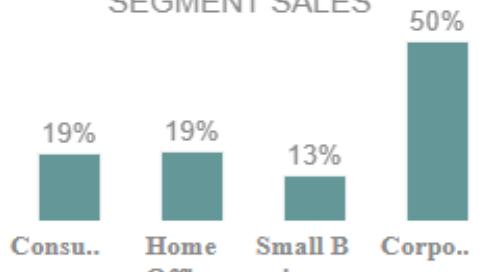
\$41,386 PROFIT



SELECT MONTH

September 2013

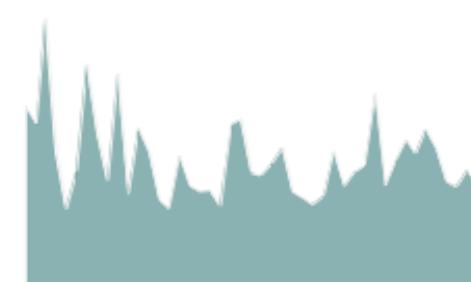
SEGMENT SALES



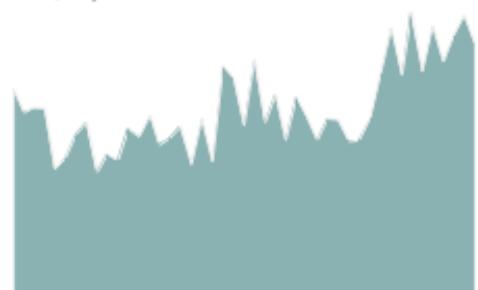
STATE SALES



\$68 AVG UNIT PRICE



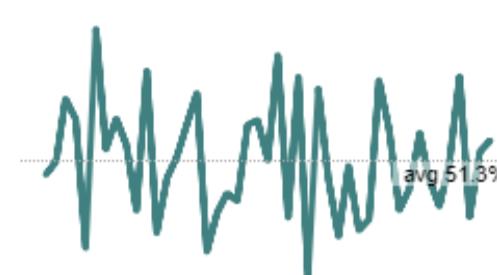
\$3,299 SHIPPING COST



4.9% AVG DISCOUNT



51.7% AVG MARGIN



SELECT REGION

- (All)
- Central
- East
- South
- West

SELECT STATE(S)

(All)

SELECT SEGMENT

- (All)
- Consumer
- Corporate
- Home Office
- Small Business

SELECT RANGE

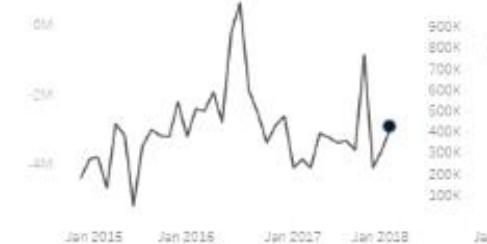
Jan-10 Sep-13

Notes:

Data source, date of pull,
range or pull, and caveats.

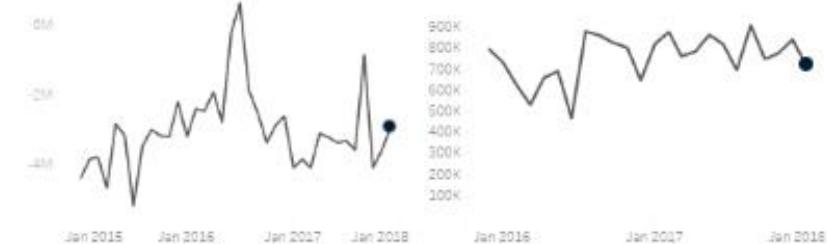
Total Output
vs. YTD Prior Year

55,314,152

726M
Budget MTD - For Other Net sales**Material Expenses**
vs. YTD Prior Year

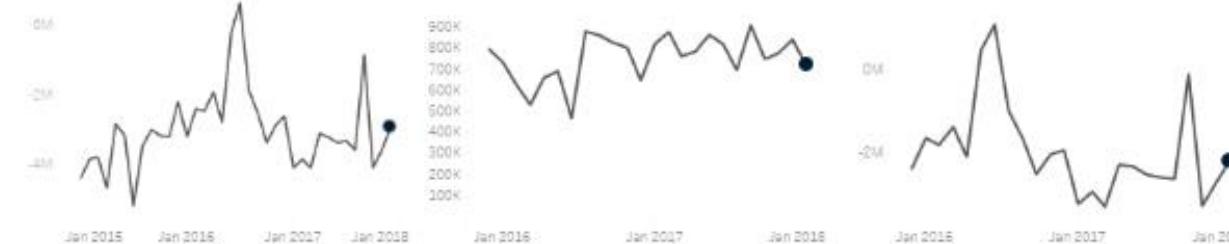
2,348,980

78,203,433

3M
Post Amount MTD**Gross Profit**
vs. YTD Prior Year

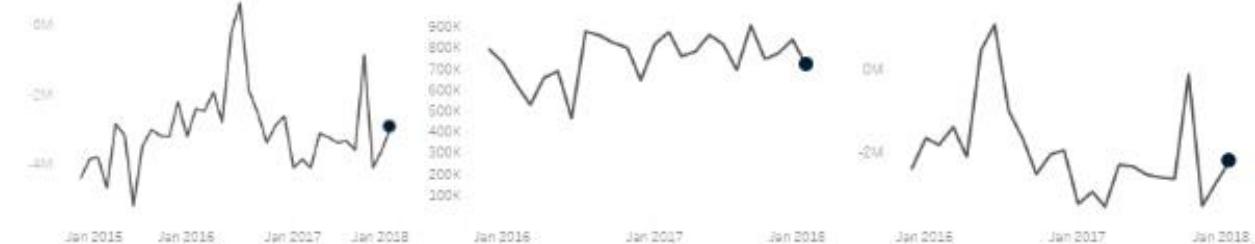
57,663,132

3,990,984

24M
Budget MTD**Personnel Expenses**
vs. YTD Prior Year

4,283,242

82,194,417

-232M
Budget MTD**Other Operating Expenses**
vs. YTD Prior Year

2,661,767

7,108,625

4,294,766

**EBITDA Operative**
vs. YTD Prior Year

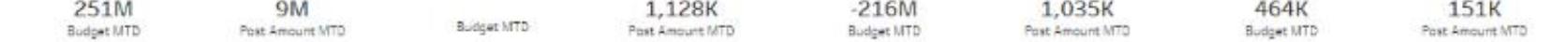
64,608,141

93,597,808

-216M
Budget MTD**Inventory Metal Valuation**
vs. YTD Prior Year

-296,091

41,733

9M
Post Amount MTD**Derivatives Mark to Market Valuation**
vs. YTD Prior Year

1,475,255

Budget MTD

**EBITDA**
vs. YTD Prior Year

66,127,149

92,767,630

-216M
Post Amount MTD**Amortization & Depreciation**
vs. YTD Prior Year

455,157

794,865

1,035K
Post Amount MTD**EBIT**
vs. YTD Prior Year

66,582,307

93,562,496

151K
Post Amount MTD**Financial Result**
vs. YTD Prior Year

150,165

243,019

1M
Post Amount MTD

what do you want to develop?

- 1) executive
- 2) analytical
- 3) operational

what are your key visualizations?

bar charts are fine

what do you want to develop?

- 1) executive
- 2) analytical
- 3) operational

what are your key visualizations?

bar charts are great

what do you want to develop?

- 1) executive
- 2) analytical
- 3) operational

what are your key visualizations?

bar charts are love

Function first.

Function first.

Aesthetics are irrelevant if the dashboard
doesn't contain the information or comparison
your user needs.

Women's representation in politics

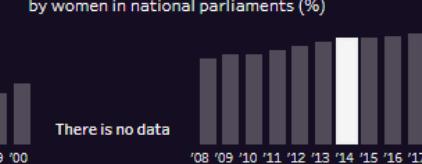
Designed by  @IvettAlexa

Although women's representation in politics increased from 1999 to 2017, last year still only **21.52%** of Parliament members were women and there are 5 countries without even one female political participant.

How changed the proportion of seats held by women in national parliaments (%)



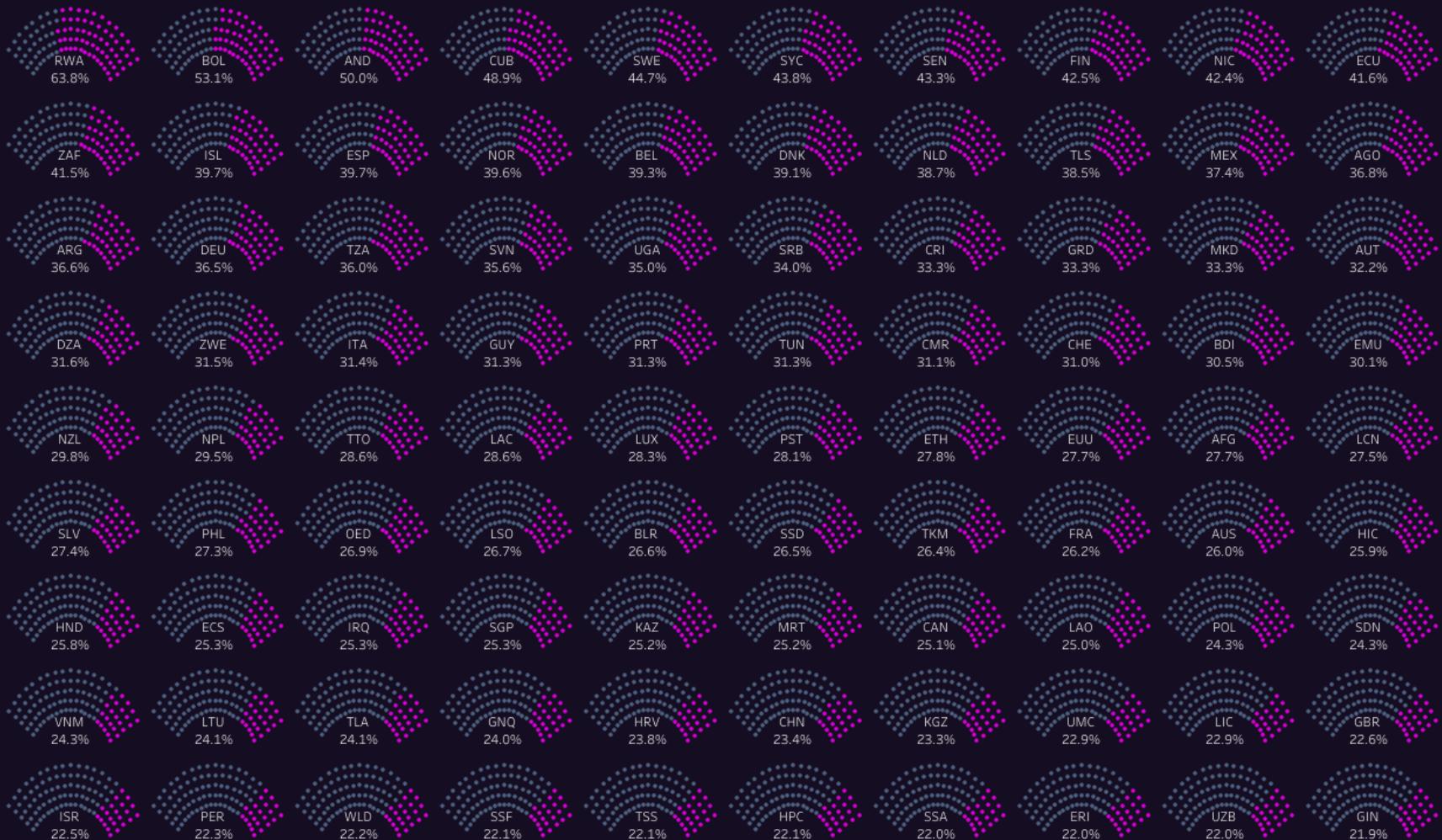
There is no data



5

countries
without even one female
political participant
in 2014

Men Women



That said, a highly functional dashboard
might be difficult to use

Key Hospital Statistics Dashboard - FYTD



Range:
FYTD

Facility:
(All)

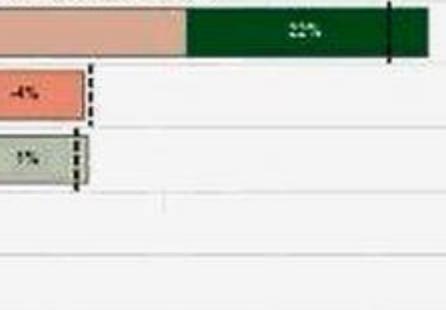
Manually Set Date?
No

Set Date:
5/31/2013

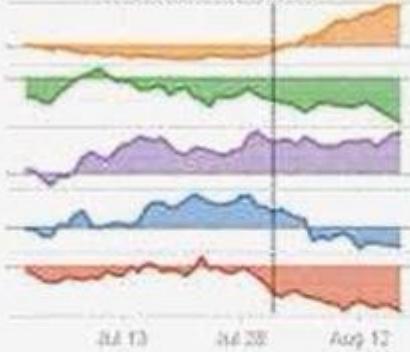
Entity Act Bud Var % Var

	Act	Bud	Var	% Var
[21] PAH	3,280	3,098	182	5.9%
[24] PFH	1,616	1,656	-40	-2.4%
[26] PHH	1,636	1,583	53	3.4%
[3] PNH	979	994	-.15	-1.5%
[25] PMH	349	374	-.25	-6.7%

Saturday, August 17, 2013



Daily Cumulative Variance



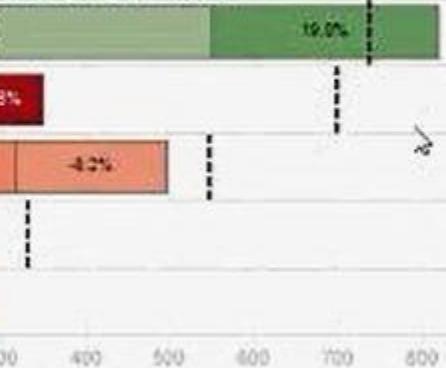
Performance vs Prior Year



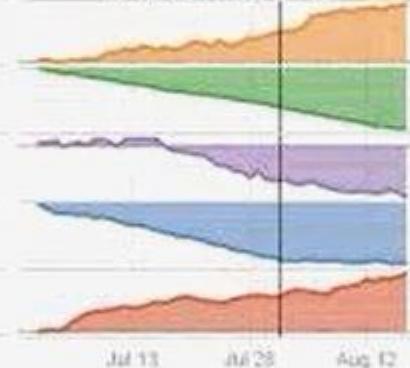
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[26] PHH	496	548	-.52	-9.5%
[3] PNH	225	333	-.108	-32.4%
[25] PMH	275	207	68	32.8%

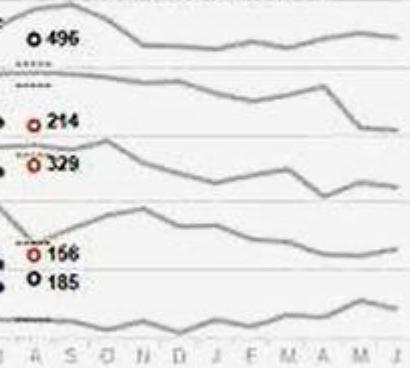
Saturday, August 17, 2013



Daily Cumulative Variance



Performance vs Prior Year



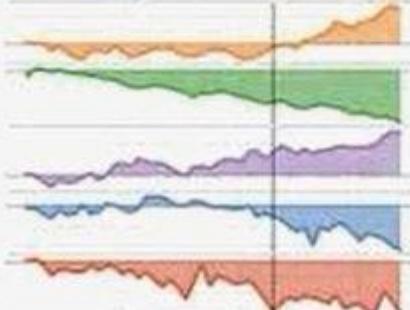
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	Act	Bud	Var	% Var
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[26] PHH	3,187	3,064	122	4.0%
[3] PNH	2,362	2,498	-.136	-5.4%
[25] PMH	1,362	1,438	-.76	-5.3%

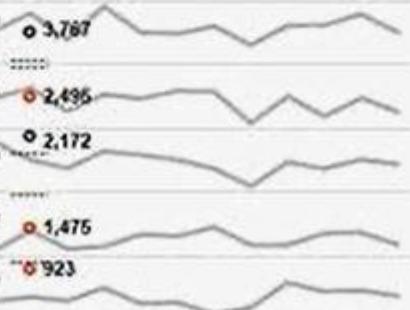
Saturday, August 17, 2013



Daily Cumulative Variance



Performance vs Prior Year



Year-to-Date Income Statement (In 000s)

Goal met

Goal not met

• Latest month △ to budget

Select a Region

(All)

Select a Channel

(All)

Select a Product

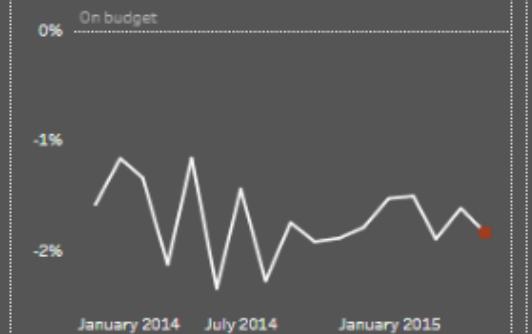
(All)

Gross Sales
vs. YTD PY

10,004

11,386

Monthly Variance to Budget

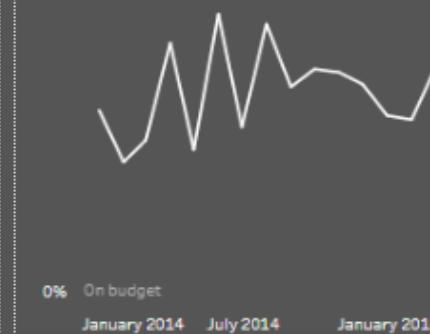


Discounts
vs. YTD PY

573

509

Monthly Variance to Budget



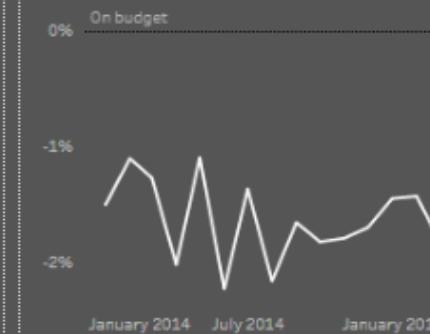
Net Sales
vs. YTD PY

10,813

Cost of Goods Sold
vs. YTD PY

6,164

Monthly Variance to Budget

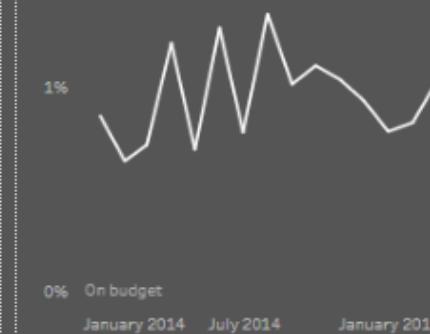


Cost of Goods Sold
vs. YTD PY

5,711

6,164

Monthly Variance to Budget

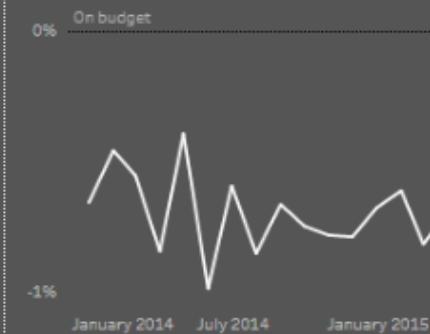


Gross Profit
vs. YTD PY

3,784

4,649

Monthly Variance to Budget



Operating Expenses
vs. YTD PY

1,315

1,502

Monthly Variance to Budget



Operating Income
vs. YTD PY

3,147

2,468

Monthly Variance to Budget



Taxes
vs. YTD PY

385

Net Profit
vs. YTD PY

2,762

313

Monthly Variance to Budget



Net Profit
vs. YTD PY

2,155

2,762

Monthly Variance to Budget



It will be tempting to try to provide everything you want on one dashboard.

But too much functionality will quickly erode your viewer's ability to *grok* the visualizations.

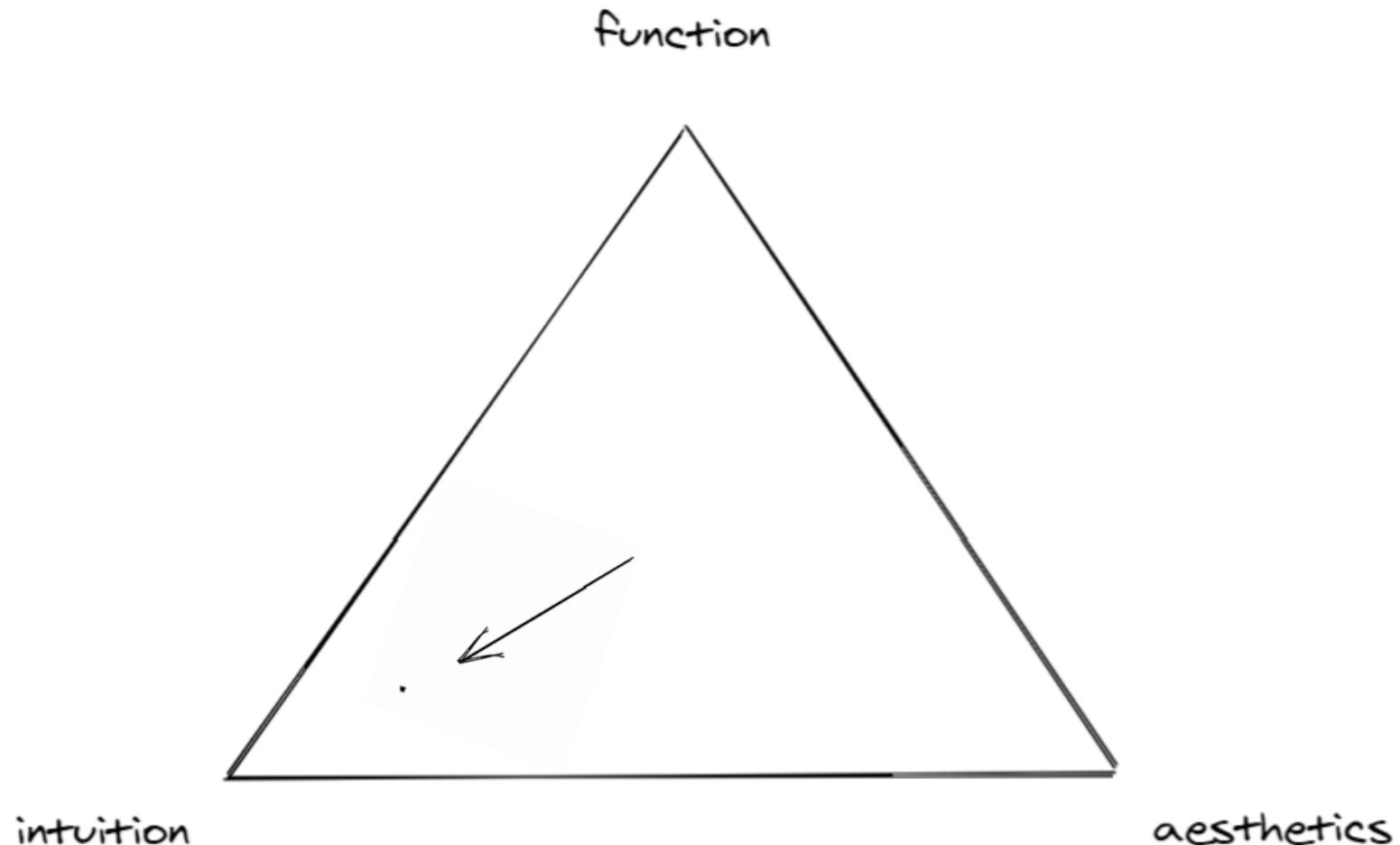
Which leads us to...



INTUITION

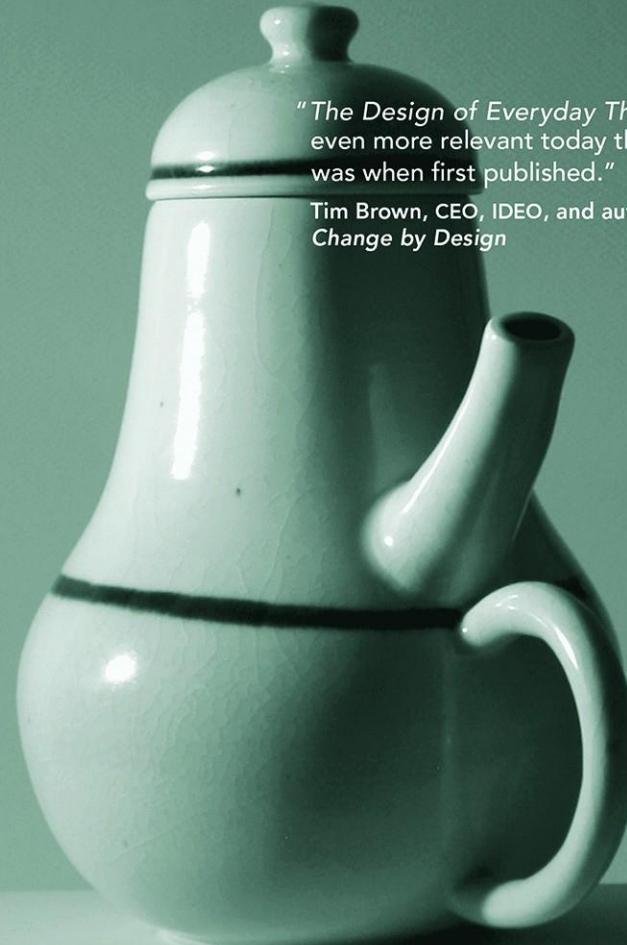
Is the dashboard easy to use
and understand?

The Trilemma of Dashboard Design



REVISED AND EXPANDED EDITION

The Design of Everyday Things



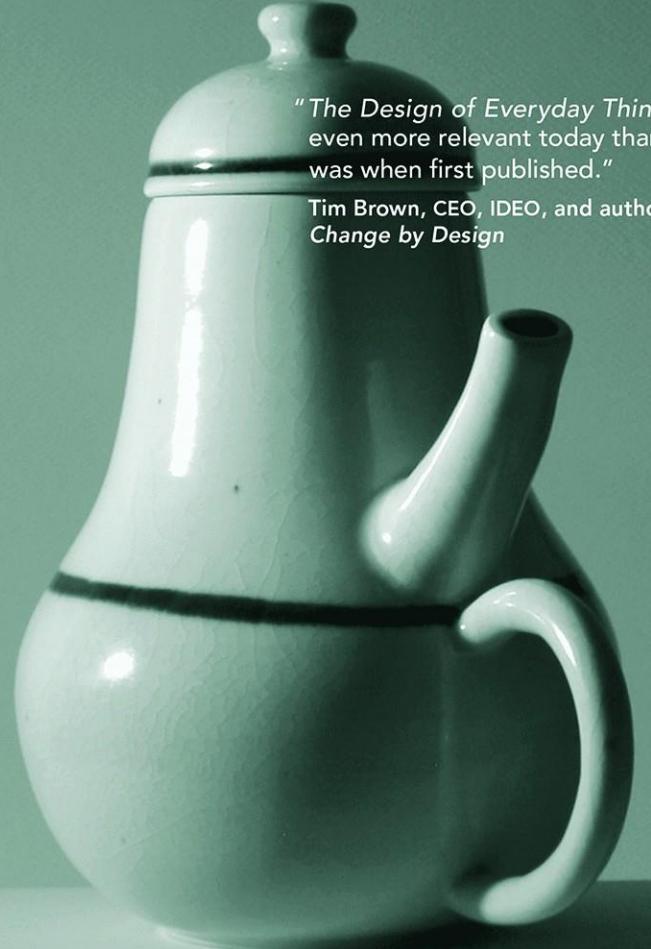
"The Design of Everyday Things is even more relevant today than it was when first published."

Tim Brown, CEO, IDEO, and author of
Change by Design

Donald A. Norman

REVISED AND EXPANDED EDITION

The Design of Everyday Things



"The Design of Everyday Things is even more relevant today than it was when first published."

Tim Brown, CEO, IDEO, and author of *Change by Design*

Donald A. Norman

Good design starts with an understanding of **psychology and technology**.

Good design requires **good communication**, especially from machine to person, indicating what actions are possible, what is happening, and what is about to happen.

The Curse of Knowledge in Economic Settings: An Experimental Analysis

Colin Camerer

University of Pennsylvania

George Loewenstein

University of Chicago

Martin Weber

Institut für Wirtschaftswissenschaften

In economic analyses of asymmetric information, better-informed agents are assumed capable of reproducing the judgments of less-informed agents. We discuss a systematic violation of this assumption that we call the “curse of knowledge.” Better-informed agents are unable to ignore private information even when it is in their interest to do so; more information is not always better. Comparing judgments made in individual-level and market experiments, we find that market forces reduce the curse by approximately 50 percent but do not eliminate it. Implications for bargaining, strategic behavior by firms, principal-agent problems, and choice under uncertainty are discussed.

more information is not always better.

The Curse of Knowledge occurs when you unknowingly assume that others have the background information necessary to understand you





Activity Demographics

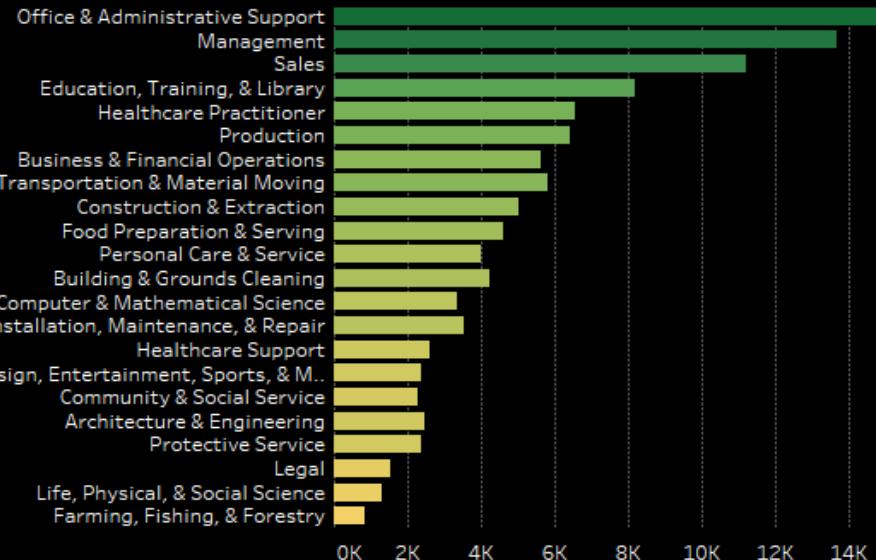
Happiness Score

7.1

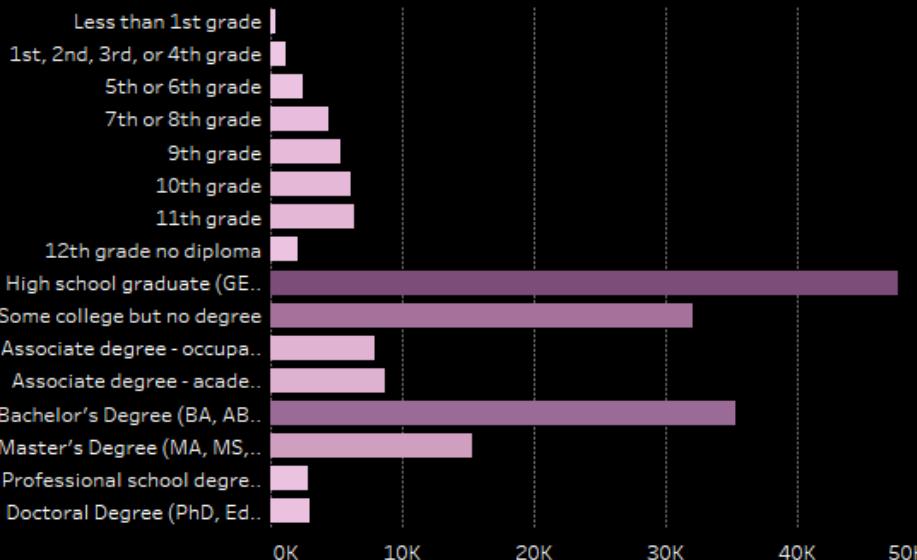
Total # of Respondents

181,335

Occupation



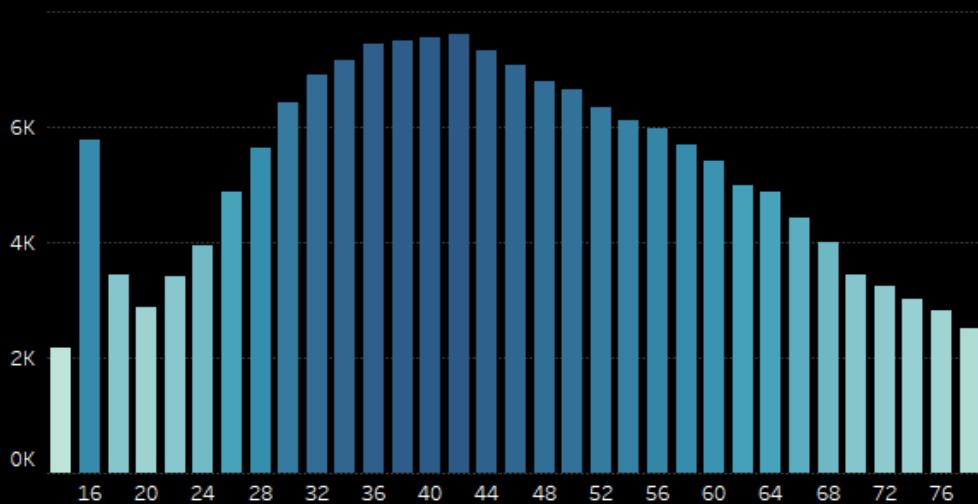
Educational Attainment



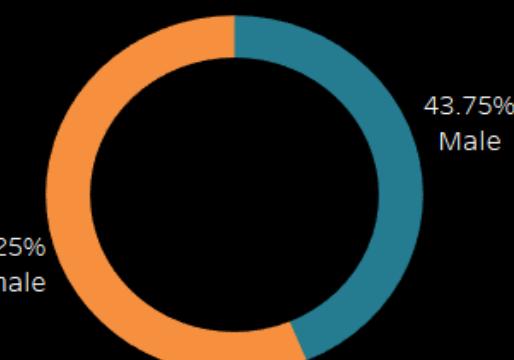
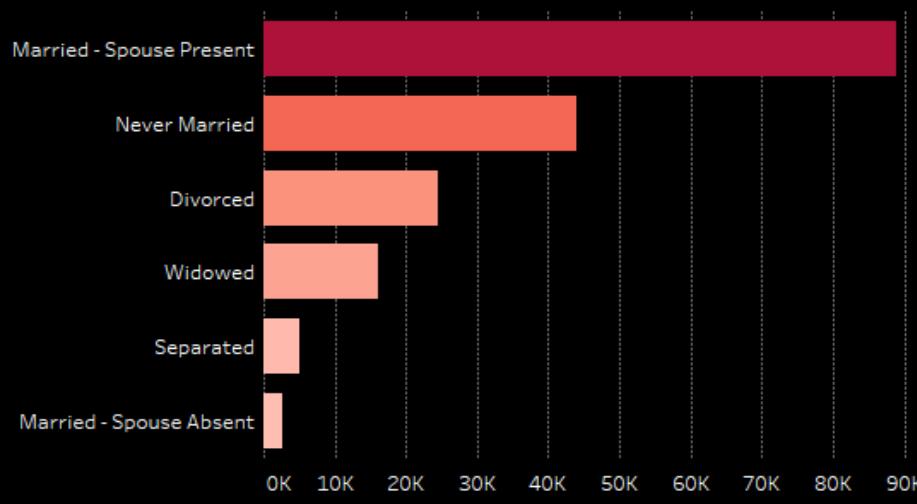
Family Income



Age



Marital Status



The Curse of Knowledge

the more you know about a topic, the harder it is for you to communicate with someone who doesn't know anything about that topic

The Curse of Knowledge

you cannot go back to the way you
were before you possessed knowledge

The Curse of Knowledge

you cannot disregard your knowledge
even when it is in your best interest to
do so

The Curse of Knowledge

you cannot disregard your knowledge
even when it is in your best interest to
do so

As much as you'd like to experience
The Sixth Sense for the first time again,
you cannot erase your knowledge that
**Bruce Willis was dead the
whole time**

The Curse of Knowledge

is a fundamental obstacle in any effort
to communicate or teach

The Curse of Knowledge

the more information you display, the harder it will be for your audience to understand

Key Hospital Statistics Dashboard - FYTD



Range:
FYTD

Facility:
(All)

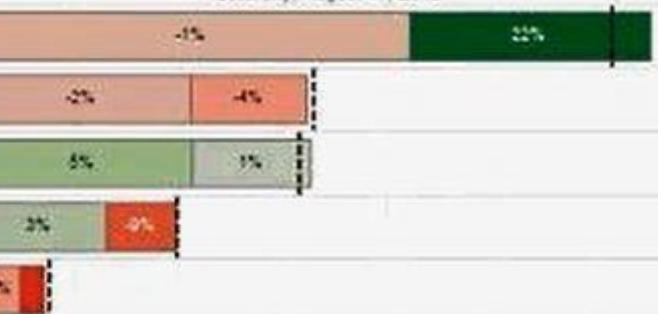
Manually Set Date?
No

Set Date:
5/31/2013

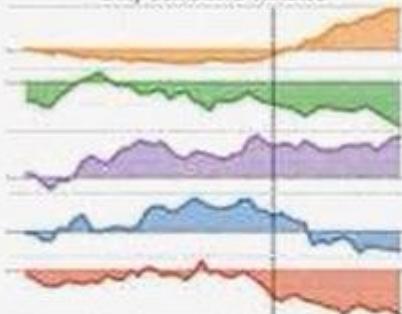
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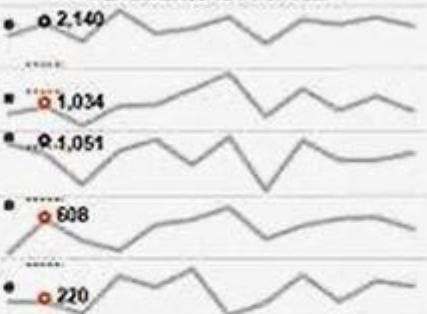
Saturday, August 17, 2013



Daily Cumulative Variance



Performance vs Prior Year



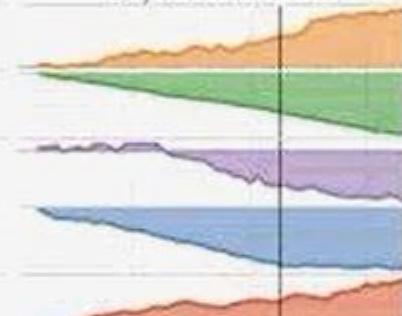
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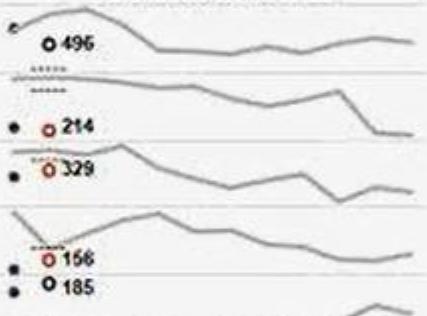
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Daily Cumulative Variance



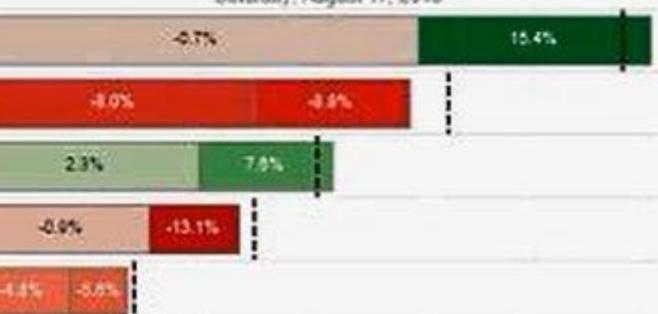
Performance vs Prior Year



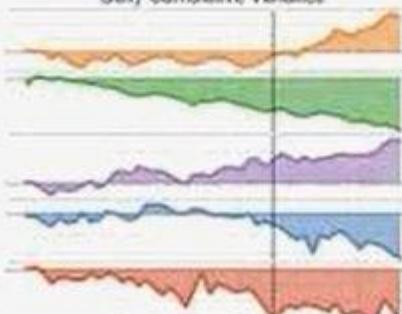
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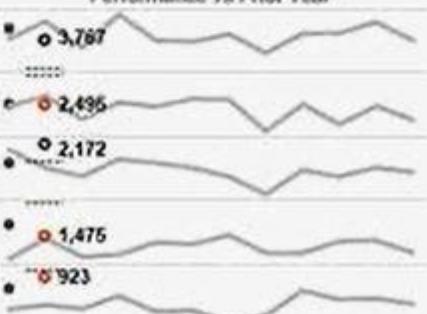
Saturday, August 17, 2013



Daily Cumulative Variance



Performance vs Prior Year



The Curse of Knowledge

is the reason college math professors
are often terrible at teaching
introductory calculus

The Curse of Knowledge

is the reason people are confused
when you don't label your axes

you think you can throw ten
visualizations on one screen without a
title and get people to understand your
data?

The Curse of Knowledge is why
you're wrong

you think your data is so widely understood that you don't need to define acronyms?

The Curse of Knowledge is why
you're wrong

i think i can explain the curse of
knowledge to you in two minutes?

The Curse of Knowledge is why I'm
wrong

Good communication often amounts to
overcoming **The Curse of Knowledge**

How do we defeat **The Curse of Knowledge**
in designing a dashboard?

Direct your viewer's gaze

Direct your viewer's gaze

focus the viewer's attention towards key things
you want them to see

Direct your viewer's gaze

focus the viewer's attention towards key things
you want them to see

in a presentation I can do this by shifting text
around on the screen, forcing you to look in
various places

Direct your viewer's gaze

Direct your viewer's gaze

Direct your viewer's gaze

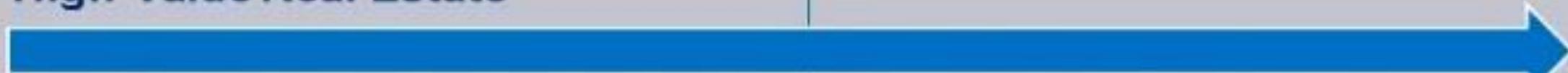
Direct your viewer's gaze

in a dashboard, you need to steer your viewer's eye towards key pieces of information

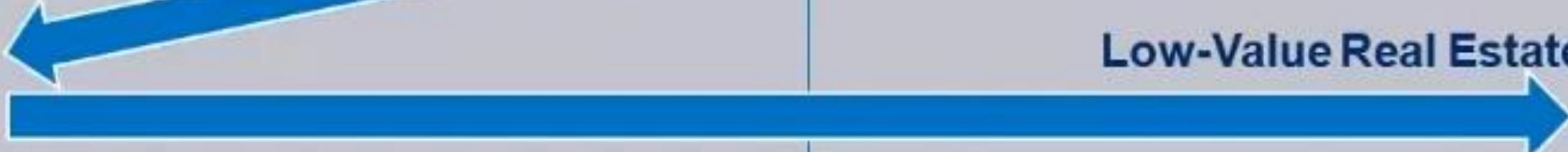
Direct your viewer's gaze

1) Take advantage of how we read

High-Value Real Estate



Low-Value Real Estate



Design Best Practices

Emphasized

Neither emphasized
nor de-emphasized

Emphasized

Neither emphasized
nor de-emphasized

De-emphasized

\$3.8M
Fees

• \$3.4M
Potential

\$1.3M
New Biz + Opportunity

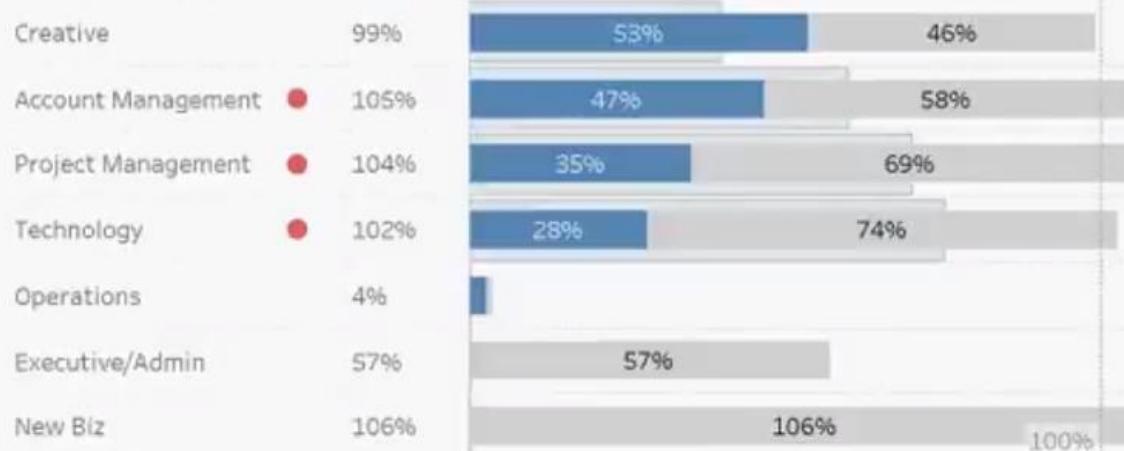
\$2.6M
Internal Projects

• +12.2
FTE Overstaffed

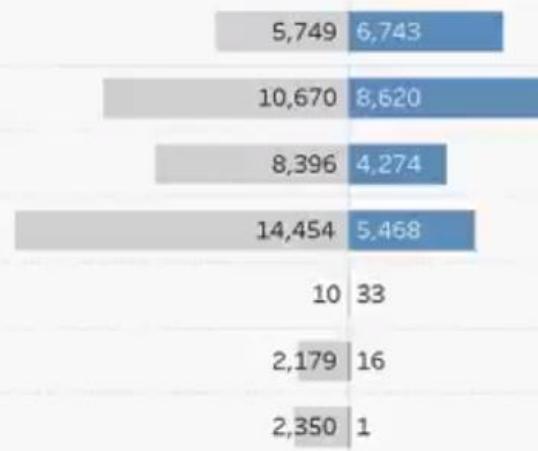
36%

56%

Target vs Billable vs Non-Billable %



Non-Billable vs Billable Hours



Cost | Fees | Potential



New Biz + Opp

Creative	1,456 hrs	12%	1,301 hrs	10%	2,992 hrs	24%
Account Management	4,524 hrs	25%	1,579 hrs	9%	4,567 hrs	25%
Project Management	1,455 hrs	12%	2,283 hrs	15%	4,659 hrs	38%
Technology	361 hrs	2%	9,608 hrs	49%	4,485 hrs	23%
Operations	6 hrs	0%	0 hrs	0%	5 hrs	0%
Executive/Admin	0 hrs	0%	4 hrs	0%	2,176 hrs	56%
New Biz	1,511 hrs	22%	1,111 hrs	15%	5,111 hrs	25%

Internal Projects

Internal Admin

Utilization Trend



\$3.8M
Fees

\$3.4M
Potential

\$1.3M
New Biz + Opportunity

\$2.6M
Annual Profit

+ 2
FTE OVER

Target vs Billable vs Non-Billable %



74%

106%

24

44% F

9% Poten

Billab

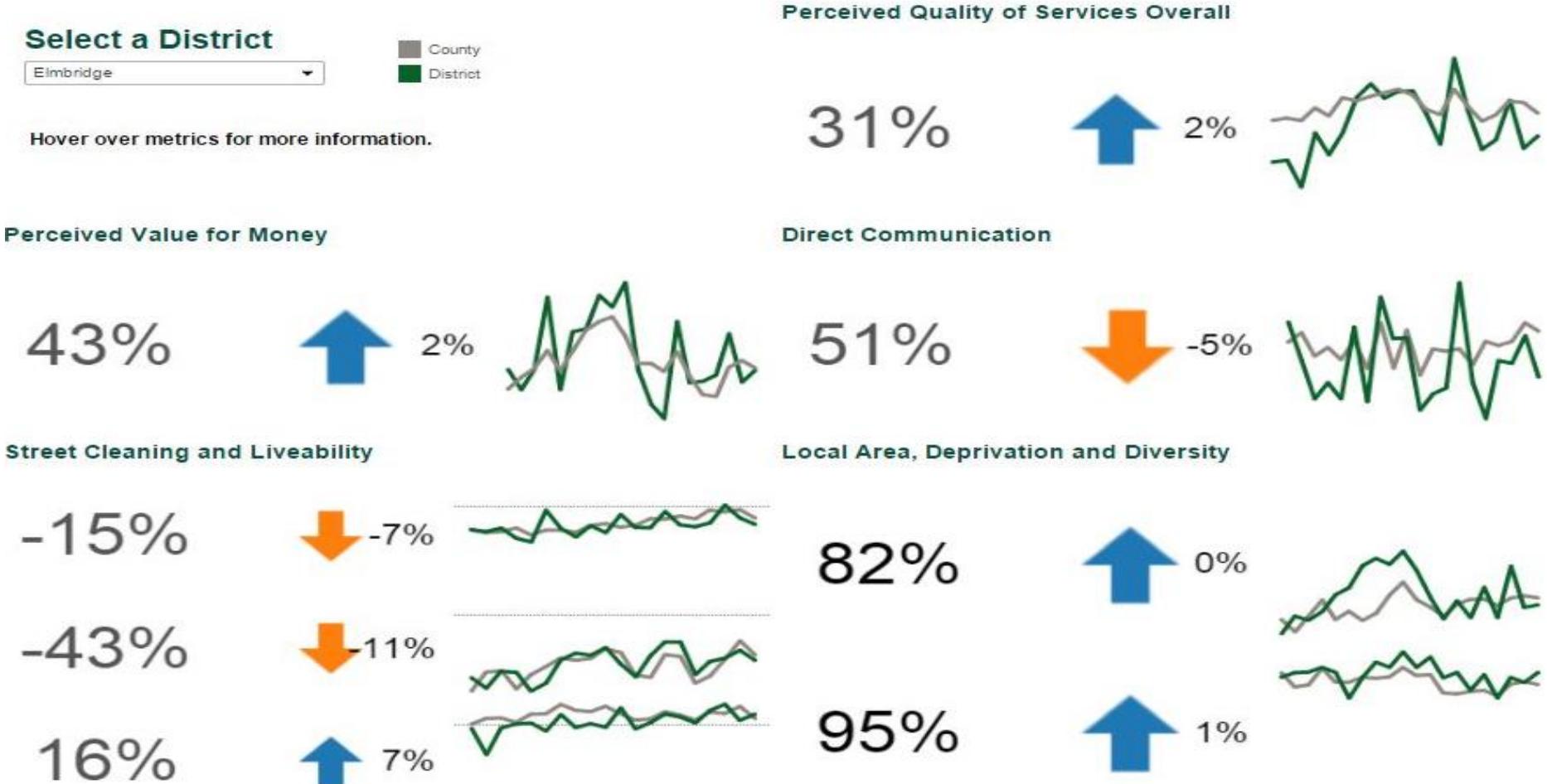
56%

Direct your viewer's gaze

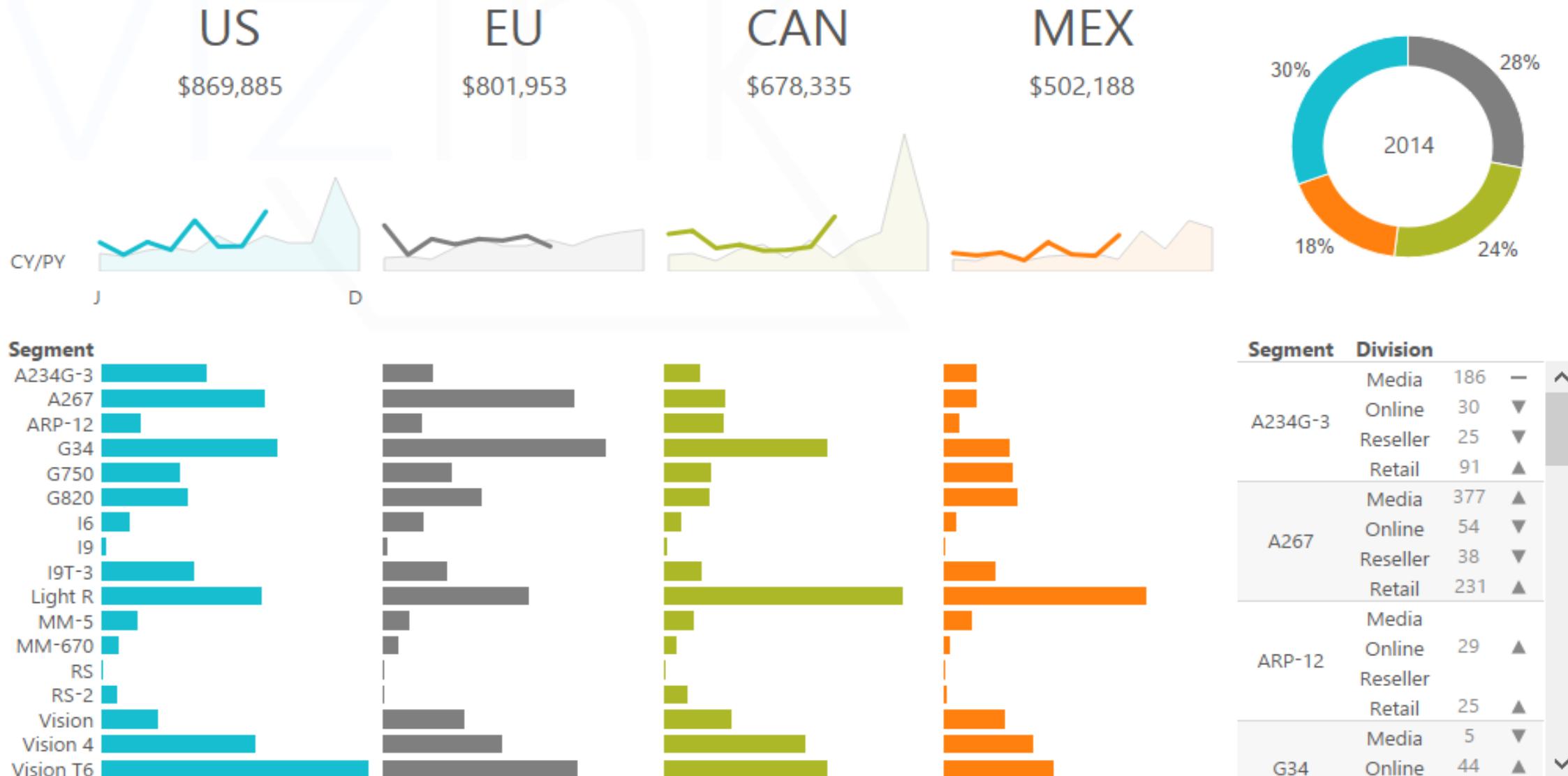
- 1) Take advantage of how we read
- 2) Use BANS

Use Big Ass Numbers

Key Results From The Surrey Residents Survey



Use Big Analytical Numbers



North America Market Outlook

CLICK a region
to filter data



Africa



C.I.S.



Europe



Latin America



Middle East



North America



China



Oceania



Northeast Asia



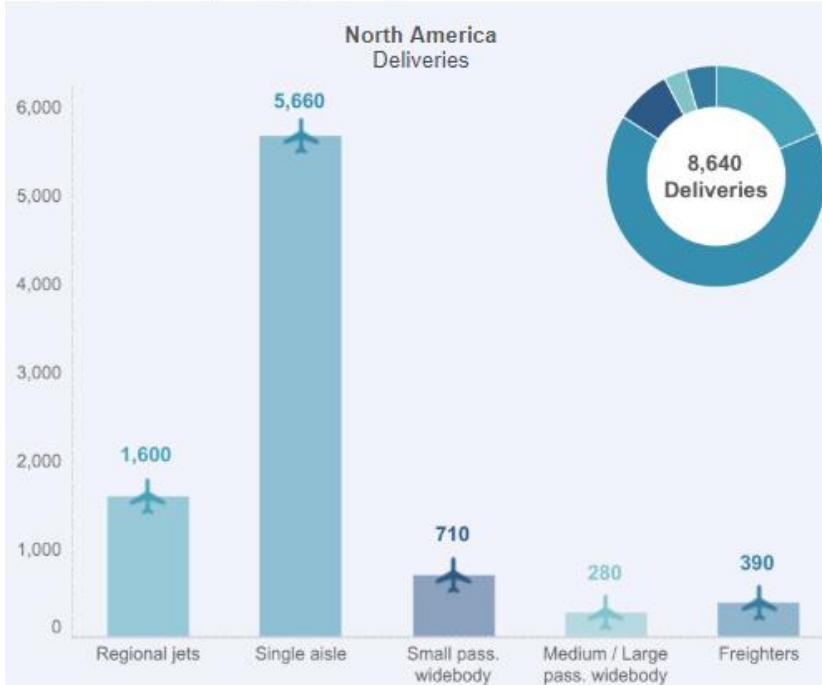
South Asia



Southeast Asia



Following restructuring in the last decade, the North American fleet has begun to grow again, up 6 percent over the last two years. With the region accounting for more than half of global airline industry profitability since 2013, airlines are well positioned to expand and refresh their fleets over the next 20 years. Long-term traffic growth of 2.6 percent in today's largest intra-regional market is projected to boost the single-aisle share of the fleet from 62 percent today to 71 percent in 20 years. Small widebody airplanes, projected to account for 72 percent of widebody passenger deliveries over the next 20 years, offer North American airlines the ability to operate additional nonstop flights from hubs as well as secondary markets to capture international growth opportunities.



Use Big Analytical Numbers



Direct your viewer's gaze

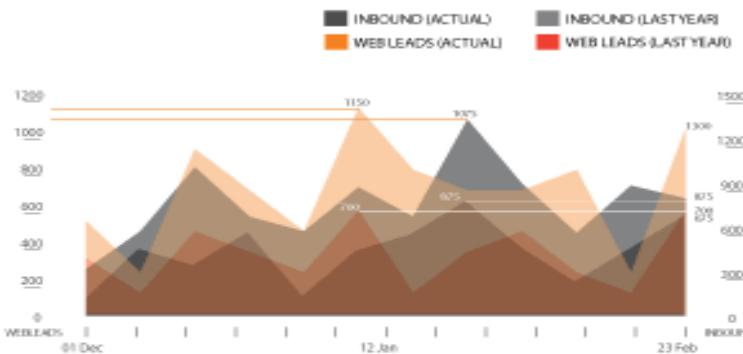
- 1) Take advantage of how we read
- 2) Use BANS
- 3) K.I.S.S.

Direct your viewer's gaze

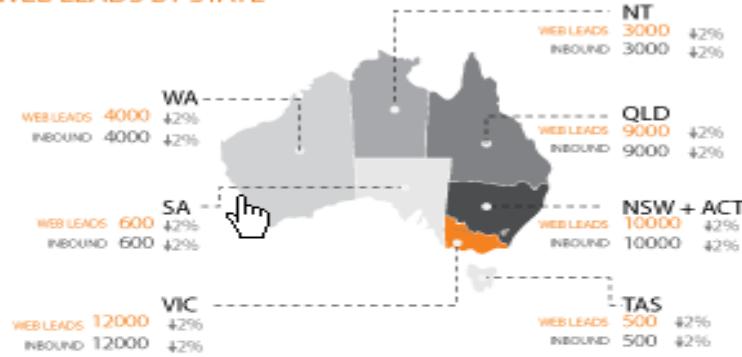
- 1) Take advantage of how we read
- 2) Use BANS
- 3) K.I.S.S.

Keep it Simple, Stupid

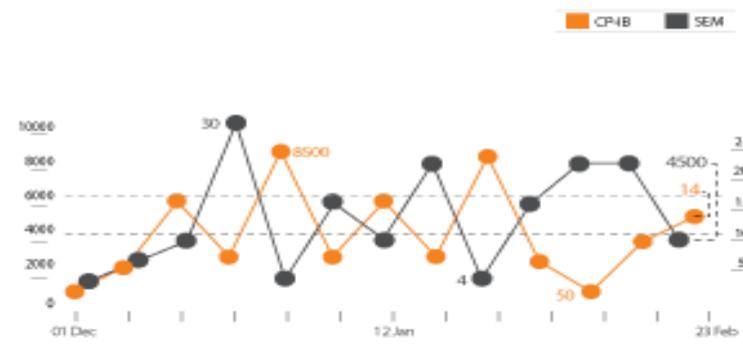
WEB LEADS AND INBOUND (ACTUAL AND LAST YEAR)



WEB LEADS BY STATE



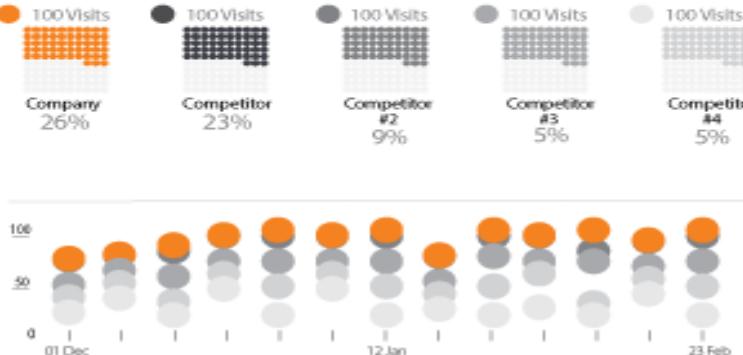
COST PER INBOUND AND SEM



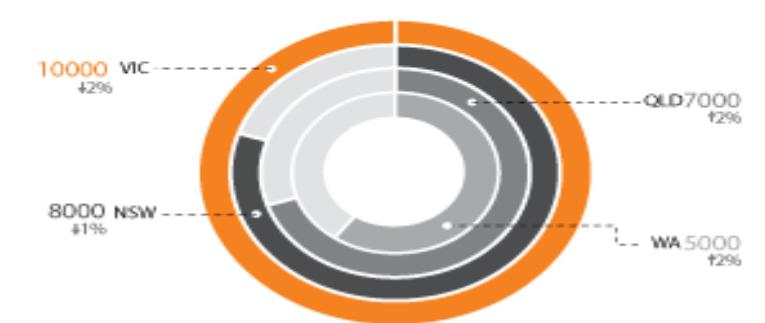
MEDIA SPEND BY STATE



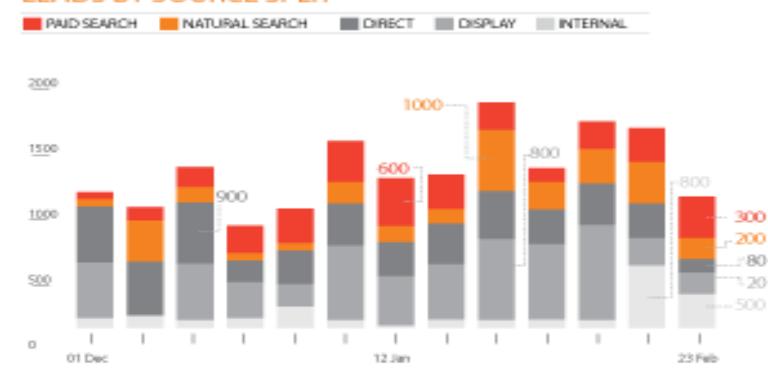
VISIT MARKET SHARE



OVERLAY BRAND AWARENESS BY STATE



LEADS BY SOURCE SPLIT



TOTAL SPEND



COMPETITORS (SEO AND SEM)

SEO VISIBILITY SCORE V COMP



SEM COMP SPEND







Charles Mingus,
Jazz musician



Charles Mingus,
Jazz musician

My son's a painter. All through school his teachers tell him he's a genius. I tell him to paint me an apple that looks like an apple before he paints me one that doesn't.

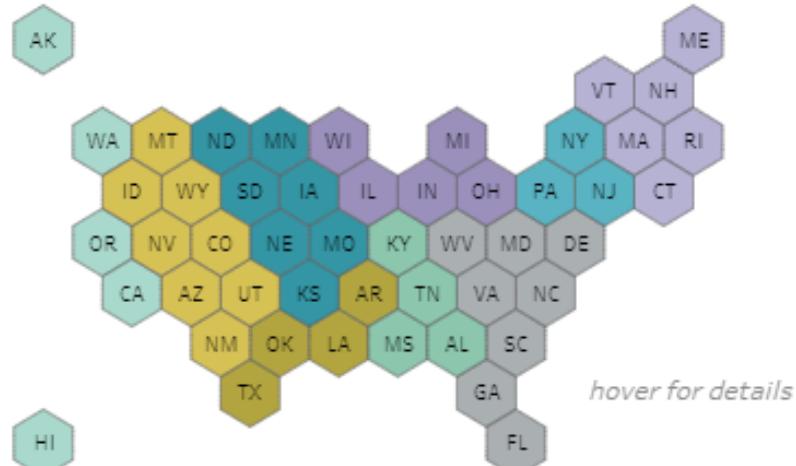
Go where you can go, but start from someplace recognizable.

Making the simple complicated is commonplace; **making the complicated simple, awesomely simple, that's creativity.**

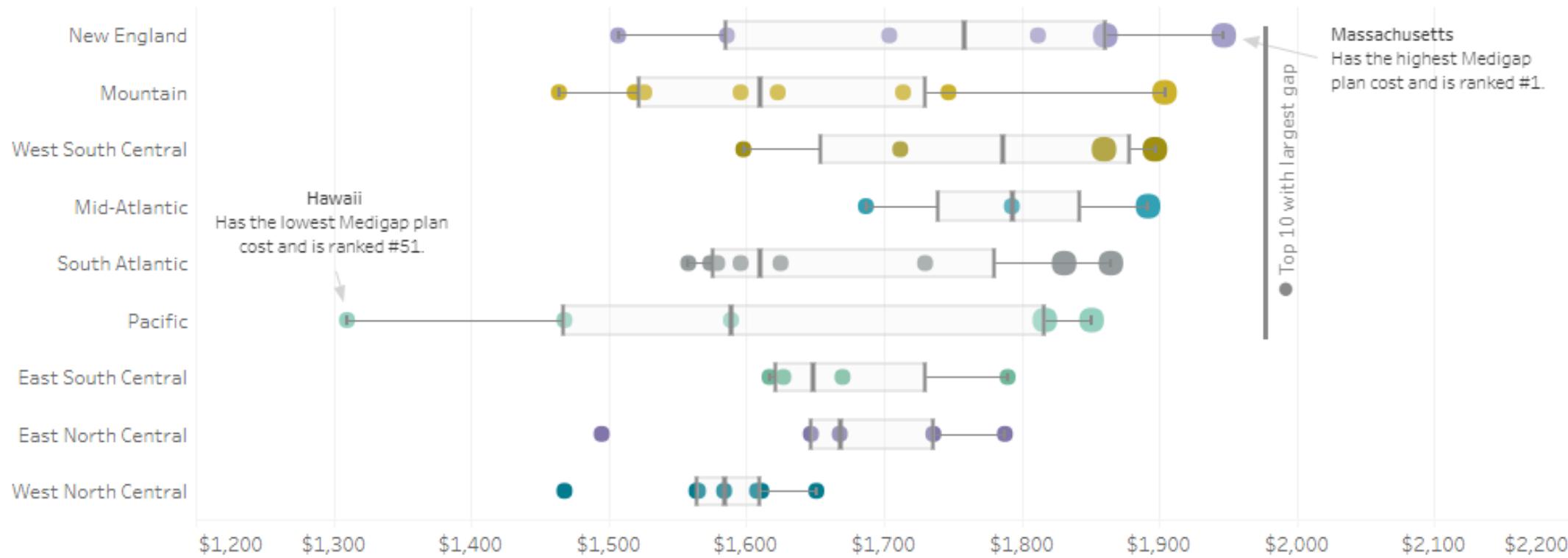
the m e d i G A P

SOURCE | business insider • DESIGN | lindsay betzendahl • PROJECT | project health viz

Once you turn 65 you qualify for Medicare health insurance. However, Medicare doesn't cover everything. Medigap plans are sold by private companies to help pay for some of those extra costs. Depending on where you live, it will cost you.



Annual Average Medigap Plan Cost by region



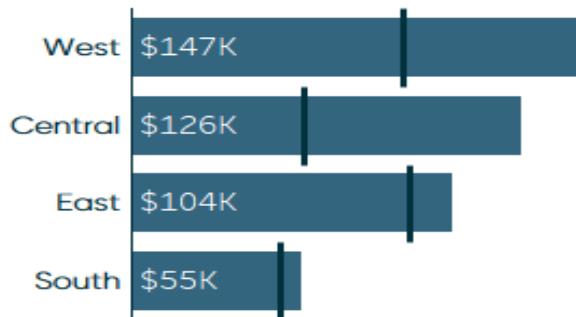
This dashboard covers September through March. Click a button or bar chart for further analysis.

SALES

TREND

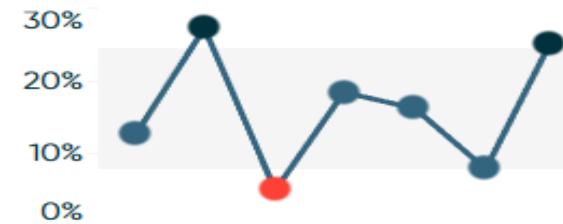


BY REGION

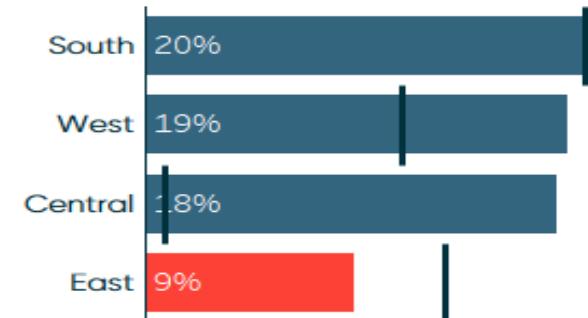
[VIEW MORE](#)

PROFIT RATIO

TREND



BY REGION

[VIEW MORE](#)

DAYS TO SHIP

TREND



BY REGION

[VIEW MORE](#)

Direct your viewer's gaze

- 1) Take advantage of how we read
- 2) Use BANS
- 3) K.I.S.S.
- 4) Provide context

At the heart of any quantitative analysis is the question:

“Compared to what?”

Women's representation in politics

Designed by  @IvettAlexa

Although women's representation in politics increased from 1999 to 2017, last year still only **21.52%** of Parliament members were women and there are 5 countries without even one female political participant.

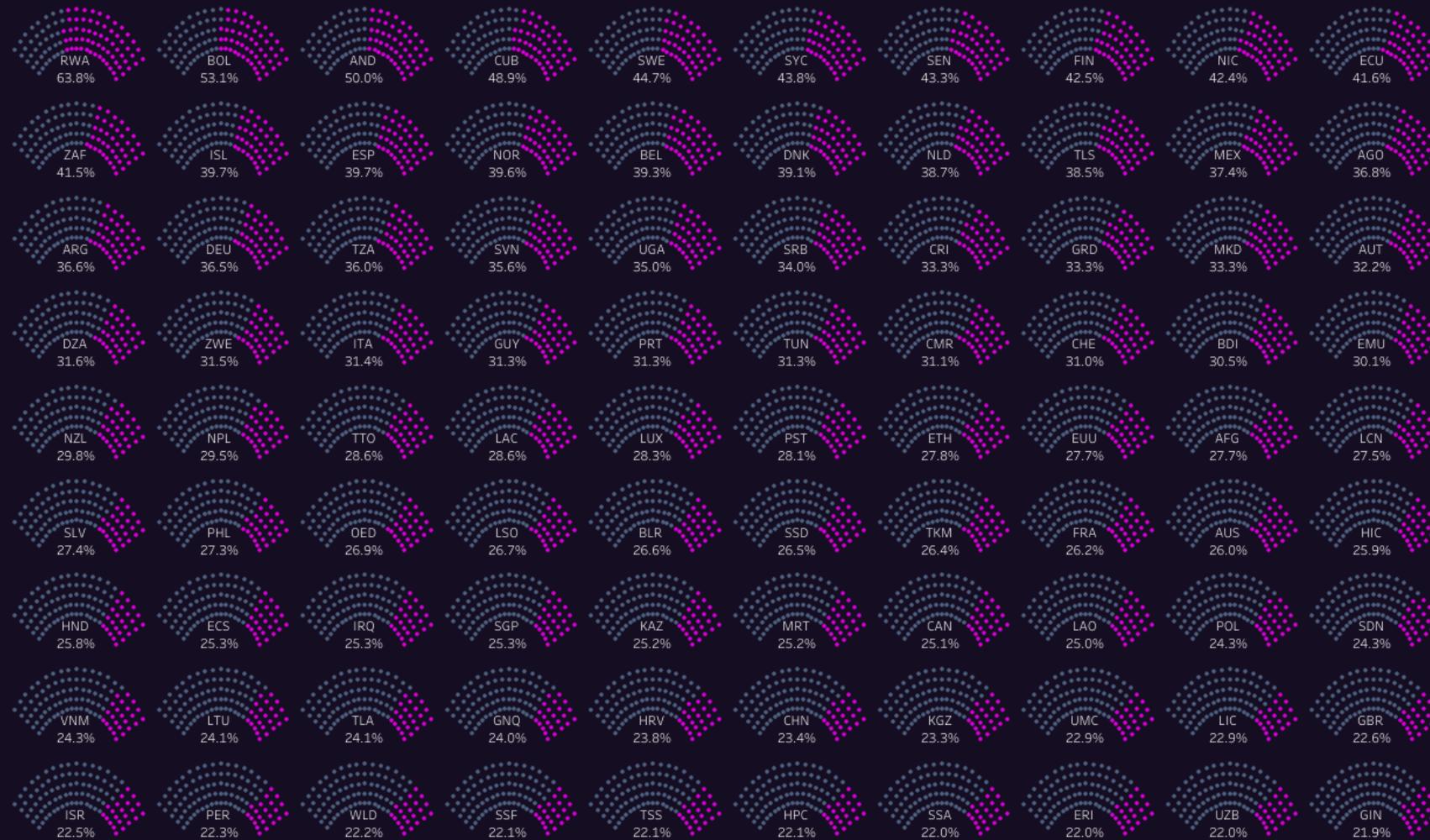
How changed the proportion of seats held by women in national parliaments (%)



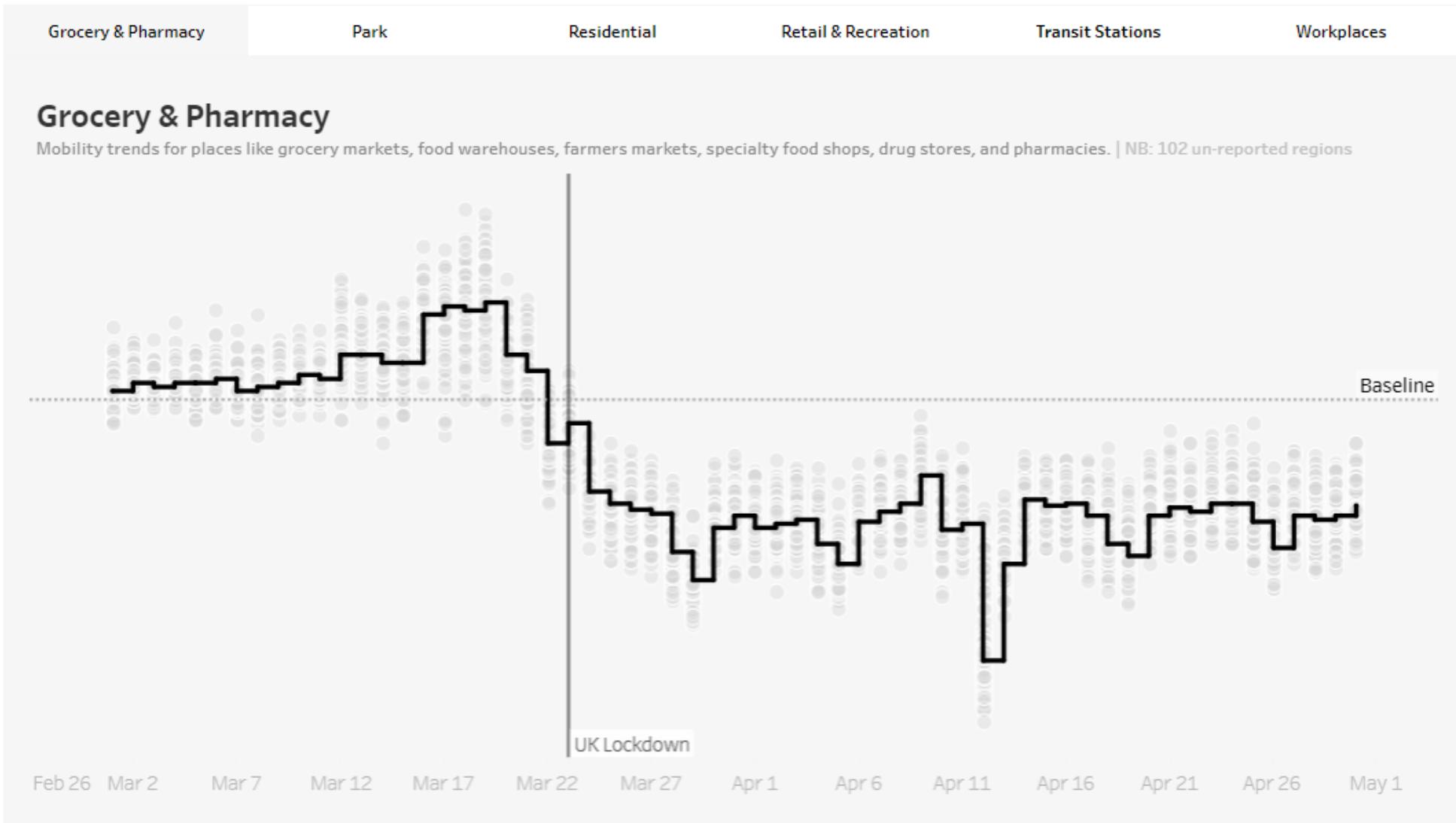
5

countries
without even one female
political participant
in 2014

Men Women



Google Mobility Report: UK Lockdown



Direct your viewer's gaze

- 1) Take advantage of how we read
- 2) Use BANS
- 3) K.I.S.S.
- 4) Provide context
- 5) Use contrast

If everything is emphasized, nothing is.

Activity Demographics

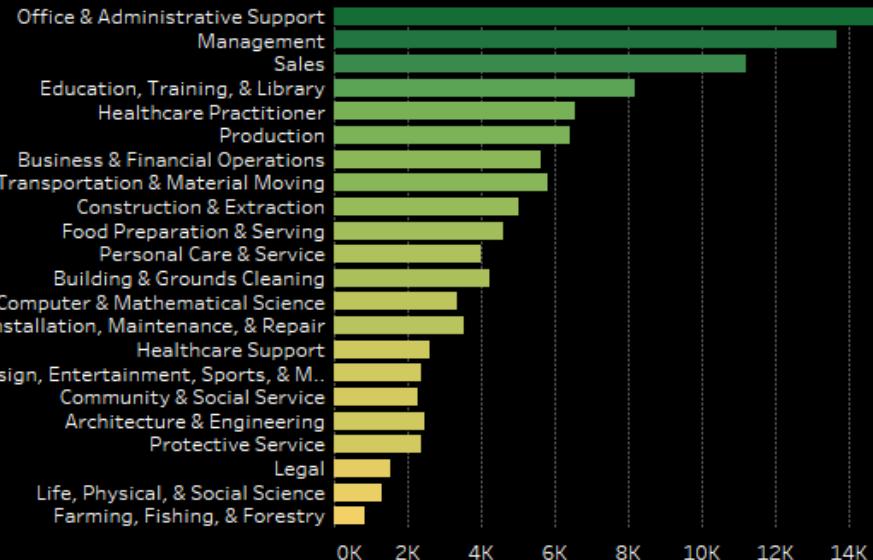
Happiness Score

7.1

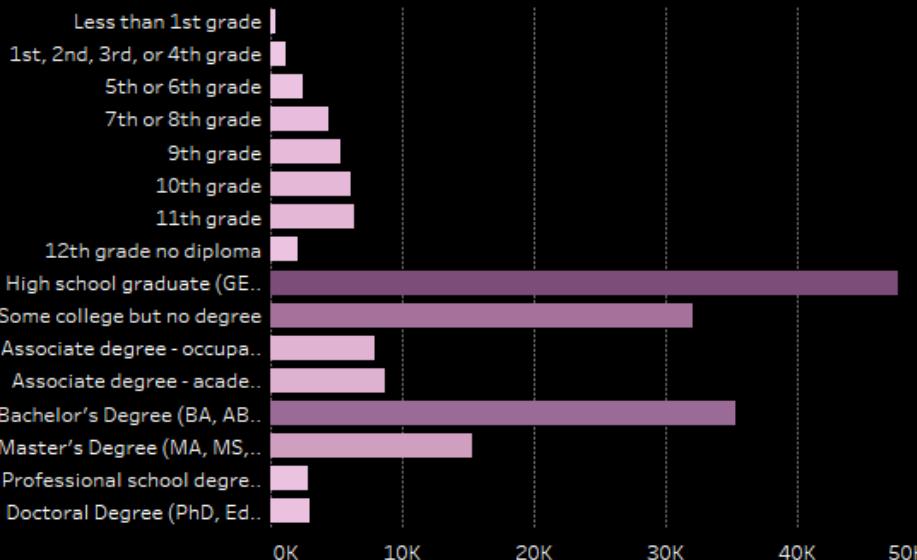
Total # of Respondents

181,335

Occupation



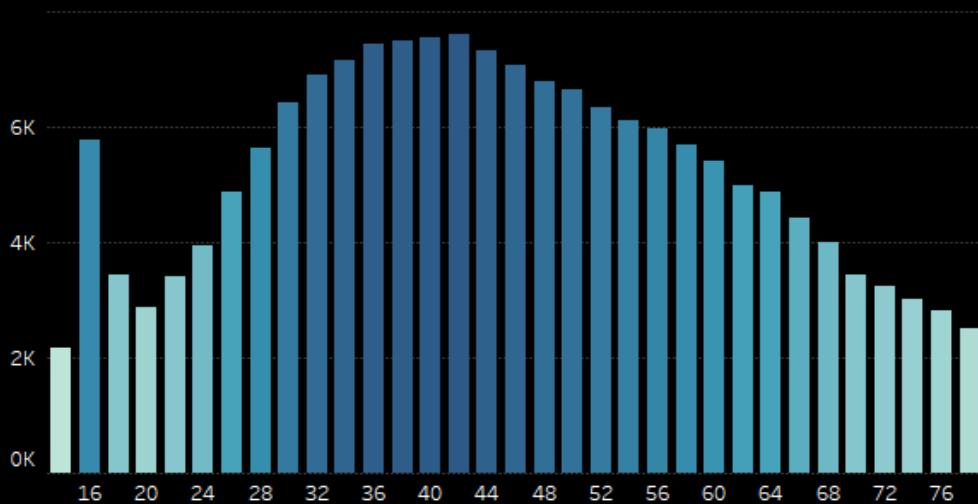
Educational Attainment



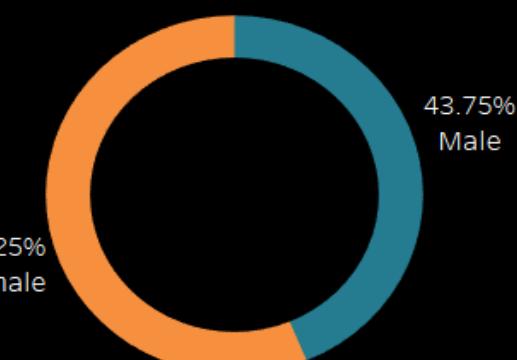
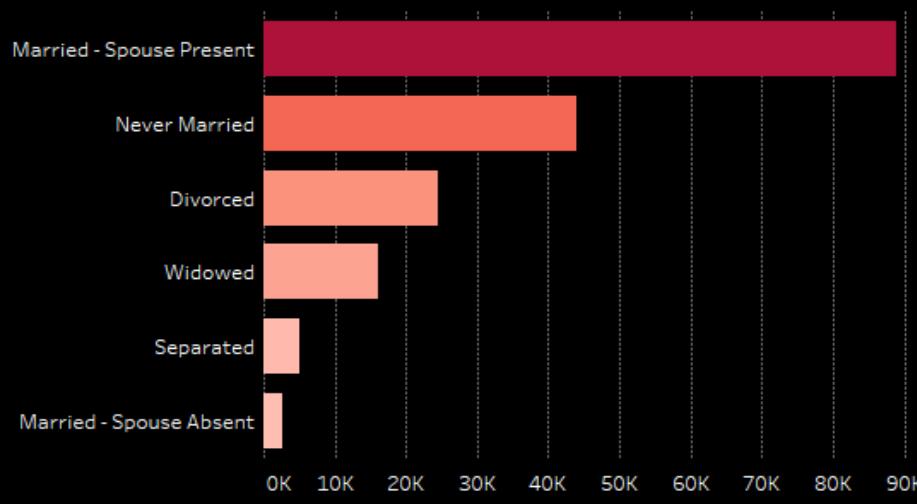
Family Income



Age



Marital Status

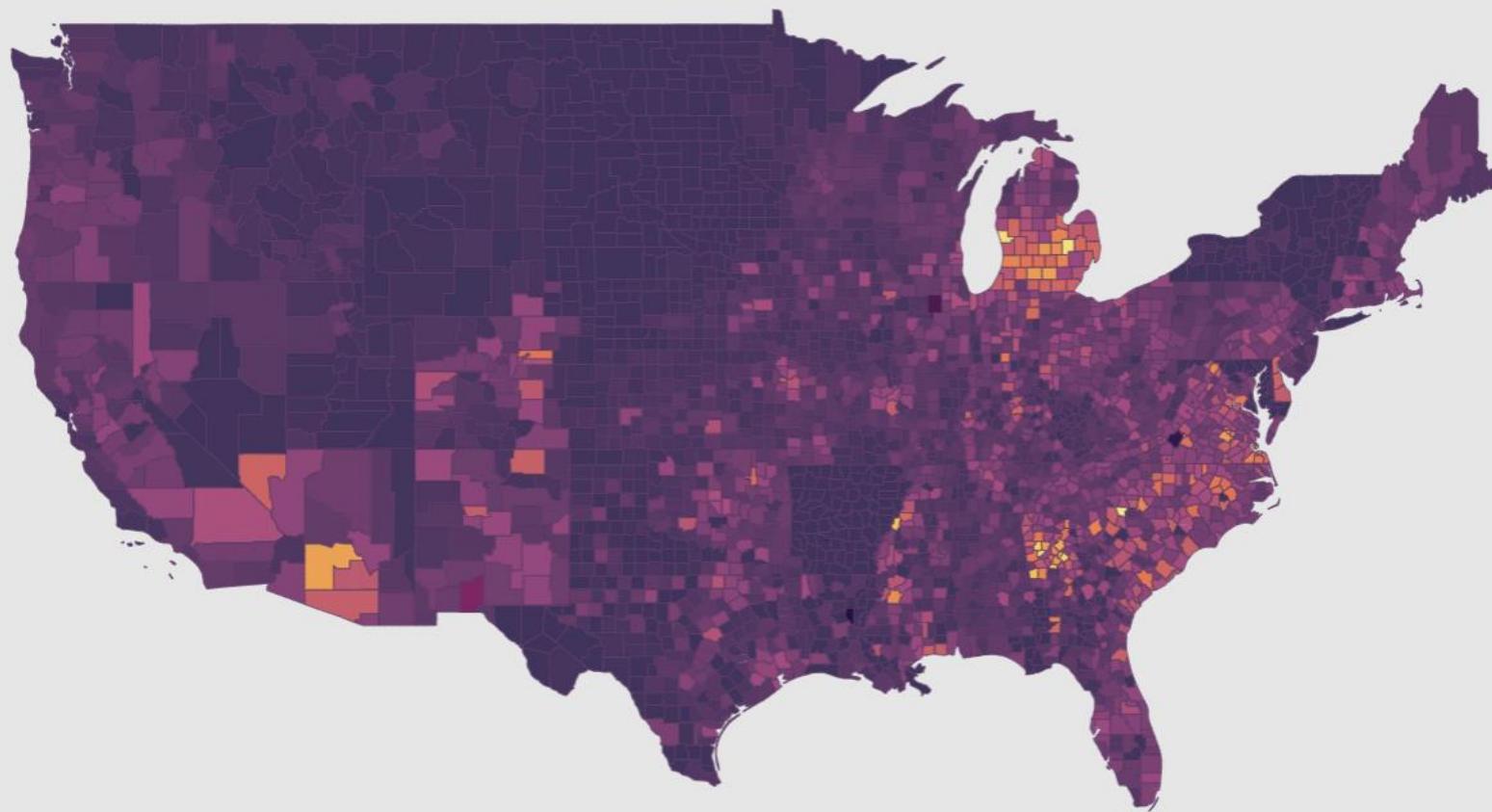


US EVICTIONS

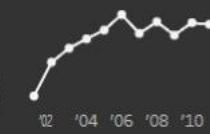
Click to
filter year



Select Metric ►
 Evictions
 Filing Rate
 Eviction Rate



Year
All Years **Total Evictions**
14,940,858



DEFINITIONS

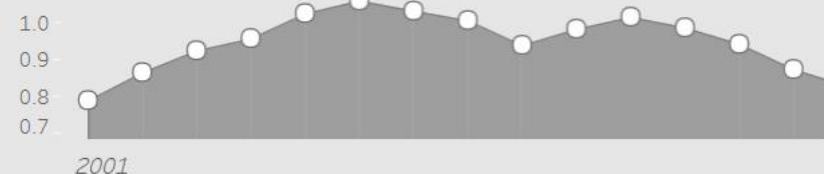
Evictions - Number of homes that received an eviction judgement.

Filing Rate - Ratio of the number of evictions filed in an area over the number of renter-occupied homes in that area.

Eviction Rate - Ratio of the number of homes in an area that received an eviction judgement over the number of renter-occupied homes in that area.

EVICTION RATE TRENDING

Texas, All Counties



Select your state ►

Click to
filter
county



Texas, All Counties

White	60.1%
African-American	6.4%
Hispanic	31.1%
American-Indian	0.4%
Multiple	1.0%
Asian	0.8%
Other	0.1%

Population
24,179,9

Renter Occupied
3,199,39

Avg. Yearly Evic
385

Med. Household

Are You a Geek? Finding the Best Board Games for You

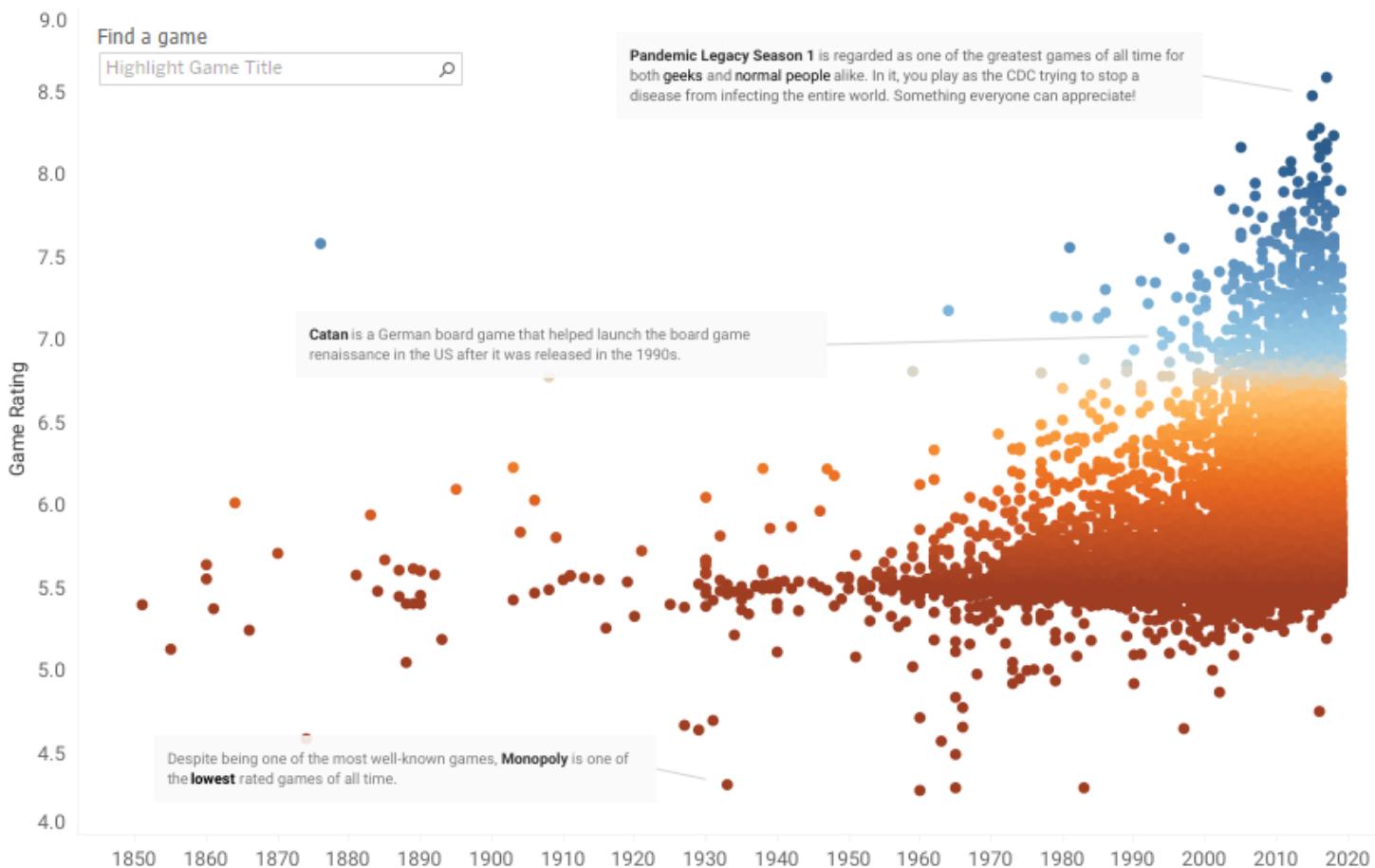
Board games have experienced a renaissance in the last decade. Thousands of new games are released every year, most of which you likely have never heard of. Some of these games (especially more modern ones) are **very good**, while others are **not as good**.

Which games are right for you? Are you a **geek**? Do you like complex games, rich in strategy that take time to learn and sometimes hours to play? Or are you a **normal person**? Would you prefer a game that's easy to learn and quick to play?

Using user ratings from BoardGameGeek.com, I have assembled rankings for games based on whether you are a **geek** (like me*) or a **normal person****.

Use the filters on the right to search for games that might be right for you.

Game Ratings over Time for a Geek



Best Games for a Geek

Gloomhaven	8.58
Pandemic Legacy Season 1	8.47
Terraforming Mars	8.27
Through Ages New Story Civilization	8.23
Brass Birmingham	8.23
Twilight Imperium Fourth Edition	8.18
Star Wars Rebellion	8.16
Twilight Struggle	8.16
Gala Project	8.14
Great Western Trail	8.10
Scythe	8.10
War of the Ring (2nd Edition)	8.07
Spirit Island	8.03
Terra Mystica	8.02
Castles Burgundy	8.01
7 Wonders Duel	7.98
7th Continent	7.96
Concordia	7.95
Brass Lancashire	7.94
Arkham Horror Card Game	7.92
Viticulture Essential Edition	7.92
Puerto Rico	7.90
Wingspan	7.90
Feast Odin	7.89
Mage Knight	7.89
Orleans	7.88
Caverna Cave Farmers	7.88
Food Chain Magnate	7.87
Agricola	7.86
Mansions Madness Second Edition	7.85
Blood Rage	7.83
Kingdom Death Monster	7.82
Pandemic Legacy Season 2	7.81

I am a...

Geek

I am looking for something...

- (All)
- 1: Simple
- 2: Easy to Learn
- 3: Learnable
- 4: Complex
- 5: Very Complex

My ideal player count is...

Any

I want a family game

(All)

I want a strategy game

(All)

I want a party game

(All)

I want a cooperative game

(All)

Communication is difficult.

Be clear about how you are **directing your audience's gaze** so they can understand what you are trying to communicate.

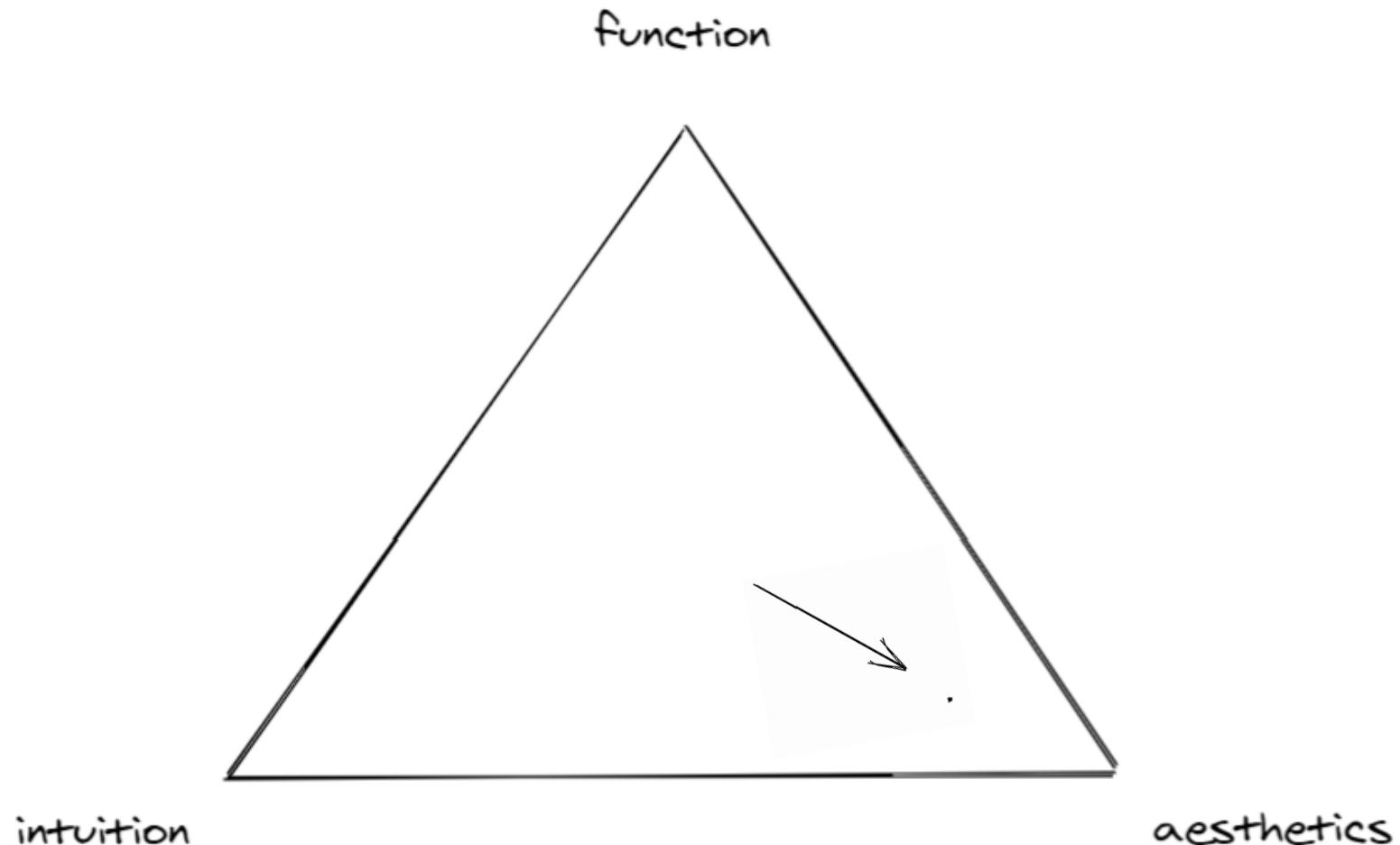
Iterate and gather feedback along the way.

3

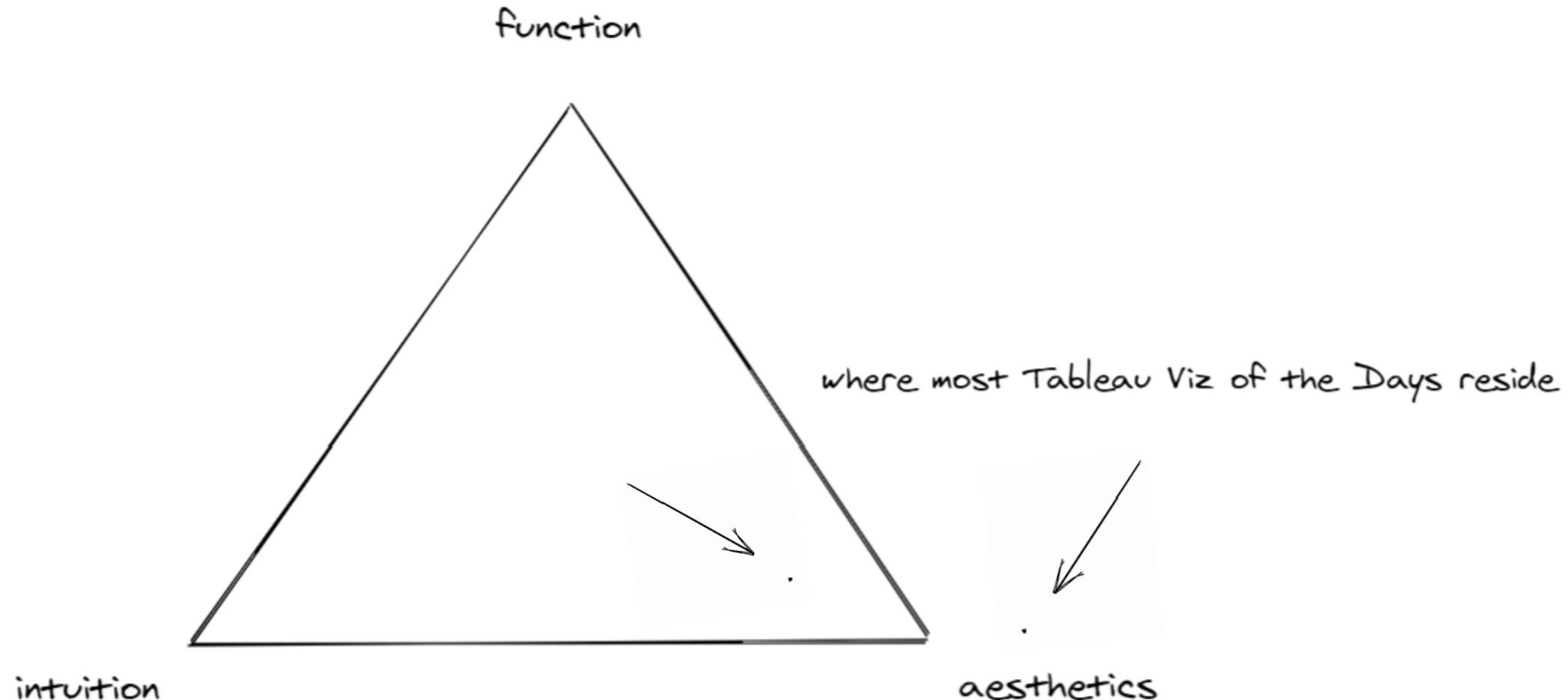
AESTHETICS

How do I make a dashboard
visually appealing?

The Trilemma of Dashboard Design

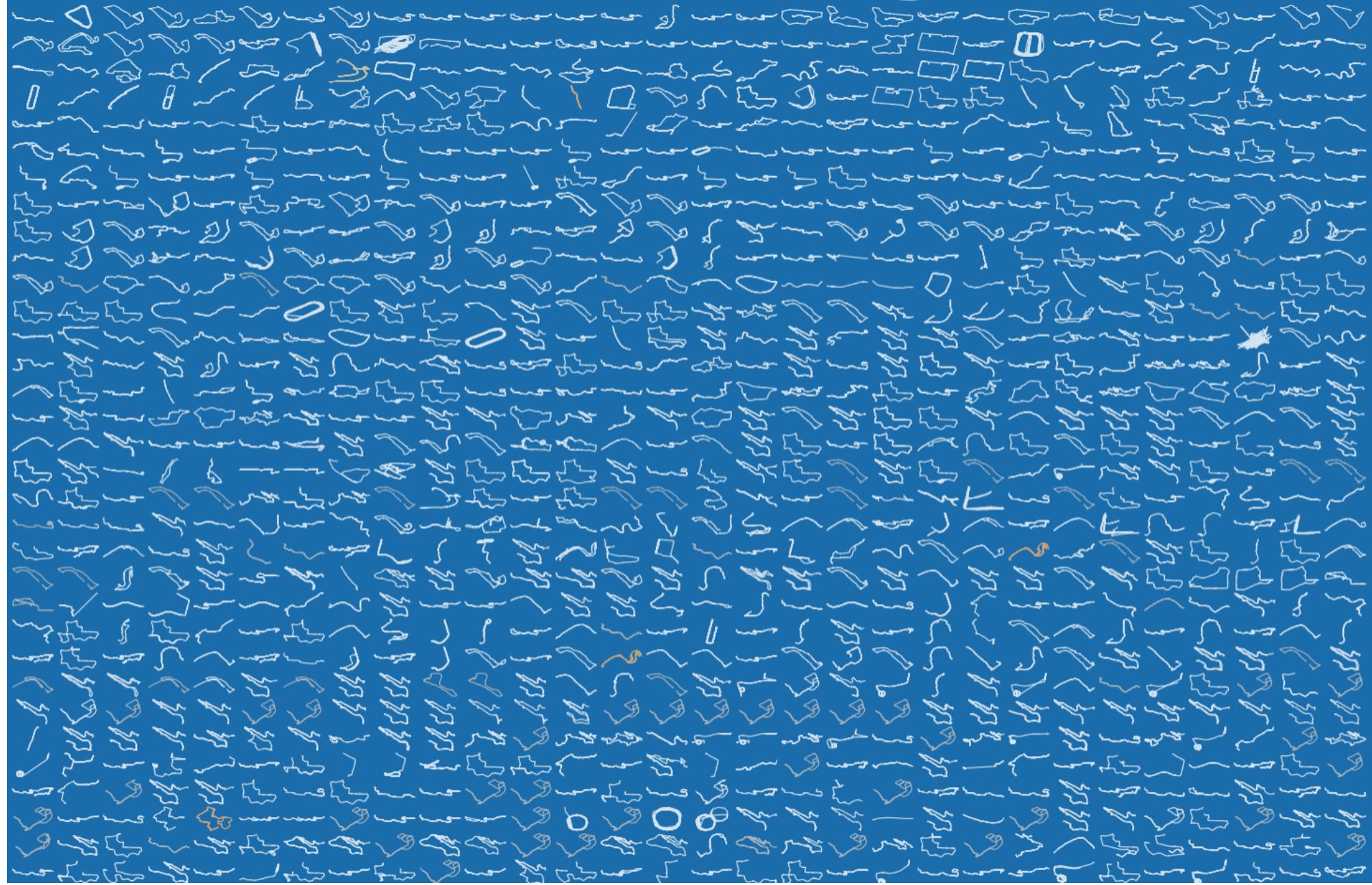


The Trilemma of Dashboard Design



1000 RUNS

Half Marathon
Marathon
Parkrun
Training



1996-1997 Chicago Bulls Season - Nothing But Buckets!

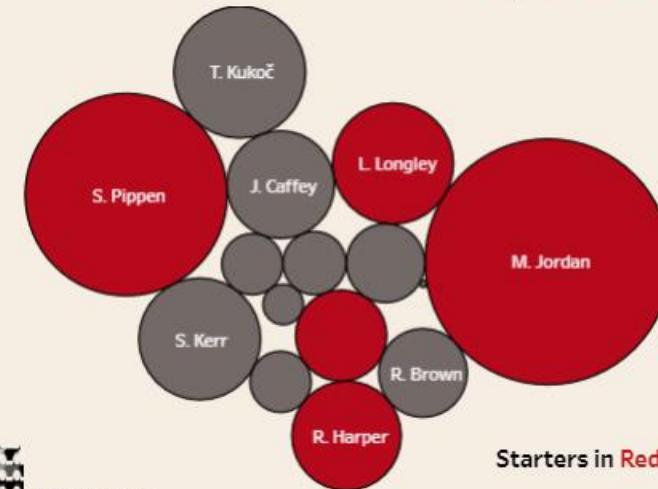
A visualization of every bucket the Chicago Bulls scored in the 1996-1997 NBA Season. The Bulls piled a whopping 3,936 made field goals at 0.438 shooting percentage.

Scorer	Assist	Opponent	# of Points	Shot Type
(All)	(All)	(All)	(All)	(All)

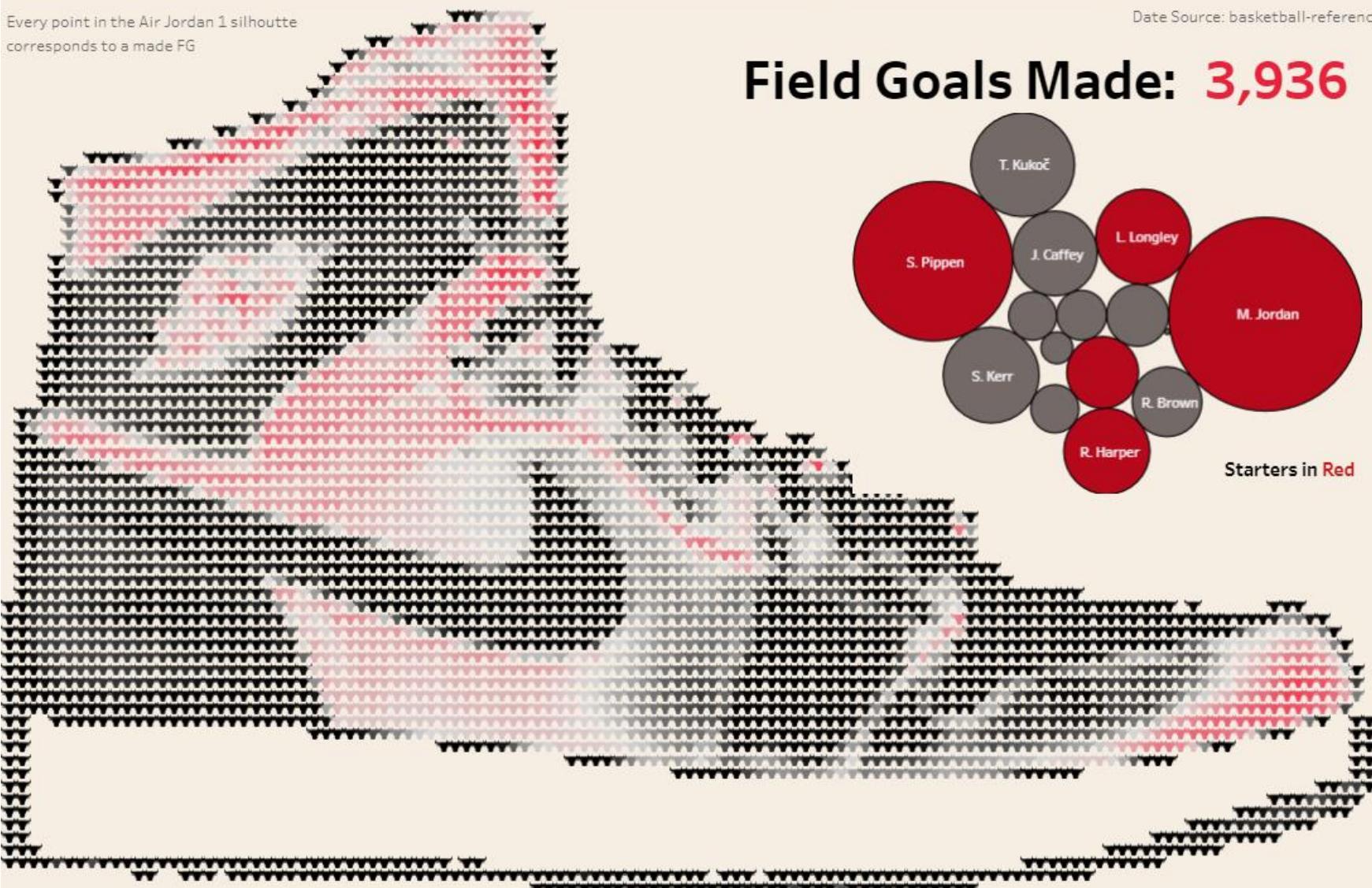
Every point in the Air Jordan 1 silhouette corresponds to a made FG

Date Source: basketball-reference

Field Goals Made: 3,936



Starters in Red



1st Game

1997 NBA Finals

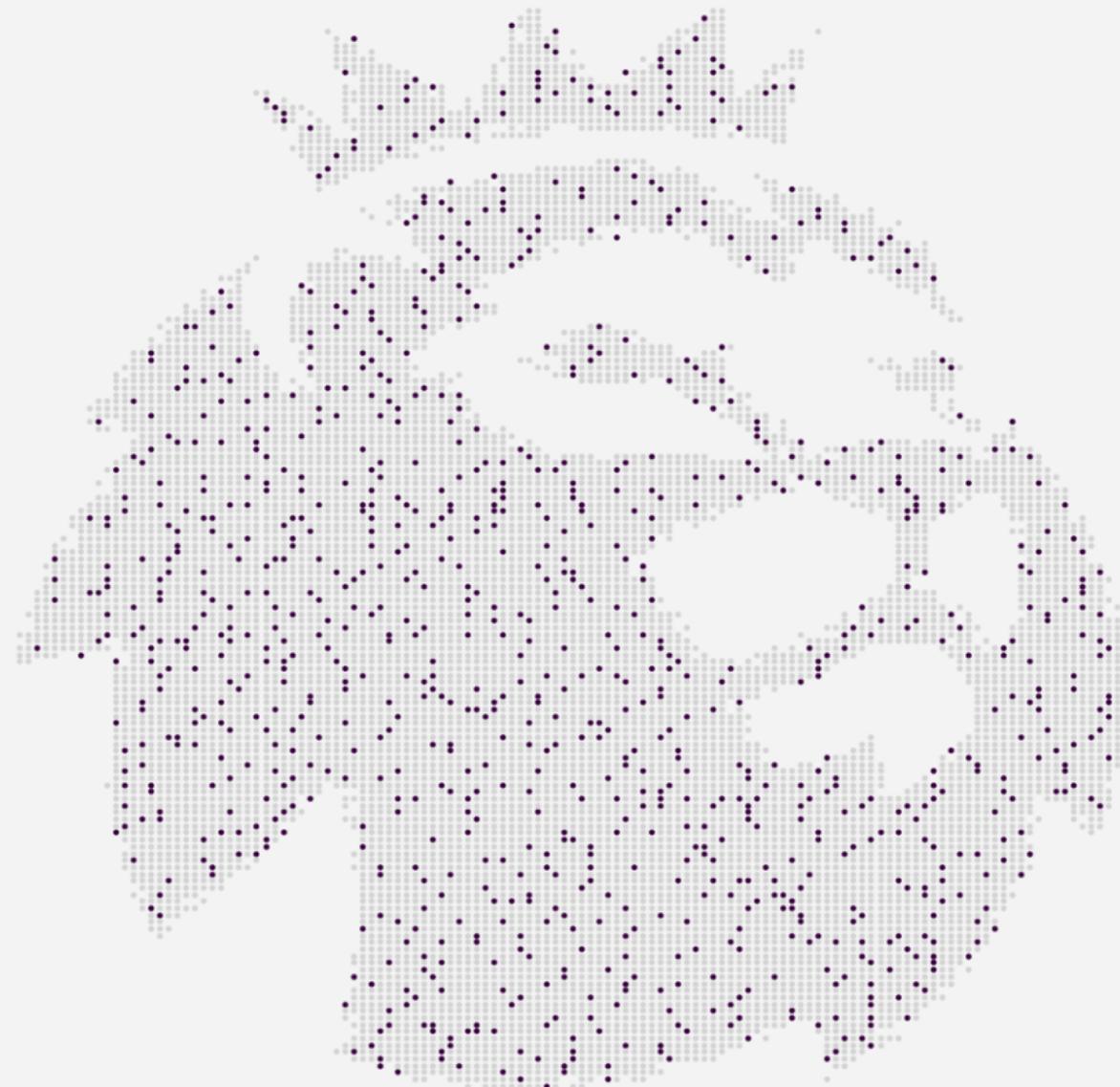
History of the Premier League

26.75 Seasons | 14th August 1993 - 9th March 2020

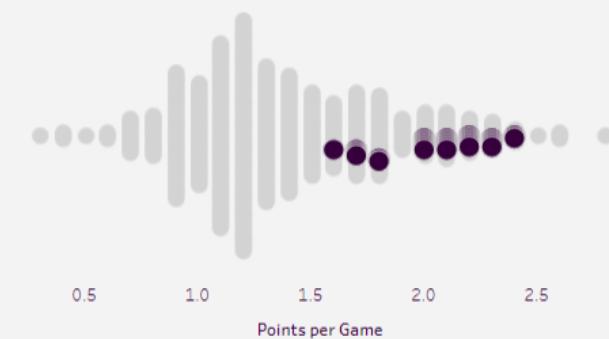
Select a Team

Manchester United

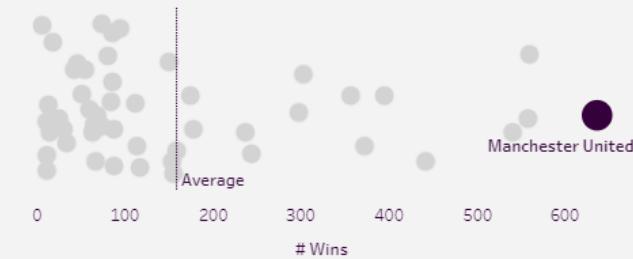
- Pts per Game (1DP)
- Pts per Game (2DP)



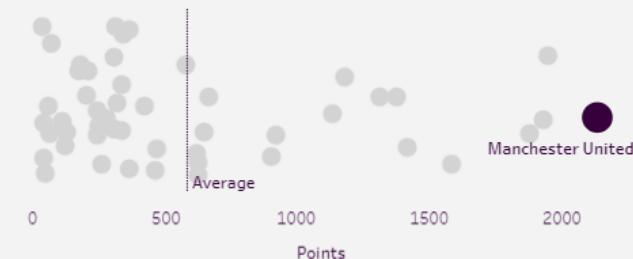
Points per Game per Season



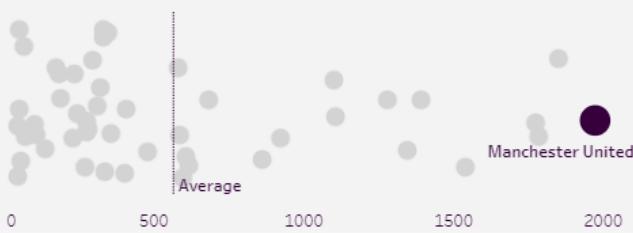
Total Wins



Total Points



Goals Scored



You don't need to dial the aesthetics up
to 11.

You don't need to dial the aesthetics up
to 11.

If your dashboard provides necessary
information and is reasonably easy to
understand, you have mostly done your
job.

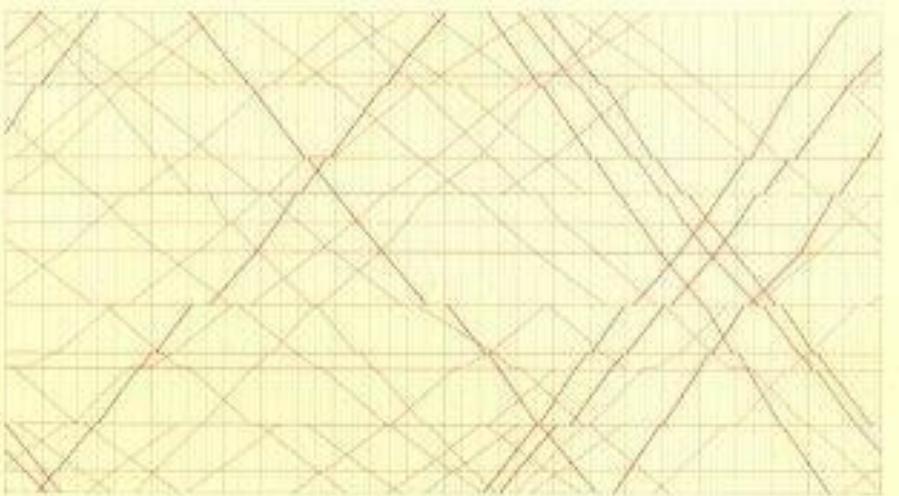
You don't need to dial the aesthetics up
to 11.

If your dashboard provides necessary
information and is reasonably easy to
understand, you have mostly done your
job.

But there a few things you can do to
make things look a bit nicer.

Some Tips for Aesthetics

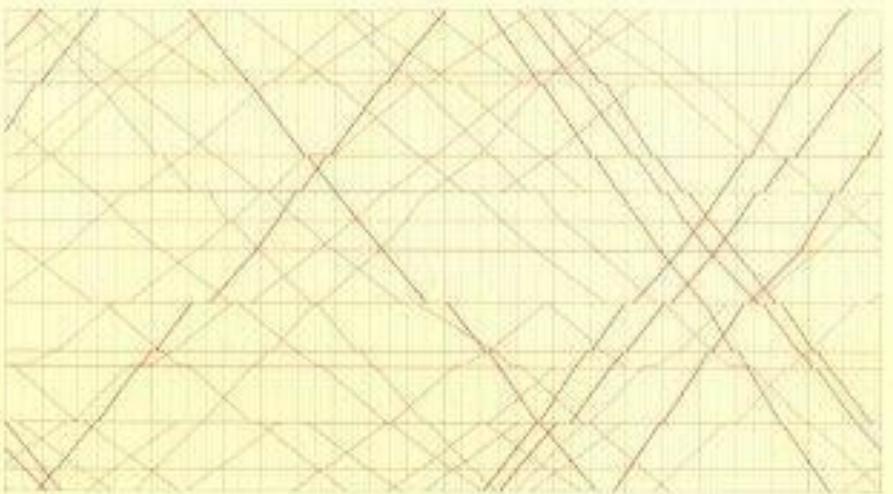
1) Maximize the data-ink ratio



SECOND EDITION

The Visual Display of Quantitative Information

EDWARD R. TUFTE

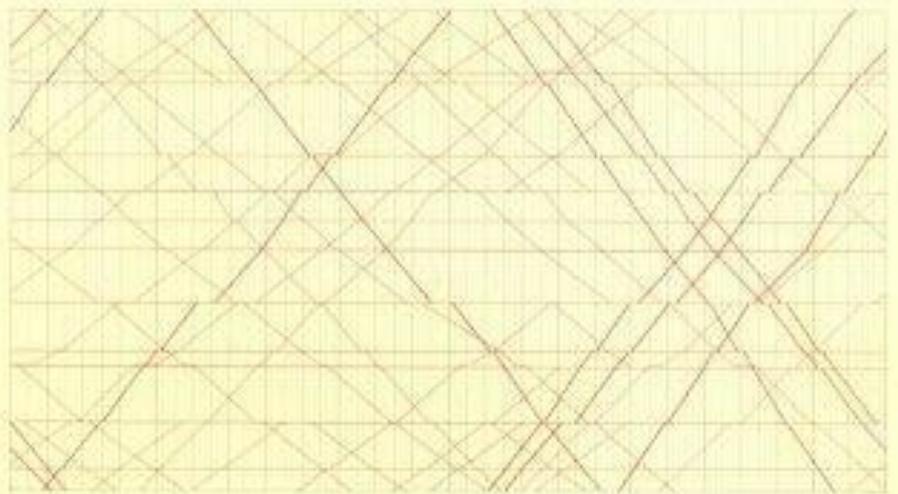


SECOND EDITION

The Visual Display of Quantitative Information

EDWARD R. TUFTE

“Above all else show the
data”



SECOND EDITION

The Visual Display of Quantitative Information

EDWARD R. TUFTE

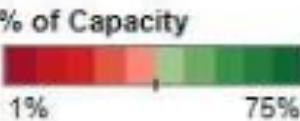
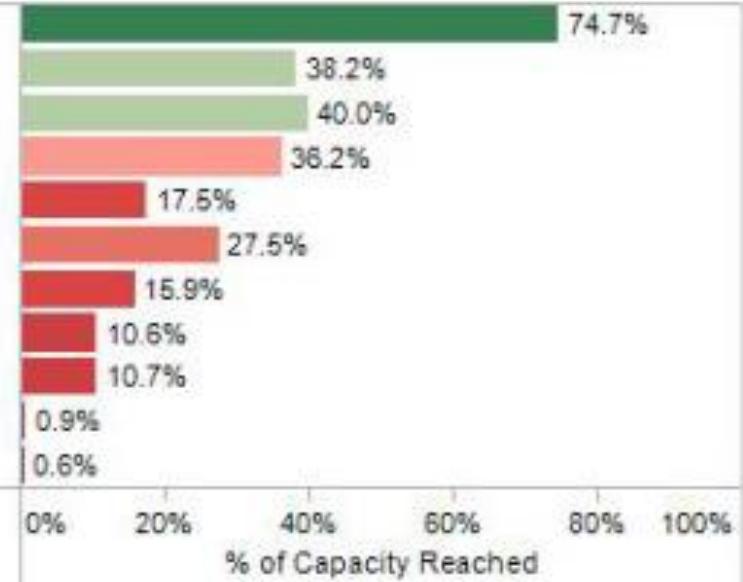
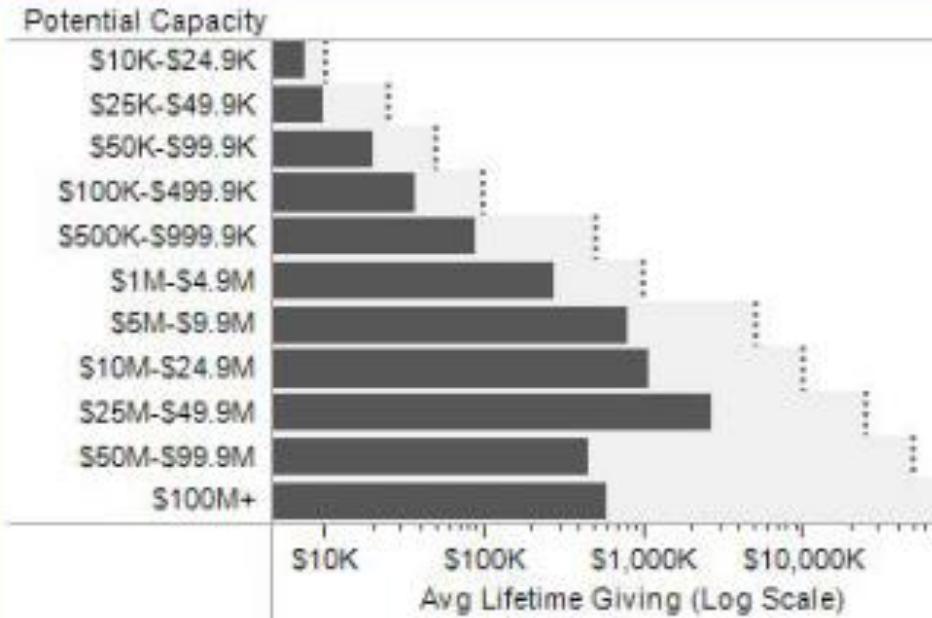
“Above all else show the
data”

The data-ink ratio

Data-ink ratio:

Data-ink

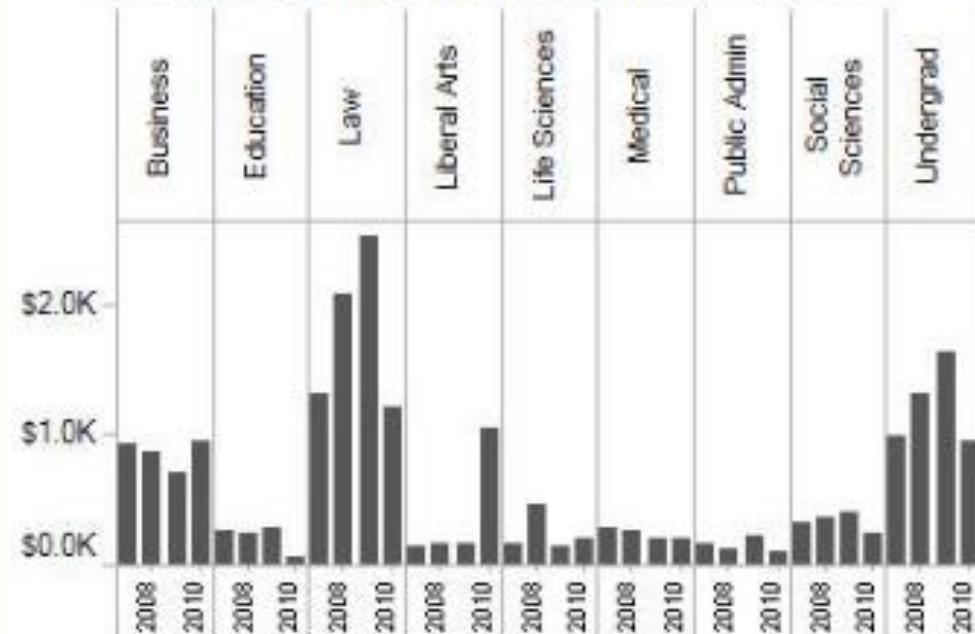
Total ink used to create
the visualization



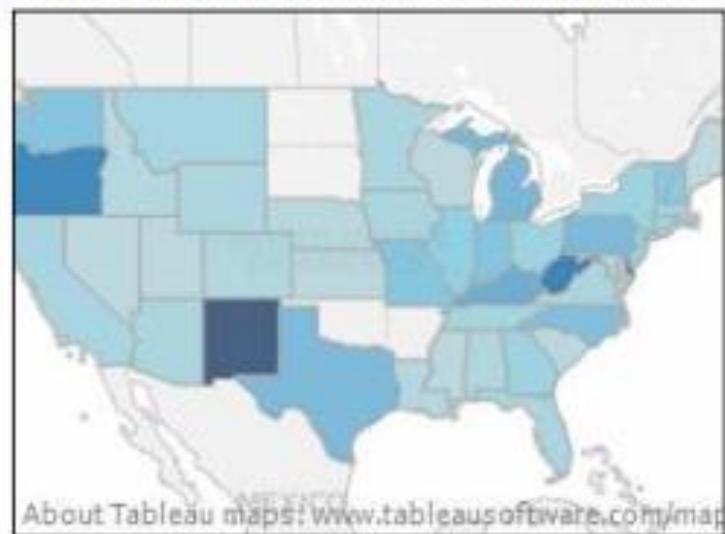
Choose Schools

- (All)
- Business
- Education
- Law
- Liberal Arts
- Life Sciences
- Medical
- Public Admin
- Social Sciences
- Undergrad

What has been the donation trend by school?



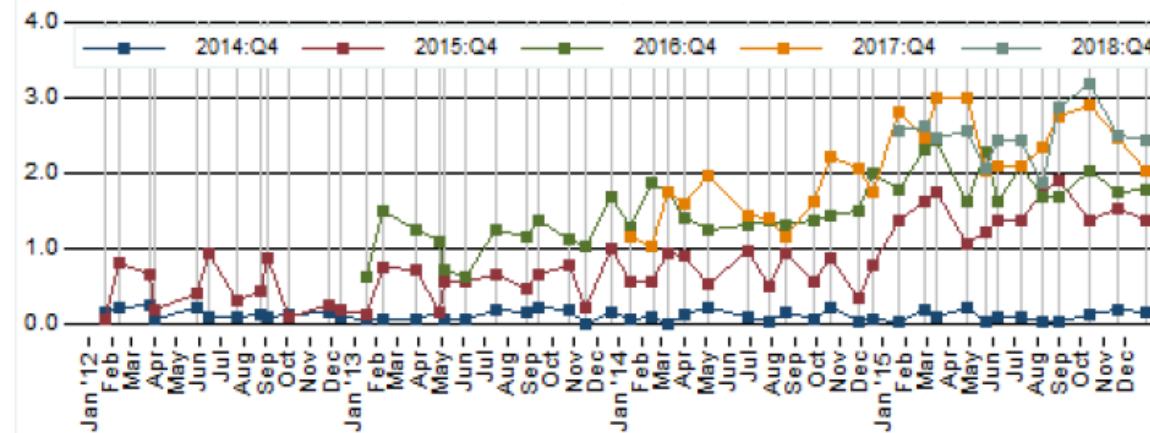
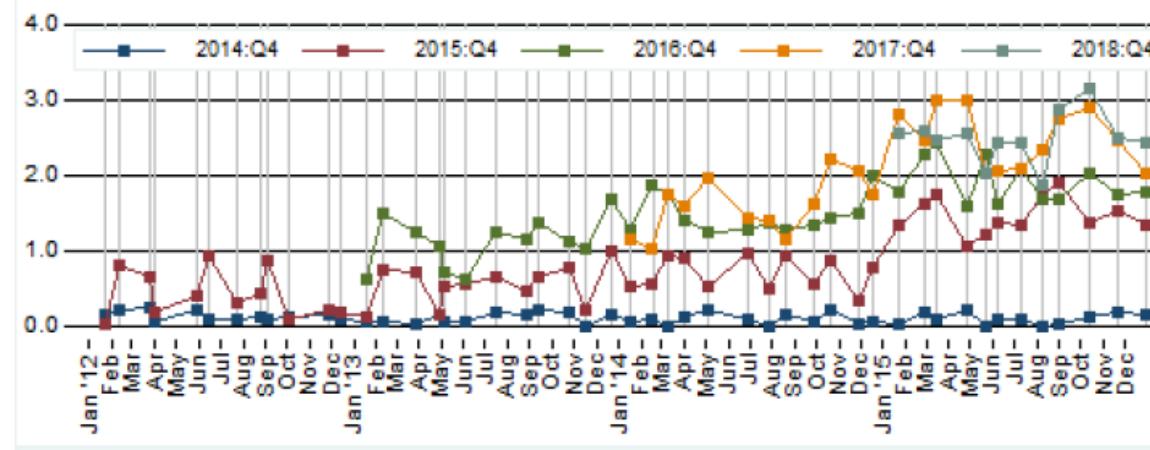
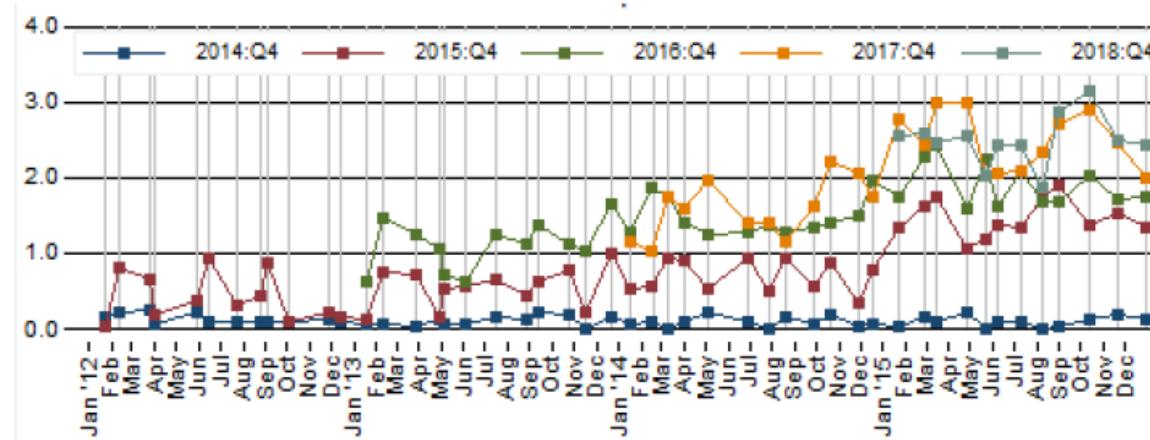
Where are the donations coming from?



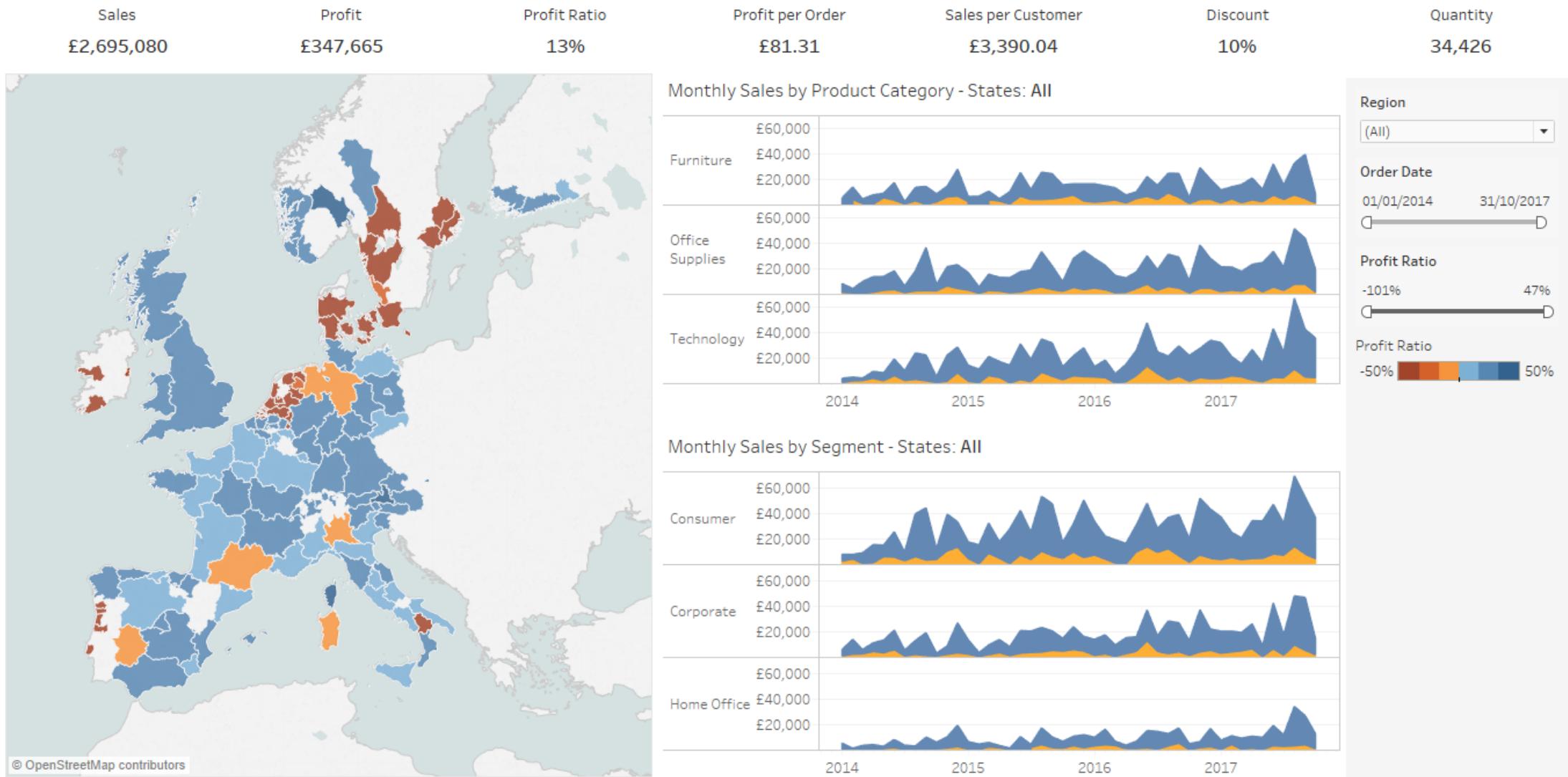
Choose Degrees

- (All)
- BA
- BS
- JD
- MA
- MBA
- MD
- MS
- PHD

% Capacity 0.1% 111.6%



Executive Overview - Profitability (All)



How America Uses Its Land

Click on the arrows to switch slides



There are many statistical measures that show how productive the U.S. is. Its economy is the largest in the world and grew at a rate of 4.1 percent last quarter, its fastest pace since 2014. The unemployment rate is near the lowest mark in a half century.

What can be harder to decipher is how Americans use their land to create wealth. The 48 contiguous states alone are a 1.9 billion-acre jigsaw puzzle of cities, farms, forests and pastures that Americans use to

Highlight State

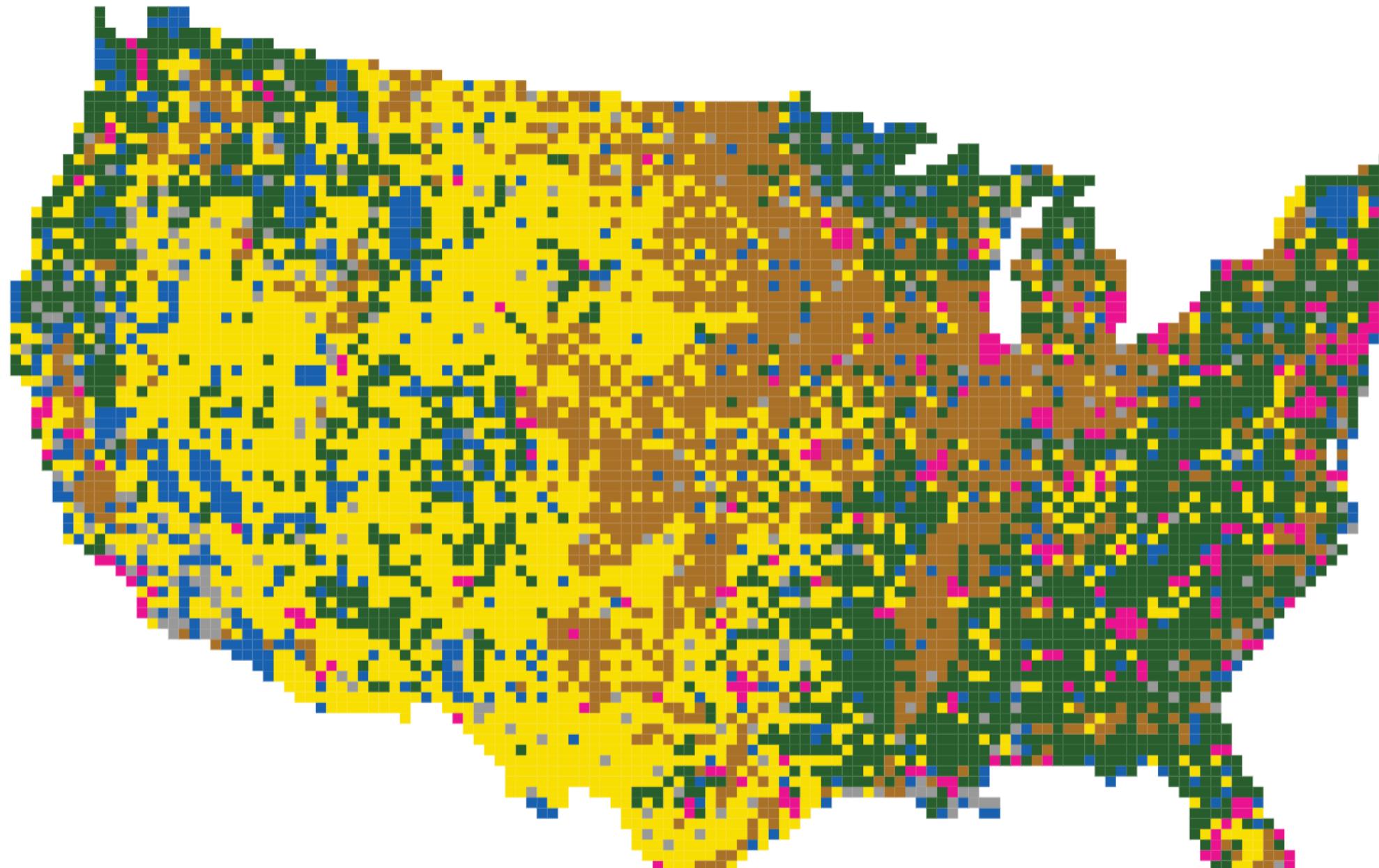
Highlight State

Pasture/Range

Forest

Cropland

Special Use



What is the point?

How much ink are you using for
something that isn't about the point?

Some Tips for Aesthetics

- 1) Maximize the data-ink ratio
- 2) Look at lots of different dashboards

City of Milwaukee Parking Tickets



Select a Neighborhood and/or Filters for Details

Bay View	Downtown (East Side)	Downtown (West Side)	East Side	Fifth Ward	Jones' Island	Menomonee River Valley	Riverwest	Shorewood	Third Ward
62,474	125,326	131,010	290,046	39,228	2	362	32,008	14	51,102

Violation Type

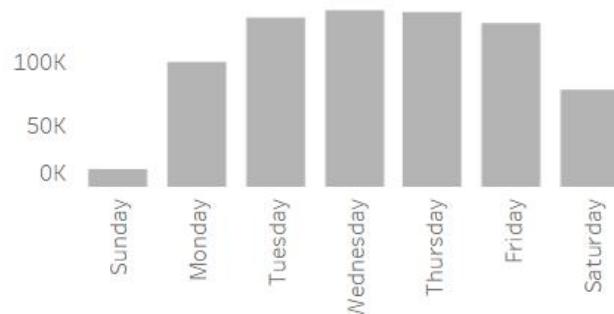
Issue Month

Day of Week

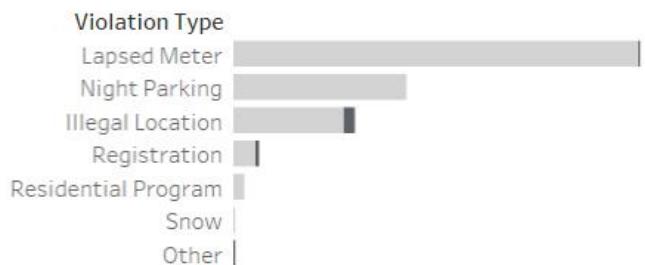
Tickets by Time of Day



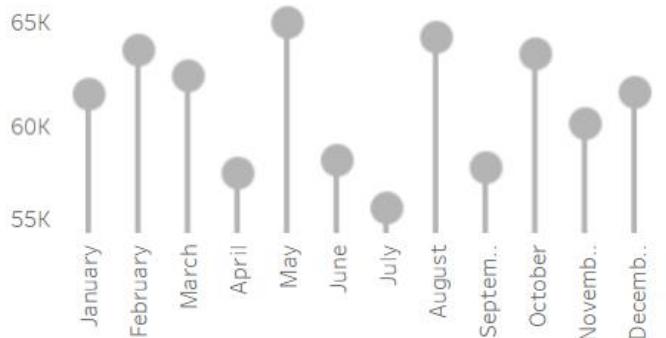
Tickets by Weekday



Tickets by Violation
Sundays in light gray



Tickets by Month





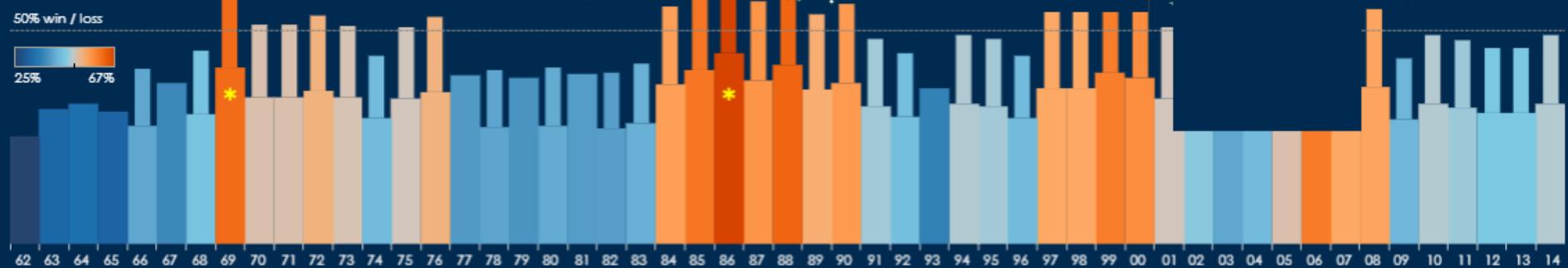
53 Seasons of New York Mets Wins and Losses

Do the Mets perform better on certain days and in certain months?

Hover over Mr. Met for instructions.



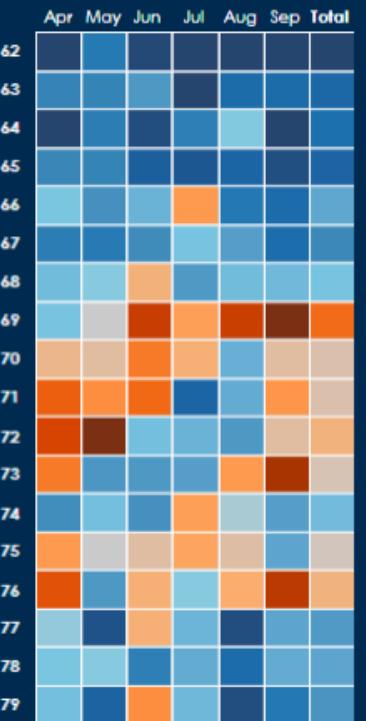
• PERCENTAGE WINS BY YEAR



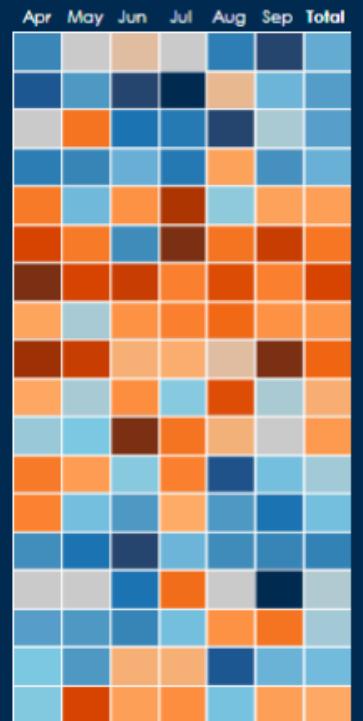
Developed by
Data Revelations

• PERCENTAGE WINS BY MONTH AND YEAR

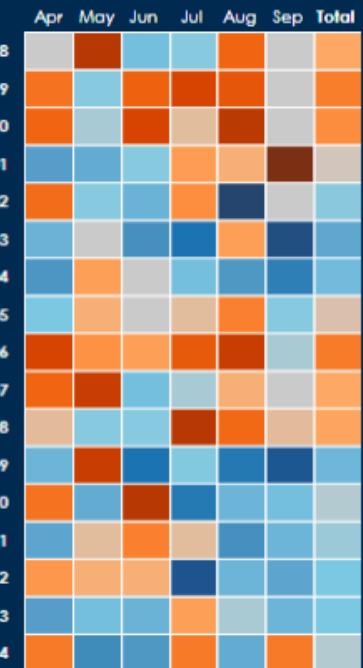
1962 - 1979



1980 - 1997



1998 - 2014



• PERCENTAGE WINS BY WEEKDAY AND MONTH

	Apr	May	Jun	Jul	Aug	Sep	Total
Sunday	47%	47%	43%	47%	41%	49%	45%
Monday	54%	44%	47%	46%	42%	45%	46%
Tuesday	56%	47%	50%	52%	50%	44%	49%
Wednesday	48%	45%	50%	53%	48%	48%	49%
Thursday	55%	50%	49%	50%	47%	45%	49%
Friday	48%	52%	49%	47%	47%	44%	48%
Saturday	49%	50%	46%	45%	47%	50%	48%
Total	50%	48%	47%	48%	46%	47%	48%

In 1962 the Mets didn't win any games on a Thursday.

In 1969 the Mets started out cold but won 77% of their games in September.

If you want to see the Mets win your best bet is a Tuesday in April.

In 2012 the Mets were hot for three months then went ice

Melbourne Trees

Explore the urban forest in a interactive and visual way.

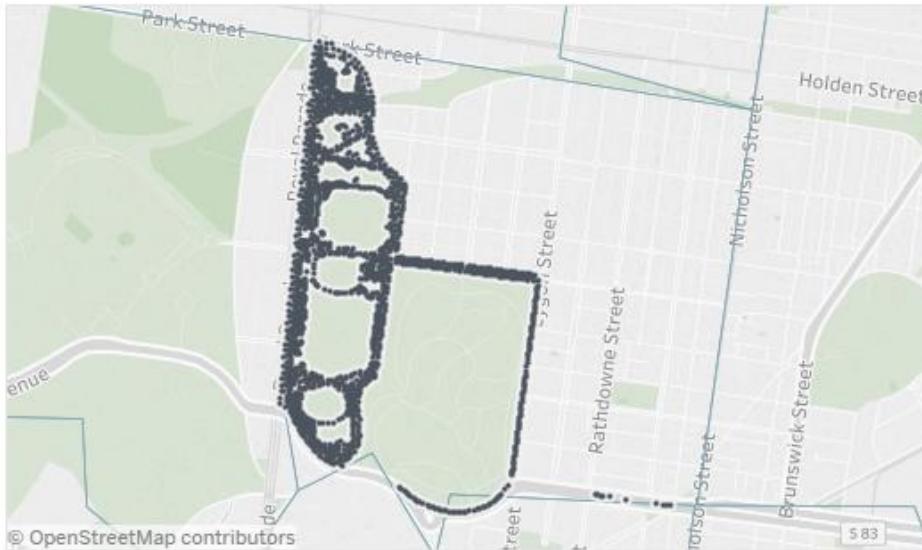
Postcode

3054



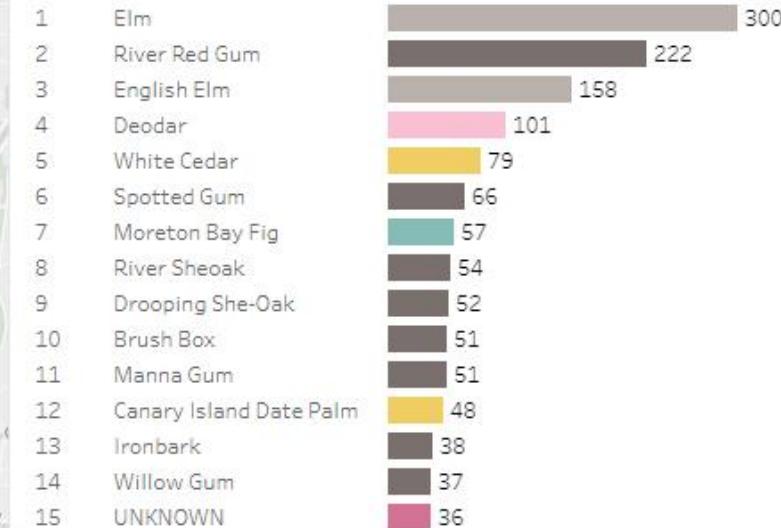
Tree Location

Check out my 'loupe' tooltip on hover! Click on a tree to see interactive Google Street View.



Top Species by Common Name

Colour indicates species variety (same colour = same family).

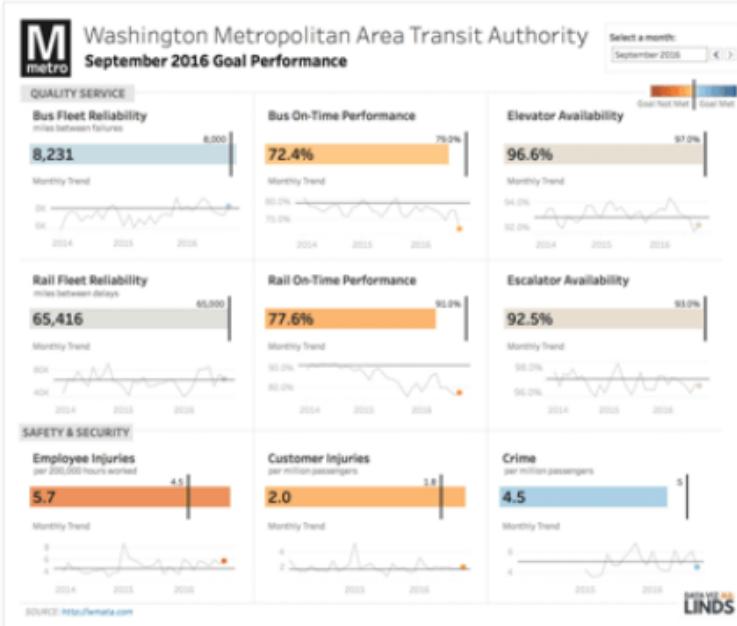


Some Tips for Aesthetics

- 1) Maximize the data-ink ratio
- 2) Look at lots of different dashboards
- 3) Steal from other dashboards

1. Steal like an artist

From public transport data...



... to reimagining financial statements



Austin Kleon, author of [Steal Like an Artist](#), encourages us to embrace the influence of others. This holds true in designing dashboards as much as in any creative endeavor. Don't create your work in a vacuum: Take inspiration from as many places as you can.

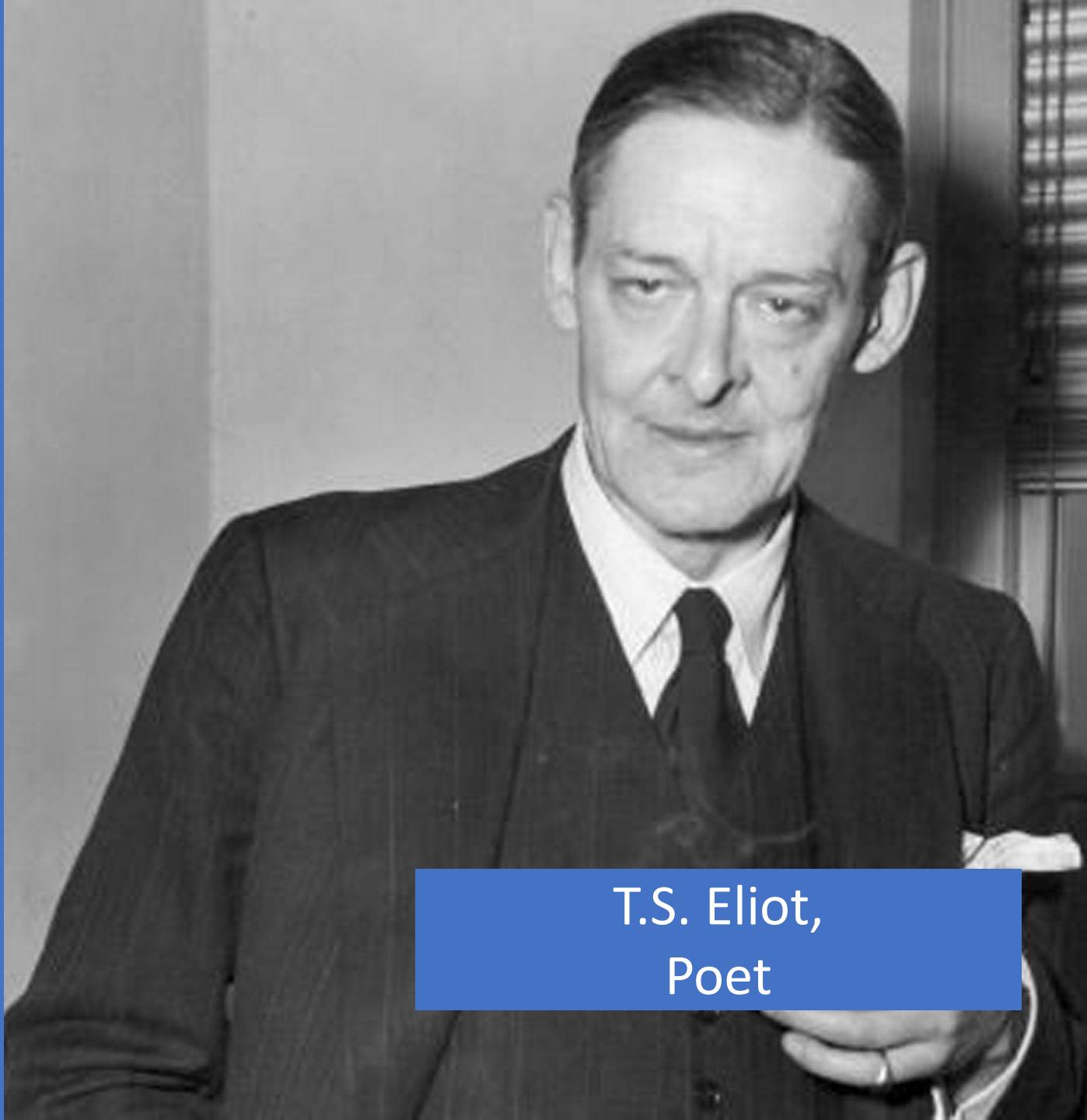




T.S. Eliot,
Poet

Immature poets imitate;
mature poets steal;
bad poets deface what they take,
and good poets make it into
something better, or at least
something different.

The good poet welds his theft into a
whole of feeling which is unique...
the bad poet throws it into
something which has no cohesion.



T.S. Eliot,
Poet

Some Tips for Aesthetics

- 1) Maximize the data-ink ratio
- 2) Look at lots of different dashboards
- 3) Steal from other dashboards
- 4) Be careful with color

Injury Deaths by Locality

This page displays injury death rates by type of injury and residence (health district) at the time of death for the state of Virginia. Use the Indicator, Year, and Health District filters to change the map and trend line.

Indicator

All Cause

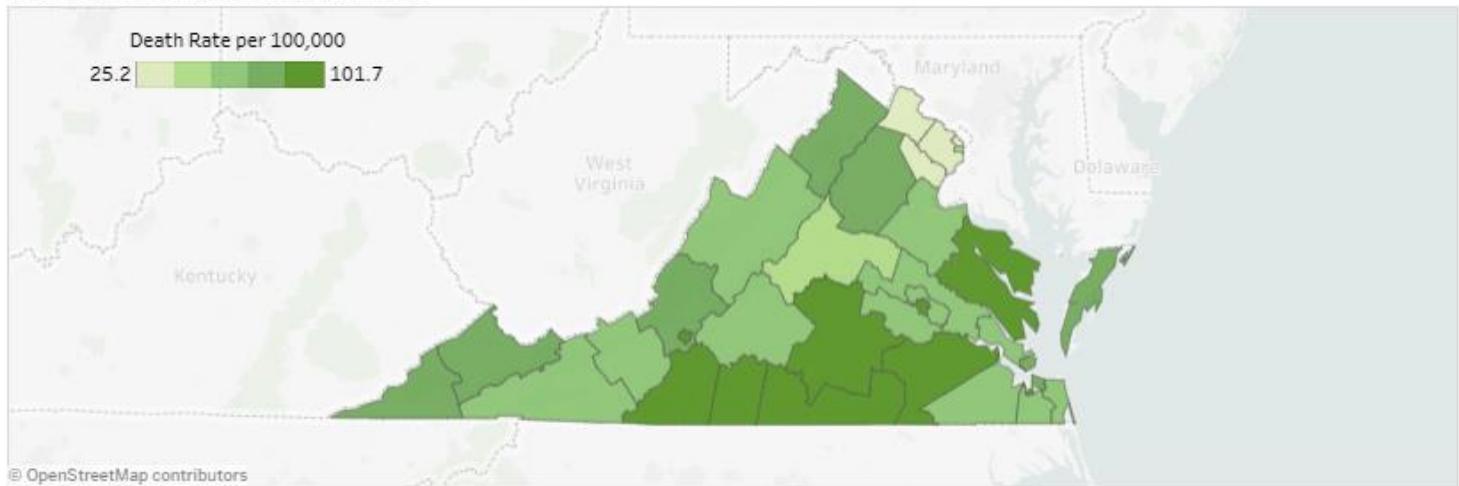
Year

2016

Health District

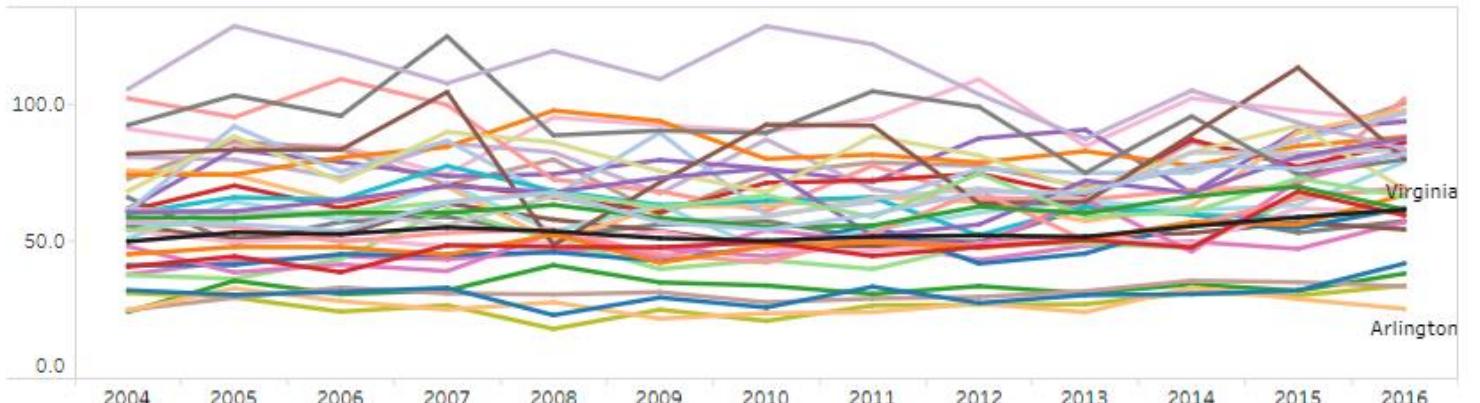
(All)

All Cause Death Rate Map, 2016



All Cause Death Rate Trend - All Health District

Death Rate per 100,000



Sales Performance

Salesforce Data

Days Left to EoQ	QTD Sales	Current Quarter Quota	Sales Quota Diff	QTD Transactions	QTD Customer Count	QTD Opportunity Quant.
31	\$4,978K	\$10,131K	(\$5,153K)	192	193	12,959

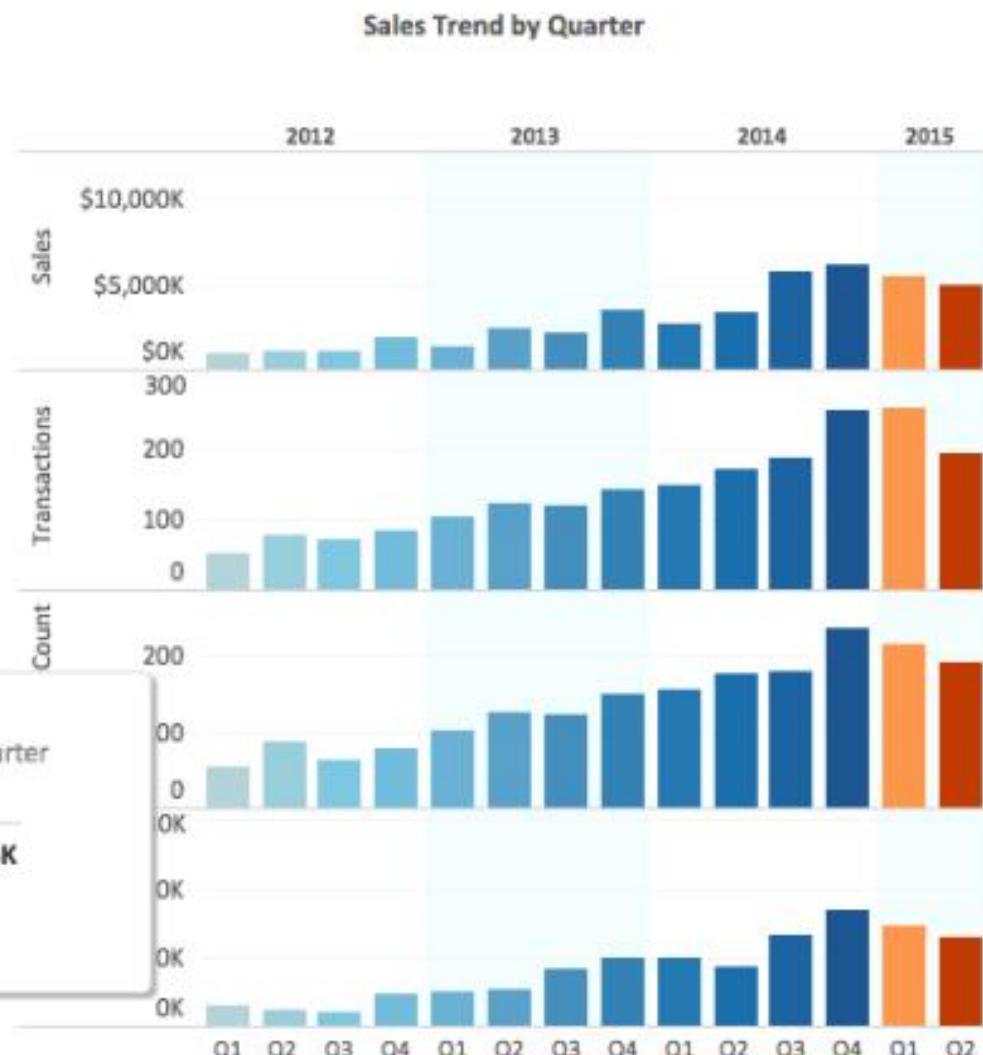
Product Name:

All

Accumulated Sales by Week of the Quarter



Sales Trend by Quarter



World Sanitation 2017

Rural population



Percentage using at least basic sanitation requirements (2017*)



In 2017 there are still many nations without full access to basic sanitation requirements. The difference in access to sanitation becomes more apparent among rural populations.

- Total
- Rural
- Urban

Data source: World Health Organisation (WHO)

*where not available, data from 2015 or 2016

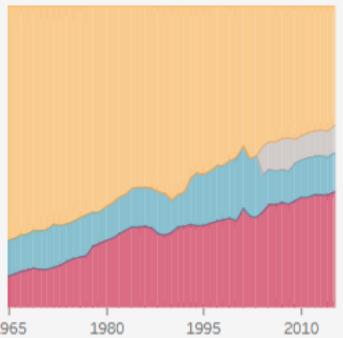
Visualisation: @theneilrichards | #ProjectHealthViz

Can I offer you a drink?

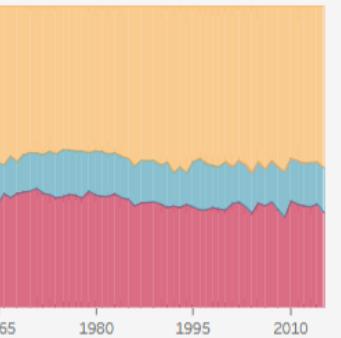
alcohol consumption by type, 1965-2015

beer // spirits // wine // other

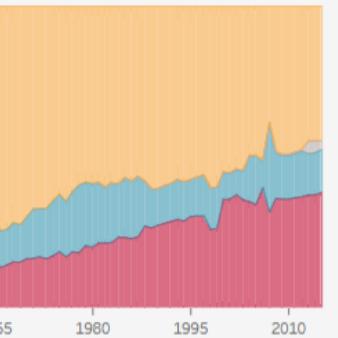
Australia



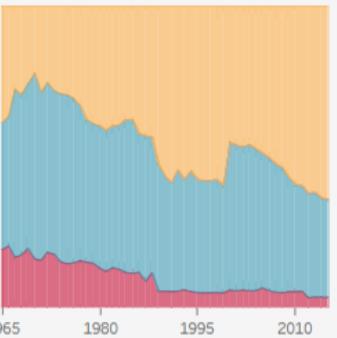
Austria



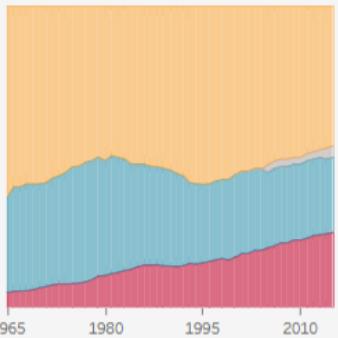
Belgium



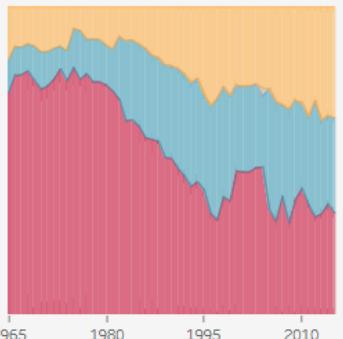
Brazil



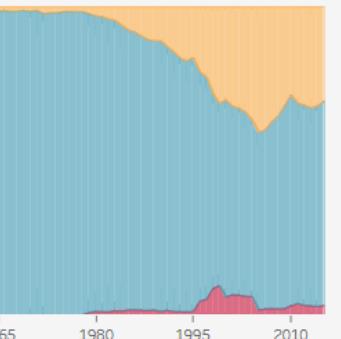
Canada



Chile



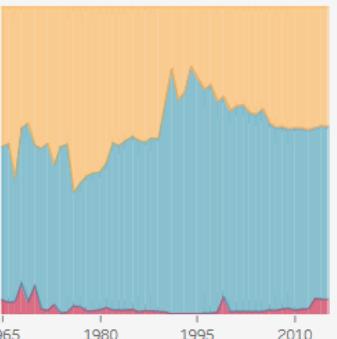
China



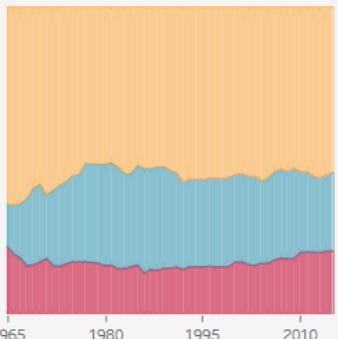
Costa Rica



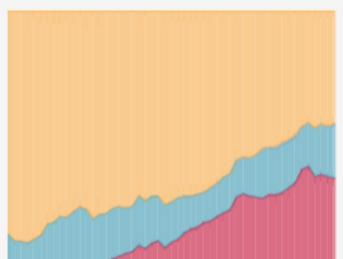
Cuba



Czechia



Denmark



Ecuador



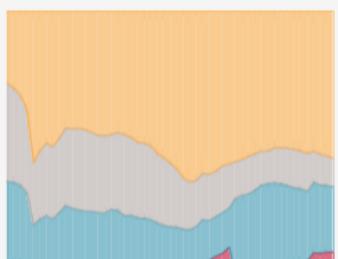
Egypt



Ethiopia



Finland



HOUSING NEW YORK

A blueprint for expanding affordable housing opportunities for low to middle income New Yorkers

Housing New York is a five-borough, ten-year strategy to address New York City's affordable housing crisis. The plan outlines more than 50 initiatives to support the goal of building or preserving 200,000 units of high-quality affordable housing to meet the needs of more than 500,000 people by 2024.

[Click here to learn more about the project.](#)

Explore this dataset to see how much progress has been made. Choose a borough below to filter and hover over the map to see details about the projects.

Bronx

Brooklyn

Manhattan

Queens

Staten Island

TOTAL BUILDINGS

3,427

COMPLETION RATE



TOTAL HOUSING UNITS

186,040

LOW INCOME RATE

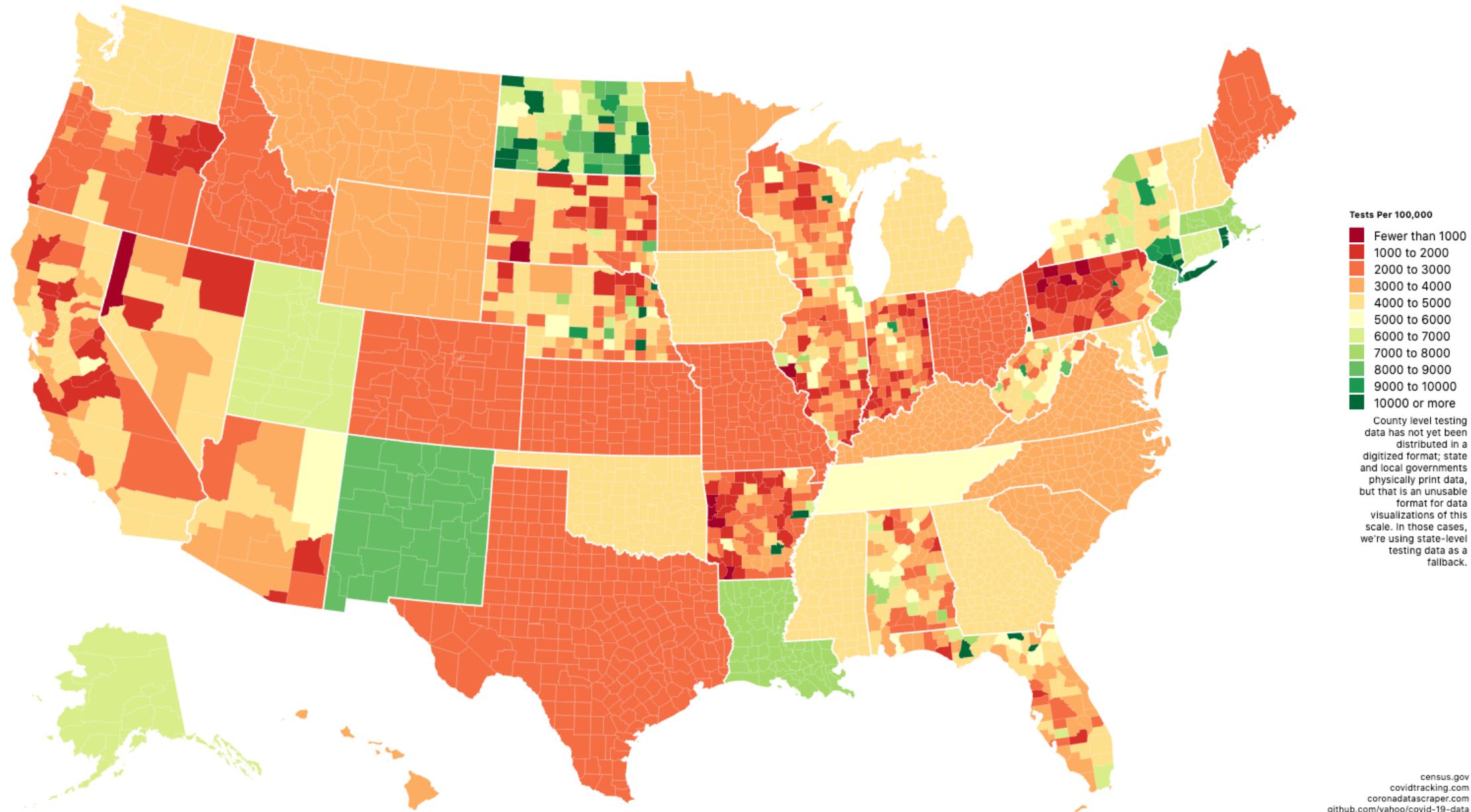


● Finished

○ Under Construction

Total Coronavirus Tests Performed Per 100,000 Residents

05/26/2020



STOP PUTTING **RED** AND **GREEN** SIDE BY SIDE
OMG

STOP PUTTING **RED** AND **GREEN** SIDE BY SIDE
OMG

THERE ARE DOZENS OF US

STOPLIGHT COLORS ARE **BAD**
AND YOU SHOULD FEEL **BAD**

STOP PUTTING **RED** AND **GREEN** SIDE BY SIDE
OMG

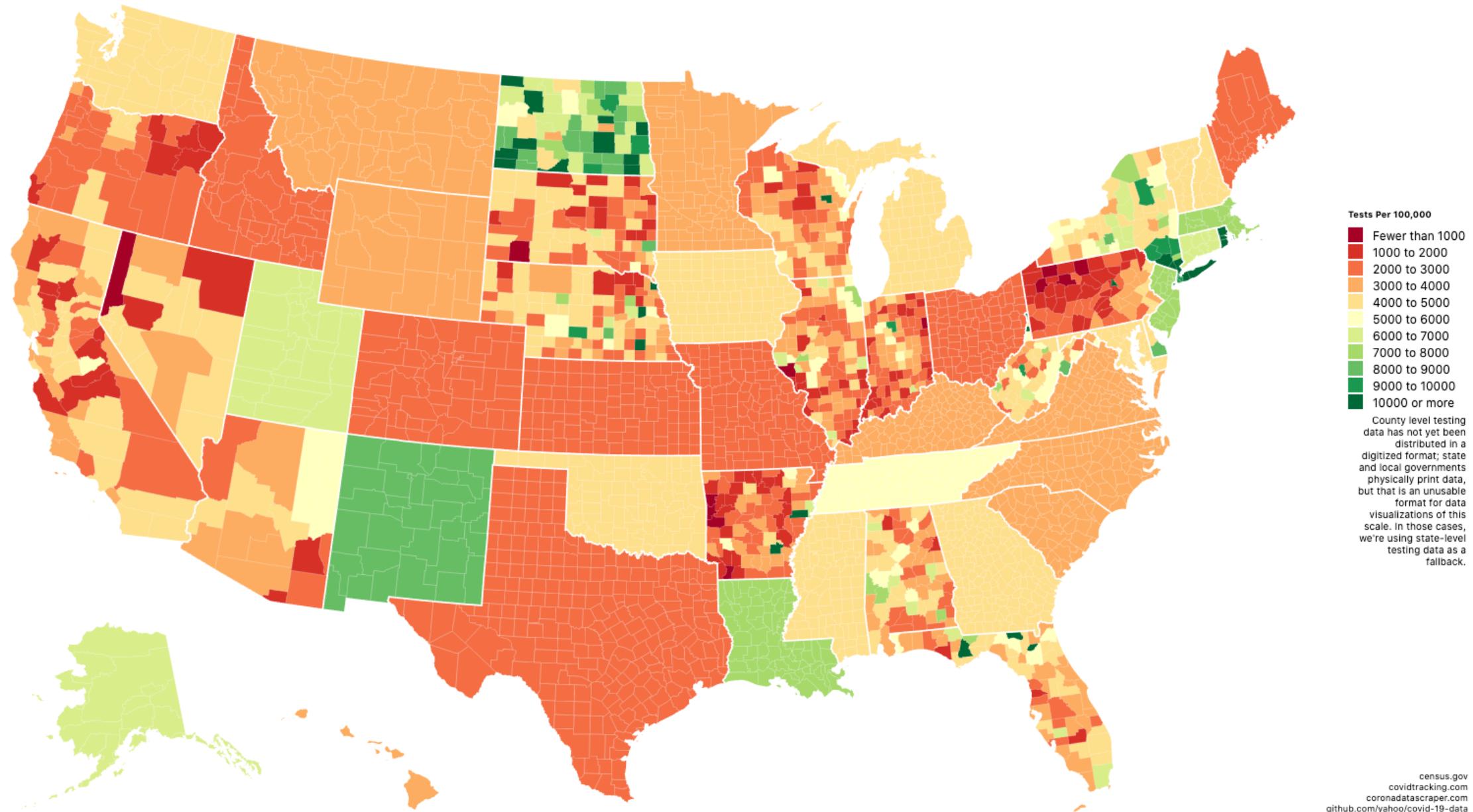
THERE ARE DOZENS OF US

STOPLIGHT COLORS ARE **BAD**
AND YOU SHOULD FEEL **BAD**

- every color blind person ever

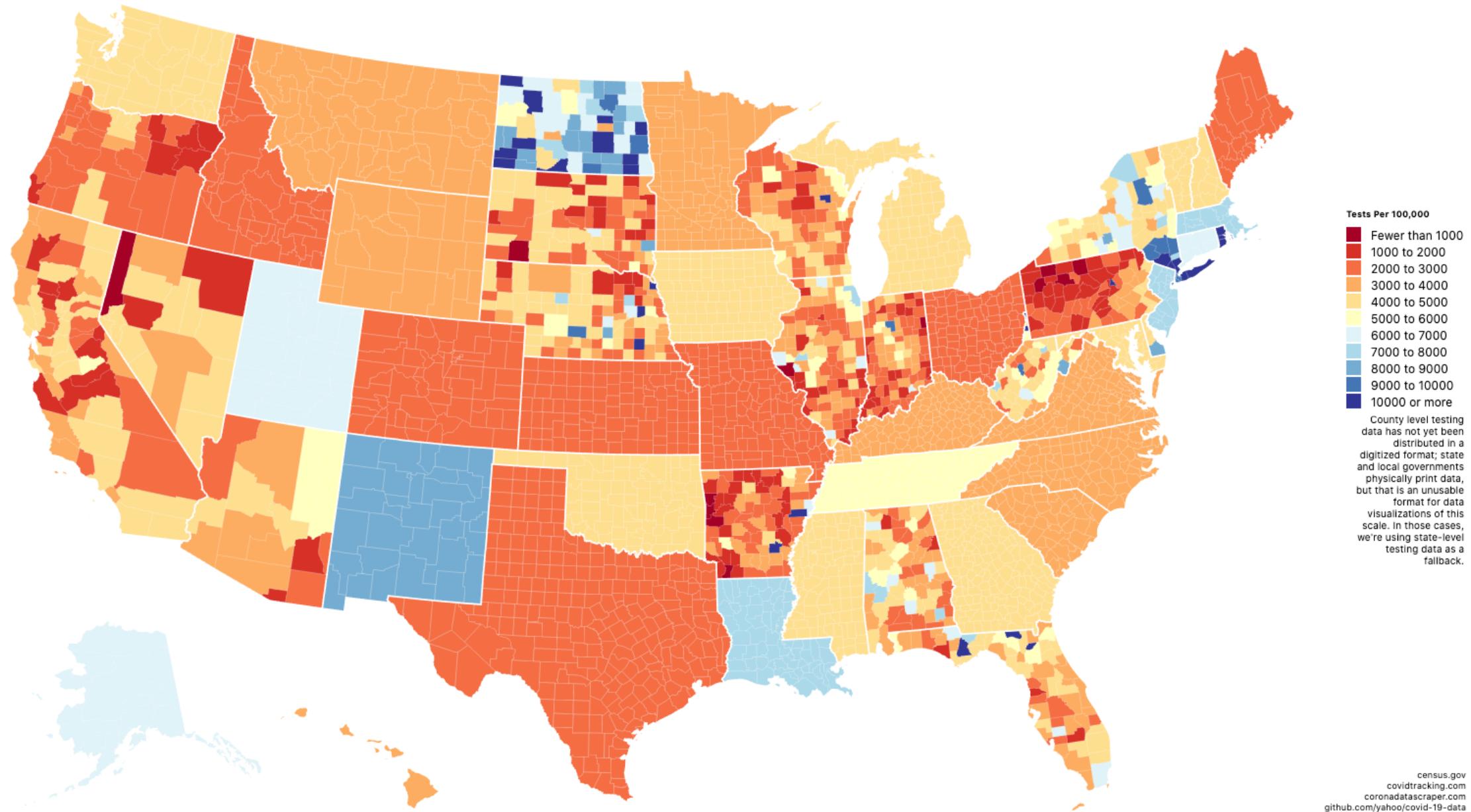
Total Coronavirus Tests Performed Per 100,000 Residents

05/26/2020



Total Coronavirus Tests Performed Per 100,000 Residents

05/26/2020



Some Tips for Aesthetics

- 1) Maximize the data-ink ratio
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- 3) Steal from other dashboards
- 4) Be careful with color
- 5) Be consistent with layout and branding

Employment Outcomes among those Planning to Work



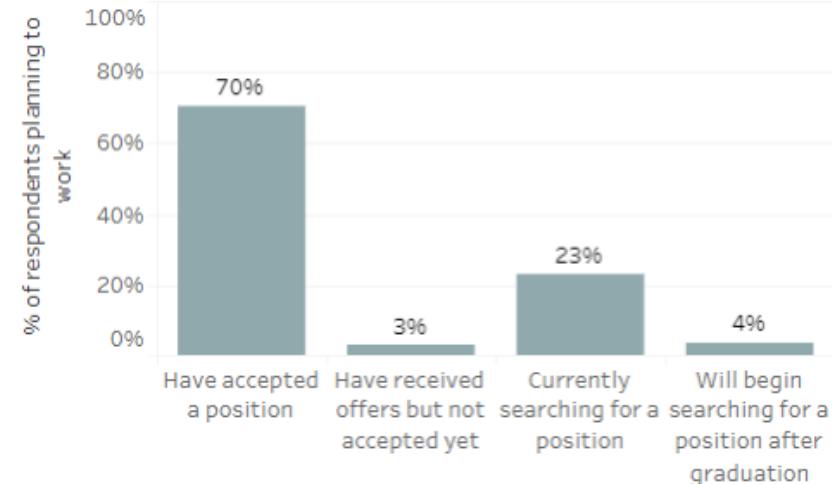
School/College of Student
Engineering

School/College of Major
(All)

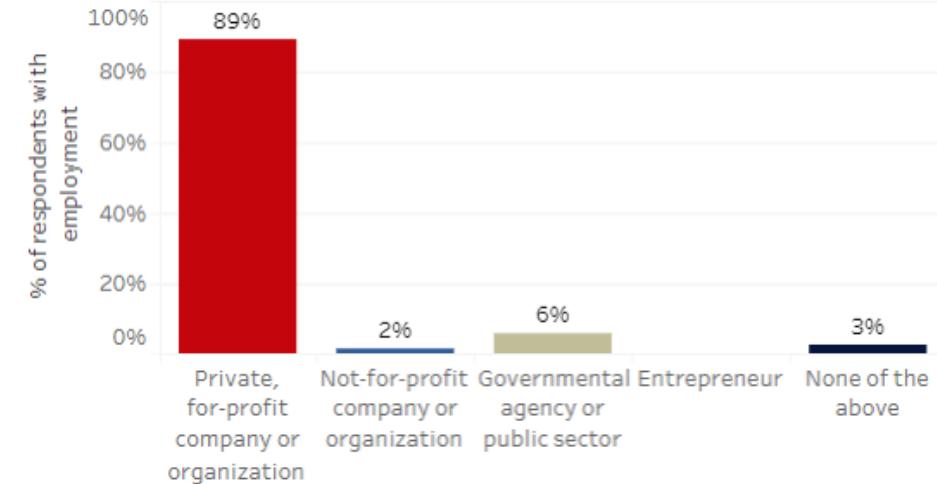
Major
(All)

Tuition Residency
(All)

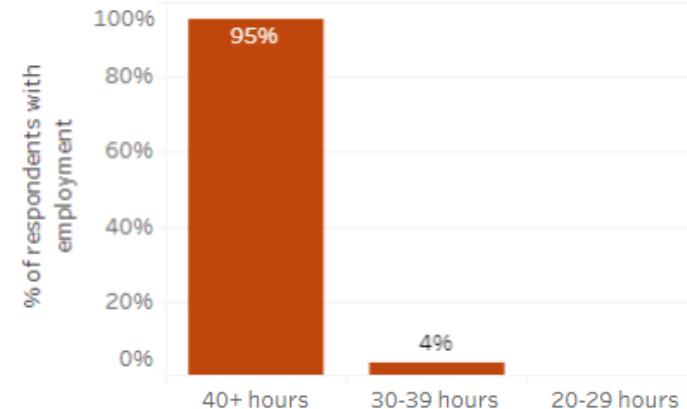
Status of Job Search



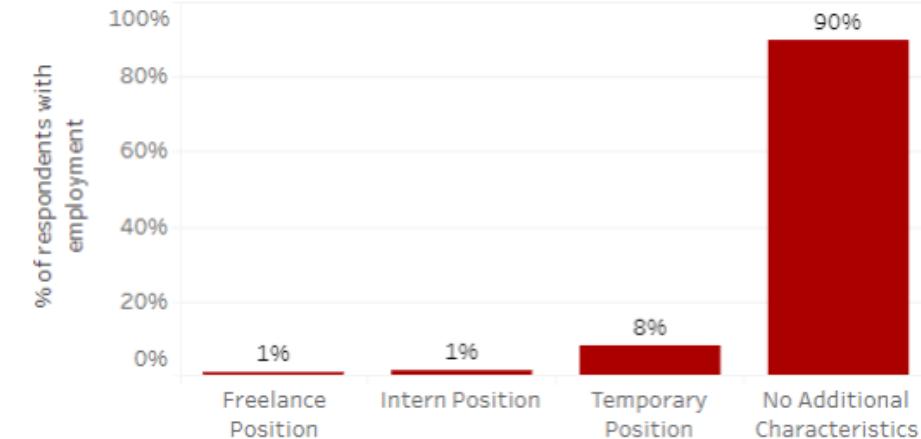
Sector of Employment



Number of Hours of Work per Week



Additional Characteristics of Employment



Employer Location of Graduates



School/College of Student
Engineering

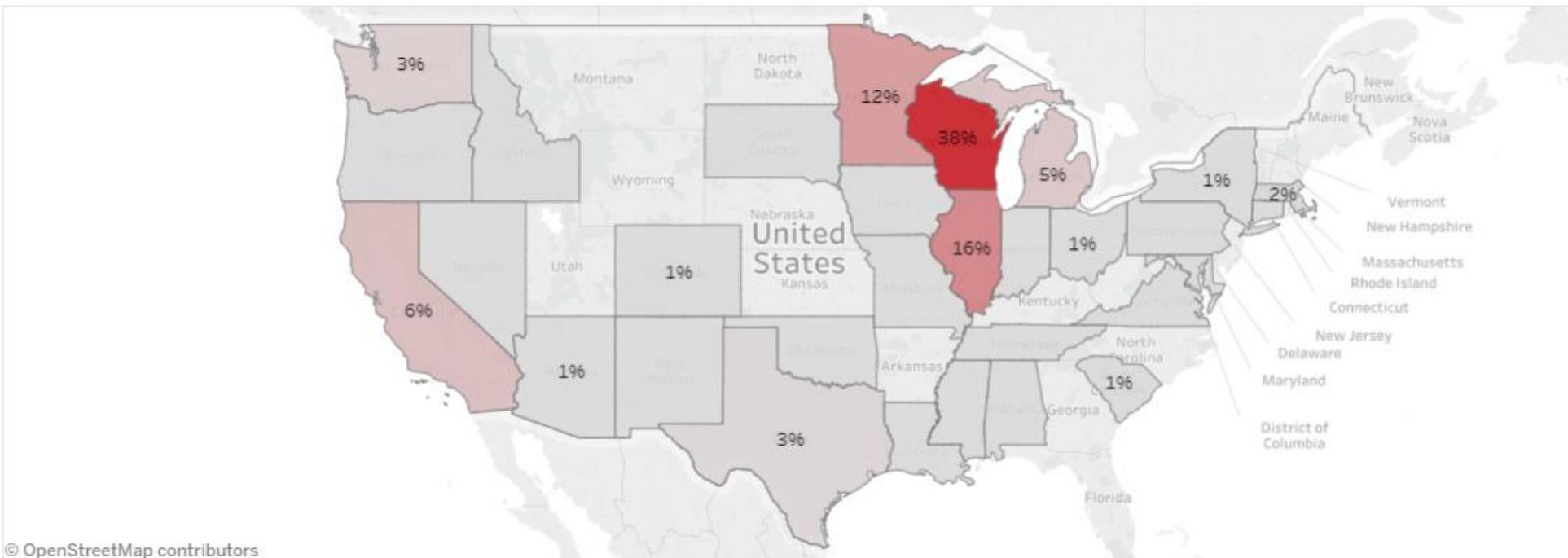
School/College of Major
(All)

Major
(All)

Tuition Residency
(All)

% of respondents working
1% 38%

Employer Location - Contiguous 48 States U.S. Map. (Zoom out to see Alaska/Hawaii)



Employers of at least 5 UW-Madison graduates

Name of Employer	# of graduates
Epic Systems	13
Accenture	9
Ford Motor Company	8
General Motors	8
Intel Corp.	6
Polaris Industries	6

of graduates (5 or more) working in Wisconsin counties

Wisconsin Counties	# of graduates
Dane County	65
Milwaukee County	29
Waukesha County	9
Racine County	6
Rock County	6
Sheboygan County	5

2016-17 graduates reported employment in:

Number of Counties in Wisconsin	24
Number of States in the U.S.	31
Number of Countries	6

4

PIE CHARTS

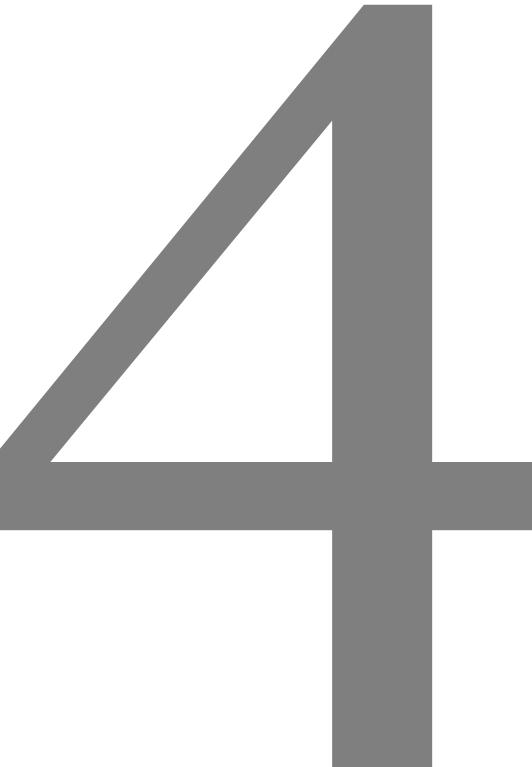
When should I use them?

4

PIE CHARTS

When should I use them?

Basically never.



PIE CHARTS

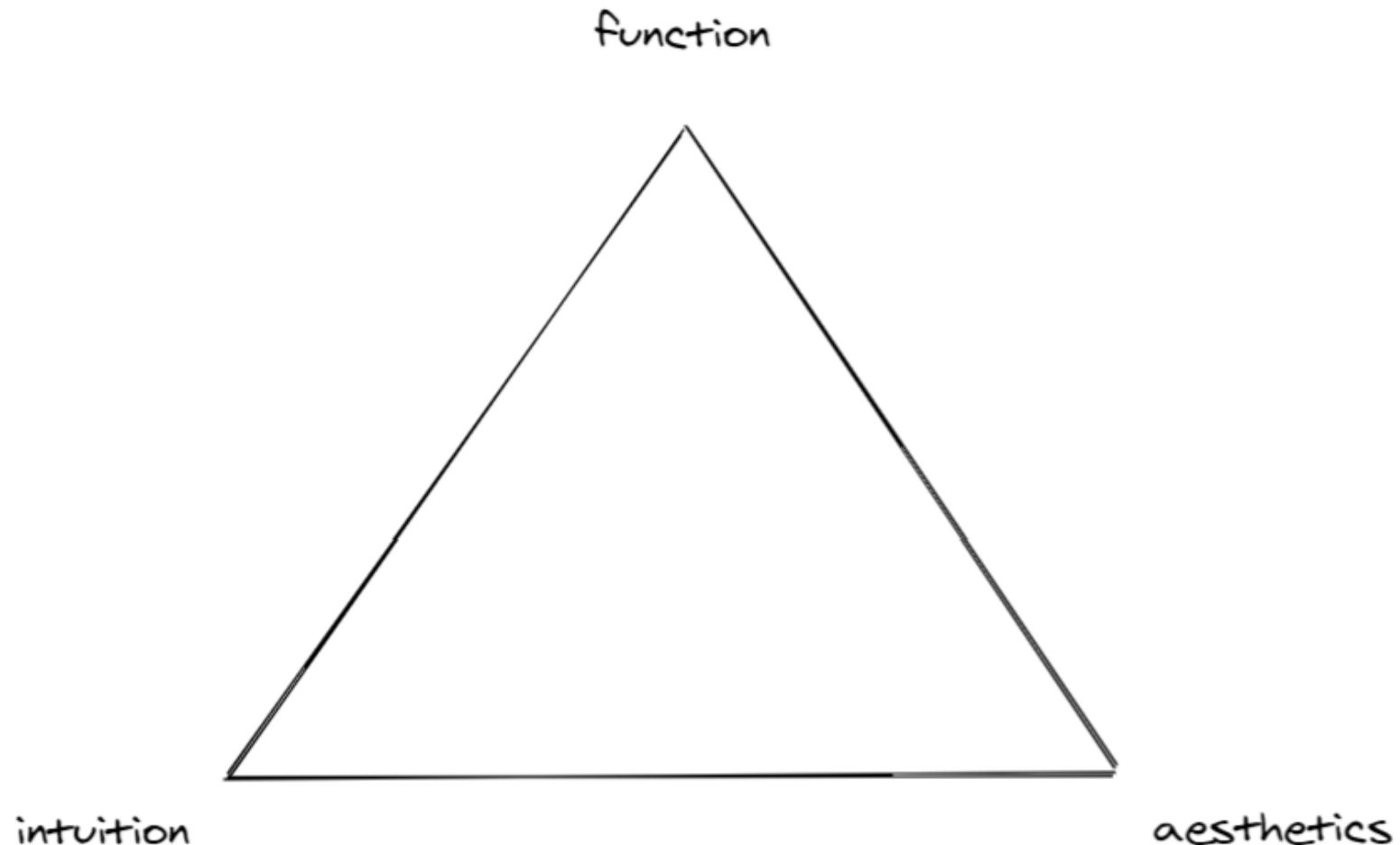
When should I use them?

Basically never.*

*You have less than five variables you are comparing, there are clear and obvious differences between each of the variables, and you are using percentages that cleanly add up to 100% and you need to show that they sum up to an entire whole because that is important for the point of making comparisons. If all of these are true, there are still better options than a pie chart. If all of these are true and you feel okay about yourself as a person for not using a better option, you can use a pie chart. But do not make it 3D.

wrapping up

The Trilemma of Dashboard Design



function

1) Make it work

intuition

2) Make it easy

aesthetics

3) Make it pretty

Communicating with data is both an art and a science.

There are guiding principles, not hard and fast rules.

Constant iteration, practice, and failure are the best way to improve.



Yoda,
Jedi Master



Yoda,
Jedi Master



Pass on what you have learned.
Strength, mastery, yes.

But weakness, folly, failure also.
Yes, failure most of all.

The greatest teacher, failure is.

thanks for listening