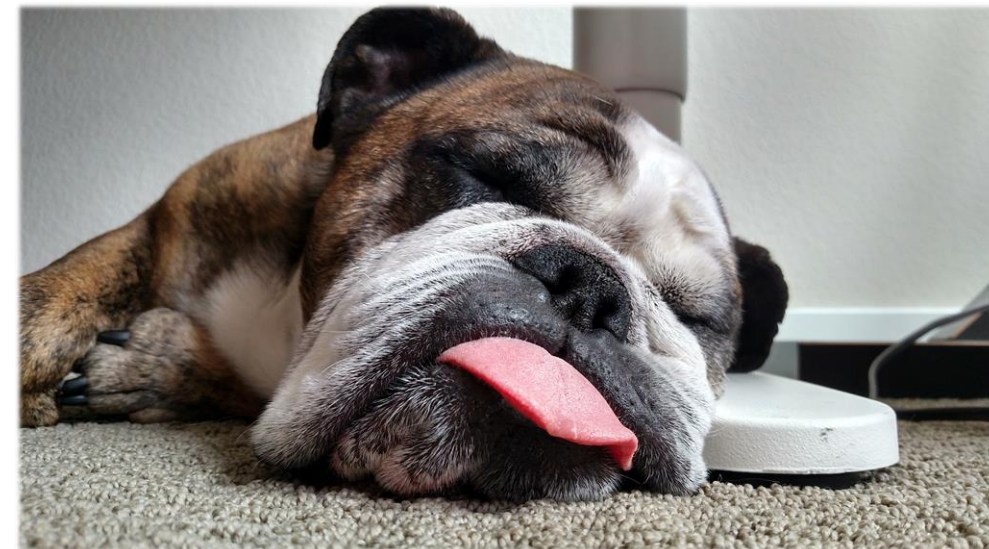# Power BI Report Design for the Non-Artist

Meagan Longoria

"I'm not creative. I'm a data person."

I Hear This All The Time

Meagan Longoria

Consultant, Denny Cherry & Associates

Microsoft Data Platform MVP

Bulldog Owner

Good data viz is a lot like good code
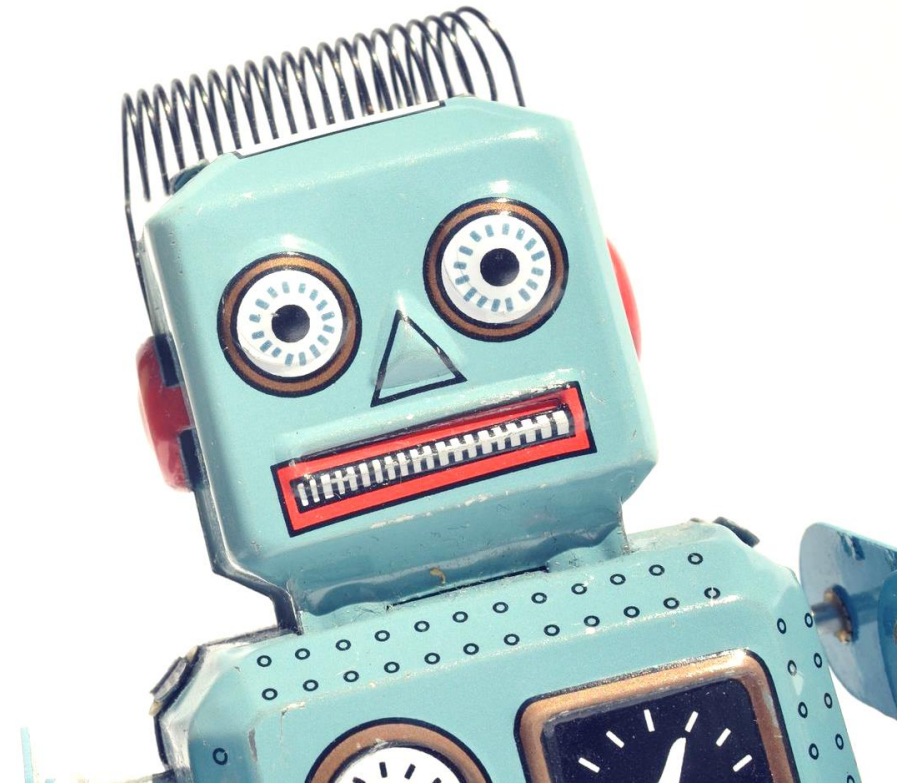
Elegance in simplicity and effectiveness

Knowing when to break the rules

For the More Technology Oriented

Think of it as optimizing your report for human consumption

Goals

Change your mindset about report design

Identify measurable attributes

Identify observable attributes

Change Your Mindset

The advice that changes everything

Stop Making It About You

Communication

Explanatory data visualization is communication. You need to plan what you are going to say.

The Goal

Communicate effectively

with the right data

at the right time

in the right delivery method

Effective Communication in Power BI

Clarifies
Provides memorable insights
Helps the audience make a decision or take an action

4 Basic Steps

Choose an appropriate visual display

Remove clutter

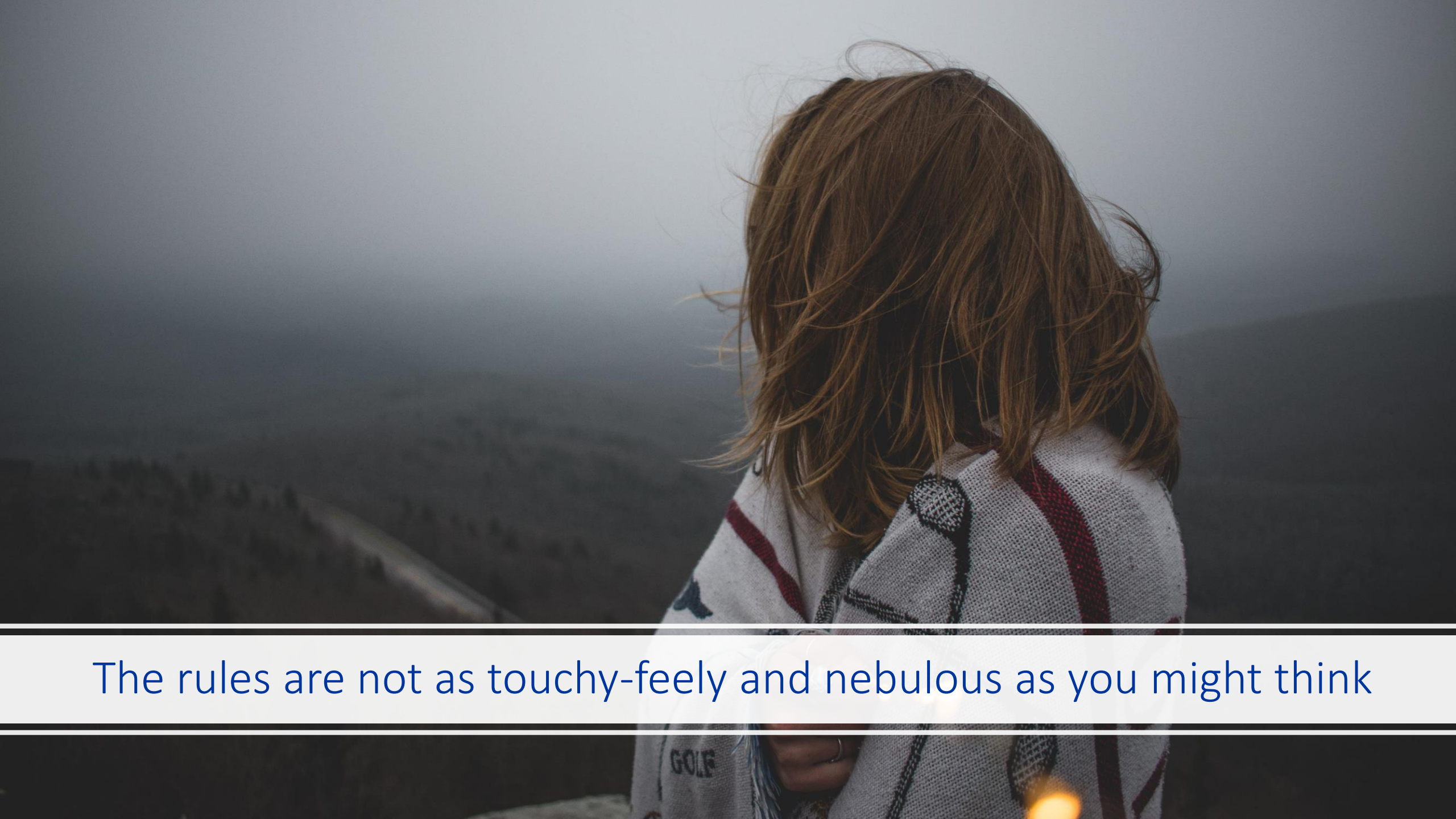Highlight what's important

Create an effective navigation path

Rules

You have to learn the rules in order to know when to break them.

But it's fine to start out with following the rules.

The rules are not as touchy-feely and nebulous as you might think

Choosing a Chart Type
What do you want to say?

Correlation

Show the relationship between two or more variables. Be mindful that, unless you tell them otherwise, many readers will assume the relationships you show them to be causal (i.e. one causes the other).

Example FT uses
Inflation and unemployment, income and life expectancy

Scatterplot
The standard way to show the relationship between two continuous variables, each of which has its own axis.

Column + line timeline
A good way of showing the relationship between an amount (columns) and a rate (line).

Connected scatterplot
Usually used to show how the relationship between 2 variables has changed over time.

Bubble
Like a scatterplot, but adds additional detail by sizing the circles according to a third variable.

XY heatmap
A good way of showing the patterns between 2 categories of data, less effective at showing fine differences in amounts.

Ranking

Use where an item's position in an ordered list is more important than its absolute or relative value. Don't be afraid to highlight the points of interest.

Example FT uses
Wealth, deprivation, league tables, constituency election results

Ordered bar
Standard bar charts display the ranks of values much more easily when sorted into order.

Ordered column
See above.

Ordered proportional symbol
Use when there are big variations between values and/or seeing fine differences between data is not so important.

Dot strip plot
Dots placed in order on a strip are a space-efficient method of laying out ranks across multiple categories.

Slope
Perfect for showing how ranks have changed over time or vary between categories.

Lollipop
Lollipops draw more attention to the data value than standard bar/column and can also show rank and

Distribution

Show values in a dataset and how often they occur. The shape (or 'skew') of a distribution can be a memorable way of highlighting the lack of uniformity or equality in the data.

Example FT uses
Income distribution, population (age/sex) distribution, revealing inequality

Histogram
The standard way to show a statistical distribution - keep the gaps between columns small to highlight the 'shape' of the data.

Dot plot
A simple way of showing the change or range (min/max) of data across multiple categories.

Dot strip plot
Good for showing individual values in a distribution, can be a problem when too many dots have the same value.

Barcode plot
Like dot strip plots, good for displaying all the data in a table, they work best when highlighting individual values.

Boxplot
Summarise multiple distributions by showing the median (centre) and range of the data

Violin plot
Similar to a box plot but more effective with complex distributions (data that cannot be summarised with simple

Change over Time

Give emphasis to changing trends. These can be short (intra-day) movements or extended series traversing decades or centuries: Choosing the correct time period is important to provide suitable context for the reader.

Example FT uses
Share price movements, economic time series, sectoral changes in a market

Line
The standard way to show a changing time series. If data are irregular, consider markers to represent data points.

Column
Columns work well for showing change over time - but usually best with only one series of data at a time.

Column + line timeline
A good way of showing the relationship over time between an amount (columns) and a rate (line).

Slope
Good for showing changing data as long as the data can be simplified into 2 or 3 points without missing a key part of story.

Area chart
Use with care – these are good at showing changes to total, but seeing change in components can be very difficult.

Candlestick
Usually focused on day-to-day activity, these charts show opening/closing and high/low points of

Magnitude

Show size comparisons. These can be relative (just being able to see larger/bigger) or absolute (need to see fine differences). Usually these show a 'counted' number (for example, barrels, dollars or people) rather than a calculated rate or per cent.

Example FT uses
Commodity production, market capitalisation, volumes in general

Column
The standard way to compare the size of things. Must always start at 0 on the axis.

Bar
See above. Good when the data are not time series and labels have long category names.

Paired column
As per standard column but allows for multiple series. Can become tricky to read with more than 2 series.

Paired bar
See above.

Marimekko
A good way of showing the size and proportion of data at the same time – as long as the data are not too complicated.

Proportional symbol
Use when there are big variations between values and/or seeing fine differences

Part-to-whole

Show how a single entity can be broken down into its component elements. If the reader's interest is solely in the size of the components, consider a magnitude-type chart instead.

Example FT uses
Fiscal budgets, company structures, national election results

Stacked column/bar
A simple way of showing part-to-whole relationships but can be difficult to read with more than a few components.

Marimekko
A good way of showing the size and proportion of data at the same time – as long as the data are not too complicated.

Pie
A common way of showing part-to-whole data – but be aware that it's difficult to accurately compare the size of the segments.

Donut
Similar to a pie chart – but the centre can be a good way of making space to include more information about the data (eg total).

Treemap
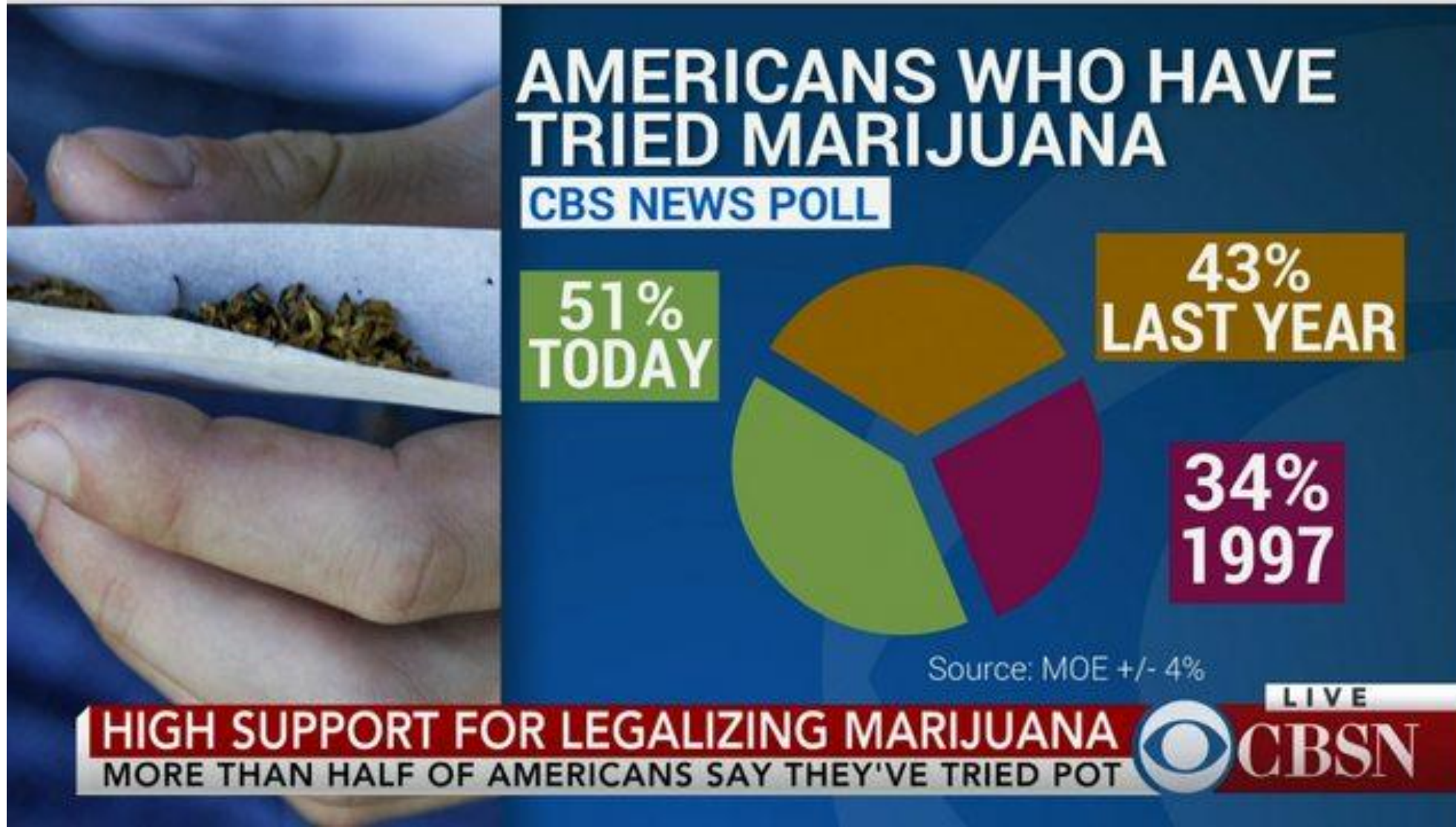Use for hierarchical part-to-whole relationships; can be difficult to read when there are many small segments.

Voronoi
A way of turning points into areas – any point within each area is closer to the central point than any other.
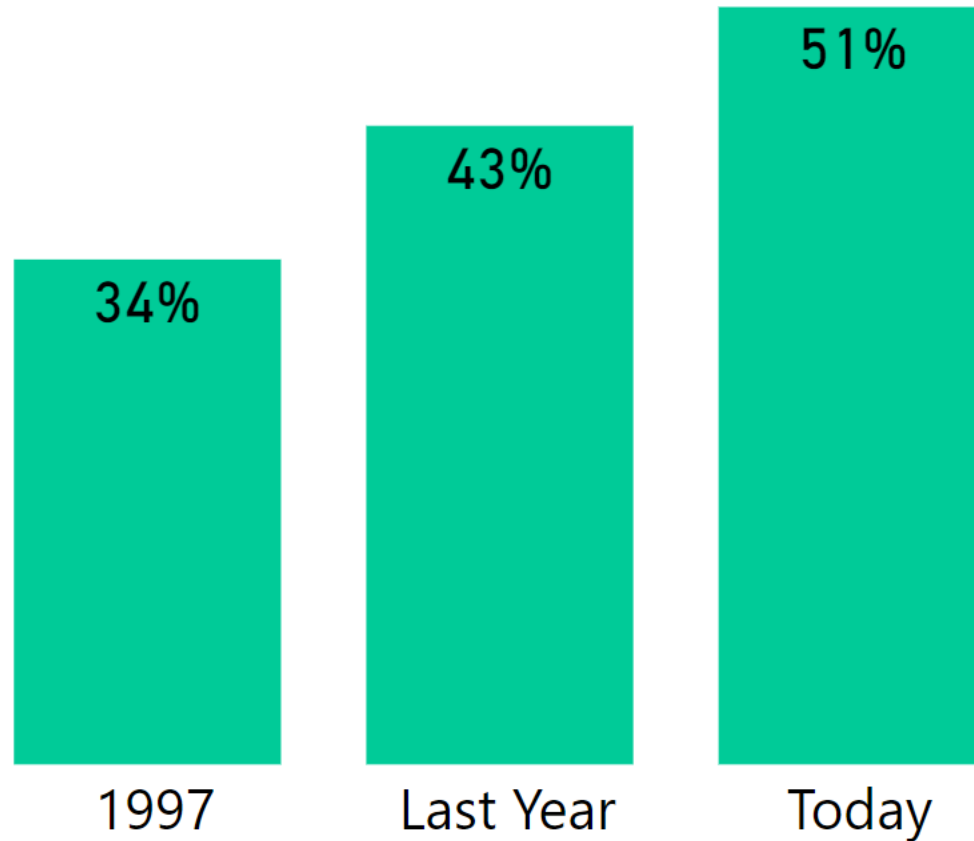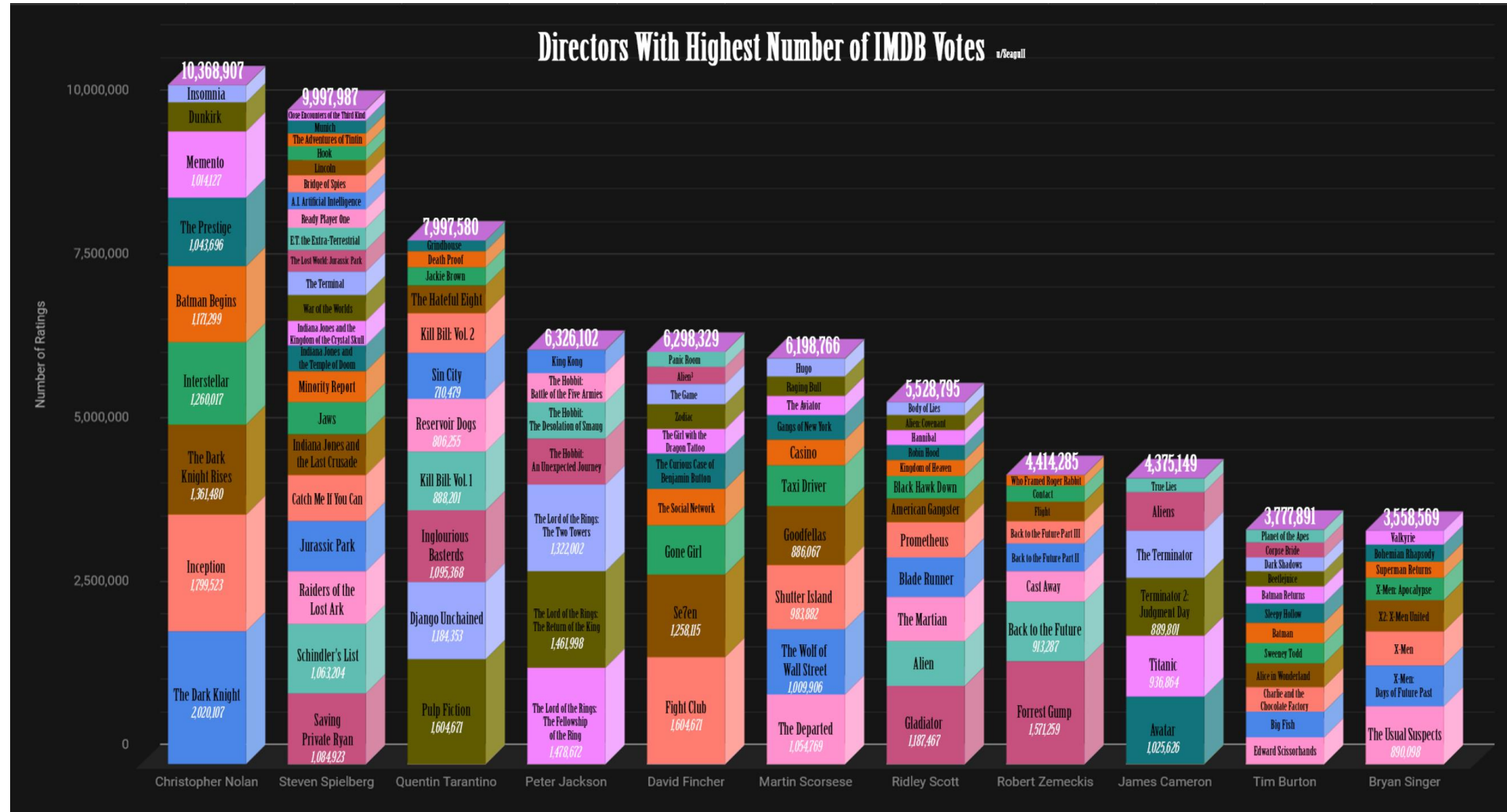
What Not To Do

Better

Percent of Americans Who Have Tried Marijuana
CBS News Poll

1997	Last Year	Today
34%	43%	51%

Hoarding, Chart Version

Directors With Highest Number of IMDB Votes u/Seagull

Number of Ratings

Christopher Nolan — 10,368,907
- Insomnia
- Dunkirk
- Memento — 1,014,127
- The Prestige — 1,043,696
- Batman Begins — 1,171,299
- Interstellar — 1,260,017
- The Dark Knight Rises — 1,361,480
- Inception — 1,799,523
- The Dark Knight — 2,020,107

Steven Spielberg — 9,997,987
- Close Encounters of the Third Kind
- Munich
- The Adventures of Tintin
- Hook
- Lincoln
- Bridge of Spies
- A.I. Artificial Intelligence
- Ready Player One
- E.T. the Extra-Terrestrial
- The Lost World: Jurassic Park
- The Terminal
- War of the Worlds
- Indiana Jones and the Kingdom of the Crystal Skull
- Indiana Jones and the Temple of Doom
- Minority Report
- Jaws
- Indiana Jones and the Last Crusade
- Catch Me If You Can
- Jurassic Park
- Raiders of the Lost Ark
- Schindler's List — 1,063,204
- Saving Private Ryan — 1,084,923

Quentin Tarantino — 7,997,580
- Grindhouse
- Death Proof
- Jackie Brown
- The Hateful Eight
- Kill Bill: Vol. 2
- Sin City — 710,479
- Reservoir Dogs — 806,255
- Kill Bill: Vol. 1 — 888,201
- Inglourious Basterds — 1,095,368
- Django Unchained — 1,184,353
- Pulp Fiction — 1,604,671

Peter Jackson — 6,326,102
- King Kong
- The Hobbit: Battle of the Five Armies
- The Hobbit: The Desolation of Smaug
- The Hobbit: An Unexpected Journey
- The Lord of the Rings: The Two Towers — 1,322,002
- The Lord of the Rings: The Return of the King — 1,461,998
- The Lord of the Rings: The Fellowship of the Ring — 1,478,672

David Fincher — 6,298,329
- Panic Room
- Alien³
- The Game
- Zodiac
- The Girl with the Dragon Tattoo
- The Curious Case of Benjamin Button
- The Social Network
- Gone Girl
- Se7en — 1,258,115
- Fight Club — 1,604,671

Martin Scorsese — 6,198,766
- Hugo
- Raging Bull
- The Aviator
- Gangs of New York
- Casino
- Taxi Driver
- Goodfellas — 886,067
- Shutter Island — 983,882
- The Wolf of Wall Street — 1,009,906
- The Departed — 1,054,769

Ridley Scott — 5,528,795
- Body of Lies
- Alien: Covenant
- Hannibal
- Robin Hood
- Kingdom of Heaven
- Black Hawk Down
- American Gangster
- Prometheus
- Blade Runner
- The Martian
- Alien
- Gladiator — 1,187,467

Robert Zemeckis — 4,414,285
- Who Framed Roger Rabbit
- Contact
- Flight
- Back to the Future Part III
- Back to the Future Part II
- Cast Away
- Back to the Future — 913,287
- Forrest Gump — 1,571,259

James Cameron — 4,375,149
- True Lies
- Aliens
- The Terminator
- Terminator 2: Judgment Day — 889,801
- Titanic — 936,864
- Avatar — 1,025,626

Tim Burton — 3,777,891
- Planet of the Apes
- Corpse Bride
- Dark Shadows
- Beetlejuice
- Batman Returns
- Sleepy Hollow
- Batman
- Sweeney Todd
- Alice in Wonderland
- Charlie and the Chocolate Factory
- Big Fish
- Edward Scissorhands

Bryan Singer — 3,558,569
- Valkyrie
- Bohemian Rhapsody
- Superman Returns
- X-Men: Apocalypse
- X2: X-Men United
- X-Men
- X-Men: Days of Future Past
- The Usual Suspects — 890,098

Clutter-free Doesn't Mean Boring
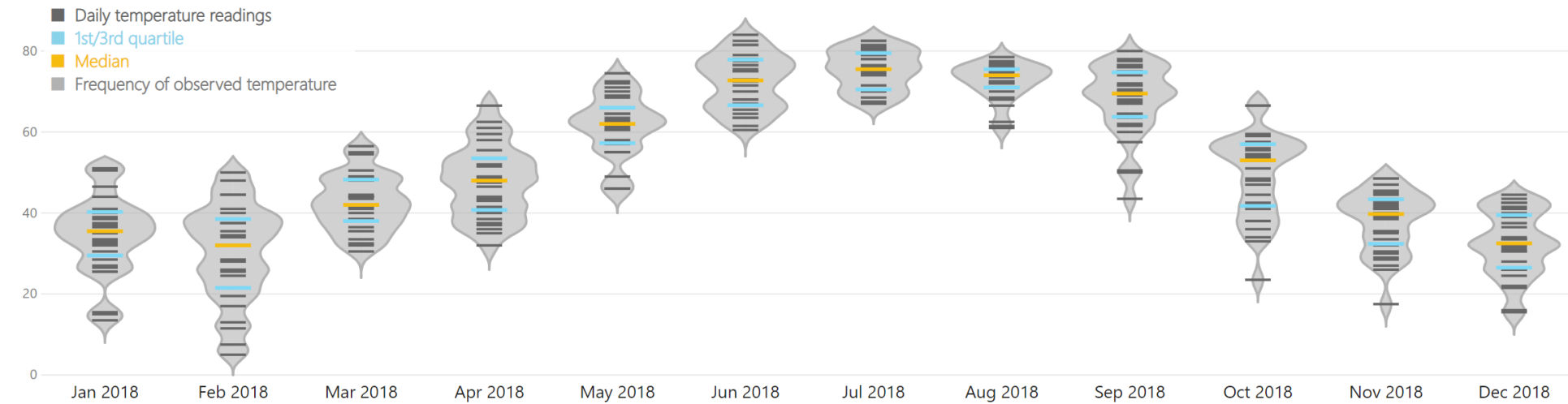

How much do daily **avg temperatures** vary in Denver?

Choose a Metric

avg temperatures | max temperatures | min temperatures

2018 daily **avg temperatures** by month (°F)
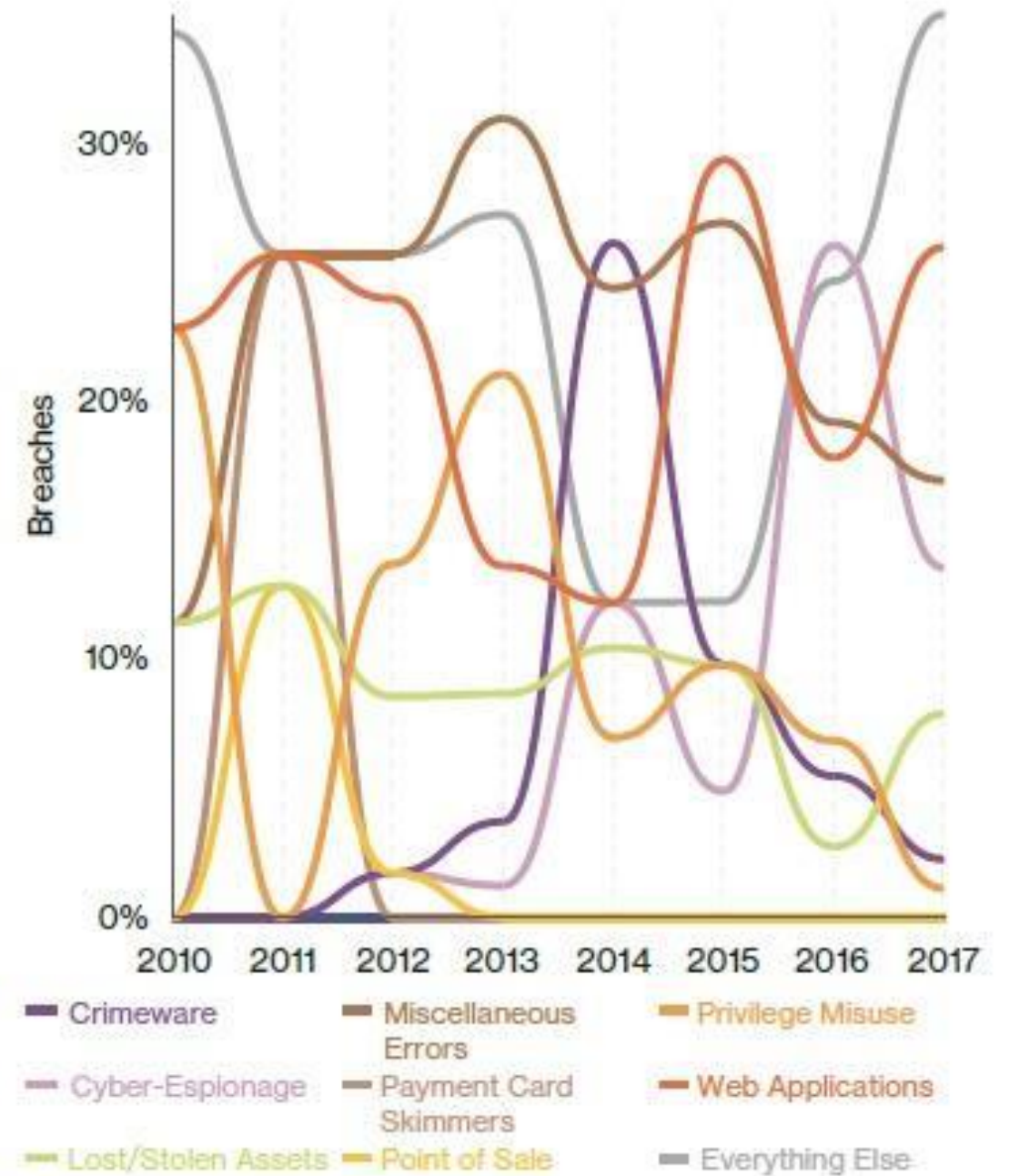
- Daily temperature readings
- 1st/3rd quartile
- Median
- Frequency of observed temperature

2018 daily avg temperatures (°F)

Clutter-Free Means Clear


Remove
to improve
(the **data-ink** ratio)

Created by **Darkhorse Analytics**   www.**darkhorseanalytics**.com

Where Do I Look?

Patterns seen in Education breaches

Legend:
- Crimeware
- Cyber-Espionage
- Lost/Stolen Assets
- Miscellaneous Errors
- Payment Card Skimmers
- Point of Sale
- Privilege Misuse
- Web Applications
- Everything Else

Headlines and HIghlights

Bacon is Delicious and has Fewer Calories Than French Fries and Potato Chips
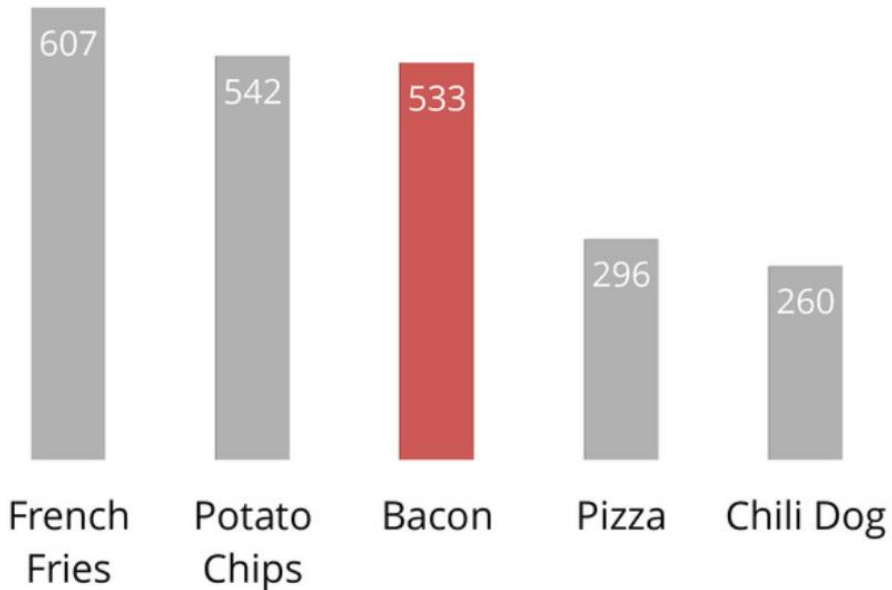
Storytelling in a World of Dynamic Data

Applying structure and order to your content

Storyforming!

Step 1

Know your audience and what metrics and categories are important to them

Step 2

For each user persona, what are their first three questions?

Step 3

Define your message and make sure all visuals relate back to the message/topic

Step 4

Ensure your report has appropriate slicers and filters to support storyforming

Example: Utilization

Audience: Consultants

Questions:
  1. How am I doing against my goal?
  2. Does my forecast keep me above goal?
  3. Where is my time going?

What's Wrong Here?

What's Wrong Here?

Utilization

Hours Distribution
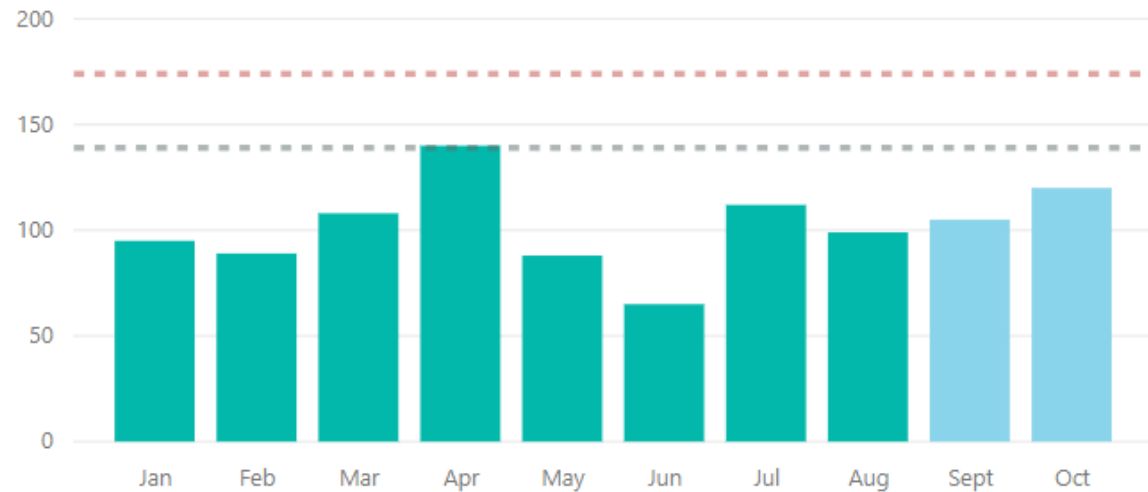
Projected Utilization % and Utilization YTD % by WeekStartDate

● Projected Utilization %   ● Utilization YTD %

It's out of order and it's not giving me a clear message

Billable H...

Type ● Actual ● Forecast
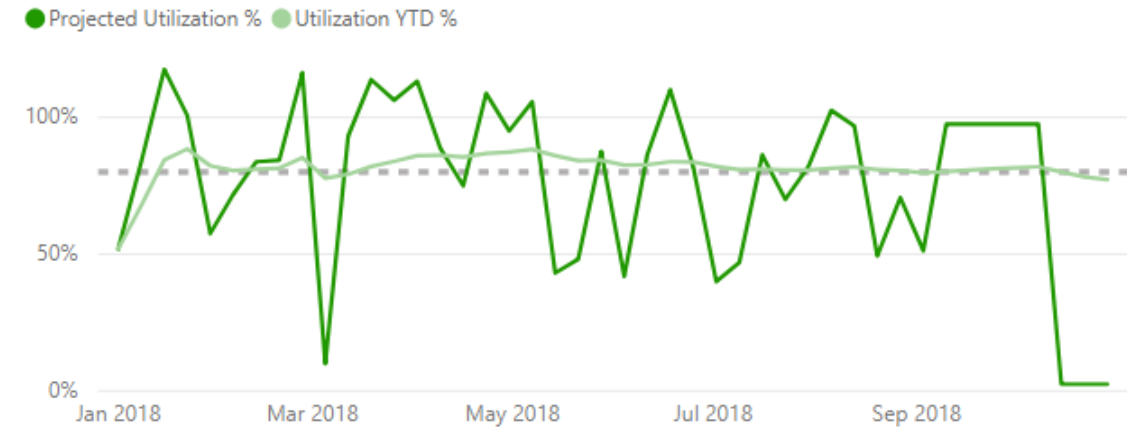
Weekly Forecast - Next 8 Weeks

Standard Work Week
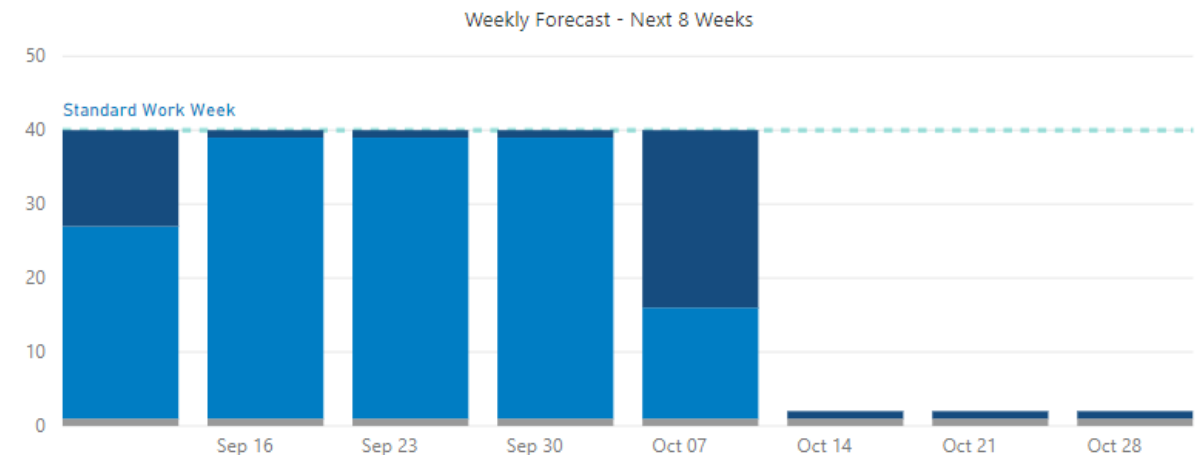
Better

Utilization

Utilization to Date	Projected Utilization	Utilization Goal
79.4%	**79.5%**	**82%**

Total Billable Hrs	Req. Hrs to Attain	Unaccounted Hrs
1040	**48**	**0**

Time Logged By Category

70% Billable · 15% Sales/Marketing · 10% Admin/PTO · 5% Pro Dev

Billable Hours By Month

● Actual ● Forecast

01-Jan-18	01-Feb-18	01-Mar-18	01-Apr-18	01-May-18	01-Jun-18	01-Jul-18	01-Aug-18	01-Sep-18	01-Oct-18	01-Nov-18	01-Dec-18
95	90	108	140	88	50	25	100	75	120	75 / 40	125

Time Budgets
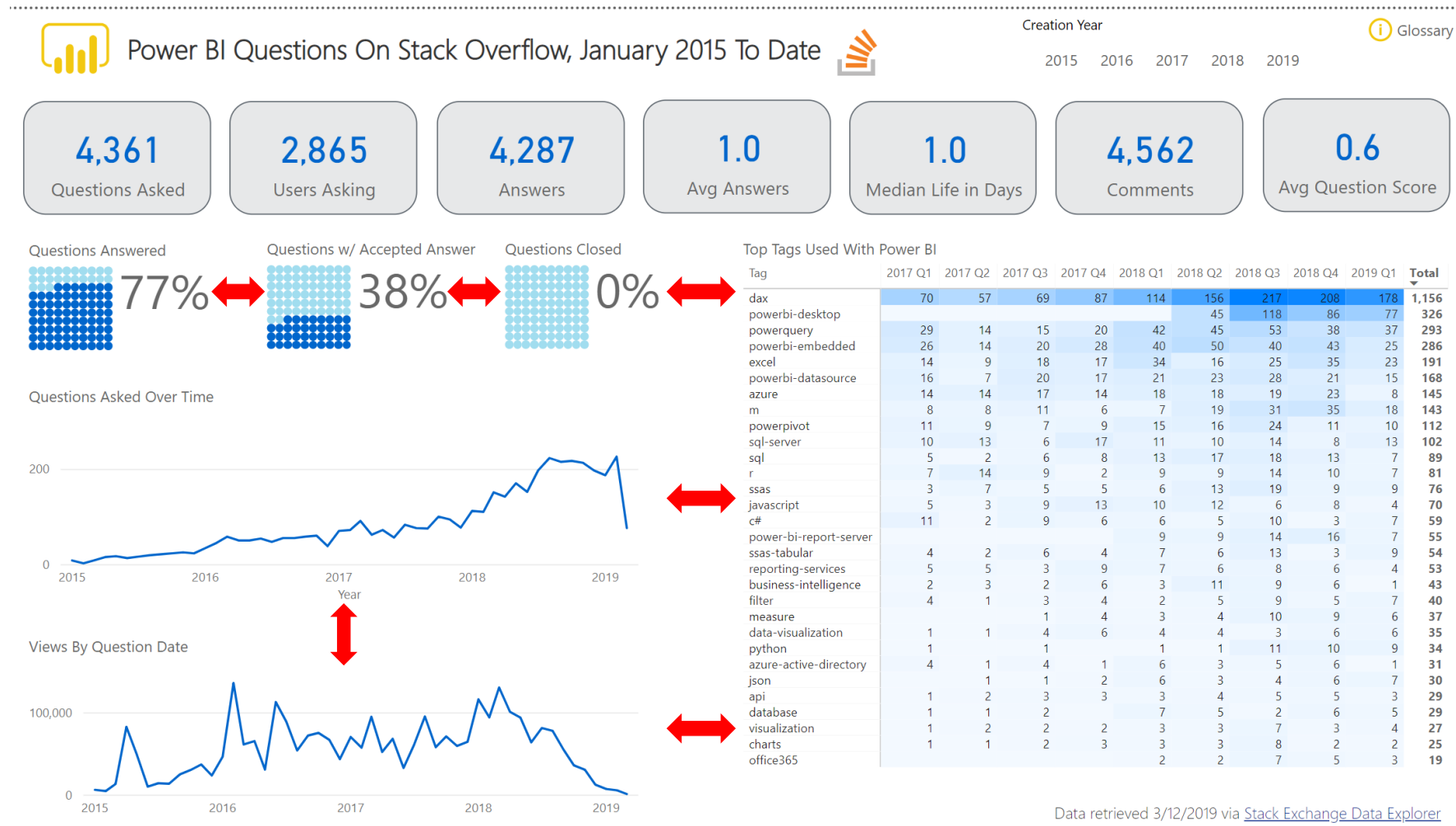

Pro Dev	270
PTO	115
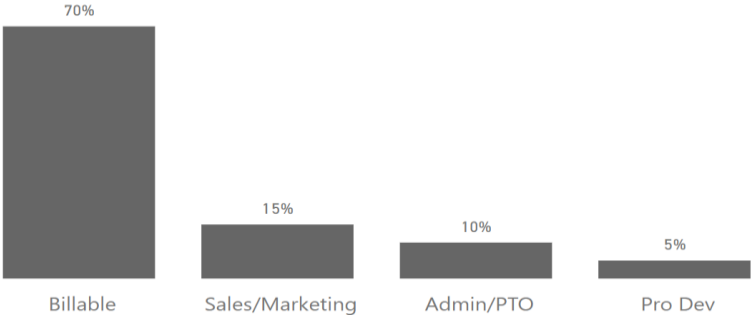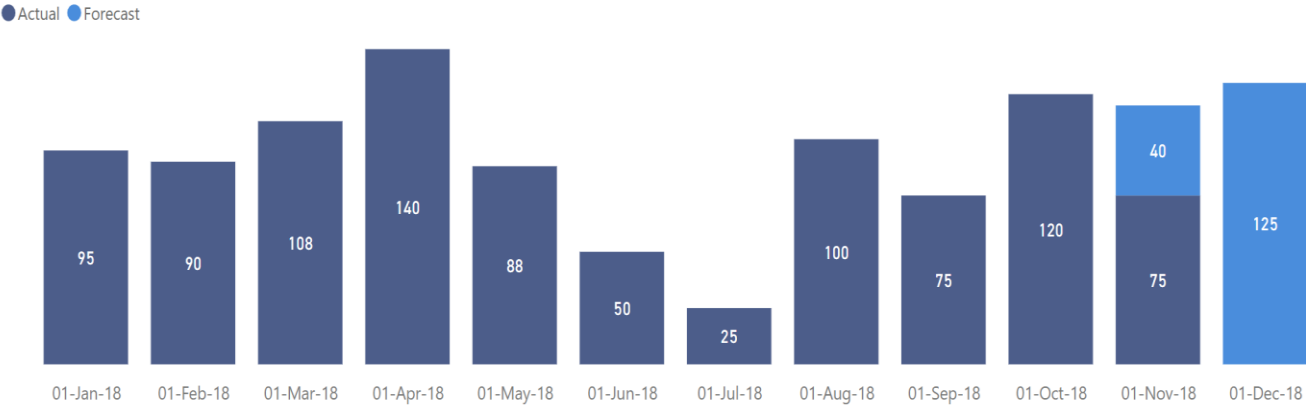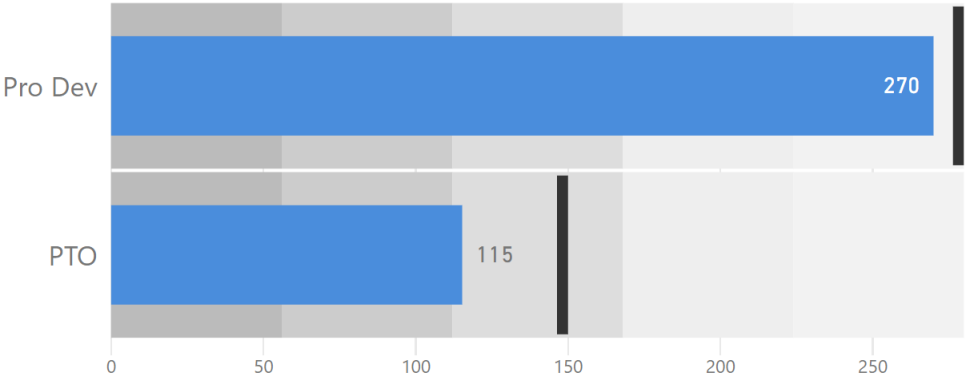
Purposeful Order - Suggestion
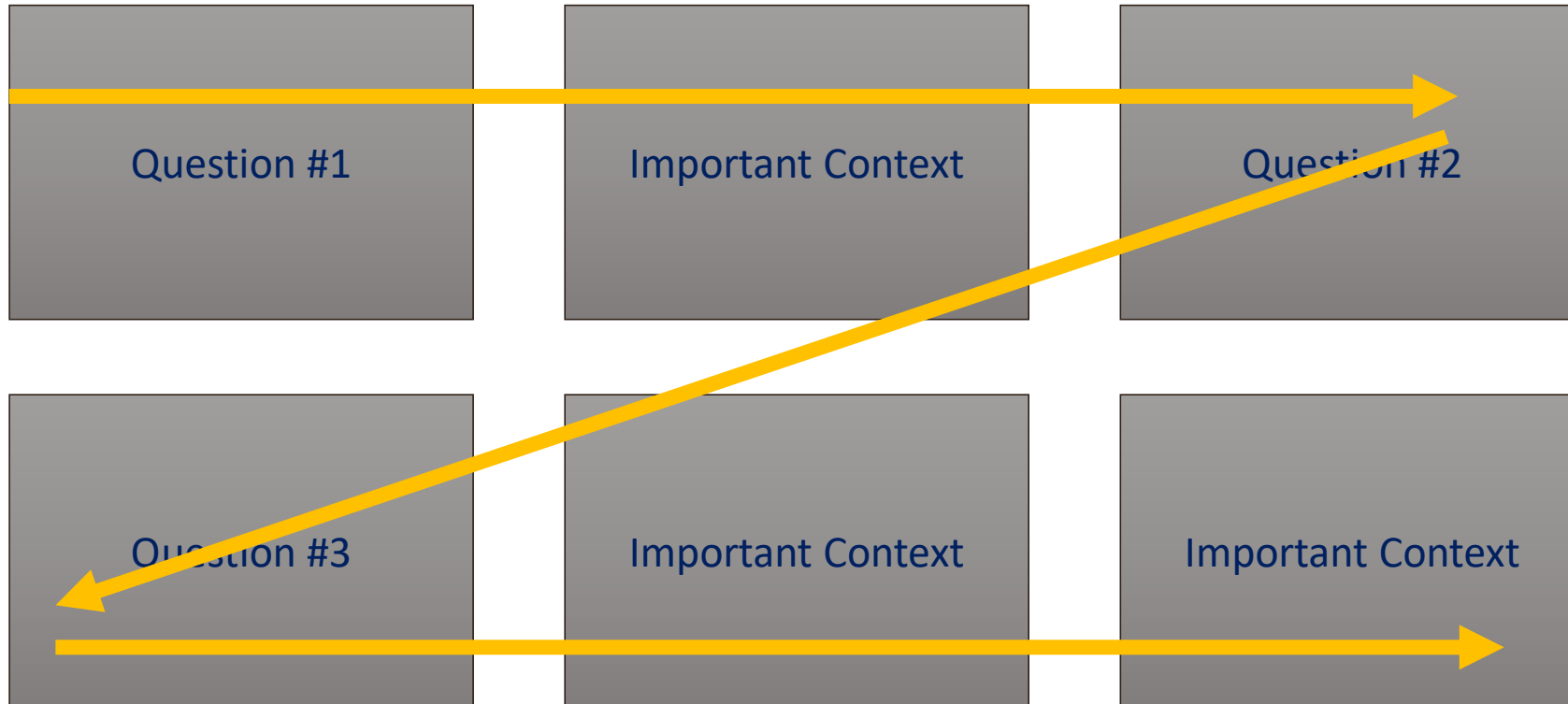
Measurable Attributes

Measurable: Space Between Visuals

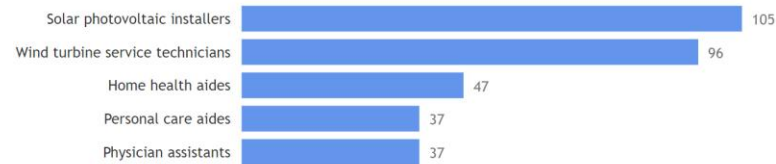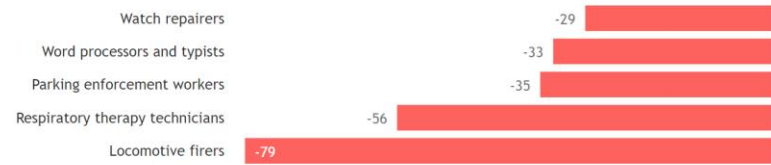# Measurable: Visual Alignment

Projected Employment Changes By Occupation 2016 - 2026
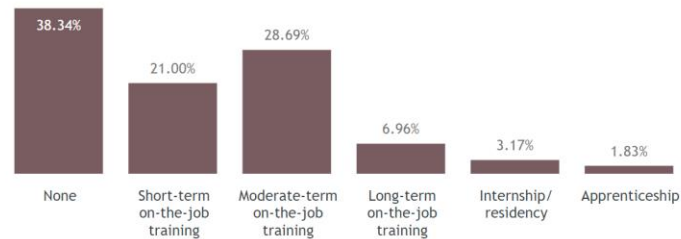
Data retrieved from the Bureau of Labor and Statistics: https://data.bls.gov/projections/occupationProj

Highest Growth Occupations By Percent Change

Occupation	Percent Change
Solar photovoltaic installers	105
Wind turbine service technicians	96
Home health aides	47
Personal care aides	37
Physician assistants	37

Lowest Growth Occupations By Percent Change

Occupation	Percent Change
Watch repairers	-29
Word processors and typists	-33
Parking enforcement workers	-35
Respiratory therapy technicians	-56
Locomotive firers	-79

Percent of Occupations By On-The-Job Training Required To Achieve Competency

Training	Percent
None	38.34%
Short-term on-the-job training	21.00%
Moderate-term on-the-job training	28.69%
Long-term on-the-job training	6.96%
Internship/residency	3.17%
Apprenticeship	1.83%

Top Paying Occupations - High School Diploma or Less

Occupation	2016 Median Annual Wage	Employment Change, 2016-2026
Nuclear power reactor operators	$91,170	-700
Transportation, storage, and distribution managers	$89,190	7,700
First-line supervisors of police and detectives	$84,840	6,900

Top Paying Occupations - Associate's Degree

Occupation	2016 Median Annual Wage	Employment Change, 2016-2026
Air traffic controllers	$122,410	900
Radiation therapists	$80,160	2,300
Nuclear technicians	$79,140	0

Top Paying Occupations - Bachelor's Degree

| Occupation	2016 Median Annual Wage	Employment Change, 2016-2026
Chief executives	$181,210	-10,700
Computer and information systems managers	$135,800	43,800
Architectural and engineering managers	$134,730	9,900

Top Paying Occupations - Master's Degree

Occupation	2016 Median Annual Wage	Employment Change, 2016-2026
Nurse anesthetists	$160,270	6,700
Political scientists	$114,290	200
Computer and information research scientists	$111,840	5,400

Top Paying Occupations - Doctoral or Professional Degree

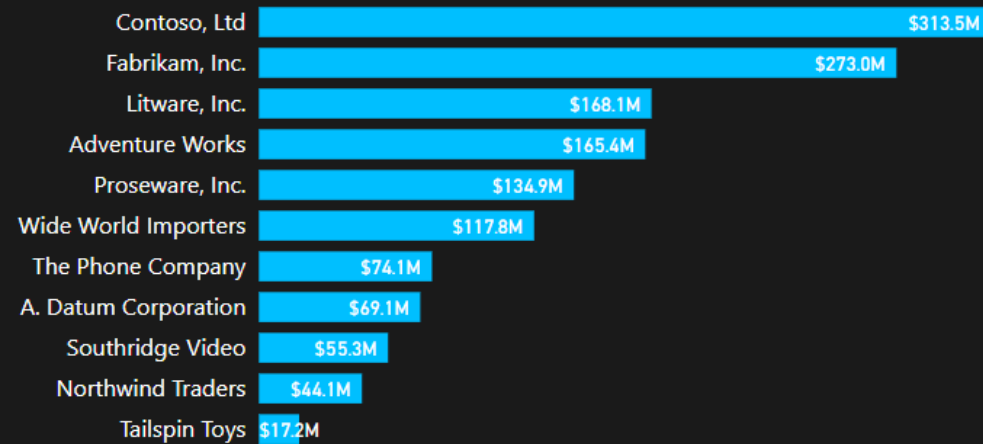| Occupation	2016 Median Annual Wage	Employment Change, 2016-2026
Anesthesiologists	$208,000	5,900
Obstetricians and gynecologists	$208,000	3,900
Oral and maxillofacial surgeons	$208,000	1,200
Orthodontists	$208,000	1,100
Surgeons	$208,000	7,600

Measurable: Orientation of Text
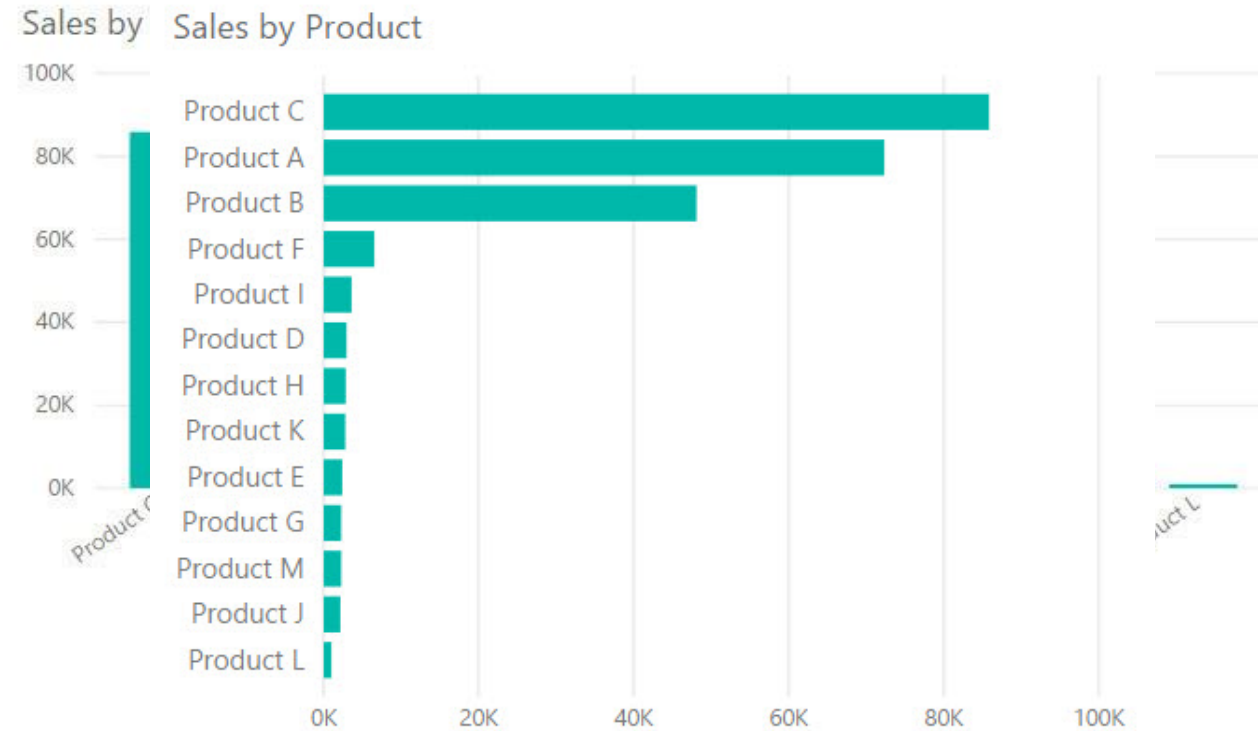
Measurable: Color Contrast

Sales By Product Manufacturer And Channel, 2014 - 2016

V2

Sales Revenue By Manufacturer

Manufacturer	Revenue
Contoso, Ltd	$313.5M
Fabrikam, Inc.	$273.0M
Litware, Inc.	$168.1M
Adventure Works	$165.4M
Proseware, Inc.	$134.9M
Wide World Importers	$117.8M
The Phone Company	$74.1M
A. Datum Corporation	$69.1M
Southridge Video	$55.3M
Northwind Traders	$44.1M
Tailspin Toys	$17.2M

Sales Channel As A Percent of Total Sales Revenue

Store	Online	Reseller	Catalog
54.71%	22.57%	14.24%	8.48%
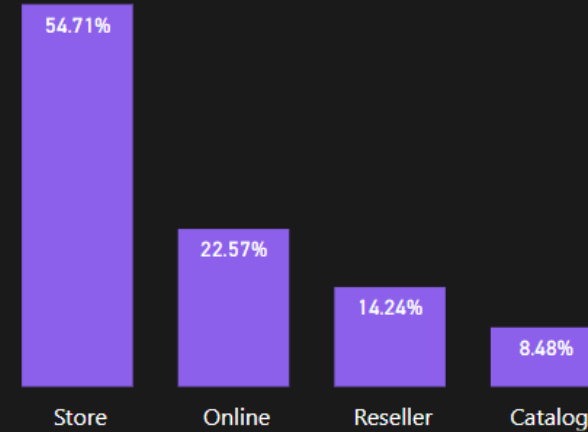
Sales Revenue by Quarter

Channel ● Catalog ● Online ● Reseller ● Store
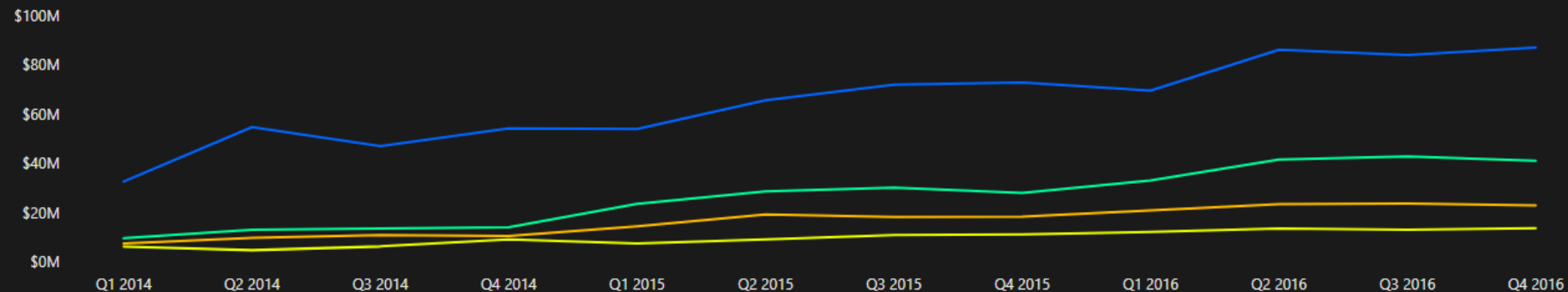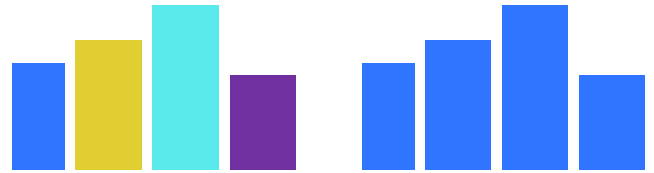
Measurable: Line Length
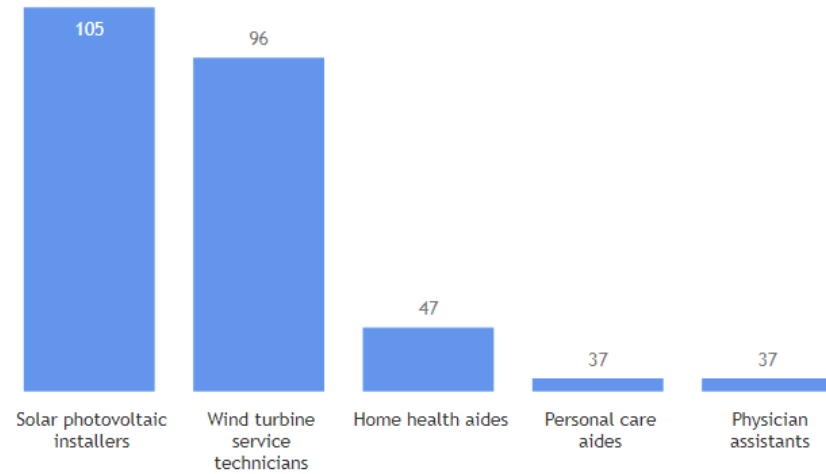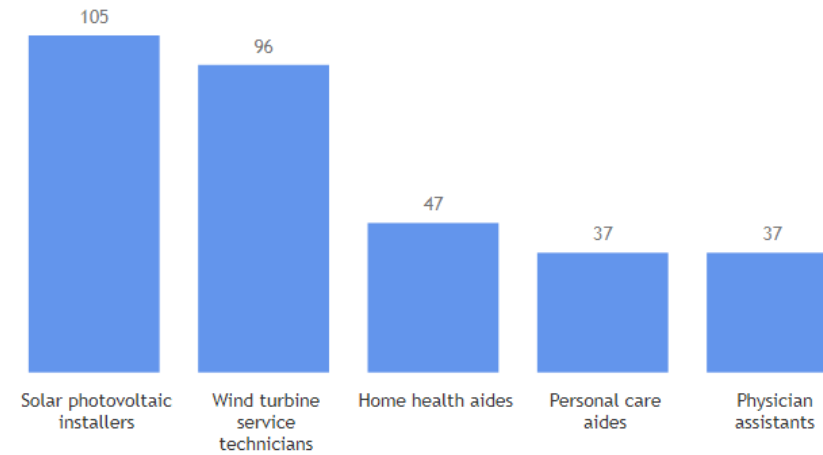
Observable Attributes

Colors and fonts

Bright colors used to draw attention

Single measure bar charts use one color

Dark intense borders are avoided

Color used consistently

Other Important Attributes

Charts have descriptive titles

Bar charts start at zero

Pie charts contain 3 or fewer slices

Slicers use consistent formatting

2018 daily avg temperatures (°F)

Help

Helpful Resources

Power BI Visual Usability Checklist: https://datasavvy.me/pbi-data-viz-checklist/

PowerBI.tips (layouts and theme generator): https://powerbi.tips/

Instant Eyedropper: http://instant-eyedropper.com/

Pixel Zoomer: http://pixelzoomer.com/

Chart doctor: https://github.com/ft-interactive/chart-doctor/blob/master/visual-vocabulary/Visual-vocabulary.pdf

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