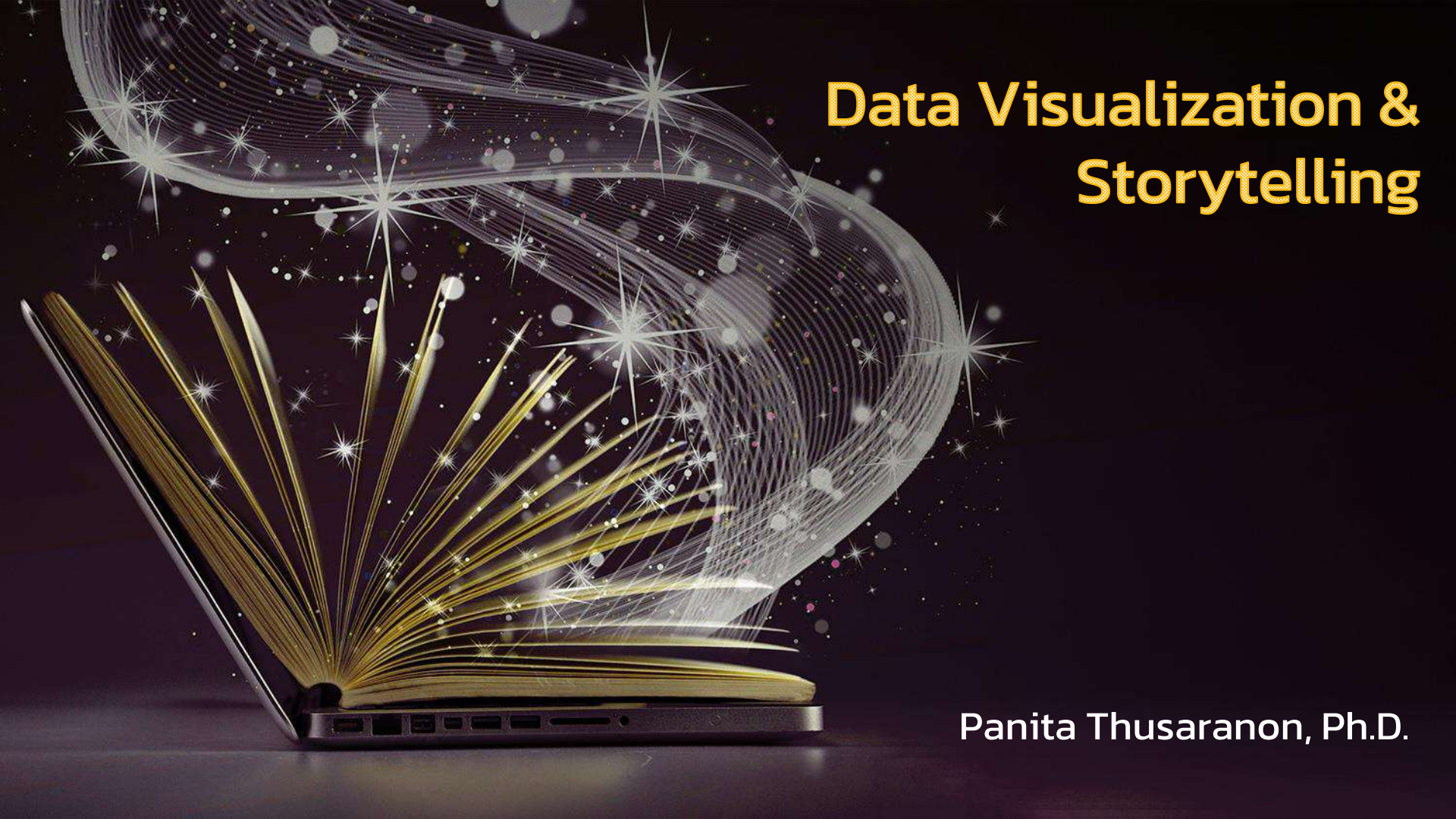
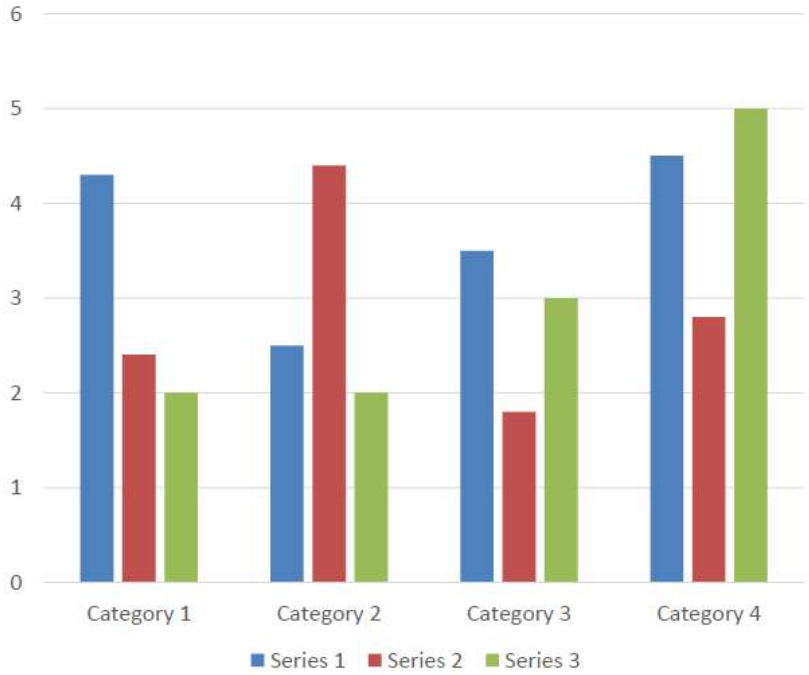


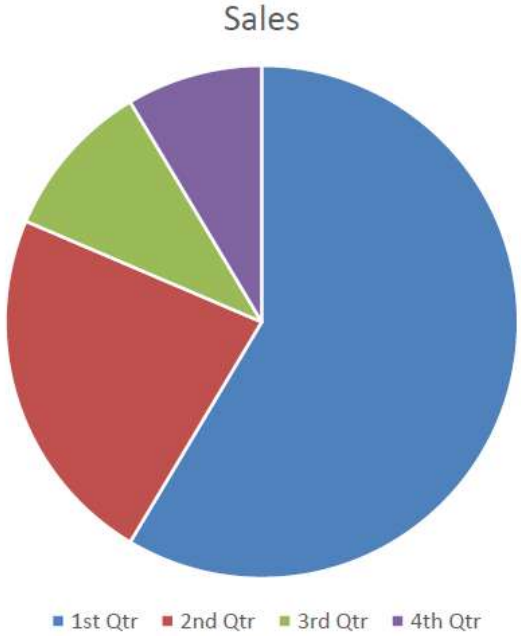
Data Visualization & Storytelling

Panita Thusaranon, Ph.D.

	A	B	C	D	E	F	G	H	I	J	K	L
1	Segment	Country	Product	Discount Band	Units Sold	Manufacturing Price	Sale Price	Gross Sales	Discounts	Sales	COGS	Profit
2	Government	Canada	Carretera	None	1618.5	$ 3.00	$ 20.00	$ 32,370.00	$ -	$ 32,370.00	$ 16,185.00	$ 16,185.00
3	Government	Germany	Carretera	None	1321	$ 3.00	$ 20.00	$ 26,420.00	$ -	$ 26,420.00	$ 13,210.00	$ 13,210.00
4	Midmarket	France	Carretera	None	2178	$ 3.00	$ 15.00	$ 32,670.00	$ -	$ 32,670.00	$ 21,780.00	$ 10,890.00
5	Midmarket	Germany	Carretera	None	888	$ 3.00	$ 15.00	$ 13,320.00	$ -	$ 13,320.00	$ 8,880.00	$ 4,440.00
6	Midmarket	Mexico	Carretera	None	2470	$ 3.00	$ 15.00	$ 37,050.00	$ -	$ 37,050.00	$ 24,700.00	$ 12,350.00
7	Government	Germany	Carretera	None	1513	$ 3.00	$ 350.00	$ 529,550.00	$ -	$ 529,550.00	$ 393,380.00	$136,170.00
8	Midmarket	Germany	Montana	None	921	$ 5.00	$ 15.00	$ 13,815.00	$ -	$ 13,815.00	$ 9,210.00	$ 4,605.00
9	Channel Partners	Canada	Montana	None	2518	$ 5.00	$ 12.00	$ 30,216.00	$ -	$ 30,216.00	$ 7,554.00	$ 22,662.00
10	Government	France	Montana	None	1899	$ 5.00	$ 20.00	$ 37,980.00	$ -	$ 37,980.00	$ 18,990.00	$ 18,990.00
11	Channel Partners	Germany	Montana	None	1545	$ 5.00	$ 12.00	$ 18,540.00	$ -	$ 18,540.00	$ 4,635.00	$ 13,905.00
12	Midmarket	Mexico	Montana	None	2470	$ 5.00	$ 15.00	$ 37,050.00	$ -	$ 37,050.00	$ 24,700.00	$ 12,350.00
13	Enterprise	Canada	Montana	None	2665.5	$ 5.00	$ 125.00	$ 333,187.50	$ -	$ 333,187.50	$ 319,860.00	$ 13,327.50
14	Small Business	Mexico	Montana	None	958	$ 5.00	$ 300.00	$ 287,400.00	$ -	$ 287,400.00	$ 239,500.00	$ 47,900.00
15	Government	Germany	Montana	None	2146	$ 5.00	$ 7.00	$ 15,022.00	$ -	$ 15,022.00	$ 10,730.00	$ 4,292.00
16	Enterprise	Canada	Montana	None	345	$ 5.00	$ 125.00	$ 43,125.00	$ -	$ 43,125.00	$ 41,400.00	$ 1,725.00
17	Midmarket	United States of America	Montana	None	615	$ 5.00	$ 15.00	$ 9,225.00	$ -	$ 9,225.00	$ 6,150.00	$ 3,075.00
18	Government	Canada	Paseo	None	292	$ 10.00	$ 20.00	$ 5,840.00	$ -	$ 5,840.00	$ 2,920.00	$ 2,920.00
19	Midmarket	Mexico	Paseo	None	974	$ 10.00	$ 15.00	$ 14,610.00	$ -	$ 14,610.00	$ 9,740.00	$ 4,870.00
20	Channel Partners	Canada	Paseo	None	2518	$ 10.00	$ 12.00	$ 30,216.00	$ -	$ 30,216.00	$ 7,554.00	$ 22,662.00
21	Government	Germany	Paseo	None	1006	$ 10.00	$ 350.00	$ 352,100.00	$ -	$ 352,100.00	$ 261,560.00	$ 90,540.00
22	Channel Partners	Germany	Paseo	None	367	$ 10.00	$ 12.00	$ 4,404.00	$ -	$ 4,404.00	$ 1,101.00	$ 3,303.00
23	Government	Mexico	Paseo	None	883	$ 10.00	$ 7.00	$ 6,181.00	$ -	$ 6,181.00	$ 4,415.00	$ 1,766.00
24	Midmarket	France	Paseo	None	549	$ 10.00	$ 15.00	$ 8,235.00	$ -	$ 8,235.00	$ 5,490.00	$ 2,745.00
25	Small Business	Mexico	Paseo	None	788	$ 10.00	$ 300.00	$ 236,400.00	$ -	$ 236,400.00	$ 197,000.00	$ 39,400.00
26	Midmarket	Mexico	Paseo	None	2472	$ 10.00	$ 15.00	$ 37,080.00	$ -	$ 37,080.00	$ 24,720.00	$ 12,360.00
27	Government	United States of America	Paseo	None	1143	$ 10.00	$ 7.00	$ 8,001.00	$ -	$ 8,001.00	$ 5,715.00	$ 2,286.00
28	Government	Canada	Paseo	None	1725	$ 10.00	$ 350.00	$ 603,750.00	$ -	$ 603,750.00	$ 448,500.00	$155,250.00
29	Channel Partners	United States of America	Paseo	None	912	$ 10.00	$ 12.00	$ 10,944.00	$ -	$ 10,944.00	$ 2,736.00	$ 8,208.00
30	Midmarket	Canada	Paseo	None	2152	$ 10.00	$ 15.00	$ 32,280.00	$ -	$ 32,280.00	$ 21,520.00	$ 10,760.00
31	Government	Canada	Paseo	None	1817	$ 10.00	$ 20.00	$ 36,340.00	$ -	$ 36,340.00	$ 18,170.00	$ 18,170.00

Used this before?





Visualization Goals

Communicate
: explanatory

- Present data and ideas
- Explain and inform
- Provide evidence and support
- Influence and persuade

Analyze
: exploratory

- Explore the data
- Assess a situation
- Determine how to proceed
- Decide what to do

หัวใจสำคัญของการทำ Data Visualization

The importance of context

Understanding WHO, WHAT and HOW

ใครคือผู้รับสารของคุณ

สิ่งที่ผู้ส่งสารควรรู้

ผู้รับสารอยากจะรู้อะไร
(เช่น ผลกำไร-ขาดทุน)

ผู้รับสารมีความรู้ด้านใดบ้างแล้ว
(เช่น การเงิน-บัญชี, คณิตศาสตร์)

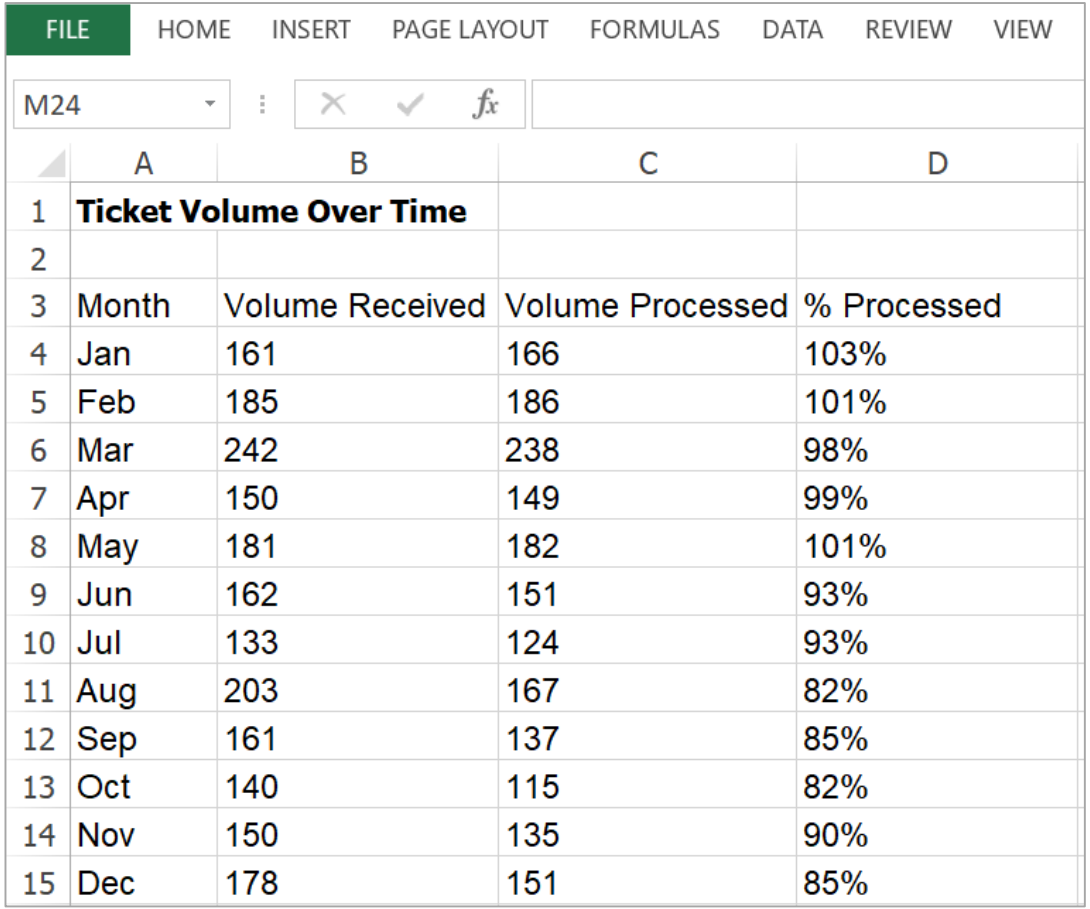
ผู้รับสารไม่สนใจเรื่องใด

What?
เรื่องอะไรที่คุณอยากนำเสนอ

Prompting action

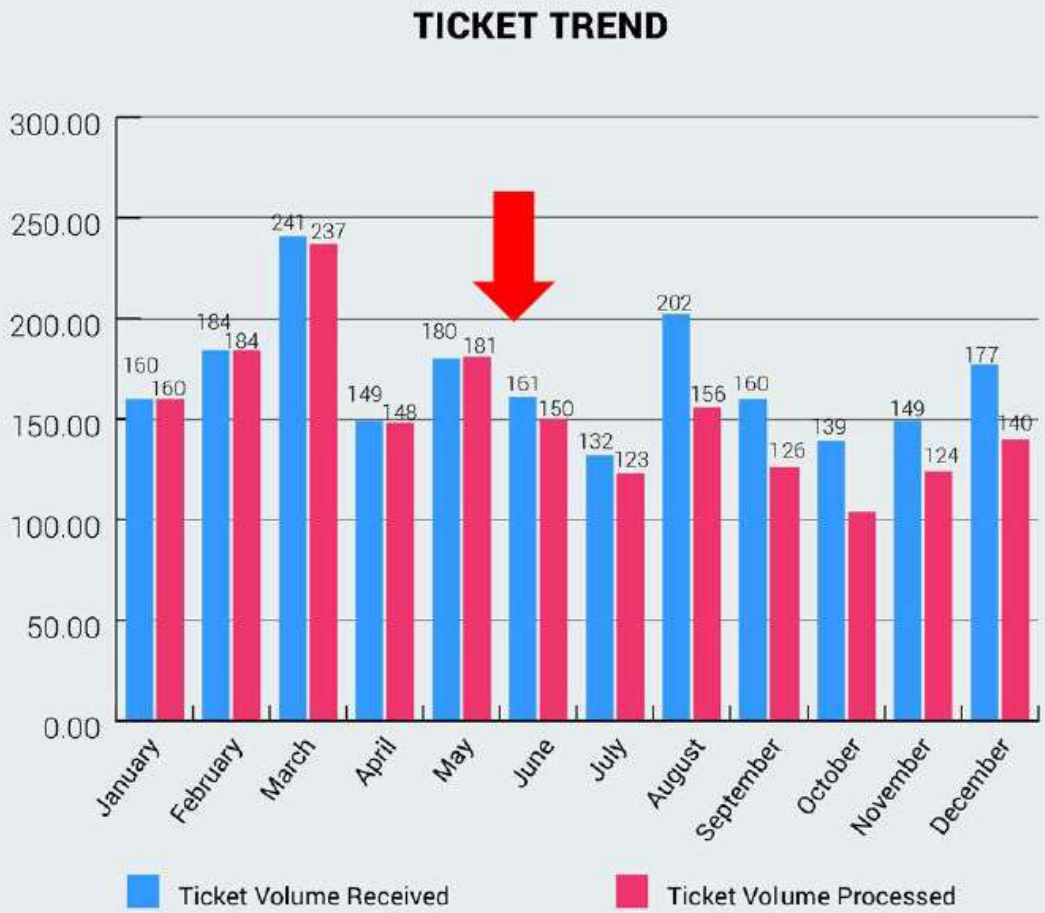
Here are some action words to help act as thought starters as you determine what you are asking of your audience:

accept | agree | begin | believe | change | collaborate | commence | create | defend | desire | differentiate | do | empathize | empower | encourage | engage | establish | examine | facilitate | familiarize | form | implement | include | influence | invest | invigorate | know | learn | like | persuade | plan | promote | pursue | recommend | receive | remember | report | respond | secure | support | simplify | start | try | understand | validate



	A	B	C	D
1	**Ticket Volume Over Time**			
2				
3	Month	Volume Received	Volume Processed	% Processed
4	Jan	161	166	103%
5	Feb	185	186	101%
6	Mar	242	238	98%
7	Apr	150	149	99%
8	May	181	182	101%
9	Jun	162	151	93%
10	Jul	133	124	93%
11	Aug	203	167	82%
12	Sep	161	137	85%
13	Oct	140	115	82%
14	Nov	150	135	90%
15	Dec	178	151	85%

https://www.dropbox.com/s/9ds22sy9g8u6mv3/Example%20-%20Drawing%20Attention%20with%20Data%20Labels.xlsx?dl=0



Before

Background:

This bar chart displays the number of tickets received and processed in a year.

Problem:

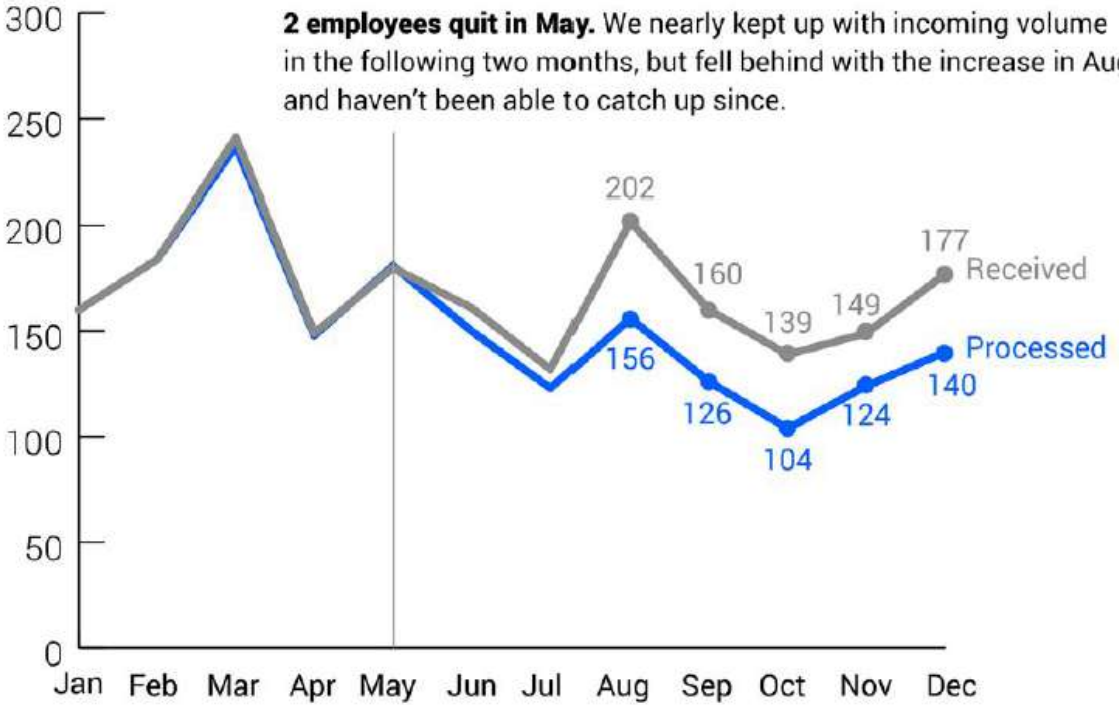
จะมีคนลาออกตอนสิ้นเดือน May ซึ่งจะทำให้คนที่มีอยู่ไม่เพียงพอเมื่อเทียบกับปริมาณงานที่ต้องทำ

From the book Storytelling with Data by Cole Nussbaumer Knaflic.

Please approve the hire of 2 FTEs

to backfill those who quit in the past year

Ticket volume over time



After

If your purpose is to convey a message and move someone to a specific action (in this case, the hire of two new employees), then this is much better.

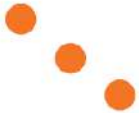
How?
Data Visualization แบบไหนที่จะทำให้ผู้รับสารเข้าใจได้เร็วที่สุด

KNOW YOUR DATA

Before understanding visualizations, you must understand the types of data that can be visualized and their relationships to each other. Here are some of the most common you are likely to encounter.

DATA TYPES

QUANTITATIVE
Data that can be counted or measured; all values are numerical.



DISCRETE
Numerical data that has a finite number of possible values. Example: Number of employees in the office.

CONTINUOUS
Data that is measured and has a value within a range. Example: Rainfall in a year.

CATEGORICAL
Data that can be sorted according to group or category. Example: Types of products sold.

GUIDE TO CHART TYPES

In this section, we'll cover the uses, variations, and best practices for some of the most common data visualizations:

BAR CHART

PIE CHART

LINE CHART

AREA CHART

SCATTER PLOT

BUBBLE CHART

HEAT MAP

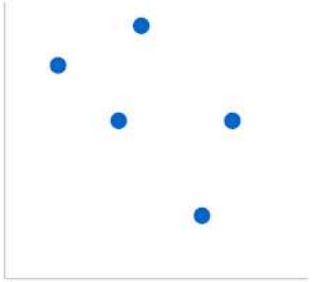
cole nussbaumer knaflic

storytelling with data

a data visualization guide for business professionals

91%

Simple Text



Scatter Plot

Vertical Bar

	A	B	C
Category 1	15%	22%	42%
Category 2	40%	36%	20%
Category 3	35%	17%	34%
Category 4	30%	29%	26%
Category 5	55%	30%	58%
Category 6	11%	25%	49%

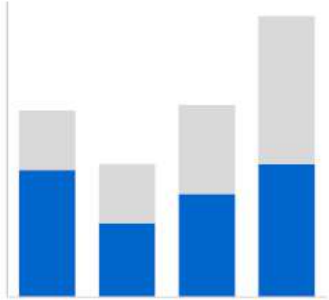
Table

	A	B	C
Category 1	15%	22%	42%
Category 2	40%	36%	20%
Category 3	35%	17%	34%
Category 4	30%	29%	26%
Category 5	55%	30%	58%
Category 6	11%	25%	49%

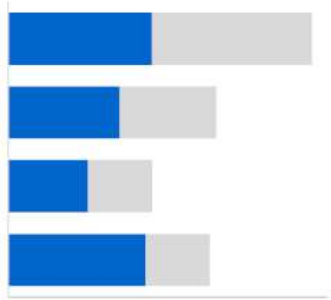
Heatmap

Horizontal Bar

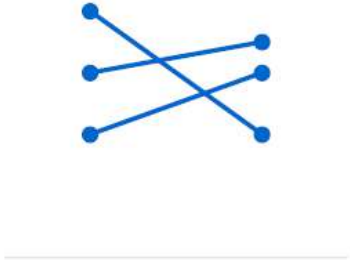
Line



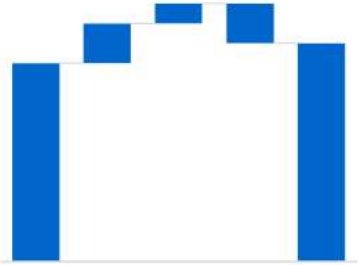
Stacked vertical bar



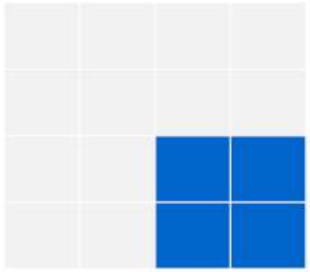
Stacked horizontal bar



Slope graph



Waterfall



Square area

What do you want to tell from your data?

1.Comparison

- Bar Chart
- Line Chart
- Bullet Chart

2.Relationship

- Scatter Plot
- Map
- Bubble Chart
- Heat Map
- Crosstab/Highlight table

3.Composition

- Pie Chart
- Tree Map

4.Distribution

- Histogram Chart
- Box Plot

What do you want to tell from your data?

1.Comparison

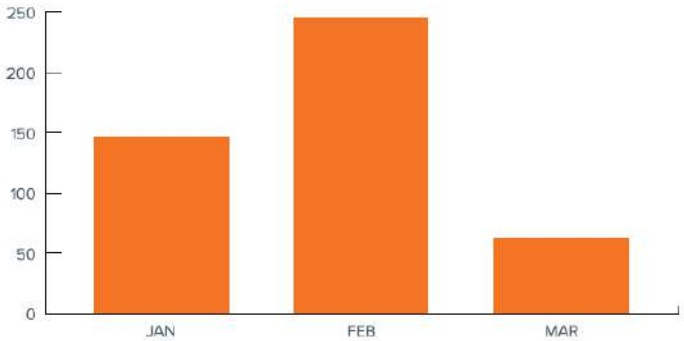
BAR CHART

Bar charts are very versatile. They are best used to show change over time, compare different categories, or compare parts of a whole.

- แสดงการเปรียบเทียบข้อมูลในแต่ละหมวดหมู่
- สามารถแสดงถึงลำดับและขนาดได้ชัดเจน
- แกนควรเริ่มต้นที่เลข 0

VARIATIONS OF BAR CHARTS

PAGE VIEWS, BY MONTH



VERTICAL (COLUMN CHART)

Best used for chronological data (time-series should always run left to right), or when visualizing negative values below the x-axis.

CONTENT PUBLISHED, BY CATEGORY

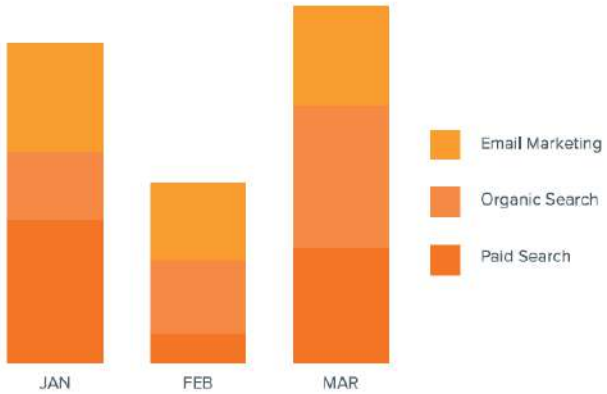
HORIZONTAL

Best used for data with long category labels.

BAR CHART

VARIATIONS OF BAR CHARTS (CONT.)

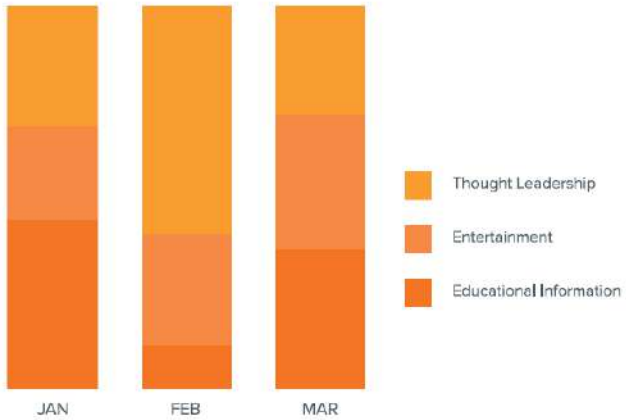
MONTHLY TRAFFIC, BY SOURCE



STACKED

Best used when there is a need to compare multiple part-to-whole relationships. These can use discrete or continuous data, oriented either vertically or horizontally.

PERCENTAGE OF CONTENT PUBLISHED, BY MONTH

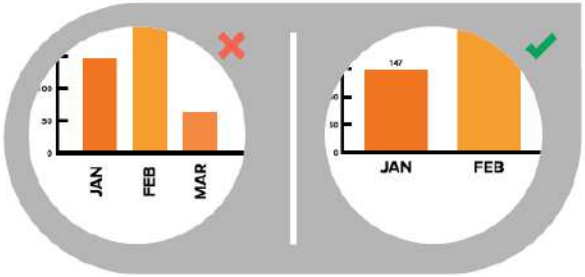


100% STACKED

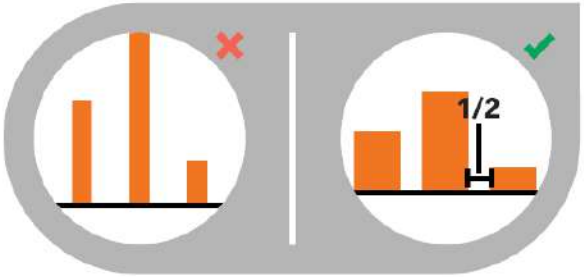
Best used when the total value of each category is unimportant and percentage distribution of subcategories is the primary message.

BAR CHART

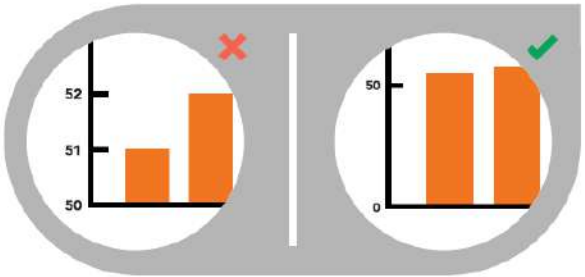
DESIGN BEST PRACTICES



USE HORIZONTAL LABELS
Avoid steep diagonal or vertical type, as it can be difficult to read.

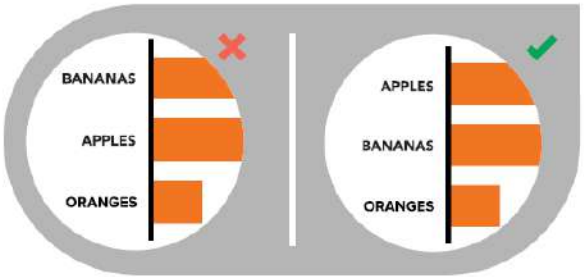


SPACE BARS APPROPRIATELY
Space between bars should be ½ bar width.



START THE Y-AXIS VALUE AT 0
Starting at a value above zero truncates the bars and doesn't accurately reflect the full value.

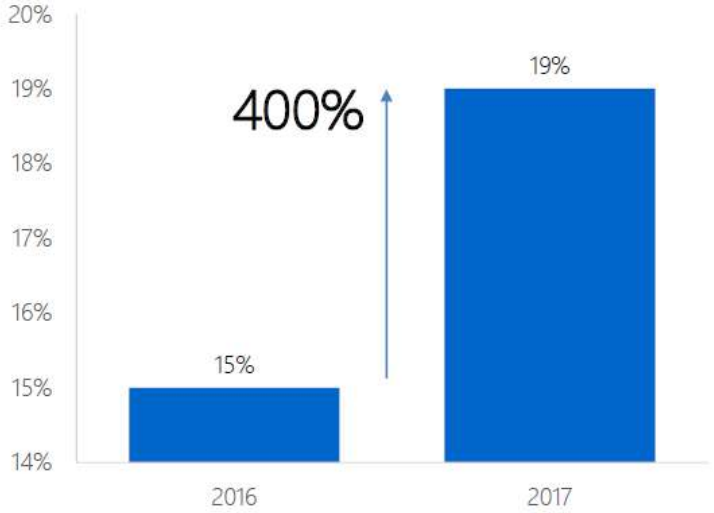
USE CONSISTENT COLORS
Use one color for bar charts. You may use an accent color to highlight a significant data point.



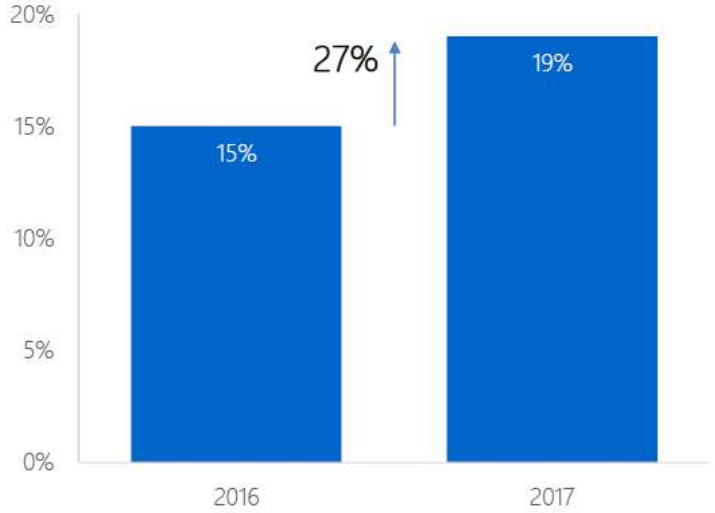
ORDER DATA APPROPRIATELY
Order categories alphabetically, sequentially, or by value.

Bars: Always use 0 baseline

Non zero baseline



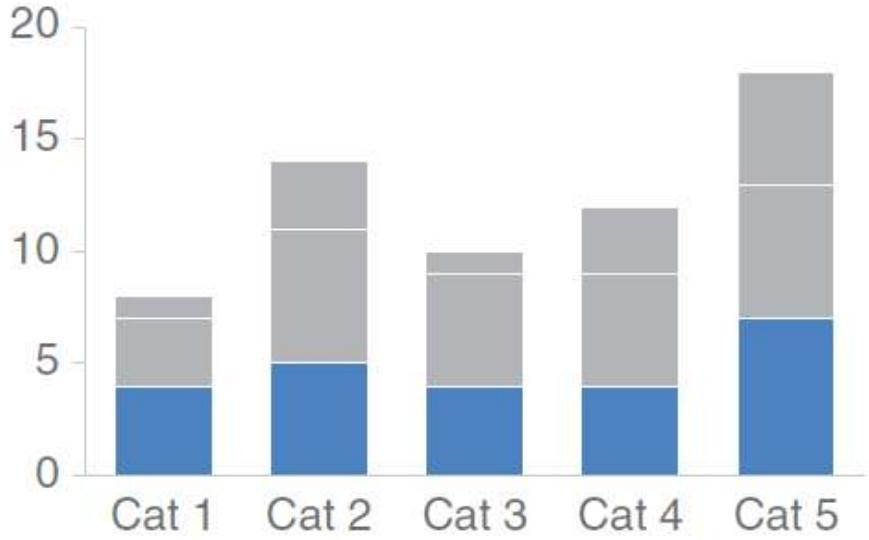
Zero baseline



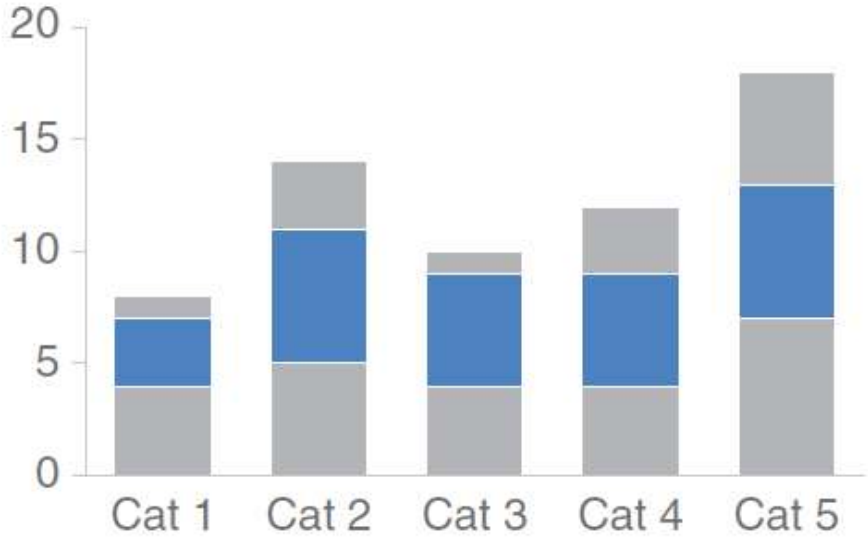
Source: Storytelling with data

Stacked vertical bar chart

Comparing **these** is easy

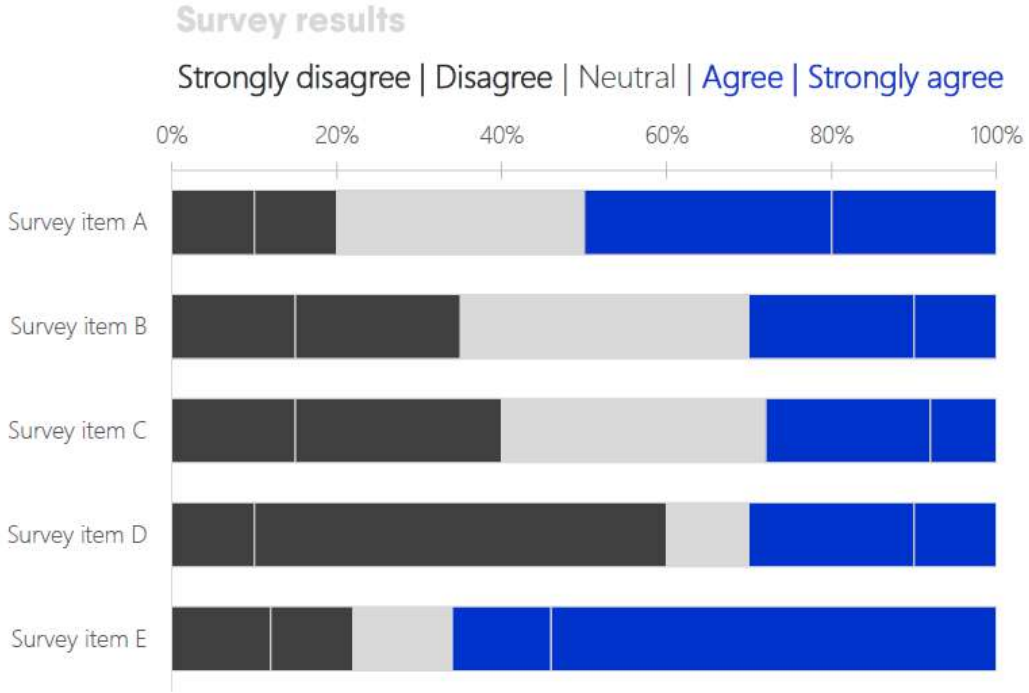


Comparing **these** is hard



Best chart for Likert scale

100% stacked bar chart is very useful for survey results

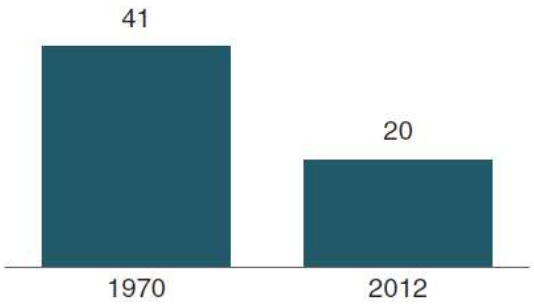


Source: Storytelling with data

Simple text

Children with a "Traditional" Stay-at-Home Mother

% of children with a married stay-at-home mother with a working husband



Note: Based on children younger than 18. Their mothers are categorized based on employment status in 1970 and 2012.

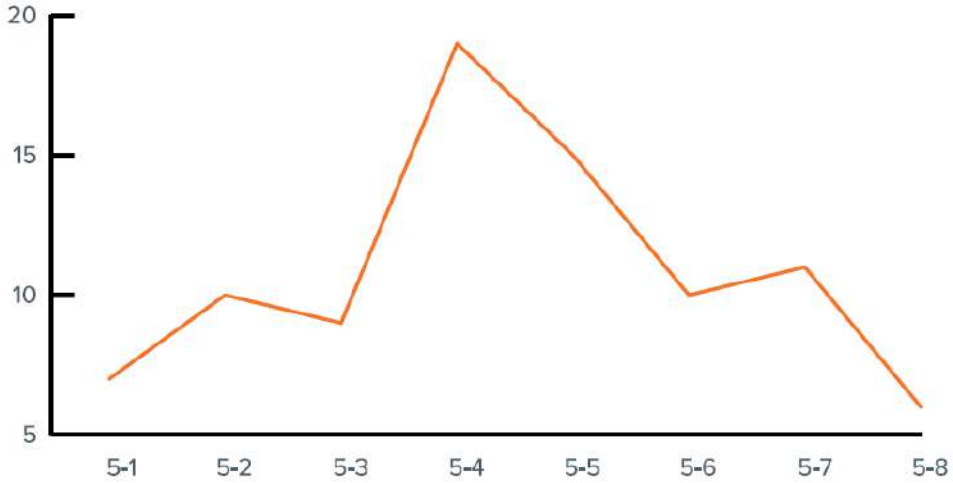
20%

of children had a **traditional stay-at-home mom** in 2012, compared to 41% in 1970

LINE CHART

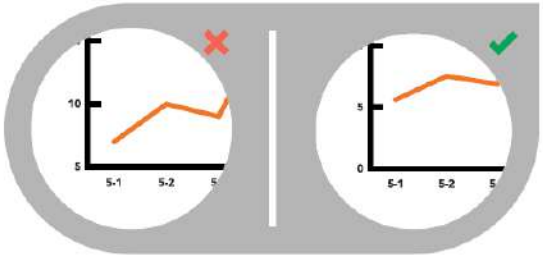
Line charts are used to show time-series relationships with continuous data. They help show trend, acceleration, deceleration, and volatility.

DIRECT MARKETING VIEWS, BY DATE

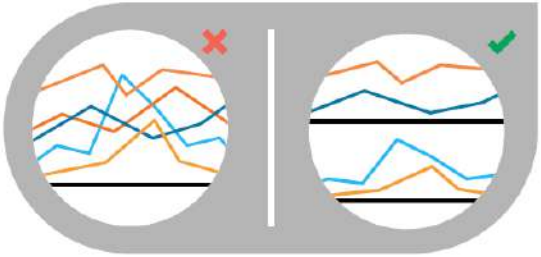


LINE CHART

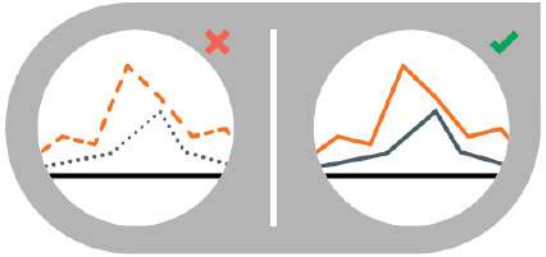
DESIGN BEST PRACTICES



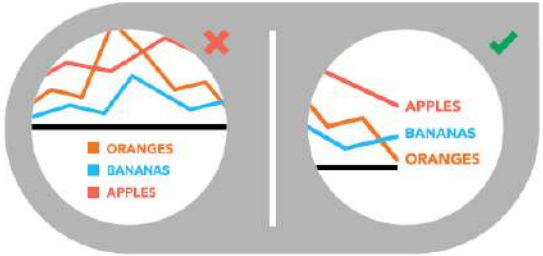
INCLUDE A ZERO BASELINE IF POSSIBLE
Although a line chart does not have to start at a zero baseline, it should be included if possible. If relatively small fluctuations in data are meaningful (e.g., in stock market data), you may truncate the scale to showcase these variances.



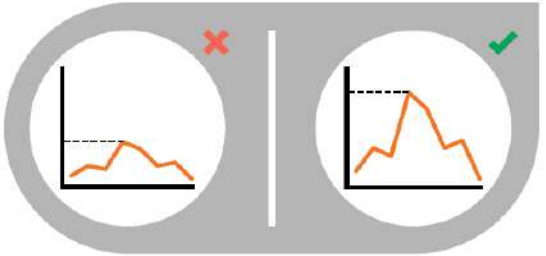
DON'T PLOT MORE THAN 4 LINES
If you need to display more, break them out into separate charts for better comparison.



USE SOLID LINES ONLY
Dashed and dotted lines can be distracting.



LABEL THE LINES DIRECTLY
This lets readers quickly identify lines and corresponding labels instead of referencing a legend.

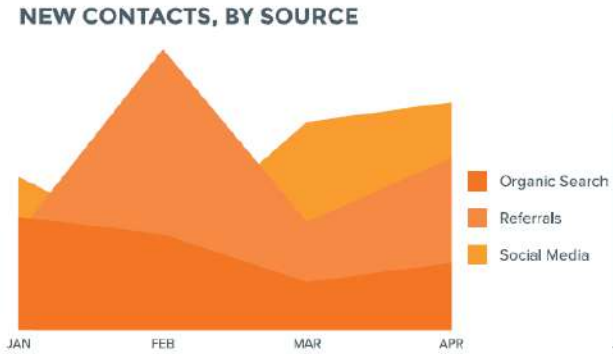


USE THE RIGHT HEIGHT
Plot all data points so that the line chart takes up approximately two-thirds of the y-axis' total scale.

AREA CHART

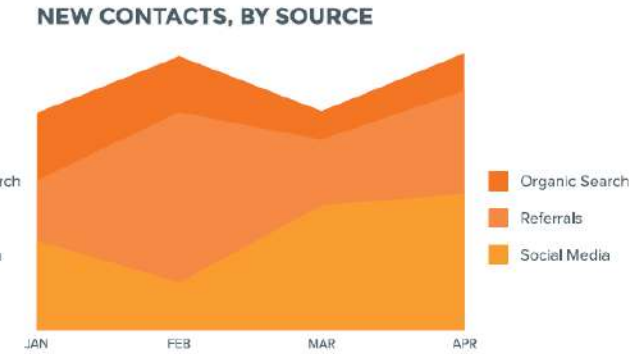
Area charts depict a time-series relationship, but they are different than line charts in that they can represent volume.

VARIATIONS OF AREA CHARTS



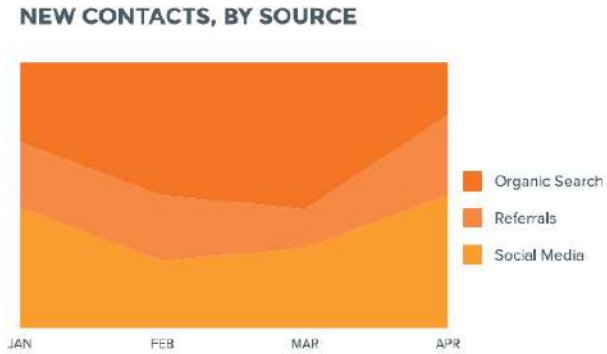
AREA CHART

Best used to show or compare a quantitative progression over time.



STACKED AREA

Best used to visualize part-to-whole relationships, helping show how each category contributes to the cumulative total.

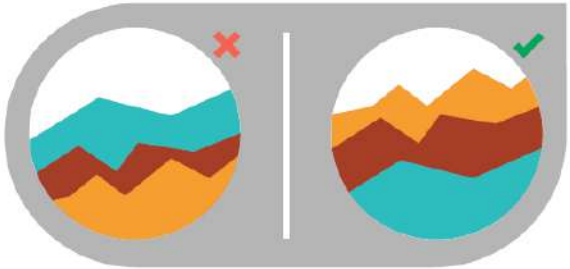


100% STACKED AREA

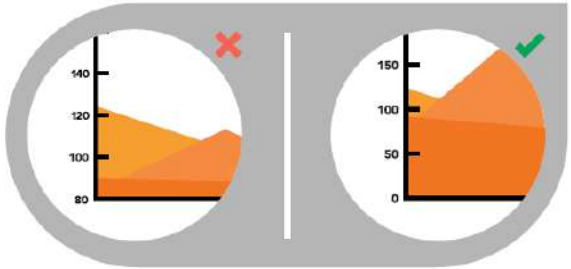
Best used to show distribution of categories as part of a whole, where the cumulative total is unimportant.

AREA CHART

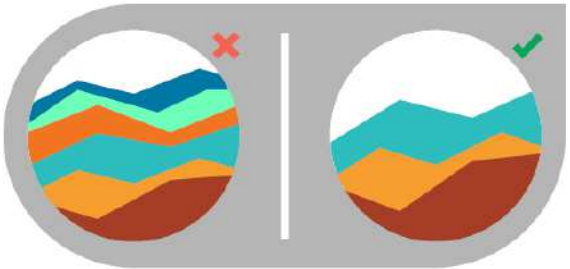
DESIGN BEST PRACTICES



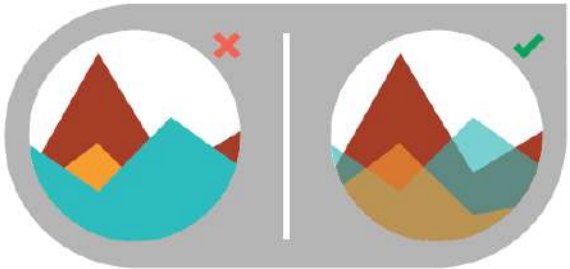
MAKE IT EASY TO READ
In stacked area charts, arrange data to position categories with highly variable data on the top of the chart and low variability on the bottom.



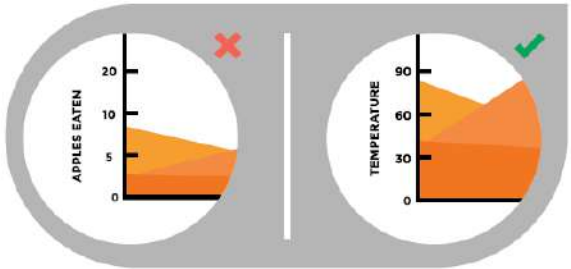
START Y-AXIS VALUE AT 0
Starting the axis above zero truncates the visualization of values.



DON'T DISPLAY MORE THAN 4 DATA CATEGORIES
Too many will result in a cluttered visual that is difficult to decipher.

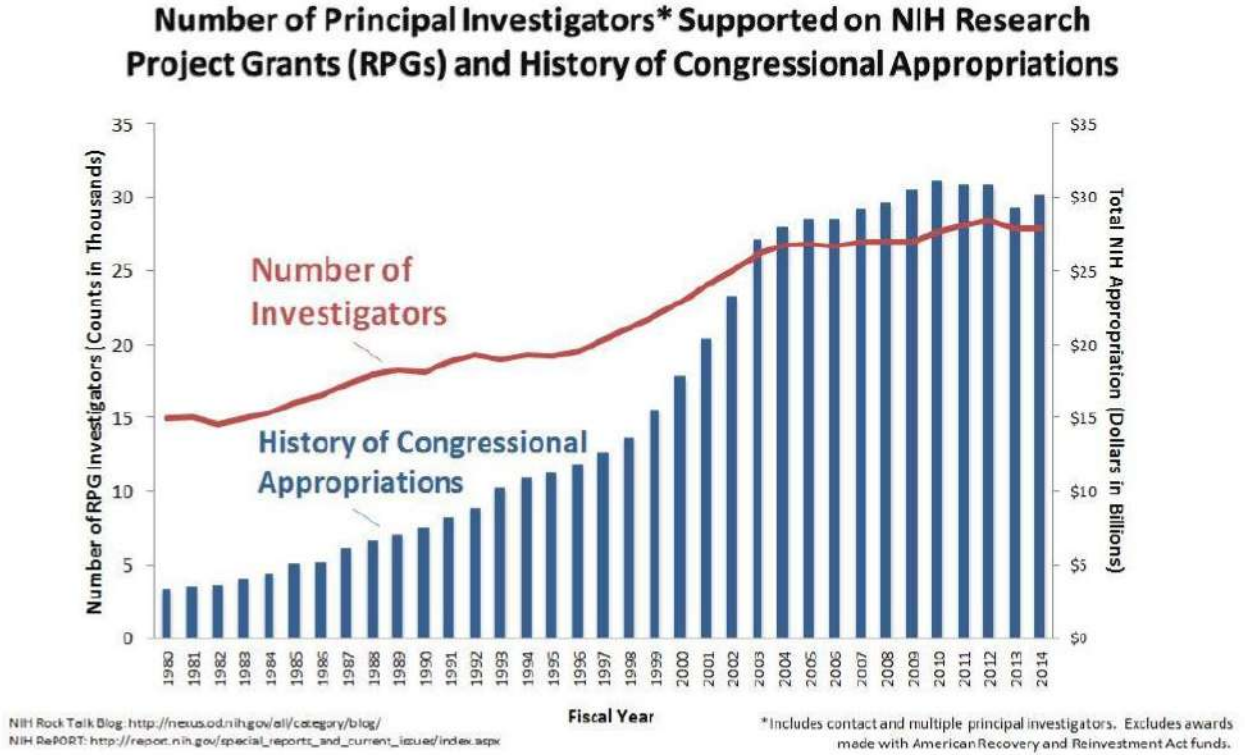


USE TRANSPARENT COLORS
In standard area charts, ensure data isn't obscured in the background by ordering thoughtfully and using transparency.



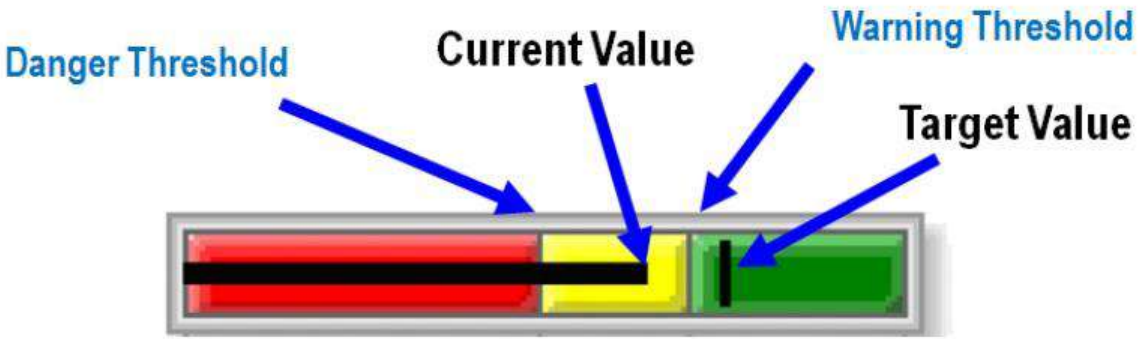
DON'T USE AREA CHARTS TO DISPLAY DISCRETE DATA
The connected lines imply intermediate values, which only exist with continuous data.

Bar Chart + Line Chart

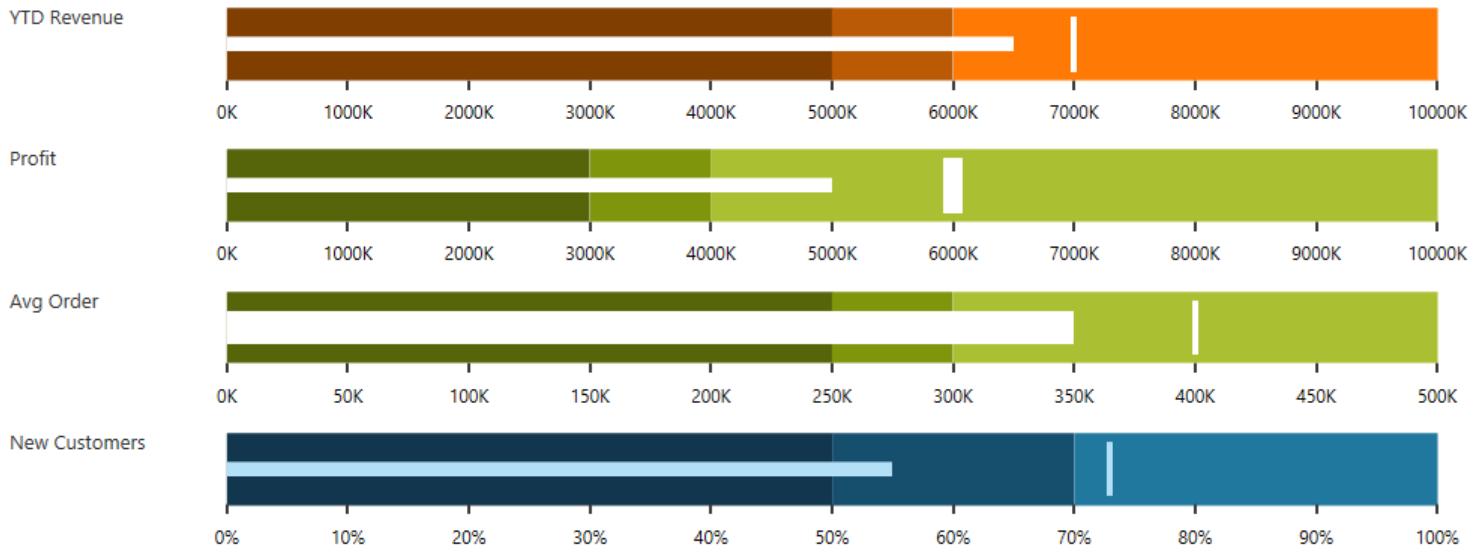


Bullet Chart

- When to use: Evaluating performance of a metric against a goal
- Possible extension
  - Use color to illustrate
  - achievement thresholds



Bullet Chart



What do you want to tell from your data?

1.Comparison

Bar Chart

Line Chart

Bullet Chart

2.Relationship

Scatter Plot

Map

Bubble Chart

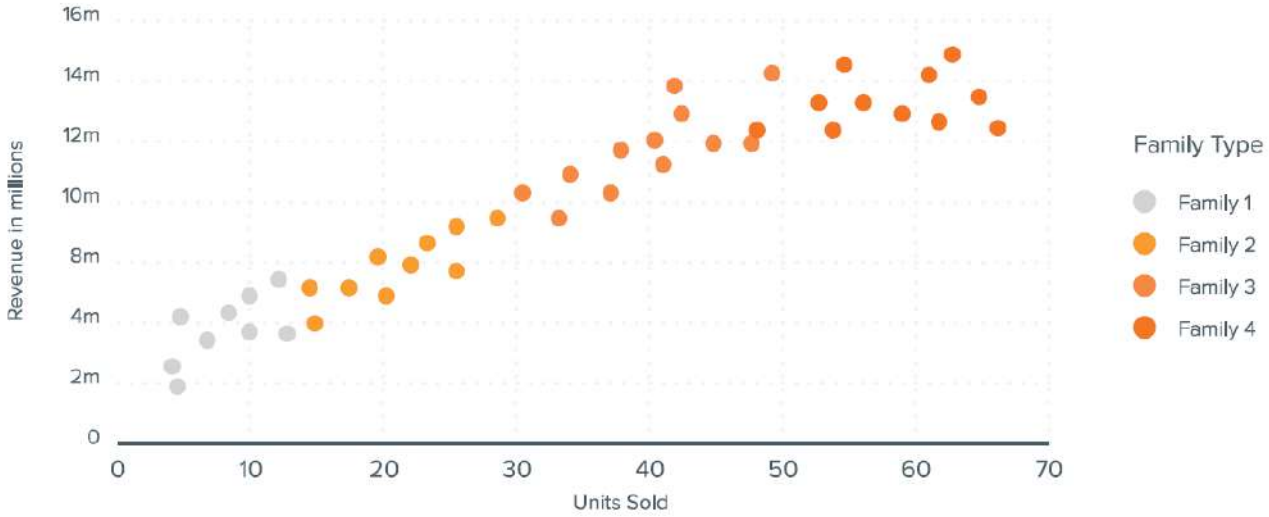
Heat Map

Crosstab/Highlight table

SCATTER PLOT

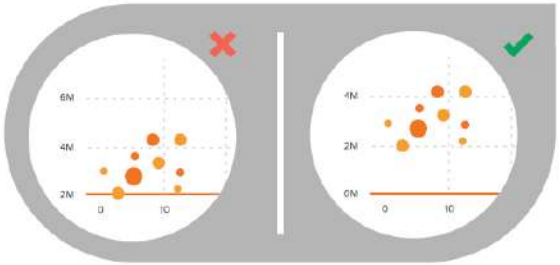
Scatter plots show the relationship between items based on two sets of variables. They are best used to show correlation in a large amount of data.

REVENUE, BY PRODUCT FAMILY

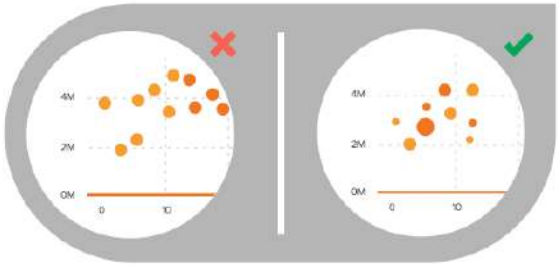


SCATTER PLOT

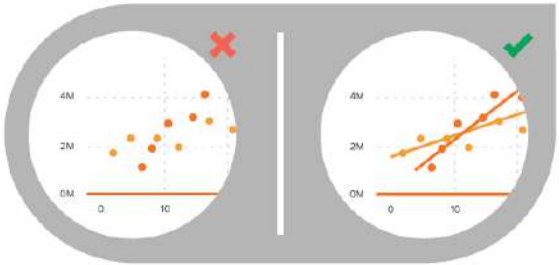
DESIGN BEST PRACTICES



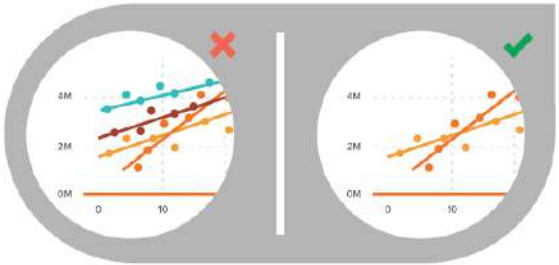
START Y-AXIS VALUE AT 0
Starting the axis above zero truncates the visualization of values.



INCLUDE MORE VARIABLES
Use size and dot color to encode additional data variables.



USE TREND LINES
These help draw correlation between the variables to show trends.



DON'T COMPARE MORE THAN 2 TREND LINES
Too many lines make data difficult to interpret.

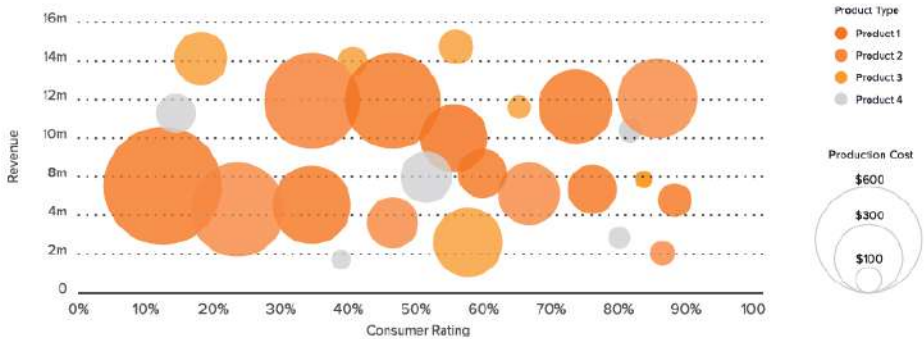
BUBBLE CHART

Bubble charts are good for displaying nominal comparisons or ranking relationships.

Bubble Chart คือ Scatter Plot ที่ขนาดของจุดแต่ละจุด
สามารถบอกถึงความแตกต่างของข้อมูลได้

VARIATIONS OF BUBBLE CHARTS

REVENUE VS. RATING



BIGGEST SALES INCREASE

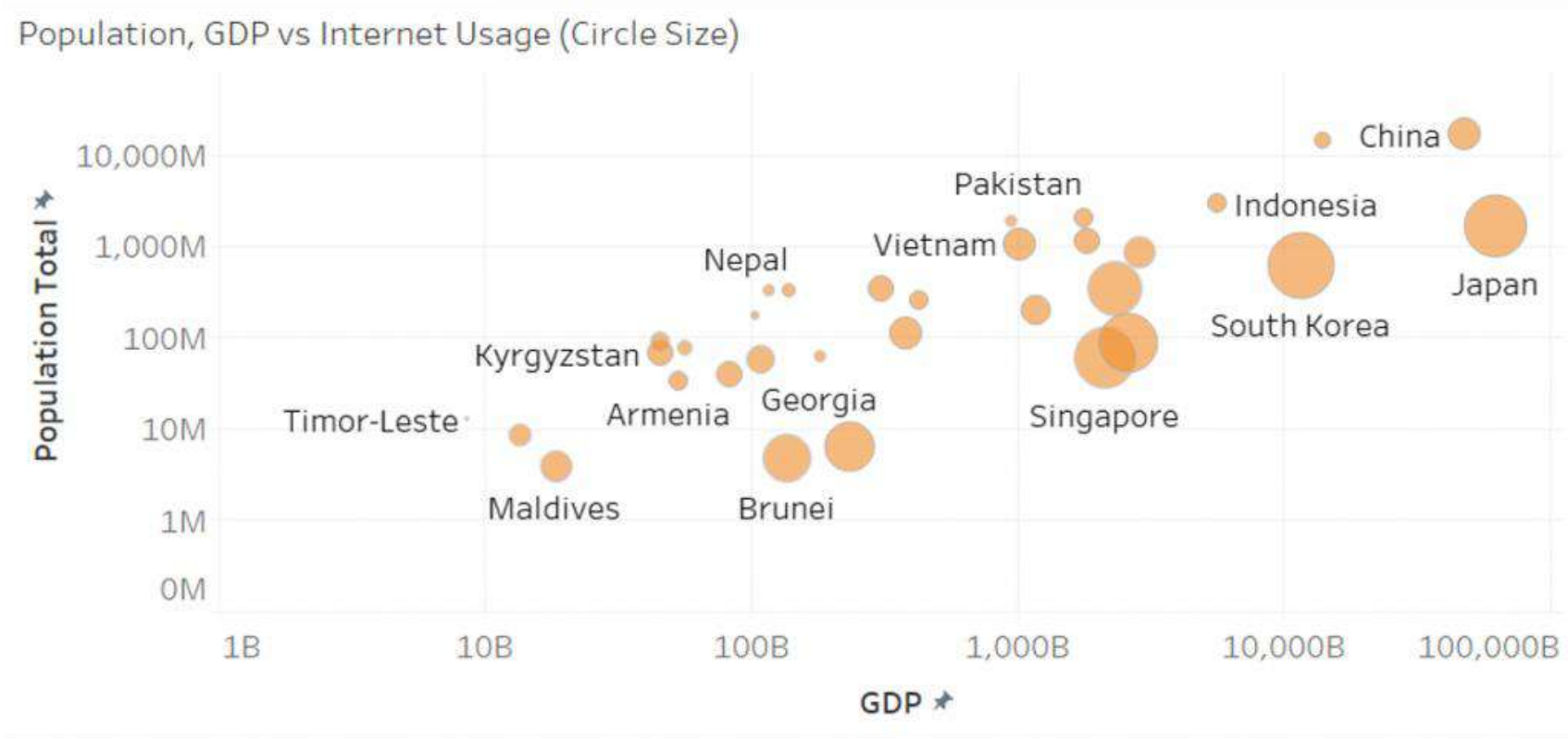
BUBBLE PLOT

This is a scatter plot with bubbles, best used to display an additional variable.

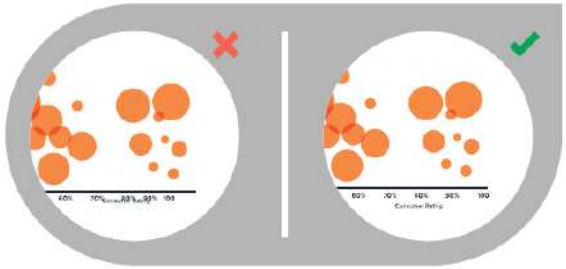
BUBBLE MAP

Best used for visualizing values for specific geographic regions.

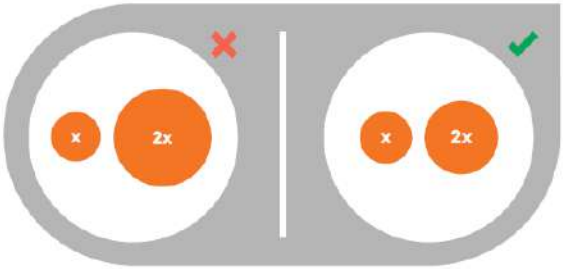
BUBBLE CHART



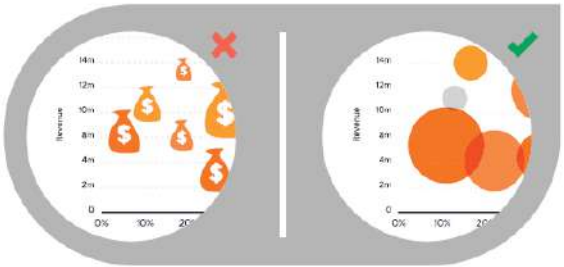
https://bigdata.go.th/big-data-101/picking-chart-for-data-visualization/



MAKE SURE LABELS ARE VISIBLE
All labels should be unobstructed and easily identified with the corresponding bubble.



SIZE BUBBLES APPROPRIATELY
Bubbles should be scaled according to area, not diameter.



DON'T USE ODD SHAPES
Avoid adding too much detail or using shapes that are not entirely circular; this can lead to inaccuracies.

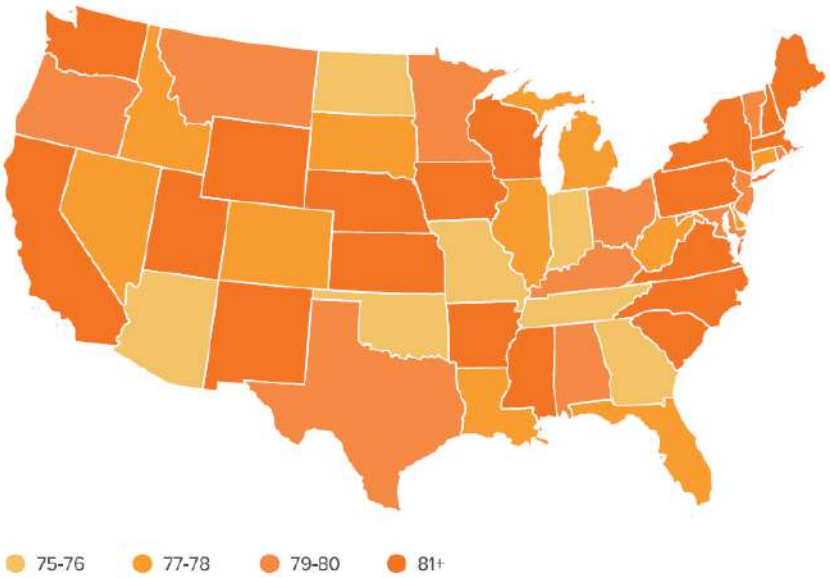
BUBBLE CHART

DESIGN BEST PRACTICES

HEAT MAP

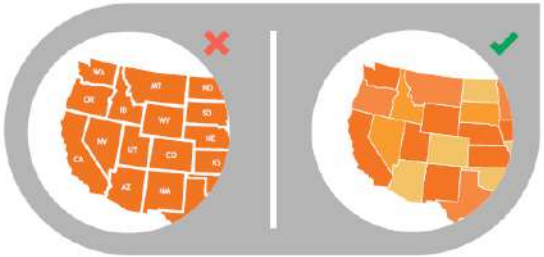
Heat maps display categorical data, using intensity of color to represent values of geographic areas or data tables.

STATES WITH NEW SERVICE CONTRACTS

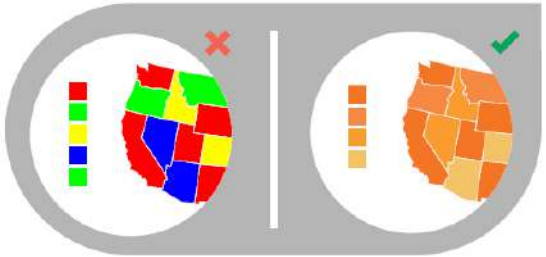


HEAT MAP

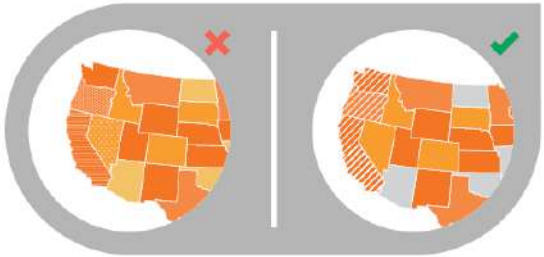
DESIGN BEST PRACTICES



USE A SIMPLE MAP OUTLINE
These lines are meant to frame the data, not distract.



SELECT COLORS APPROPRIATELY
Some colors stand out more than others, giving unnecessary weight to that data. Instead, use a single color with varying shade or a spectrum between two analogous colors to show intensity. Also remember to intuitively code color intensity according to values.

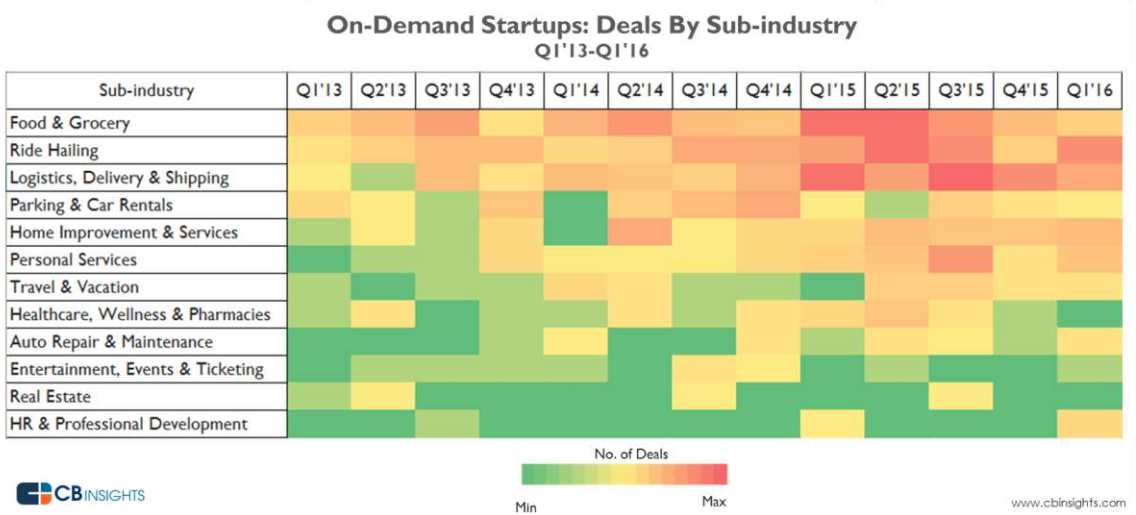


USE PATTERNS SPARINGLY
A pattern overlay that indicates a second variable is acceptable, but using multiple is overwhelming and distracting.

CHOOSE APPROPRIATE DATA RANGES
Select 3-5 numerical ranges that enable fairly even distribution of data between them. Use +/- signs to extend high and low ranges.

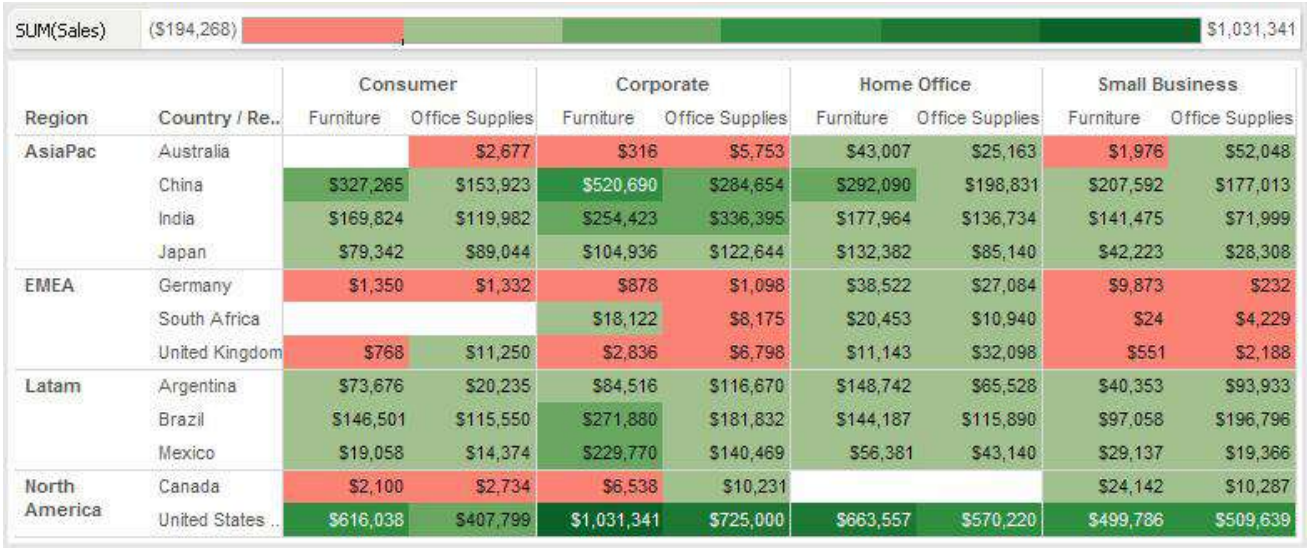
Heat Map

- When to use: Showing the relationship between two factors
- Possible extension
  - Vary the size of squares
  - Using something other than squares



Crosstab/Highlight table

- When to use: Providing detailed information on heat maps
- Possible extension
  - Combine highlight tables with other chart types



Region	Country / Re..	Consumer		Corporate		Home Office		Small Business	
		Furniture	Office Supplies	Furniture	Office Supplies	Furniture	Office Supplies	Furniture	Office Supplies
AsiaPac	Australia		$2,677	$316	$5,753	$43,007	$25,163	$1,976	$52,048
	China	$327,265	$153,923	$520,690	$284,654	$292,090	$198,831	$207,592	$177,013
	India	$169,824	$119,982	$254,423	$336,395	$177,964	$136,734	$141,475	$71,999
	Japan	$79,342	$89,044	$104,936	$122,644	$132,382	$85,140	$42,223	$28,308
EMEA	Germany	$1,350	$1,332	$878	$1,098	$38,522	$27,084	$9,873	$232
	South Africa			$18,122	$8,175	$20,453	$10,940	$24	$4,229
	United Kingdom	$768	$11,250	$2,836	$6,798	$11,143	$32,098	$551	$2,188
Latam	Argentina	$73,676	$20,235	$84,516	$116,670	$148,742	$65,528	$40,353	$93,933
	Brazil	$146,501	$115,550	$271,880	$181,832	$144,187	$115,890	$97,058	$196,796
	Mexico	$19,058	$14,374	$229,770	$140,469	$56,381	$43,140	$29,137	$19,366
North America	Canada	$2,100	$2,734	$6,538	$10,231			$24,142	$10,287
	United States ..	$616,038	$407,799	$1,031,341	$725,000	$663,557	$570,220	$499,786	$509,639

Tables

Data should be what stands out, not border

Heavy borders

Group	Metric A	Metric B	Metric C
Group1	$X.X	Y%	Z.ZZZ
Group2	$X.X	Y%	Z.ZZZ
Group3	$X.X	Y%	Z.ZZZ
Group4	$X.X	Y%	Z.ZZZ
Group5	$X.X	Y%	Z.ZZZ

Light borders

Group	Metric A	Metric B	Metric C
Group1	$X.X	Y%	Z.ZZZ
Group2	$X.X	Y%	Z.ZZZ
Group3	$X.X	Y%	Z.ZZZ
Group4	$X.X	Y%	Z.ZZZ
Group5	$X.X	Y%	Z.ZZZ

Minimal borders

Group	Metric A	Metric B	Metric C
Group1	$X.X	Y%	Z.ZZZ
Group2	$X.X	Y%	Z.ZZZ
Group3	$X.X	Y%	Z.ZZZ
Group4	$X.X	Y%	Z.ZZZ
Group5	$X.X	Y%	Z.ZZZ

Source: Storytelling with data

Tables: Heatmap

Use color saturation to highlight cells, do it easy in Excel

Table

	A	B	C
Category 1	15%	22%	42%
Category 2	40%	36%	20%
Category 3	35%	17%	34%
Category 4	30%	29%	26%
Category 5	55%	30%	58%
Category 6	11%	25%	49%

Heatmap

LOW-**HIGH**

	A	B	C
Category 1	15%	22%	42%
Category 2	40%	36%	20%
Category 3	35%	17%	34%
Category 4	30%	29%	26%
Category 5	55%	30%	58%
Category 6	11%	25%	49%

What do you want to tell from your data?

1.Comparison

- Bar Chart
- Line Chart
- Bullet Chart

2.Relationship

- Scatter Plot
- Map
- Bubble Chart
- Heat Map
- Crosstab/Highlight table

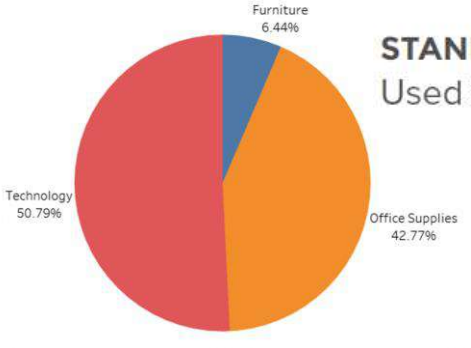
3.Composition

- Pie Chart
- Tree Map

PIE CHART

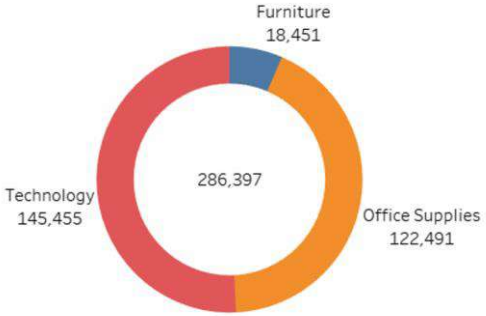
Pie charts are best used for making part-to-whole comparisons with discrete or continuous data. They are most impactful with a small data set.

VARIATIONS OF PIE CHARTS



STANDARD

Used to show part-to-whole relationships.



DONUT

Stylistic variation that enables the inclusion of a total value or design element in the center.

ใช้แสดงส่วนประกอบ หรือแสดงให้เห็นว่าแต่ละหมวดหมู่มีจำนวนหรือปริมาณที่เกี่ยวข้องเท่าใด

Note :

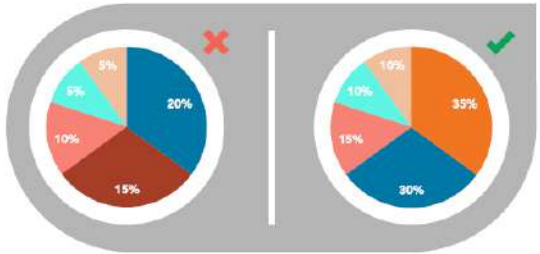
- ผลรวมต้องเท่ากับ 100%
- ต้องแสดงตัวเลข
- ไม่ควรใช้ในกรณีที่มีหมวดหมู่มากเกินไป (ไม่ควรเกิน 5 หมวดหมู่)

VISUALIZE NO MORE THAN 5 CATEGORIES PER CHART

It is difficult to differentiate between small values; depicting too many slices decreases the impact of the visualization. If needed, you can group smaller values into an "other" or "miscellaneous" category, but make sure it does not hide interesting or significant information.

DON'T USE MULTIPLE PIE CHARTS FOR COMPARISON

Slice sizes are very difficult to compare side-by-side. Use a stacked bar chart instead.



MAKE SURE ALL DATA ADDS UP TO 100%

Verify that values total 100% and that pie slices are sized proportionate to their corresponding value.

PIE CHART

DESIGN BEST PRACTICES

ORDER SLICES CORRECTLY

There are two ways to order sections, both of which are meant to aid comprehension:

OPTION 1

Place the largest section at 12 o'clock, going clockwise. Place the second largest section at 12 o'clock, going counterclockwise. The remaining sections can be placed below, continuing counterclockwise.

OPTION 2

Start the largest section at 12 o'clock, going clockwise. Place remaining sections in descending order, going clockwise.

What do you want to tell from your data?

1.Comparison

- Bar Chart
- Line Chart
- Bullet Chart

2.Relationship

- Scatter Plot
- Map
- Bubble Chart
- Heat Map
- Crosstab/Highlight table

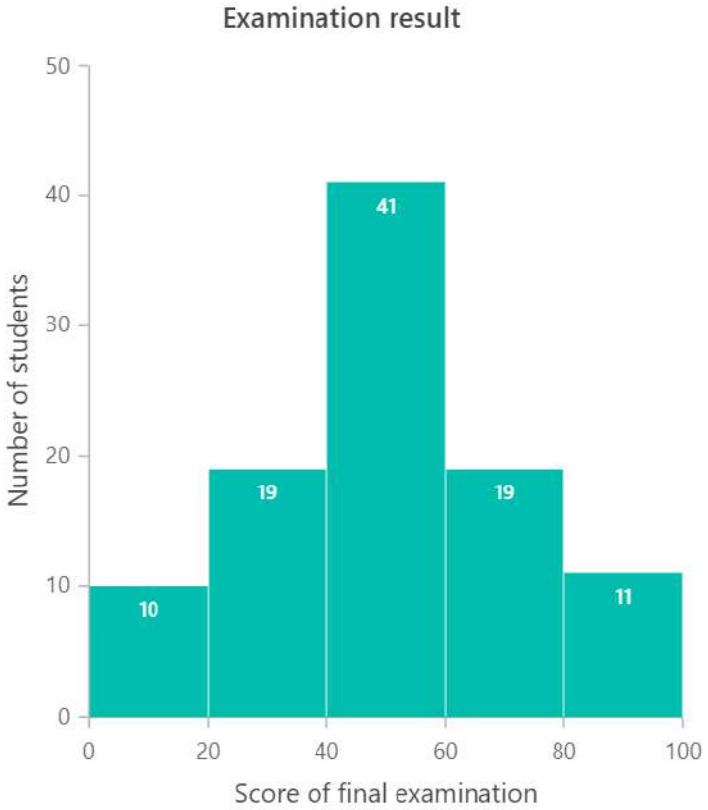
3.Composition

- Pie Chart
- Tree Map

4.Distribution

- Histogram Chart
- Box Plot

HISTOGRAM CHART

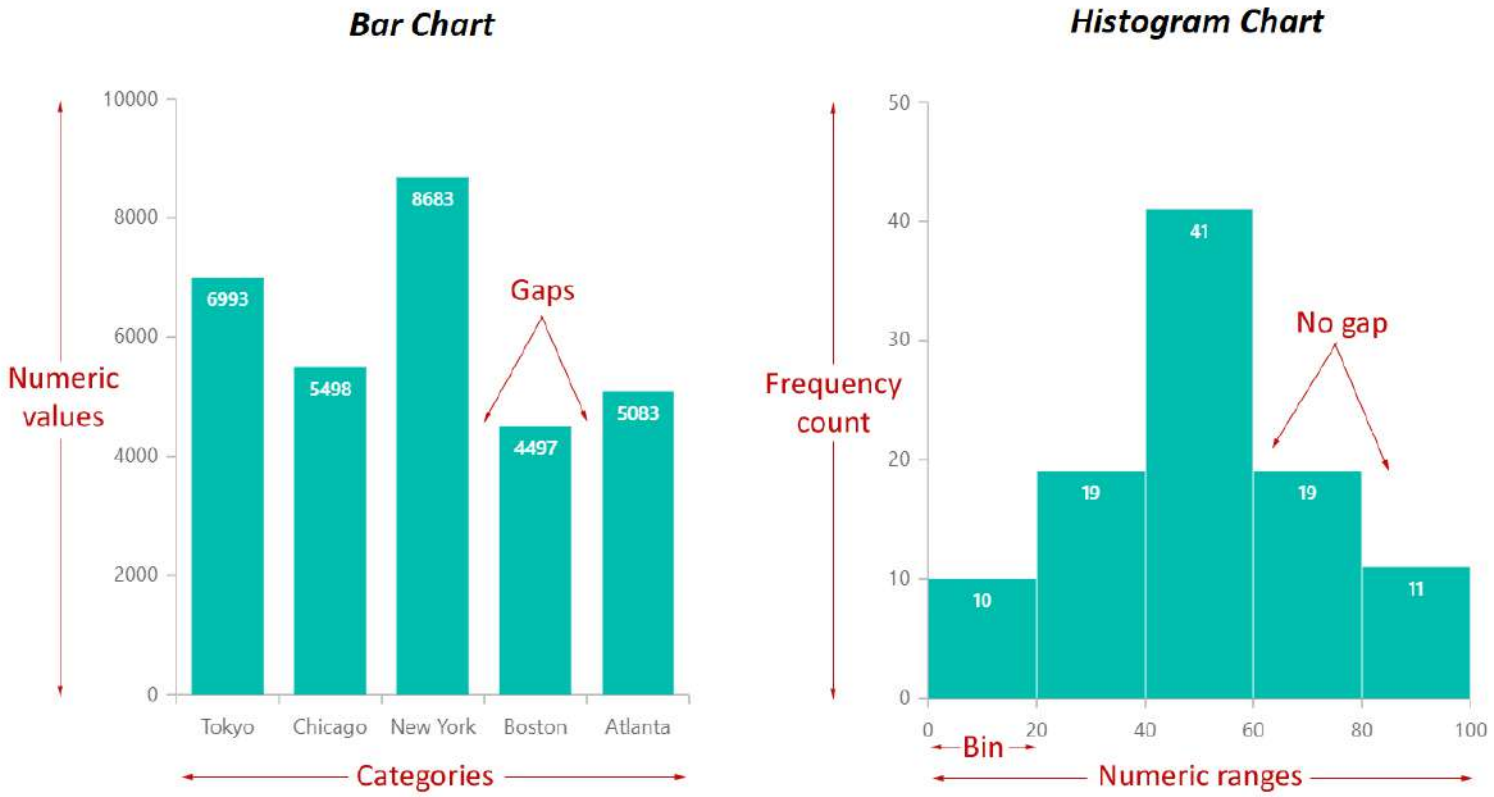


ใช้แสดงการกระจายตัวของข้อมูล

Note :

- ควรเลือกจำนวนของแท่ง (Bins) ให้เหมาะสม
- ต้องเข้าใจเรื่องการการกระจายตัวของข้อมูล ก่อนทำการวิเคราะห์
- ข้อมูลในแกน X (X-axis) มีความต่อเนื่อง

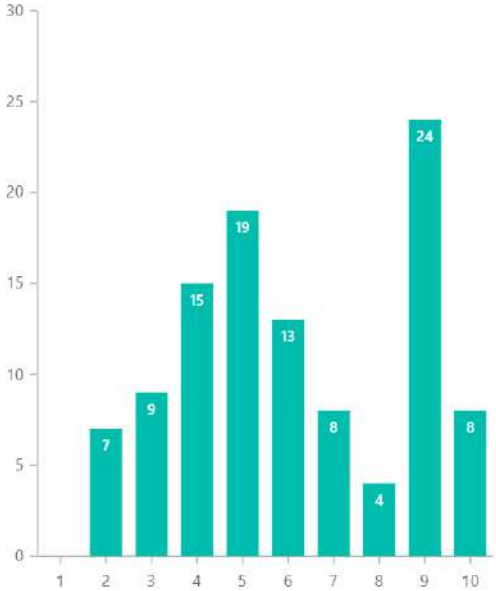
Bar chart vs Histogram



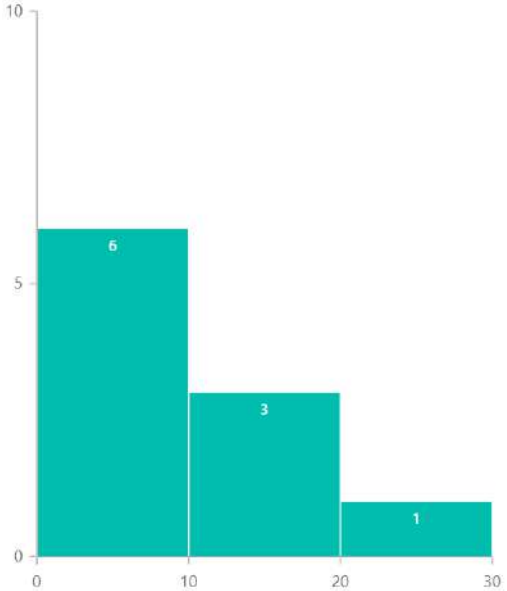
https://www.syncfusion.com/blogs/post/difference-between-bar-graph-and-histogram-chart.aspx

Bar chart vs Histogram

Here, you can see the output in a bar chart and a histogram chart for the same data set **[0, 7, 9, 15, 19, 13, 8, 4, 24, 8]**.



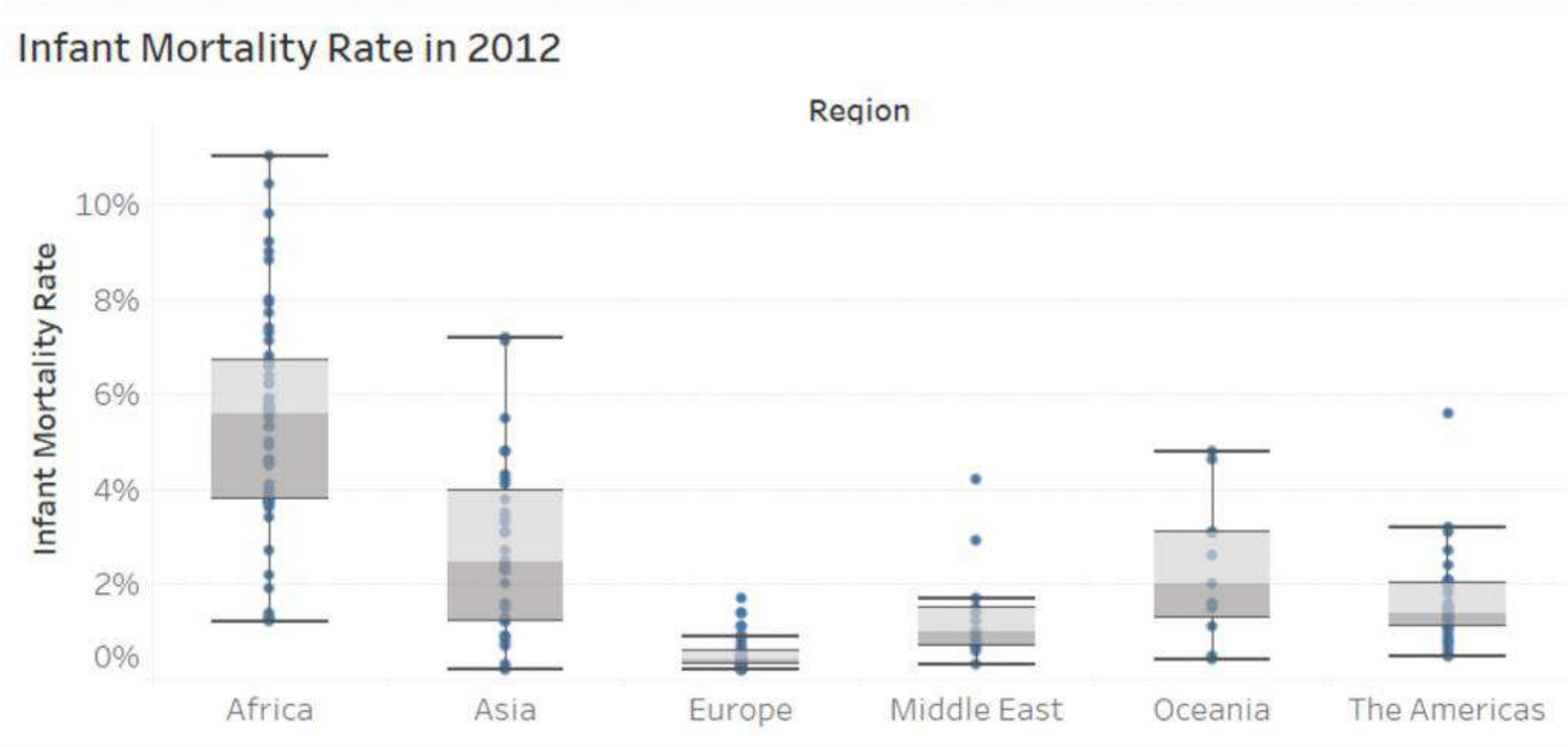
Bar Chart



Histogram Chart

https://www.syncfusion.com/blogs/post/difference-between-bar-graph-and-histogram-chart.aspx

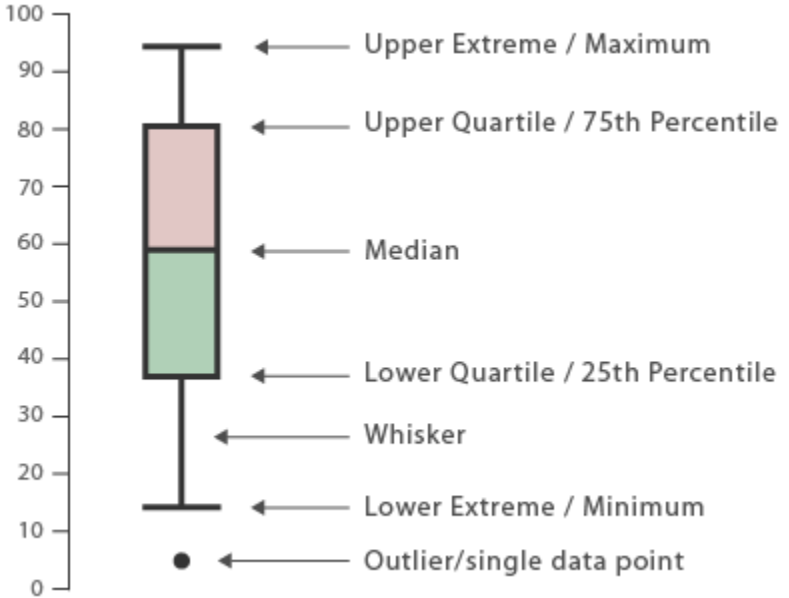
BOXPLOT



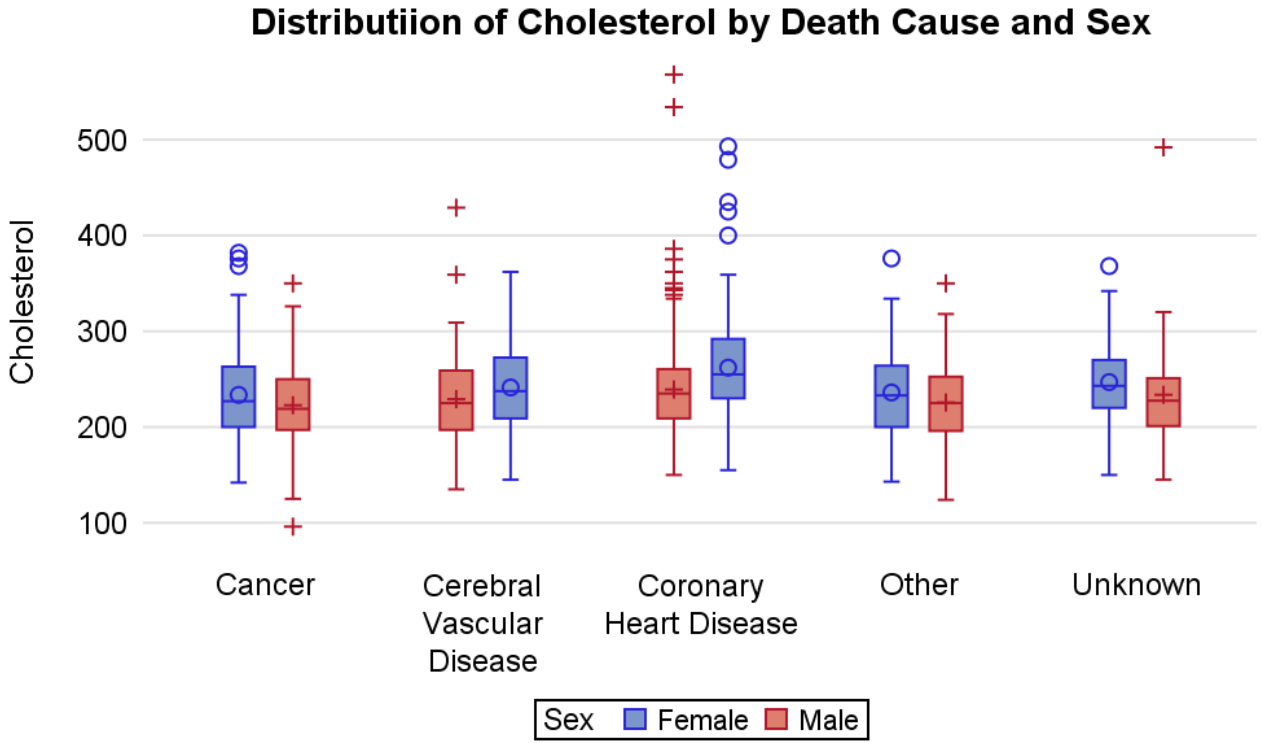
https://bigdata.go.th/big-data-101/picking-chart-for-data-visualization/

Box Plot

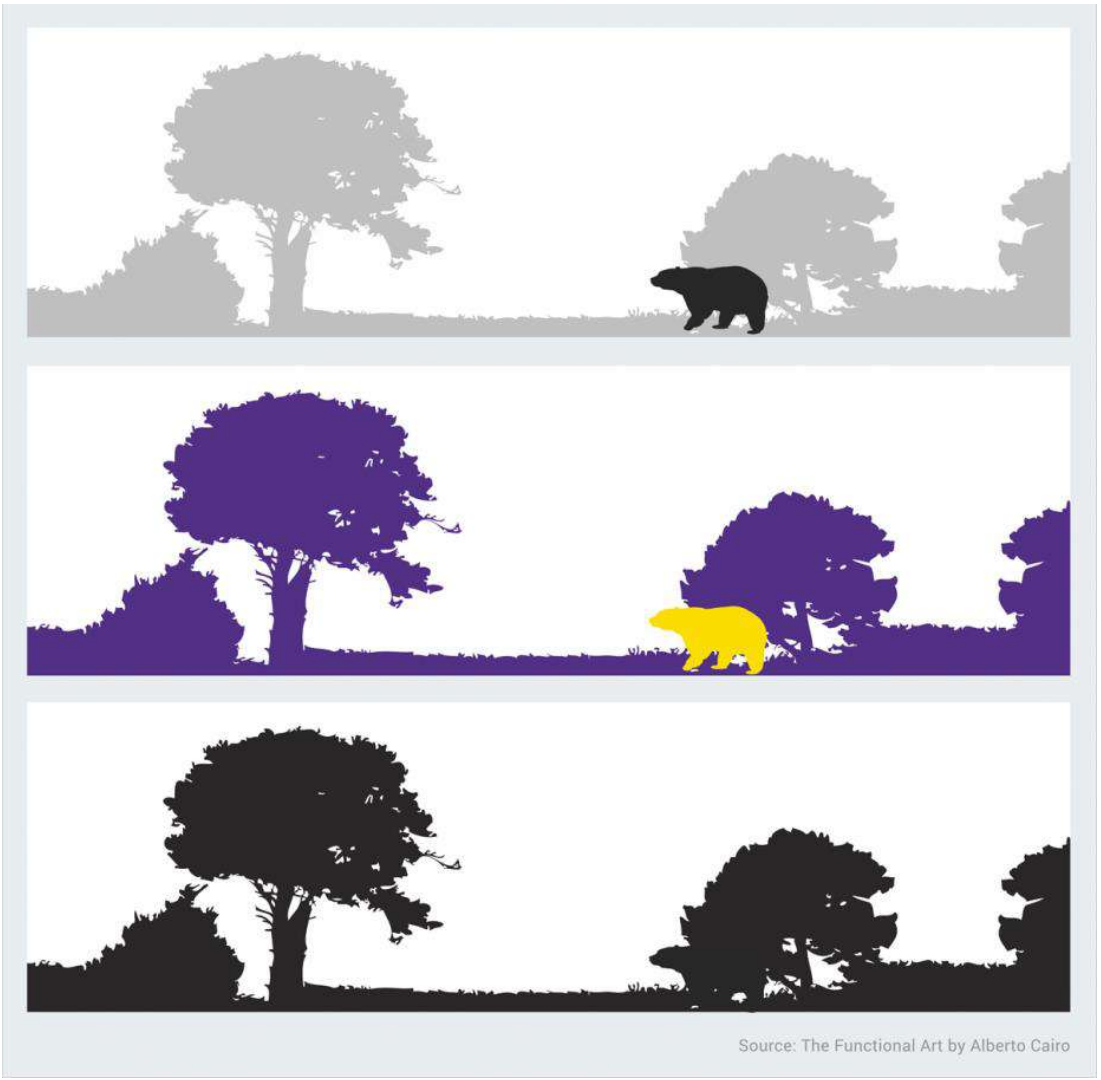
- When to use: Showing the distribution of a set of data
- Possible extension
  - Hiding the points within the box
  - Comparing boxplots across categorical dimensions



Box Plot


Distributiion of Cholesterol by Death Cause and Sex
Cholesterol
500
400
300
200
100
Cancer
Cerebral Vascular Disease
Coronary Heart Disease
Other
Unknown
Sex
Female
Male


Color should be
used strategically



Source: The Functional Art by Alberto Cairo

เรามองเห็น

ต้วหมี

ในภาพไหน

ได้ไวและชัดเจน

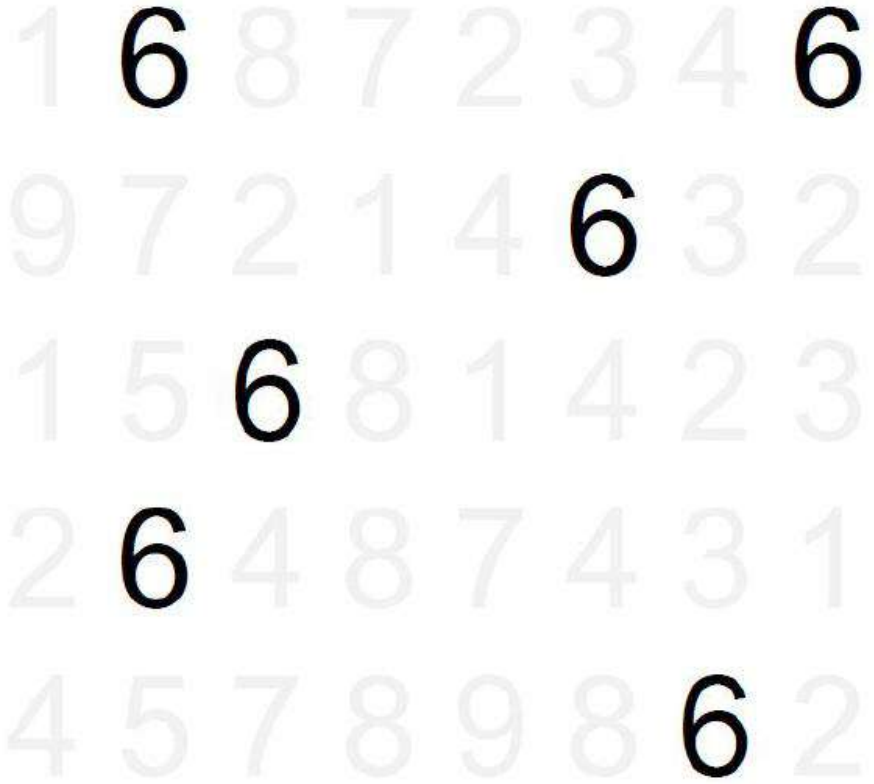
ที่สุด

Our visual brains are attracted by

Difference

เลข 6 มีกี่ตัว

Contrast



75%
ของการรับรู้ ของมนุษย์เกิดจาก
การมองเห็น

75%

ของการรับรู้ ของมนุษย์เกิดจาก

การมองเห็น

PRODUCT VARIETY

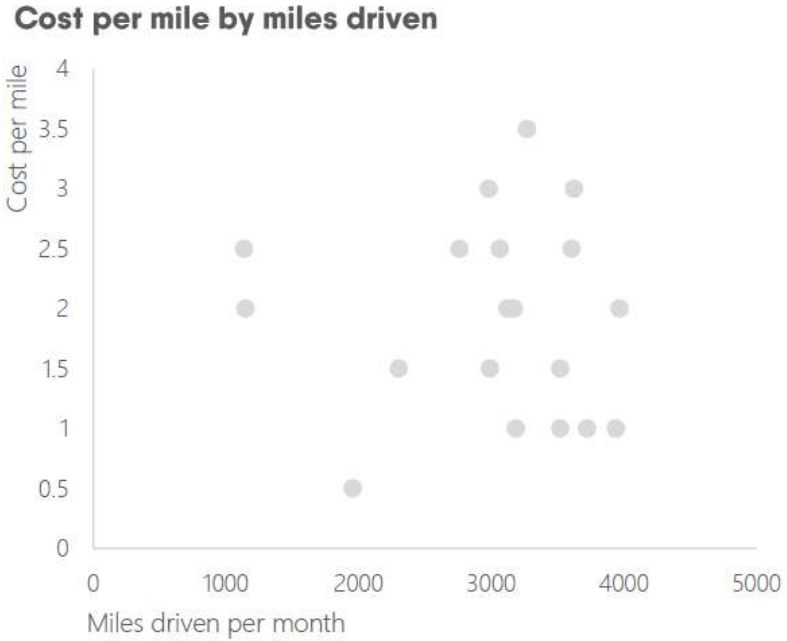
FRY 82%

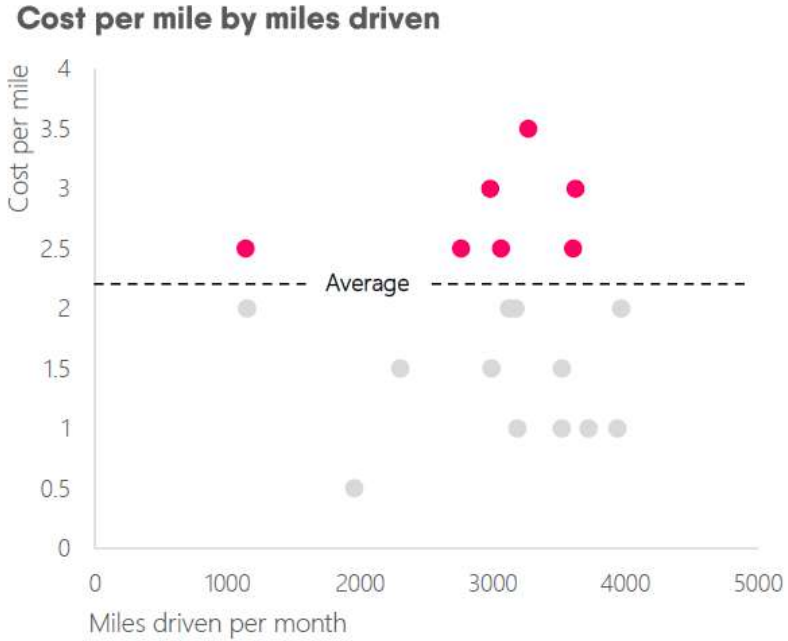
ธรรมชาติการรับรู้ของมนุษย์เรา คือ **การมองเห็น**

ใช้**ความแตกต่างของสี** เพื่อให้ข้อมูลเด่นชัด

ตัดรายละเอียดให้เหลือ**น้อยที่สุด** เพื่อให้สายตาได้โฟกันที่จุดสำคัญ

Scatter plot



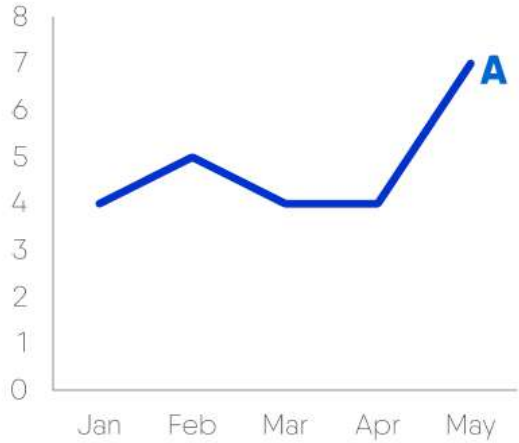


Source: Storytelling with data

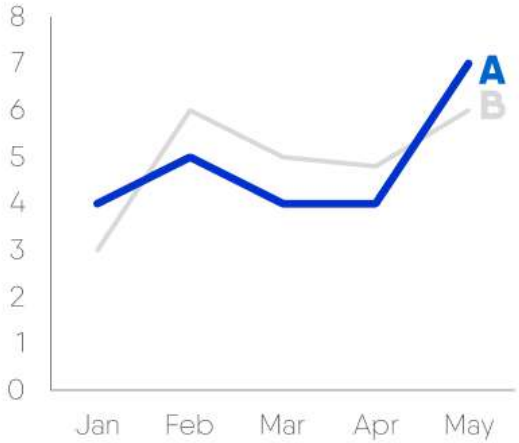
Lines

Be consistent with the interval of x axis

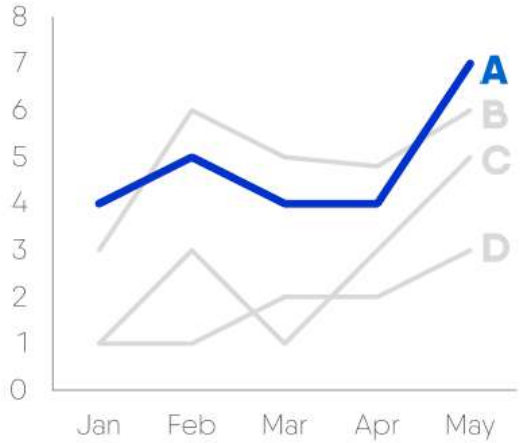
Single series



Two series



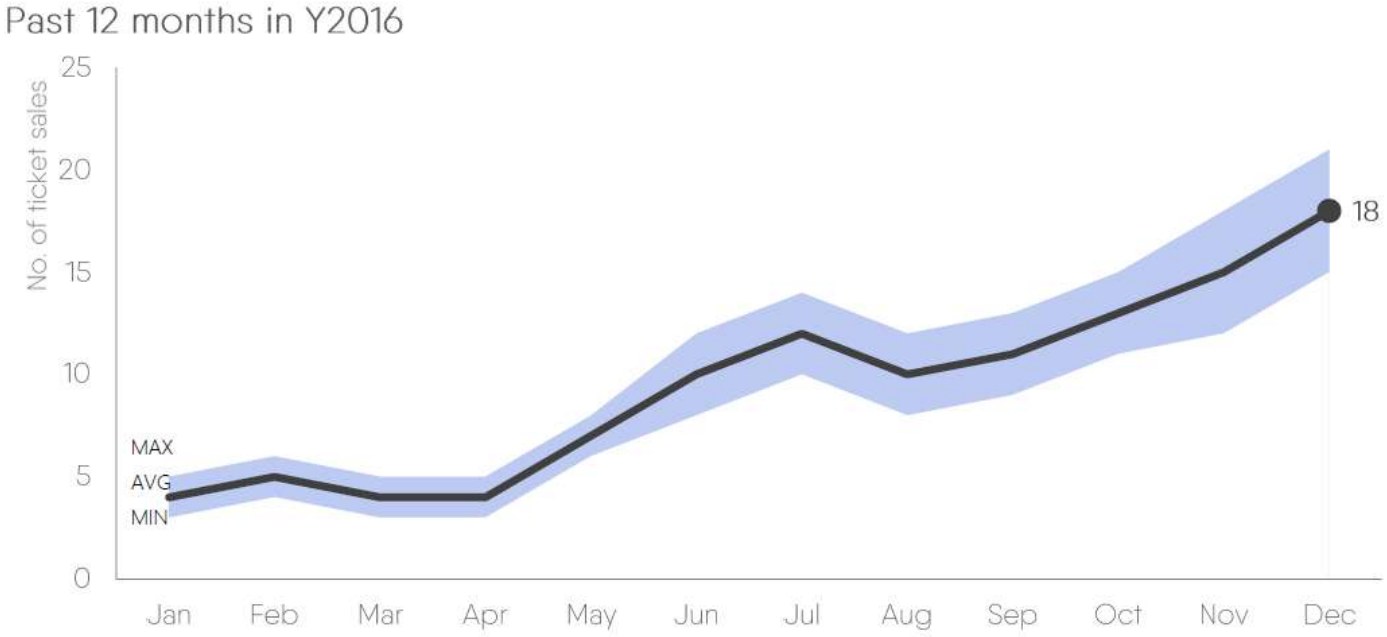
Multiple series



Source: Storytelling with data

Lines

Give a sense of confidence interval

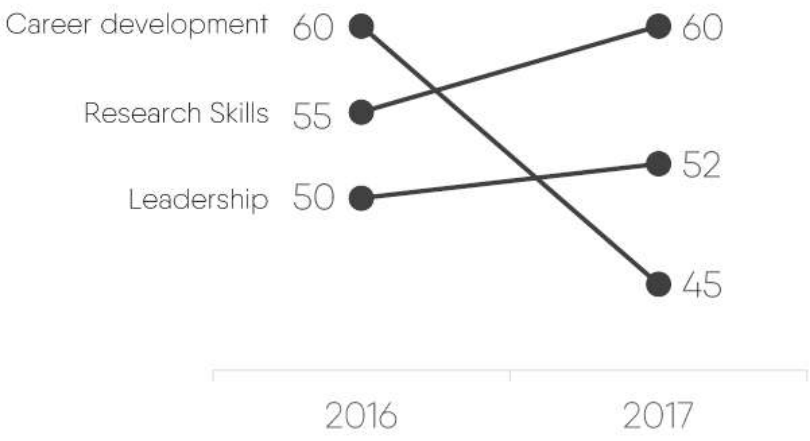


Use combo charts to create confidence interval, COOL!

Source: Storytelling with data

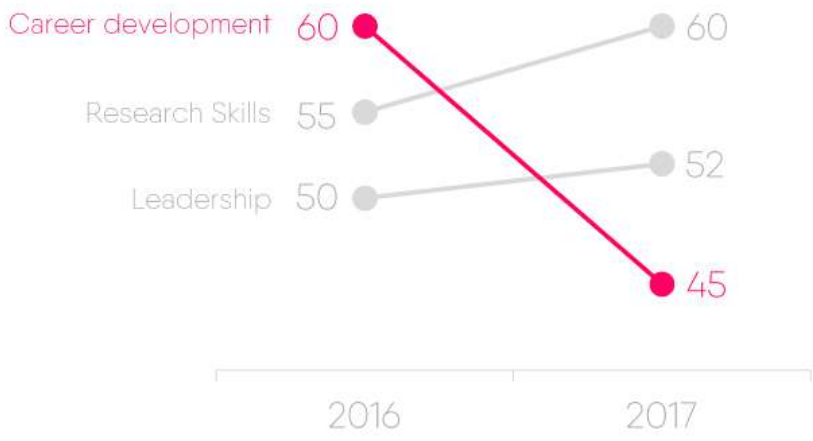
Slope graph

Employee feedback over time



Source: Employee survey results

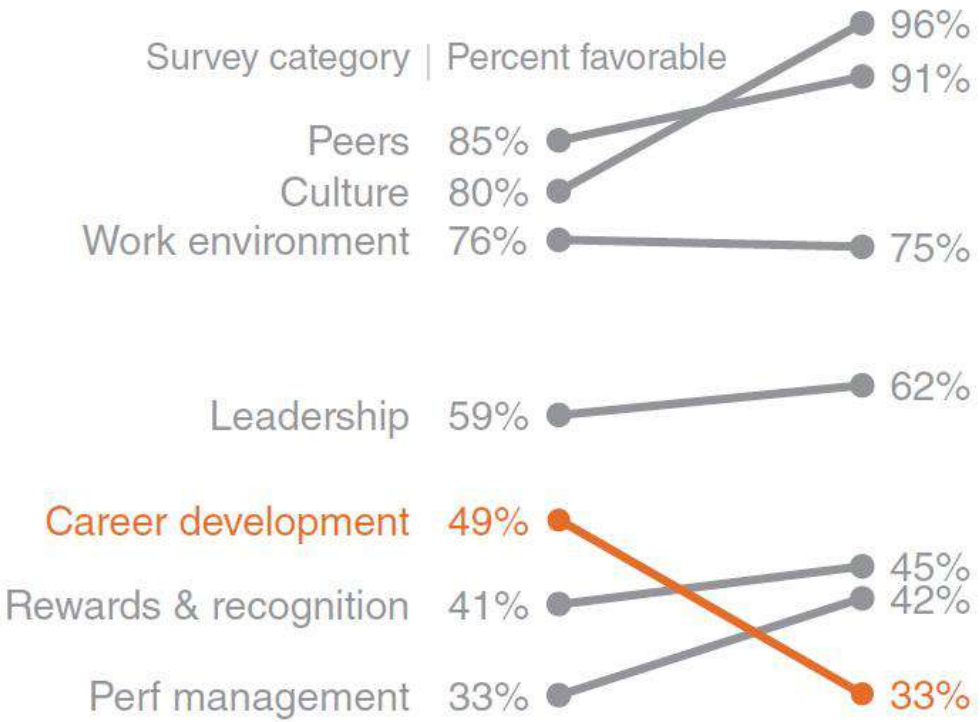
Employee feedback over time



Source: Employee survey results

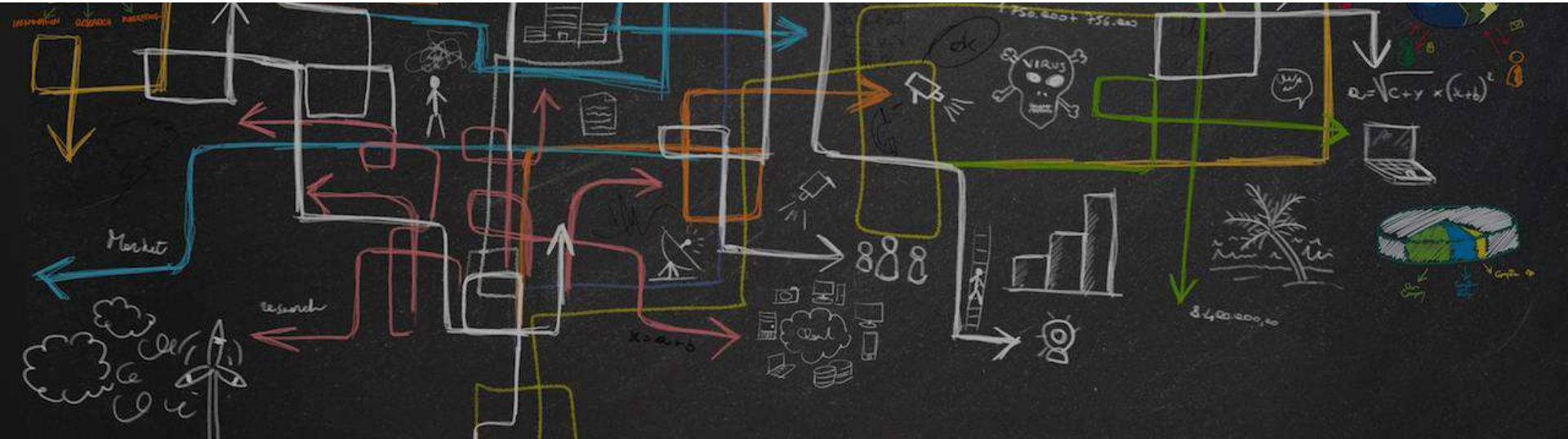
Source: Storytelling with data

Slope graph

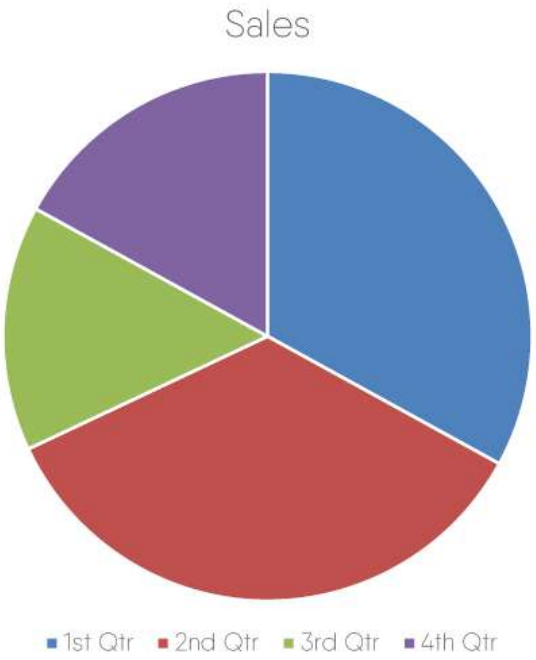

Survey category | Percent favorable
Peers 85%
Culture 80%
Work environment 76%
96%
91%
75%
Leadership 59%
62%
Career development 49%
Rewards & recognition 41%
Perf management 33%
45%
42%
33%

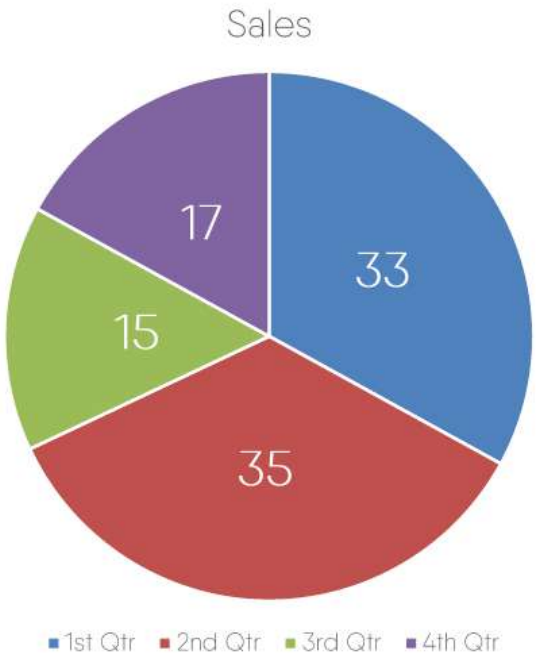
What you should avoid

Pie charts, 3D, and Secondary axis



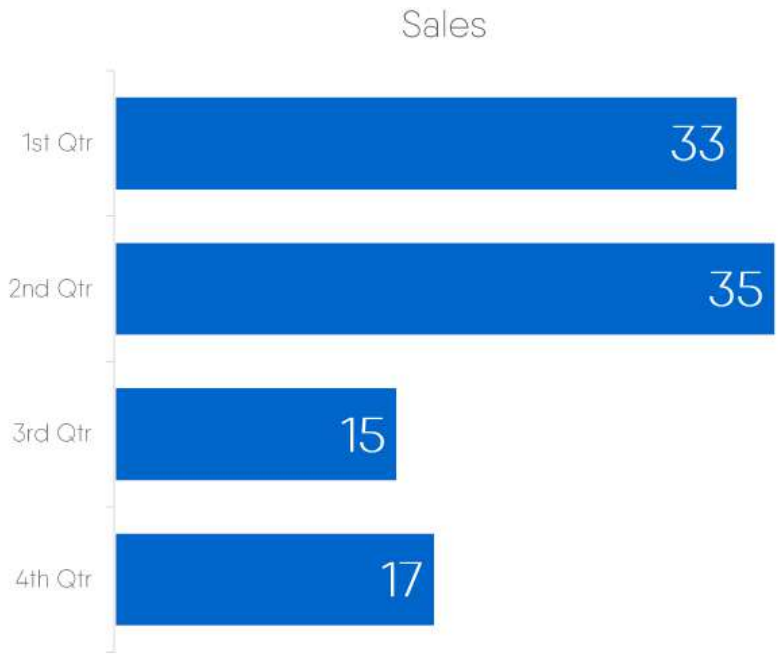
Pie charts are evil





Alternatives to Pies

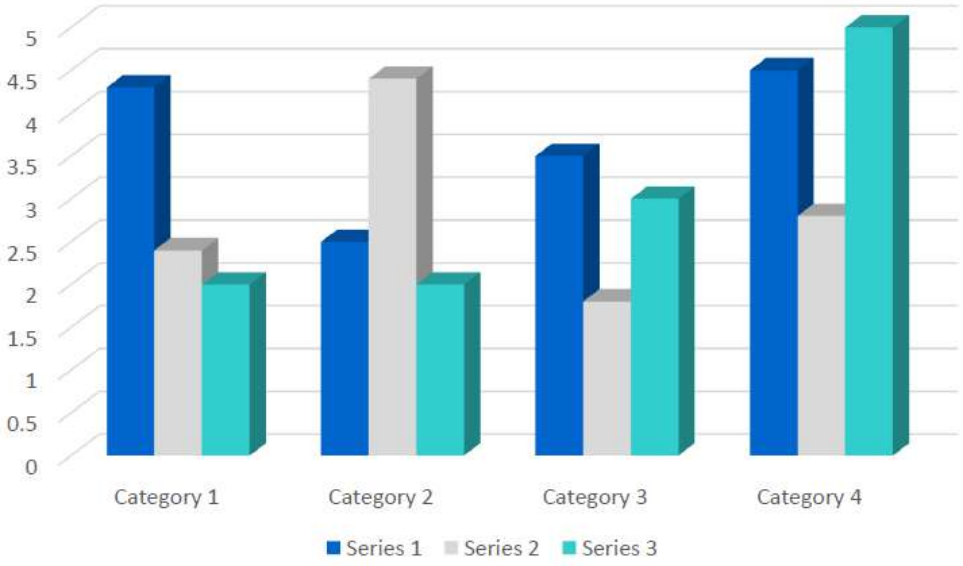
Horizontal bar chart is ideal alternative to all pies

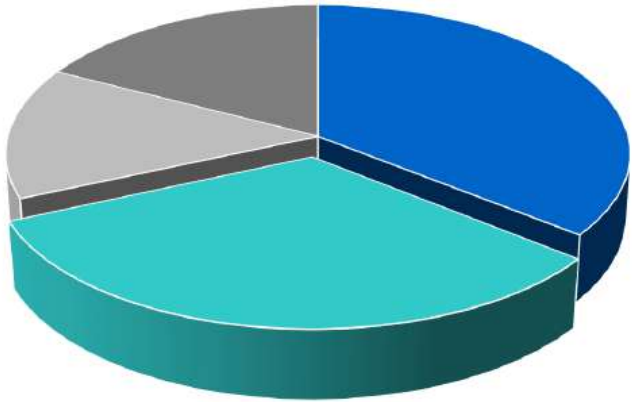


Quarter	Sales
1st	33
2nd	**35**
3rd	15
4th	17

Never use 3D

It's difficult to gauge the value on 3D charts



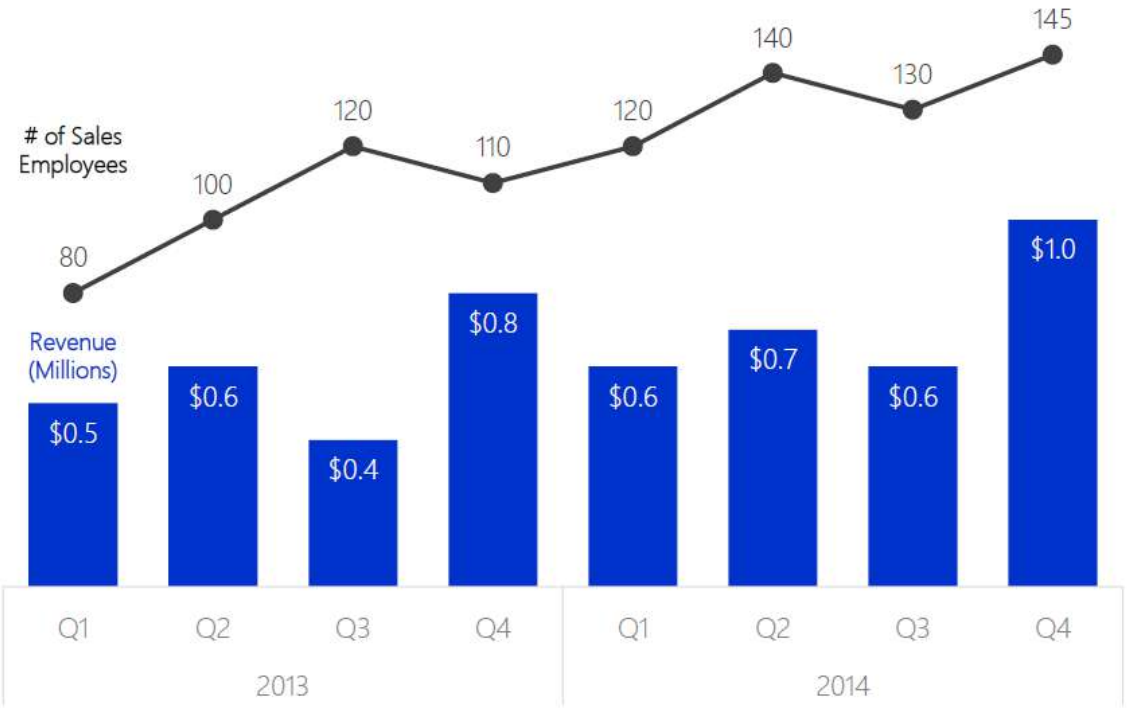


Secondary axis generally not a good idea

It takes time for audience to understand the chart

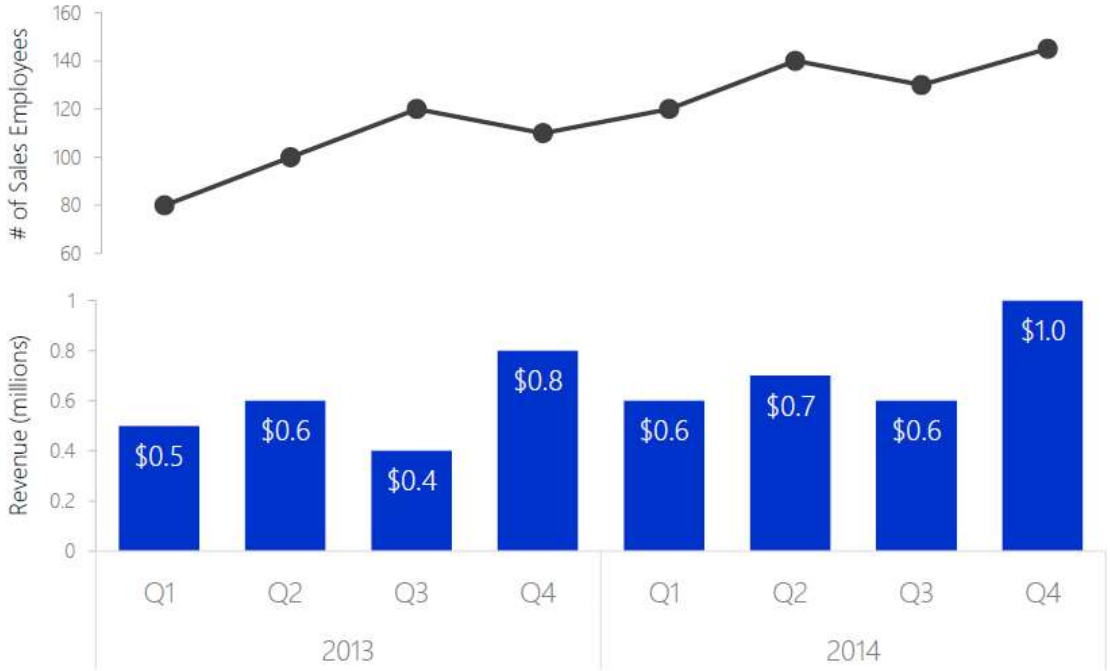
2 approaches to deal with this issue

Source: Storytelling with data



Label directly

Source: Storytelling with data



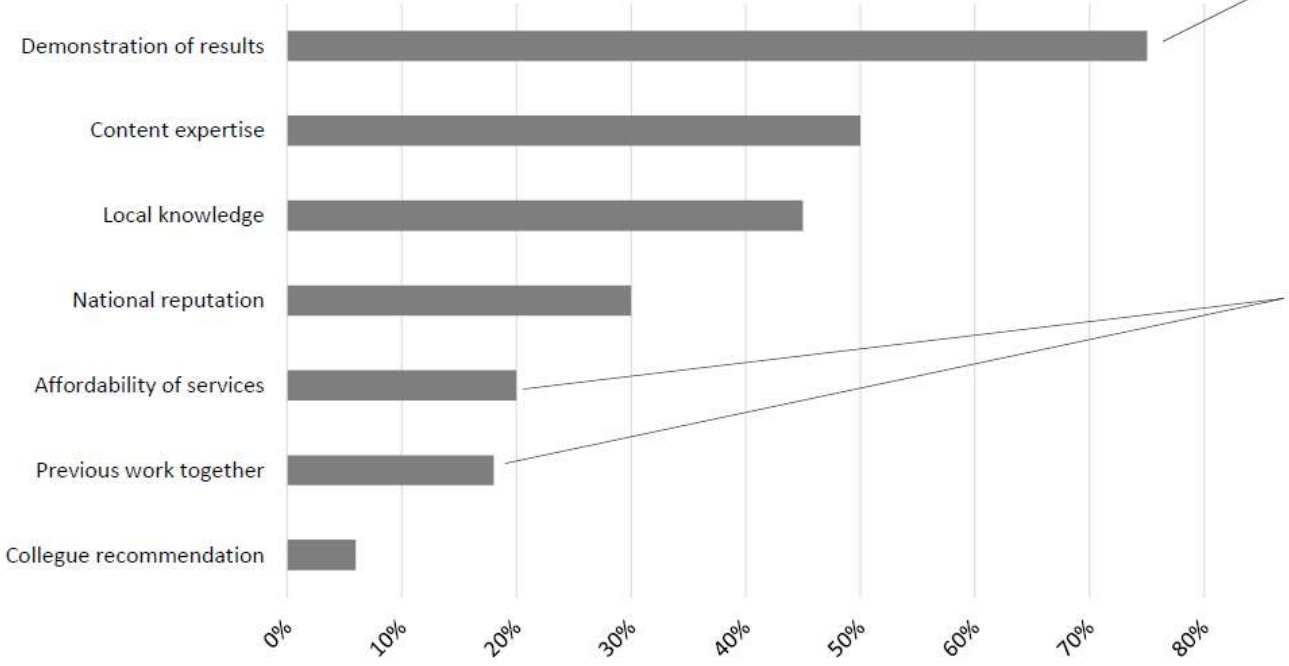
Pull apart vertically

Source: Storytelling with data

BEFORE

Demonstrating effectiveness is most important consideration when selecting a provider

In general, what attributes are the most important to you in selecting a service provider?
Choose up to 3 answers



Survey shows that demonstration of results is the single most important dimension when choosing a service provider

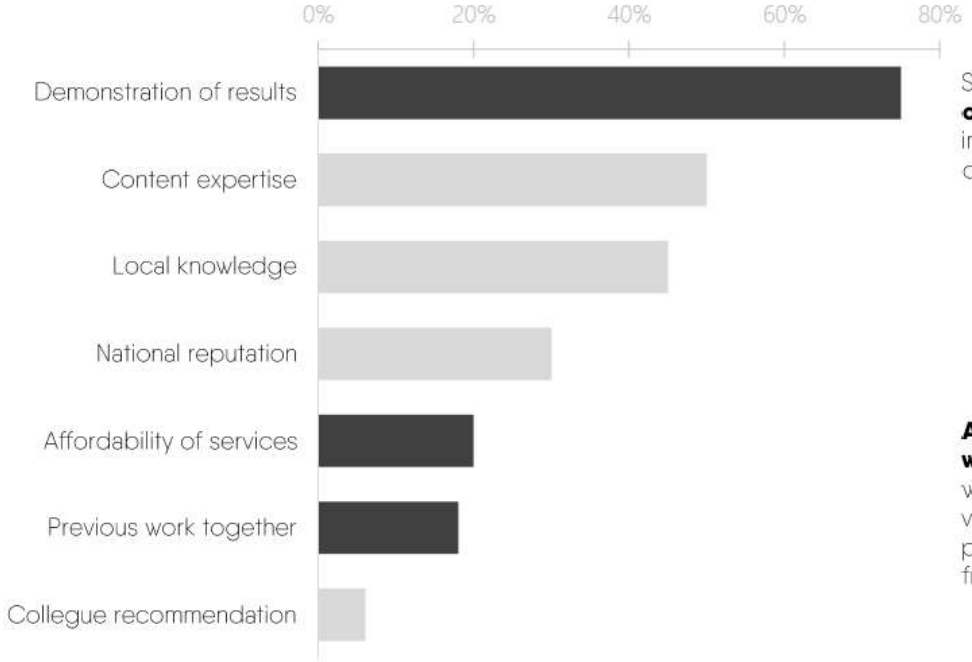
Affordability and experience working together previously, which were hypothesized to be very important in decision making process, were both cited less frequently as important attributes.

Data source: Storytelling with data by Cole. Page 81.

AFTER

Demonstrating effectiveness is most important consideration when selecting a provider

In general, **what attributes are the most important** to you in selecting a service provider?
Choose up to 3 answers



Survey shows that **demonstration of results** is the single most important dimension when choosing a service provider

Affordability and **experience working together previously**, which were hypothesized to be very important in decision making process, were both cited less frequently as important attributes.

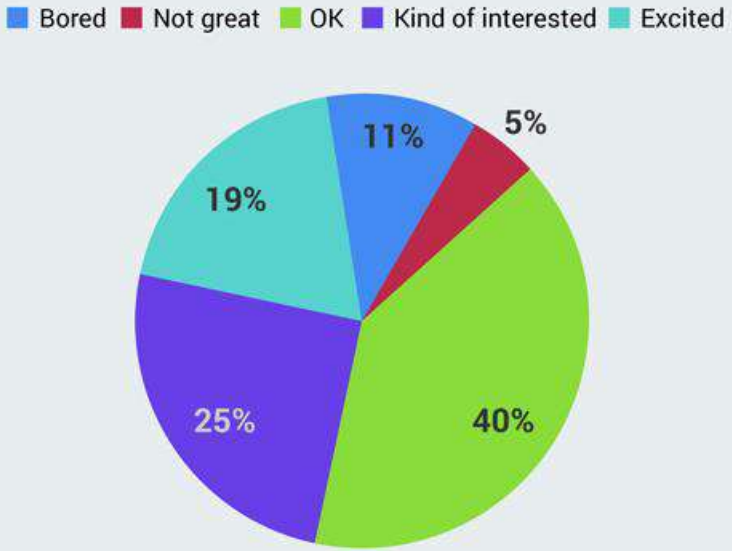
Data source: Storytelling with data by Cole. Page 81.

Source: Storytelling with data

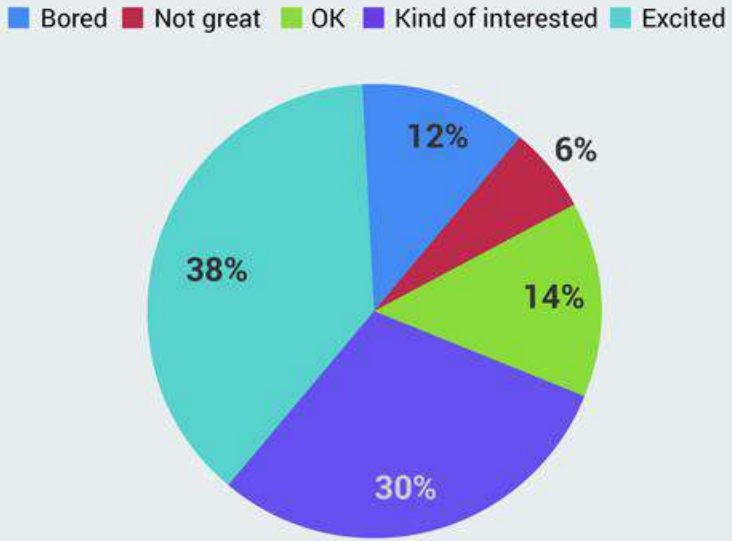
Before

Survey Results

PRE: How do you feel about doing science?



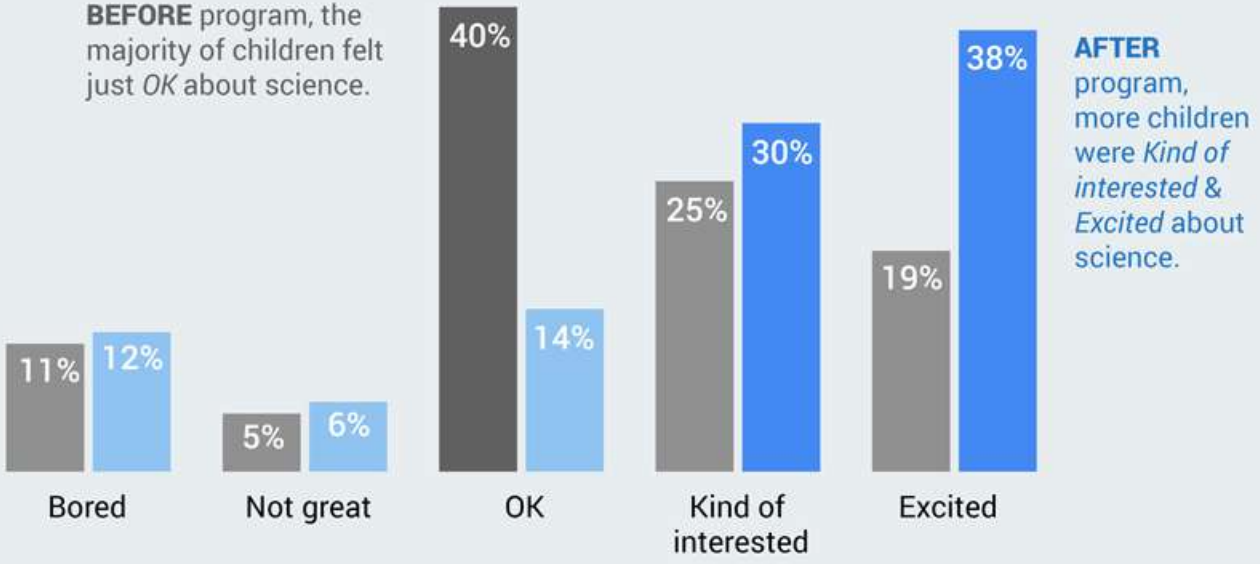
POST: How do you feel about doing science?



Source: Storytelling With Data by Cole Nussbaumer Knaflic

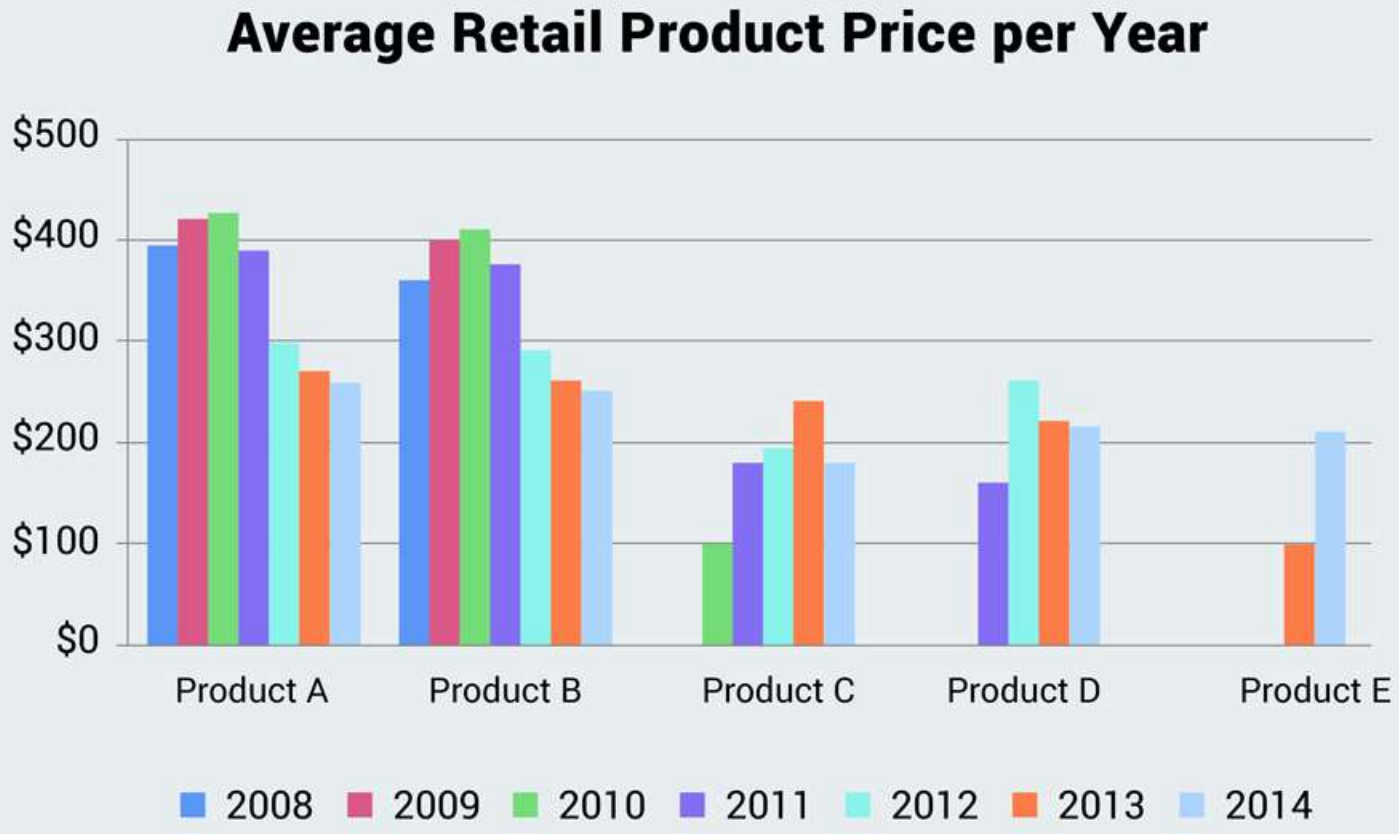
Pilot program was a success

How do you feel about science?



Source: Storytelling With Data by Cole Nussbaumer Knaflic

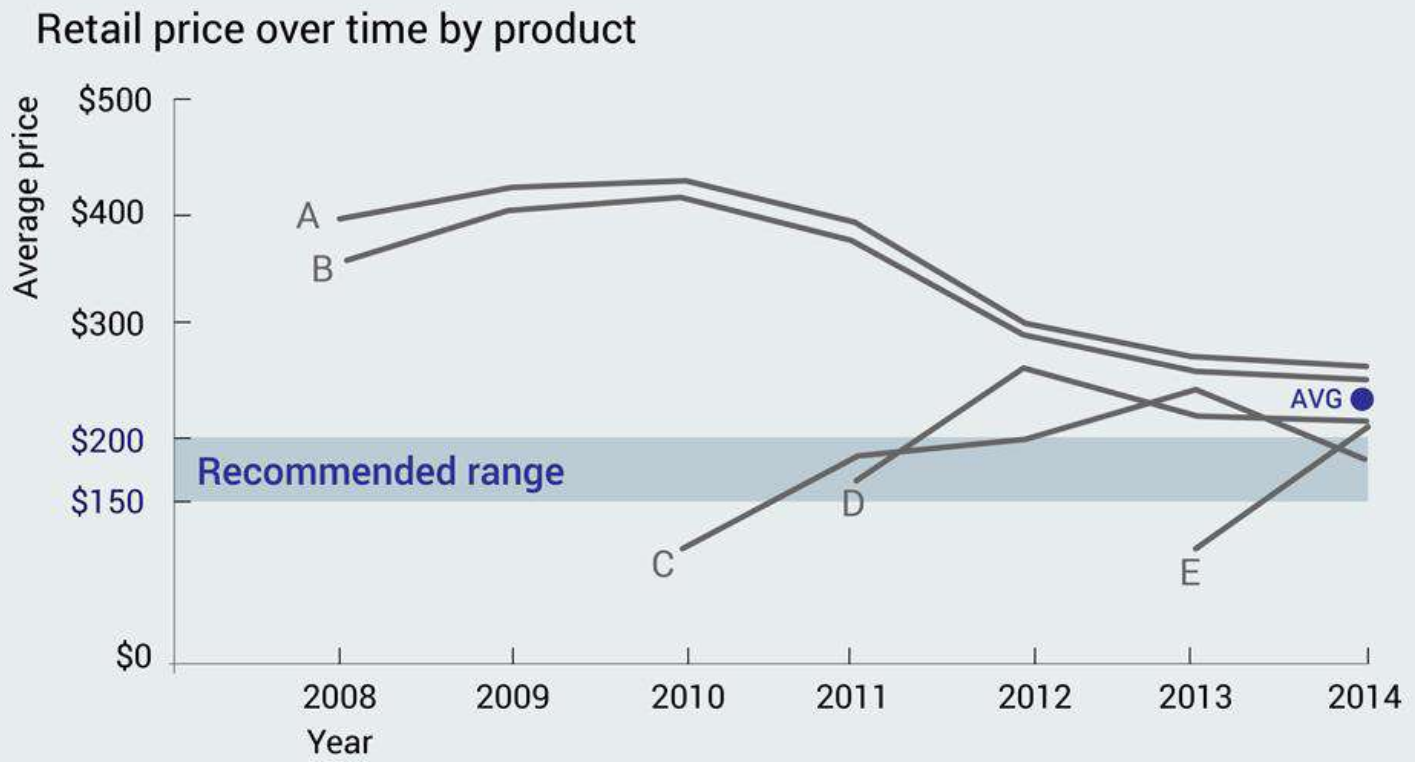
Before



Source: Storytelling With Data by Cole Nussbaumer Knaflic

After

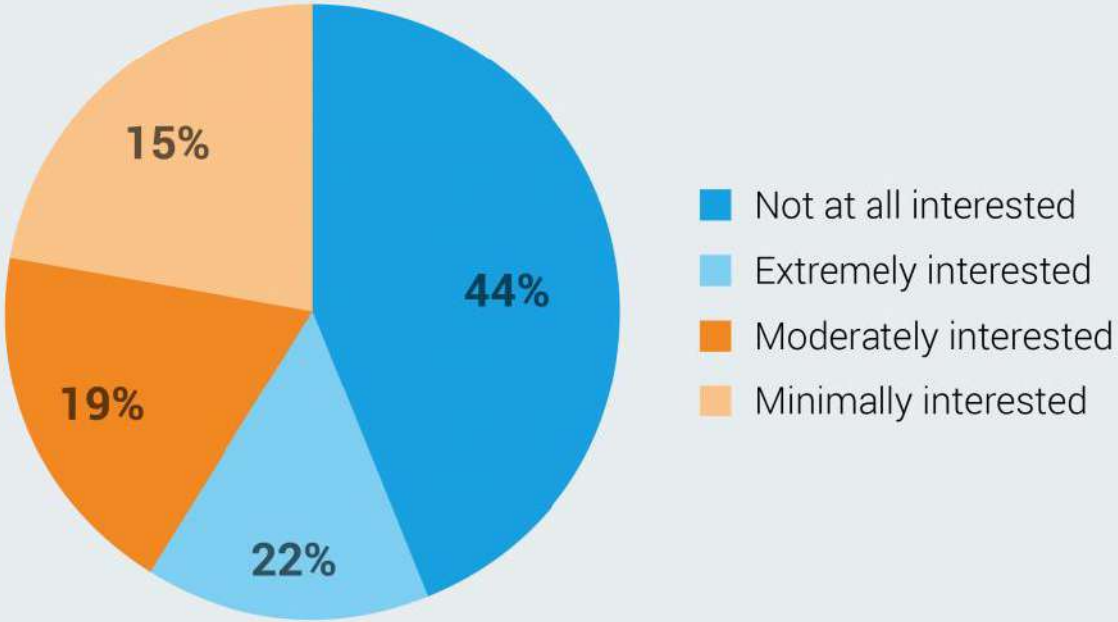
To be competitive, we recommend introducing our product below the $223 average price point in the **$150-$200 range**



Source: Storytelling With Data by Cole Nussbaumer Knaflic

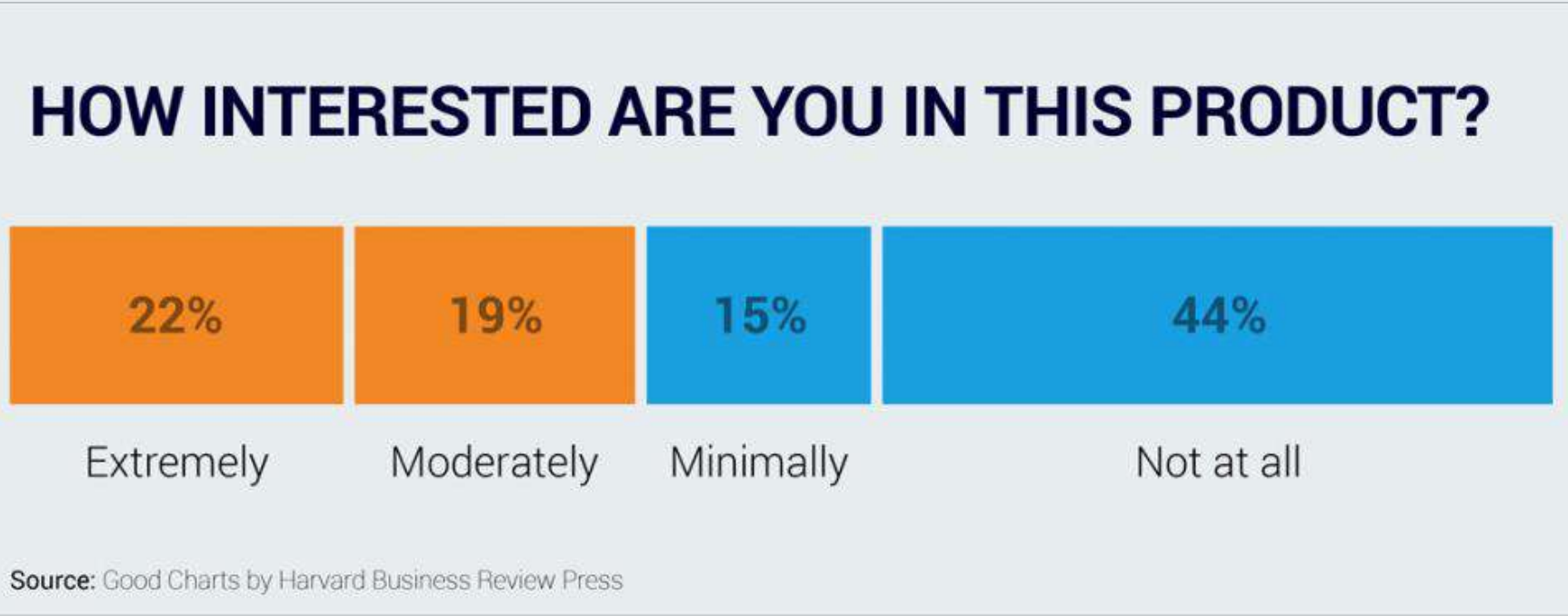
Before

HOW INTERESTED ARE YOU IN THIS PRODUCT?



Source: Good Charts by Harvard Business Review Press

After


HOW INTERESTED ARE YOU IN THIS PRODUCT?
22%
19%
15%
44%
Extremely
Moderately
Minimally
Not at all
Source: Good Charts by Harvard Business Review Press

Standard Report vs Ad Hoc Report

Standard Report

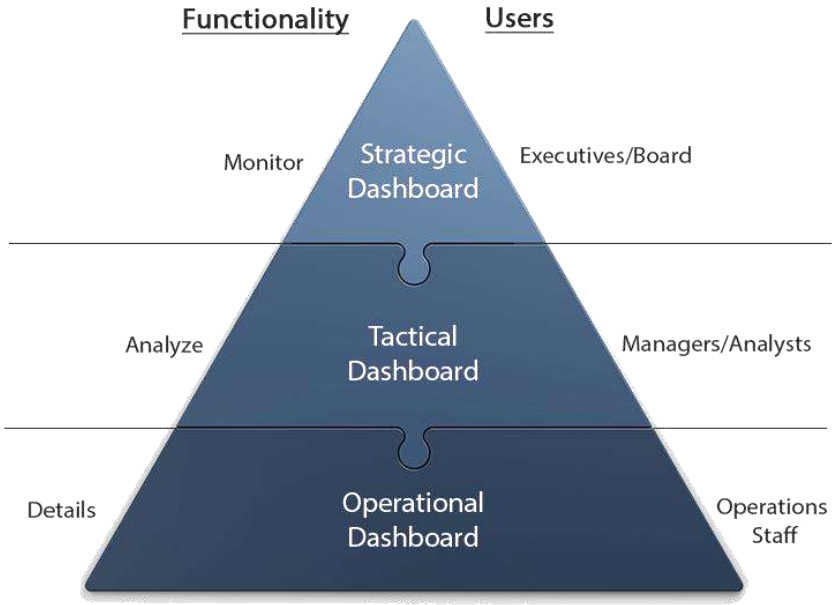
- Aim to deliver constant information
- Design for repeated monitoring

Ad Hoc Report

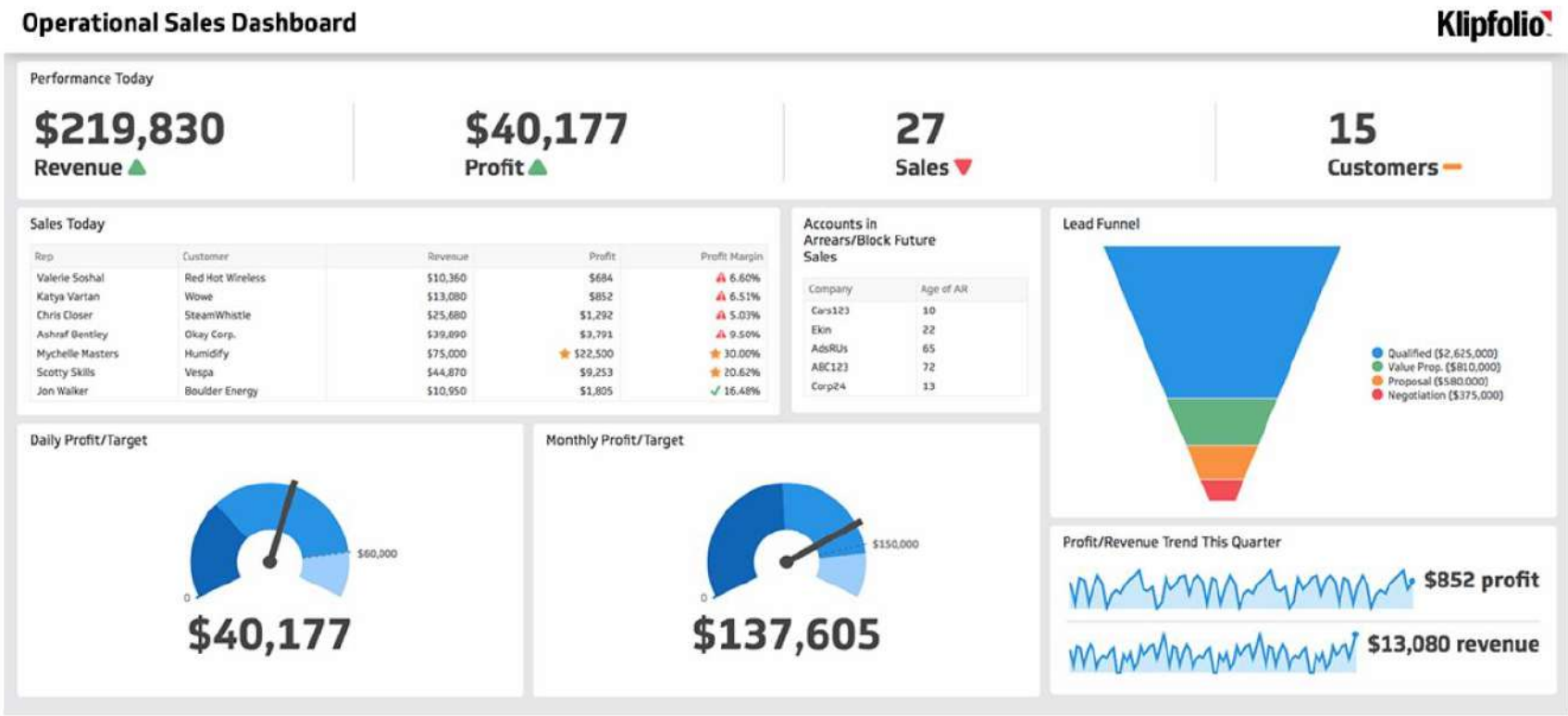
- Aim to answer specific question
- Design for one time use

Types of Dashboards

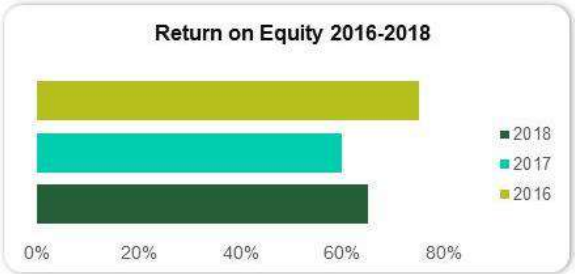
- **Operational dashboards** monitor operational processes, events, and activities as they occur (every minute, hour, or day).
- **Tactical dashboards** measure and analyze the performance of departmental activities, processes, and goals.
- **Strategic dashboards** track progress toward achieving strategic objectives in a top down fashion (e.g., a "Balanced Scorecard").

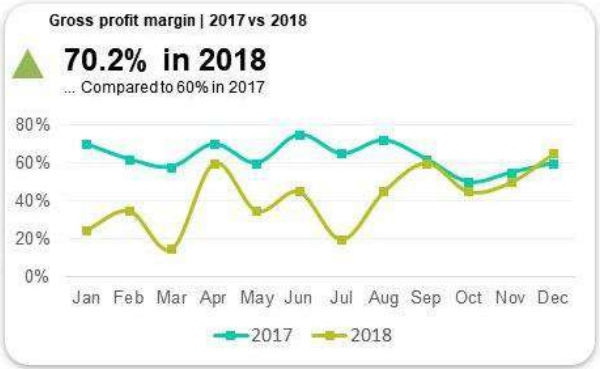


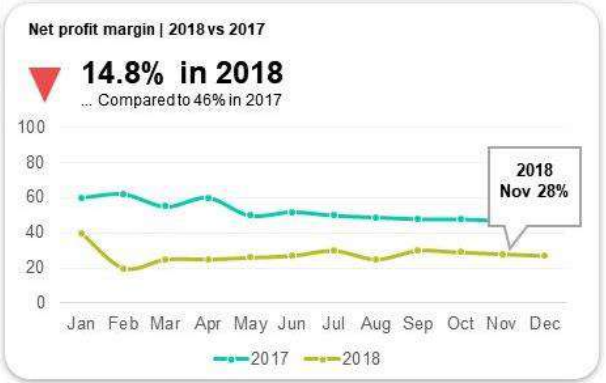
Operational Dashboard



Tactical Dashboard







This graph/chart is linked to excel, and changes automatically based on data. Just left click on it and select "Edit Data".

Strategic Dashboard

Data Visualization with Power BI Desktop

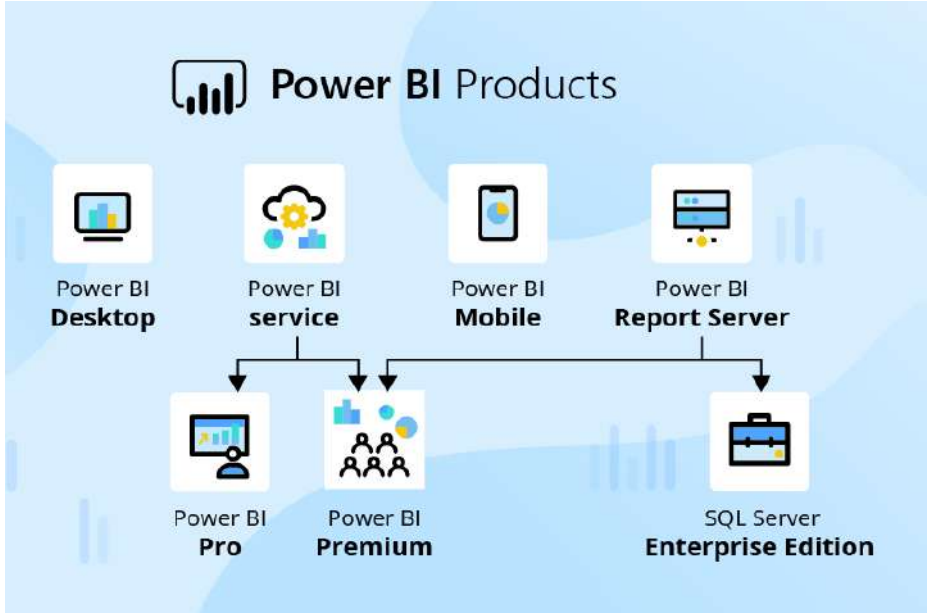
Power BI

- Power BI เป็นหนึ่งในโปรแกรมตระกูล Microsoft ที่มีความสามารถในการจัดการข้อมูลเชิงวิเคราะห์ด้วยหลักการ Data Visualization กล่าวคือ การเปลี่ยนฐานข้อมูลให้อยู่ในรูปแบบของรายงานและกราฟต่างๆ ซึ่งเรียกกันแพร่หลายว่า Report & Dashboard
- สามารถเชื่อมต่อแหล่งข้อมูลหลายๆ แหล่ง ให้เป็นข้อมูลเชิงลึกที่สอดคล้องกัน
- แสดงข้อมูล และโต้ตอบ รวมถึงสามารถแชร์ข้อมูลได้

Power BI

Power BI ประกอบด้วย

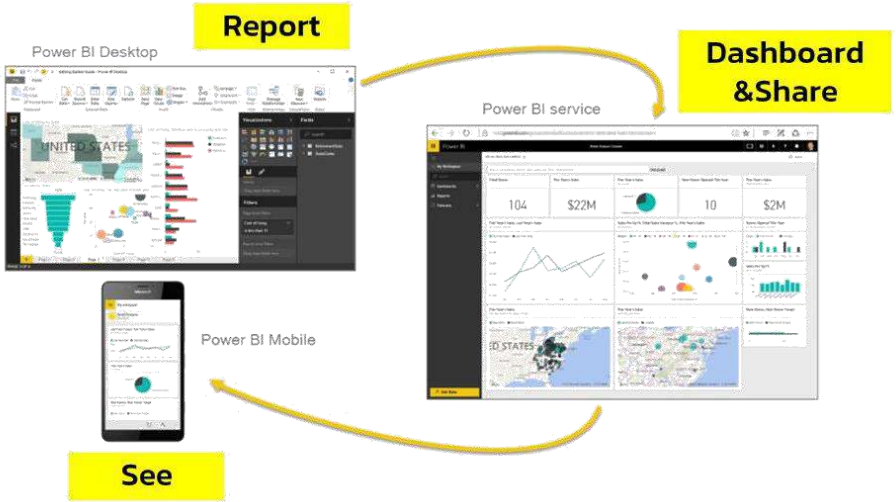
- แอปพลิเคชันสำหรับเครื่องเดสก์ท็อป Windows ที่เรียกว่า **Power BI Desktop**
- บริการ SaaS (Software as a Service) แบบออนไลน์ที่เรียกว่า **Power BI Service**
- แอปพลิเคชันสำหรับอุปกรณ์เคลื่อนที่ **Power BI Mobile** สำหรับอุปกรณ์ Windows, iOS และ Android



Power BI

ลำดับการใช้บริการของ Power BI

- **Power BI Desktop** เป็นเครื่องมือที่ทำหน้าที่สร้าง Report โดยเป็นโปรแกรมฟรีไม่ต้องมี License หรือ Account ของ Microsoft
- ถ้าต้องการดู Report ออนไลน์บน Cloud ซึ่งก็คือ **Power BI Service** รวมทั้งการแชร์ให้กับบุคคลอื่น และดู Report & Dashboard ผ่าน Power BI Mobile จะต้องมี License



Power BI Desktop

- Power BI Desktop เป็นเครื่องมือในการจัดการกับข้อมูลทั้งจัดระเบียบ, คำนวณ, ปรับแต่งอัตโนมัติ และยังเป็นเครื่องมือในการสร้างรายงาน มีความสามารถในการรวมประสานข้อมูลจากหลายแหล่ง ทั้งฐานข้อมูล, ไฟล์ต่าง ๆ ทั้ง Excel, Text File และข้อมูลจากเว็บไซต์

- ลำดับการทำงานทั่วไปใน Power BI เริ่มจากการเชื่อมต่อกับแหล่งข้อมูล และสร้างรายงานใน Power BI Desktop จากนั้นจึงเผยแพร่รายงานนั้นจาก Power BI Desktop ไปยัง Power BI Service และแชร์เพื่อให้ผู้อื่นที่ใช้บริการของ Power BI และอุปกรณ์เคลื่อนที่ สามารถดู และโต้ตอบกับรายงานได้

Power BI Service

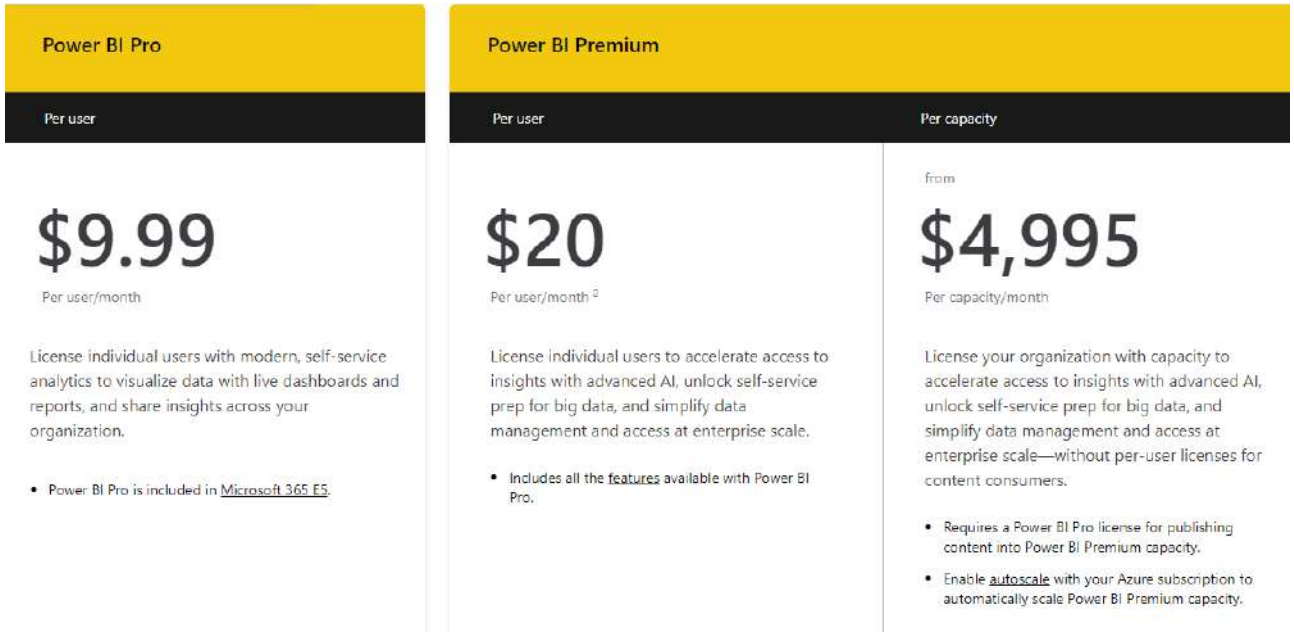
- Power BI Service เป็นบริการที่สามารถเข้ามาดู Report & Dashboard แบบออนไลน์ผ่านระบบ Internet จากที่ใดก็ได้ แต่ต้องมี License ของ Microsoft โดยหลังจากที่สร้างรายงานและแดชบอร์ดแล้ว สามารถแชร์ให้เพื่อนร่วมงานที่ใช้บริการของ Power BI และอุปกรณ์เคลื่อนที่ สามารถดูและโต้ตอบได้ นอกจากนี้ยังสามารถสร้างพื้นที่ทำงานร่วมกับเพื่อนร่วมงาน บนรายงานและแดชบอร์ดได้

Power BI Mobile

- Power BI Mobile เป็นบริการที่สามารถเข้ามาดู Report & Dashboard ด้วยอุปกรณ์เคลื่อนที่สามารถดูและโต้ตอบได้ สามารถใช้ได้ทั้งระบบปฏิบัติการ Windows, iOS และ Android โดยต้องใช้ Account ของ Microsoft ในการลงทะเบียนใช้งาน

Power BI

- Power BI จะมีมีสิทธิการใช้งานอยู่ 3 แบบ คือ
  - Power BI Free
  - Power BI Pro
  - Power BI Premium



Power BI Free

- Power BI Free is included in all Office 365 Plans, and you can sign up for Power BI Free any time you like.
- This free version is surprisingly functional. It allows you to connect to hundreds of data sources (no limit/restriction other than the amount of data you pull in), clean and prepare your data, and build visualizations (no limit). All of the types of visualization options in Power BI Pro are available in Power BI free.

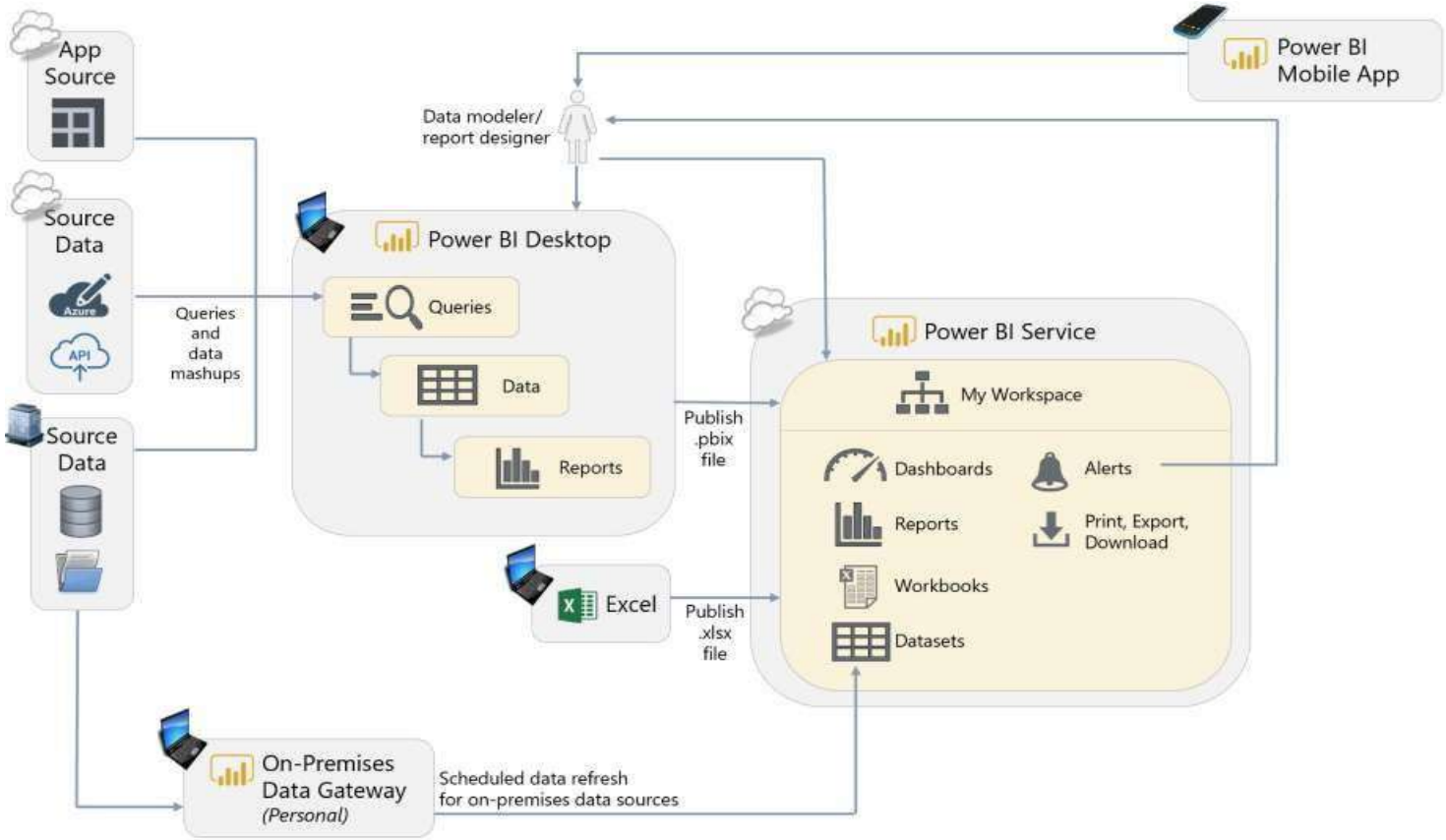
Power BI Pro

- On-Premise Data Gateways
- More Data Storage
- Better Data Refreshes
- Sharing and Collaboration

Power BI Premium

- Power BI Premium is not a type of user license. Think of it as an upgrade to your entire company’s capabilities.
- Organizations with Power BI Premium have a super-powered server running their Power BI environment; this allows them to surpass some limits.

Personal Power BI



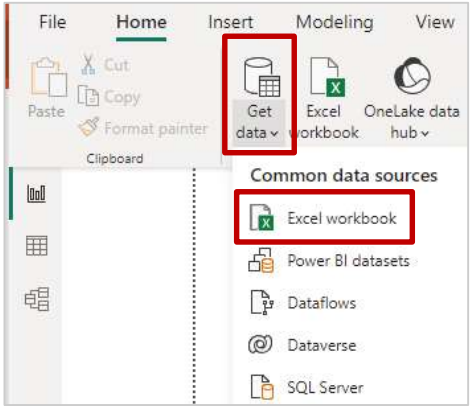
Workshop 1

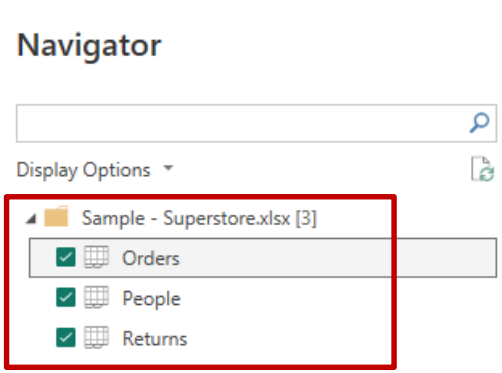
1.Comparison

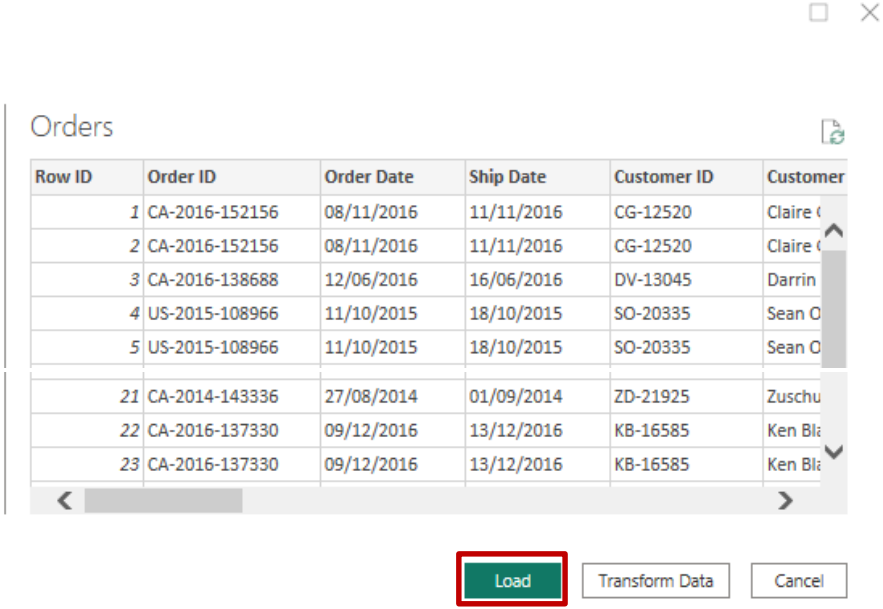
3.Composition

Workshop 1

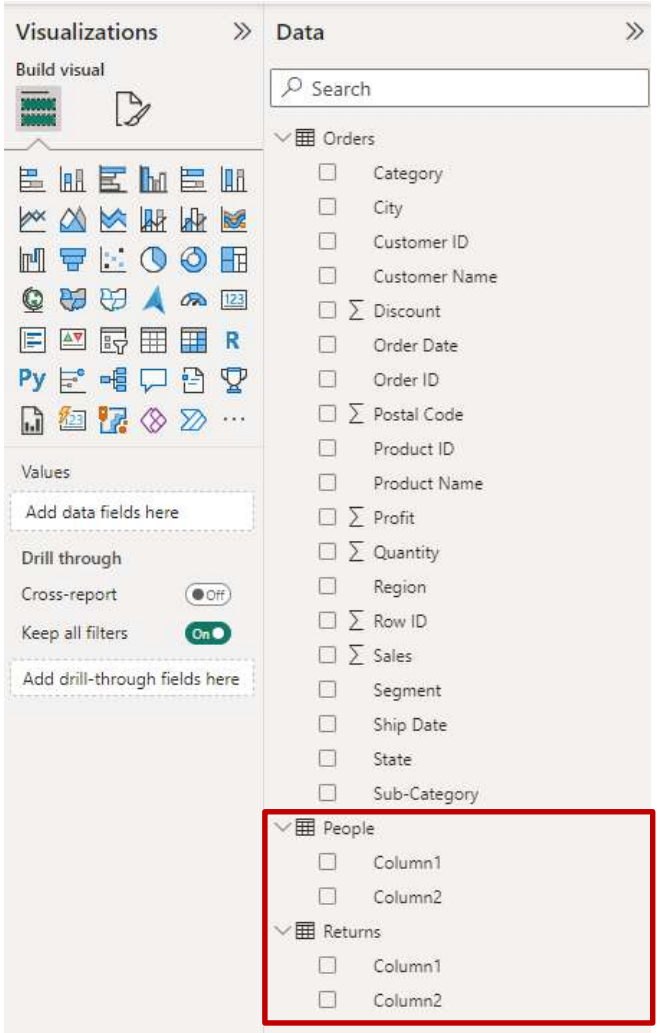
- คลิก Get data > Excel > SuperStore.xlsx



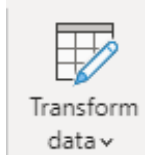




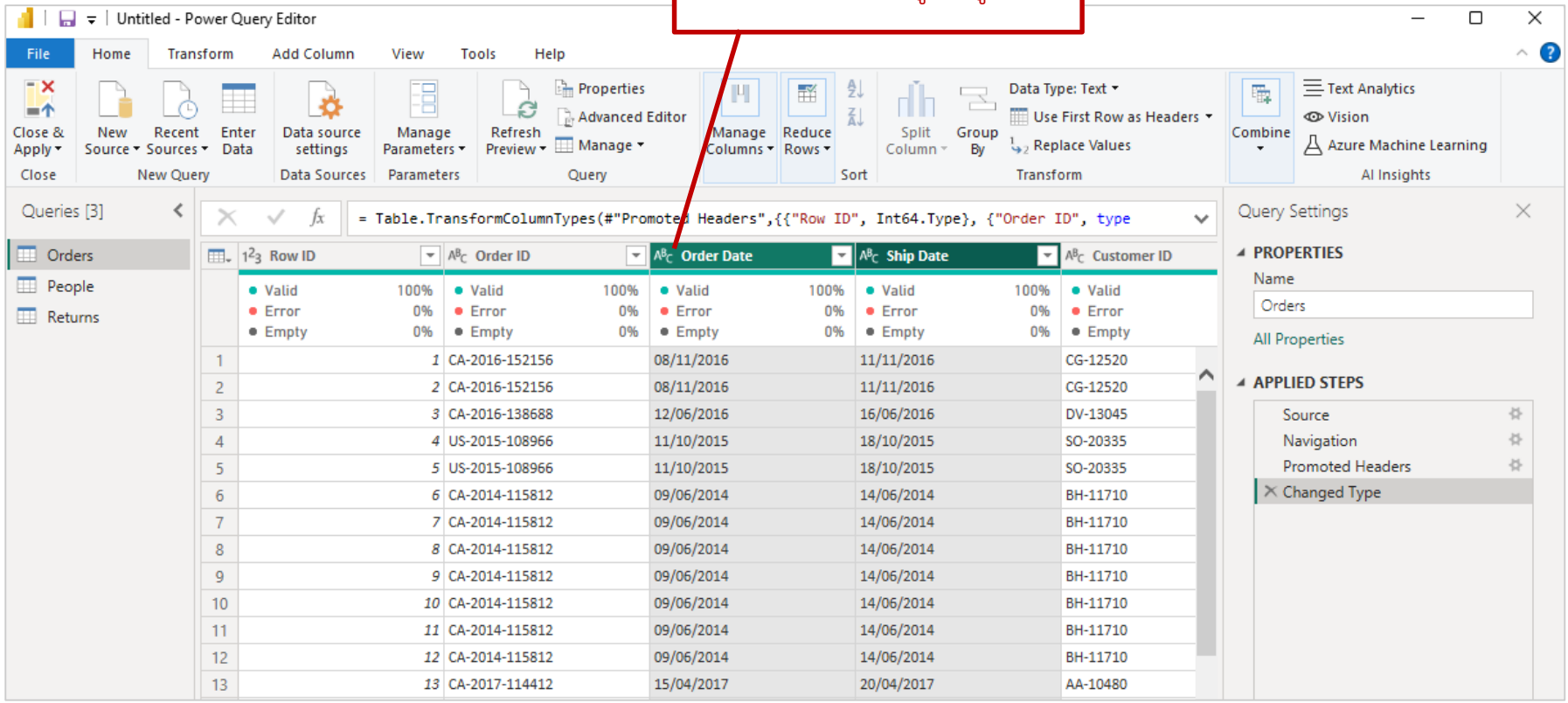
Workshop 1



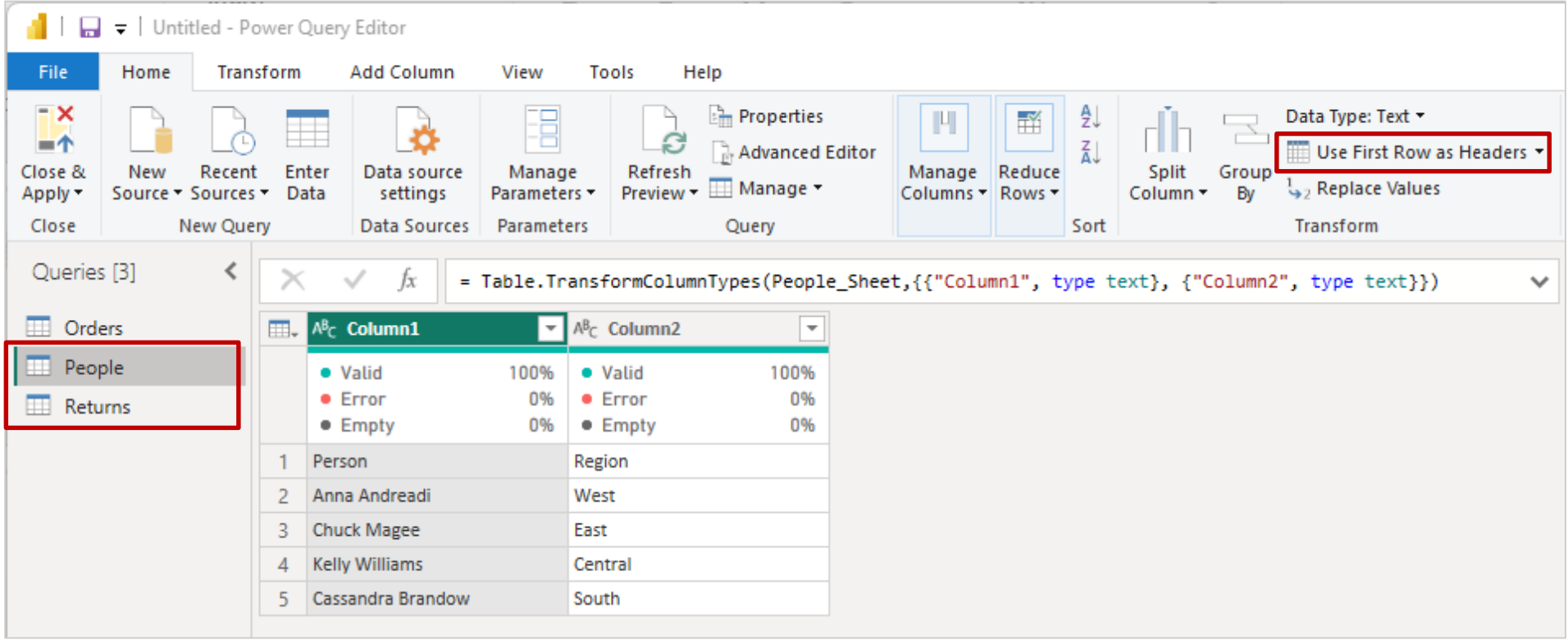
- ในเมนู Home > คลิก Transform data



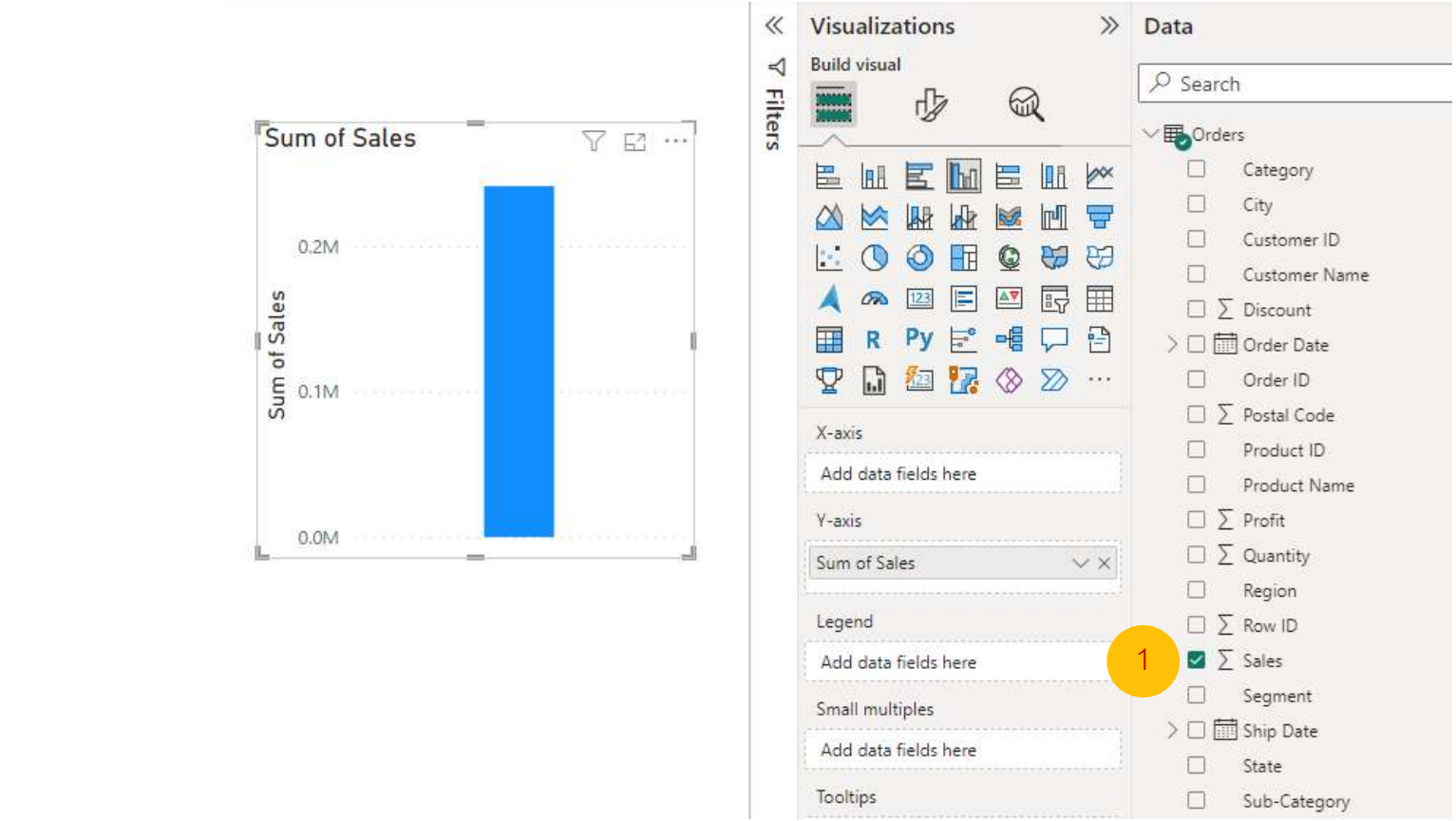
Workshop 1


เปลี่ยนชนิดของข้อมูลให้ถูกต้อง
Untitled - Power Query Editor
File
Home
Transform
Add Column
View
Tools
Help
Close & Apply
New Source
Recent Sources
Enter Data
Data source settings
Manage Parameters
Refresh Preview
Properties
Advanced Editor
Manage
Manage Columns
Reduce Rows
Split Column
Group By
Data Type: Text
Use First Row as Headers
Replace Values
Combine
Text Analytics
Vision
Azure Machine Learning
Close
New Query
Data Sources
Parameters
Query
Sort
Transform
AI Insights
Queries [3]
Orders
People
Returns
= Table.TransformColumnTypes(#"Promoted Headers",{{"Row ID", Int64.Type}, {"Order ID", type
Row ID
Order ID
Order Date
Ship Date
Customer ID
Valid 100%
Error 0%
Empty 0%
1 1 CA-2016-152156 08/11/2016 11/11/2016 CG-12520
2 2 CA-2016-152156 08/11/2016 11/11/2016 CG-12520
3 3 CA-2016-138688 12/06/2016 16/06/2016 DV-13045
4 4 US-2015-108966 11/10/2015 18/10/2015 SO-20335
5 5 US-2015-108966 11/10/2015 18/10/2015 SO-20335
6 6 CA-2014-115812 09/06/2014 14/06/2014 BH-11710
7 7 CA-2014-115812 09/06/2014 14/06/2014 BH-11710
8 8 CA-2014-115812 09/06/2014 14/06/2014 BH-11710
9 9 CA-2014-115812 09/06/2014 14/06/2014 BH-11710
10 10 CA-2014-115812 09/06/2014 14/06/2014 BH-11710
11 11 CA-2014-115812 09/06/2014 14/06/2014 BH-11710
12 12 CA-2014-115812 09/06/2014 14/06/2014 BH-11710
13 13 CA-2017-114412 15/04/2017 20/04/2017 AA-10480
Query Settings
PROPERTIES
Name
Orders
All Properties
APPLIED STEPS
Source
Navigation
Promoted Headers
Changed Type

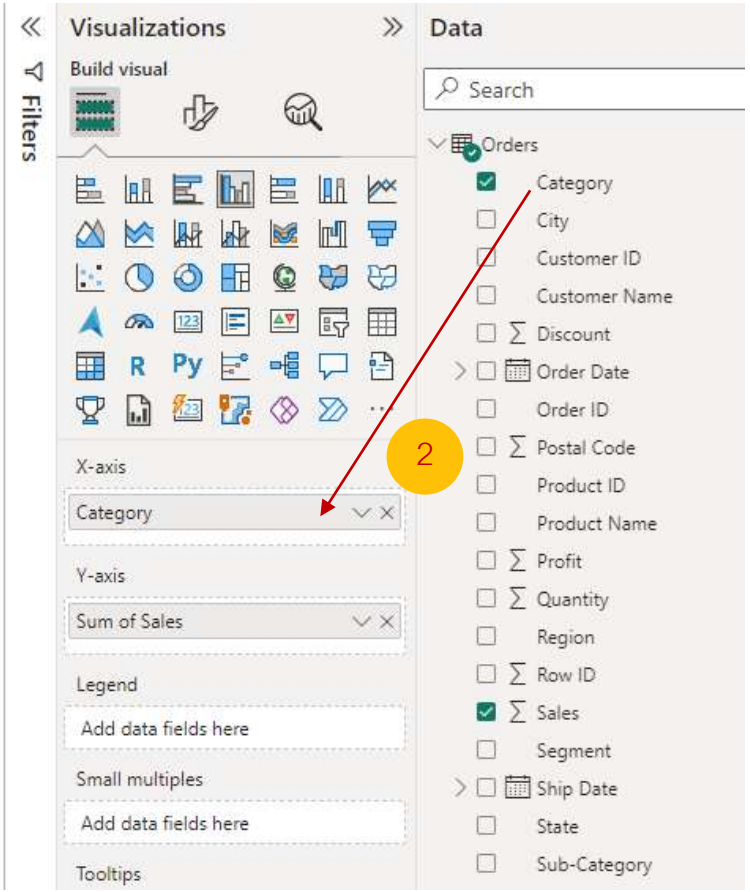
Workshop 1


Untitled - Power Query Editor
File
Home
Transform
Add Column
View
Tools
Help
Close & Apply
New Source
Recent Sources
Enter Data
Data source settings
Manage Parameters
Refresh Preview
Properties
Advanced Editor
Manage
Manage Columns
Reduce Rows
Split Column
Group By
Data Type: Text
Use First Row as Headers
Replace Values
Close
New Query
Data Sources
Parameters
Query
Sort
Transform
Queries [3]
Orders
People
Returns
= Table.TransformColumnTypes(People_Sheet,{{"Column1", type text}, {"Column2", type text}})
Column1
Column2
Valid 100%
Error 0%
Empty 0%
Valid 100%
Error 0%
Empty 0%
1 Person Region
2 Anna Andreadi West
3 Chuck Magee East
4 Kelly Williams Central
5 Cassandra Brandow South

Workshop 1: เปรียบเทียบยอดขายสินค้า



Workshop 1: เปรียบเทียบยอดขายสินค้า



241.13K
Sum of Sales

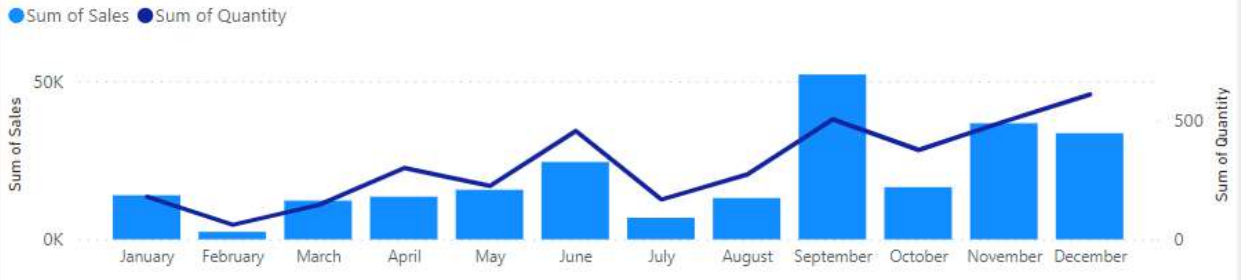
241.13
Average of Sales

8.16K
Max of Sales

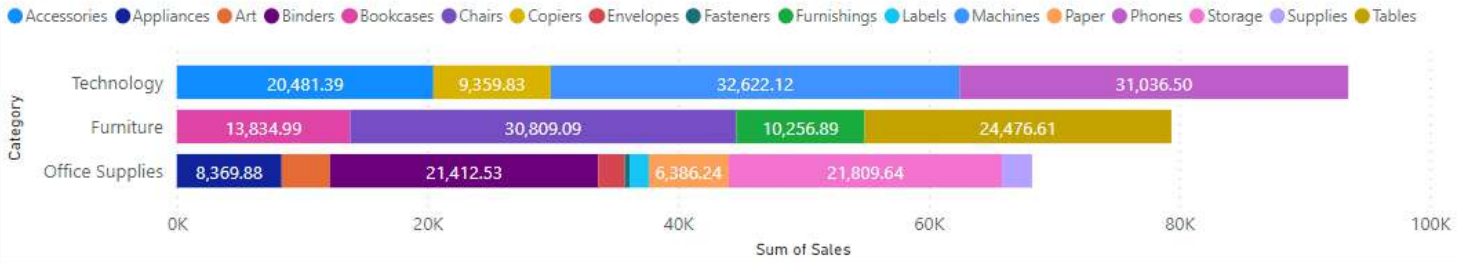
1.08
Min of Sales

Sum of Sales by Region and Segment

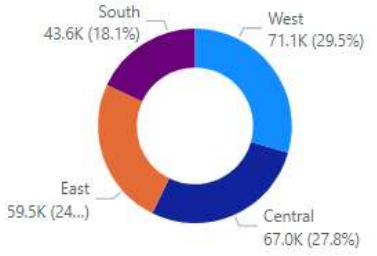
Sum of Sales and Sum of Quantity by Month



Sum of Sales by Category and Sub-Category



Sum of Sales by Region



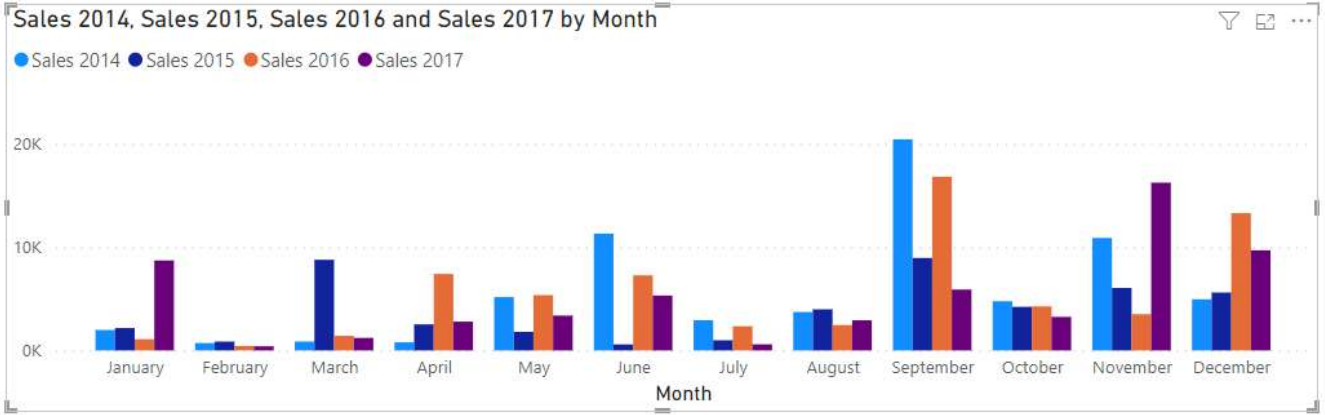
Sum of Sales and Sum of Profit by Year and Month

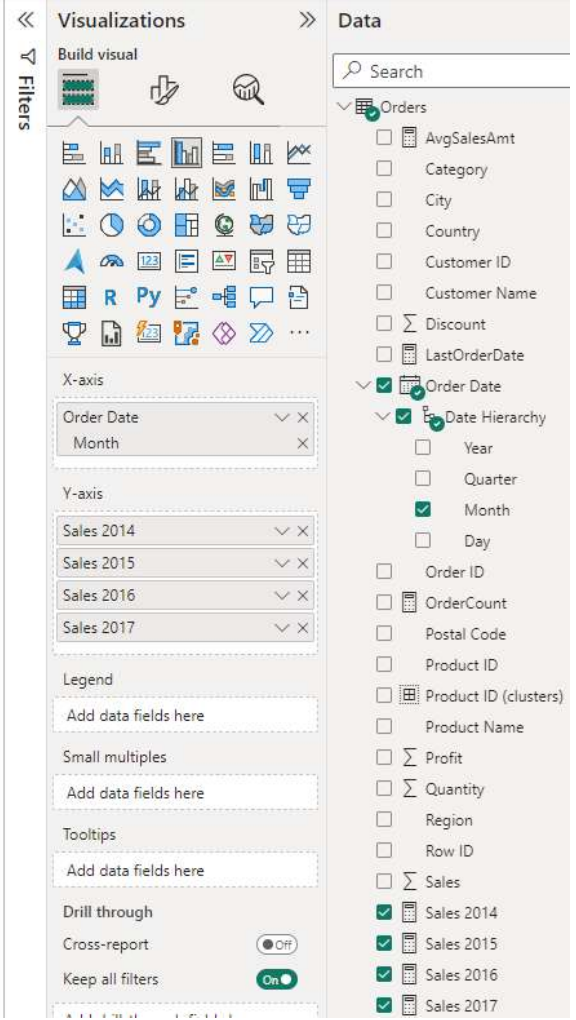
	Calculated Column	Measure
การทำงานกับข้อมูล	แถวข้อมูลในตาราง (Current Row)	ตารางข้อมูลและคอลัมน์ (Table or Column as Aggregate)
ค่าที่จัดเก็บในตาราง	ค่าที่ได้จากการประมวลผลในคอลัมน์	สูตร (ไม่เก็บผลลัพธ์)
การ Filter ข้อมูล	ได้	ไม่ได้
การประมวลผล	เมื่อเข้าถึงข้อมูลและคอลัมน์	เมื่อต้องการแสดงค่า
การประมวลผลใหม่	เมื่อสูตรที่ใช้มีการเปลี่ยนแปลง และเรียกใช้คอลัมน์	มีการเรียกใช้สูตรมาแสดงข้อมูล
ประสิทธิภาพ	สูง - ประมวลผลครั้งแรก ในครั้งต่อ ๆ ไป เมื่อเรียกคอลัมน์มาแสดงผล จะแสดงค่าได้เร็ว	ต่ำ - ประมวลผลทุกครั้งที่มีการเรียกข้อมูลมาแสดงผล
รูปแบบของข้อมูลที่เหมาะสม	■ ข้อมูลปริมาณมาก ■ ข้อมูลไม่มีการเปลี่ยนแปลงบ่อย ๆ ■ การหาค่าเฉพาะแถว (Row)	■ ข้อมูลปริมาณน้อย ■ ข้อมูลที่มีการเปลี่ยนแปลงบ่อย ๆ หรือการแสดงผลแบบเรียลไทม์ ■ การหาค่าแบบผลรวม (Aggregate)

Workshop 1: Measure

- คลิกขวาที่ตาราง Orders เลือก New measure
- สร้าง Measure ด้วยกัน 4 ตัว ดังนี้

```
Sales 2014 = CALCULATE(SUM(Orders[Sales]), FILTER(Orders, Orders[Order Date].[Year]=2014))
Sales 2015 = CALCULATE(SUM(Orders[Sales]), FILTER(Orders, Orders[Order Date].[Year]=2015))
Sales 2016 = CALCULATE(SUM(Orders[Sales]), FILTER(Orders, Orders[Order Date].[Year]=2016))
Sales 2017 = CALCULATE(SUM(Orders[Sales]), FILTER(Orders, Orders[Order Date].[Year]=2017))
```





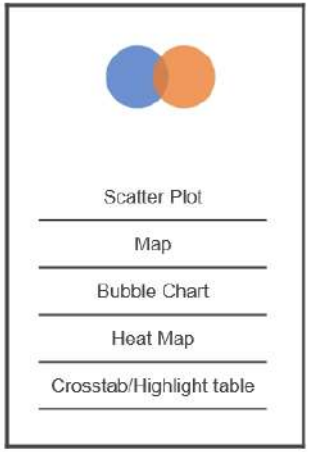
- ที่หน้าต่าง Visualizations คลิกเลือก Clustered Column Chart

ที่ Fields Tool

- Axis > เลือกฟิลด์ Date (Date Hierarchy)
- Values > เลือกฟิลด์ Sale2014, Sale2015, Sale2016 และ Sale 2017

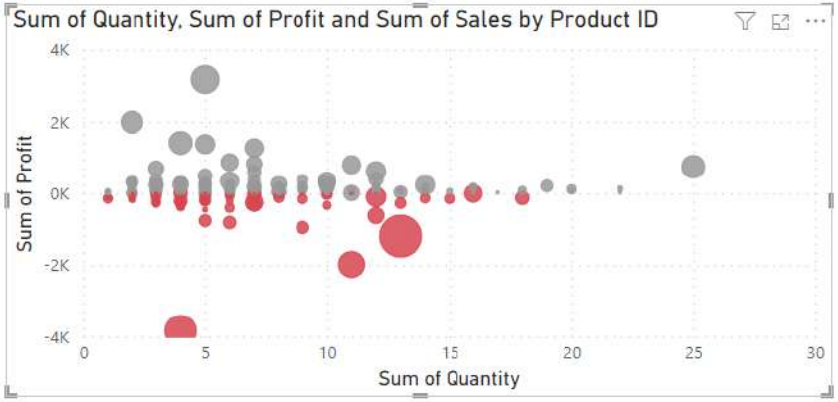
Workshop 2

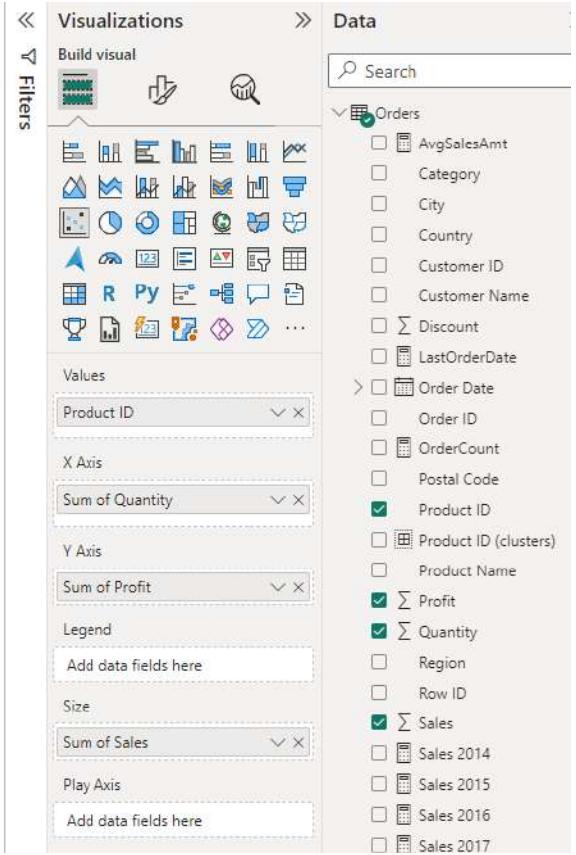
2.Relationship



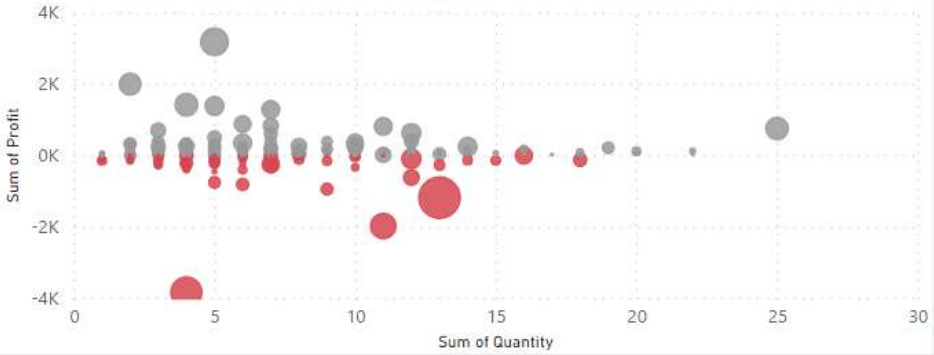
Workshop 2 :

แสดงความสัมพันธ์ระหว่างกำไรและจำนวนสินค้าที่ขายได้ของสินค้าแต่ละตัว เพื่อวิเคราะห์ความสามารถในการสร้างผลกำไรของผลิตภัณฑ์ (Product Profitability Analysis)

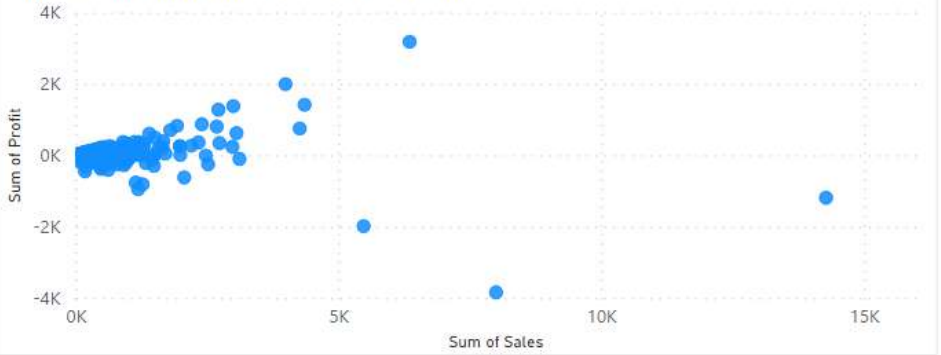




Sum of Quantity, Sum of Profit and Sum of Sales by Product ID

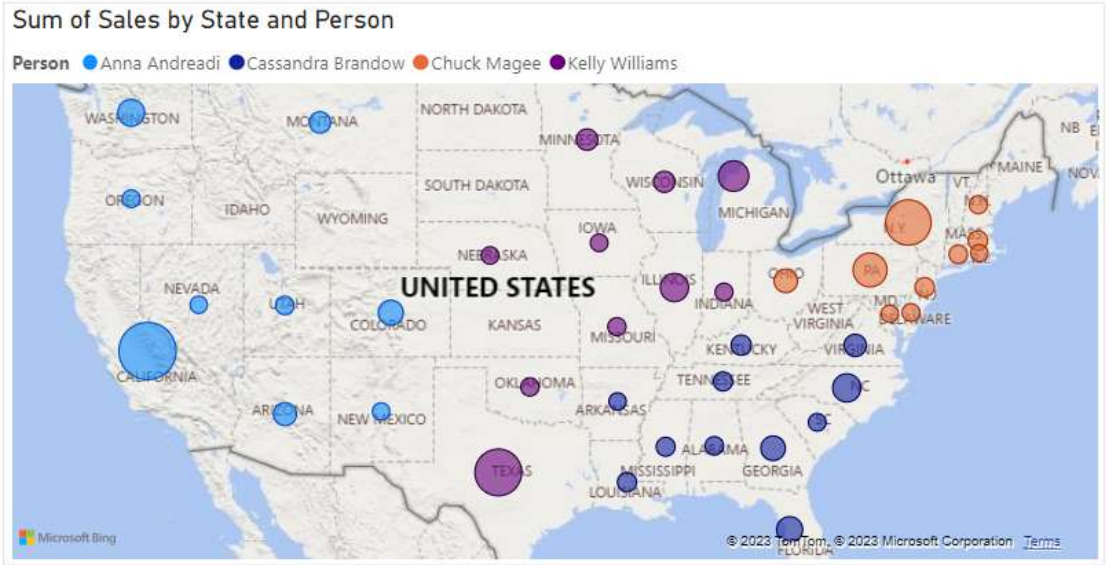


Sum of Sales and Sum of Profit by Product ID



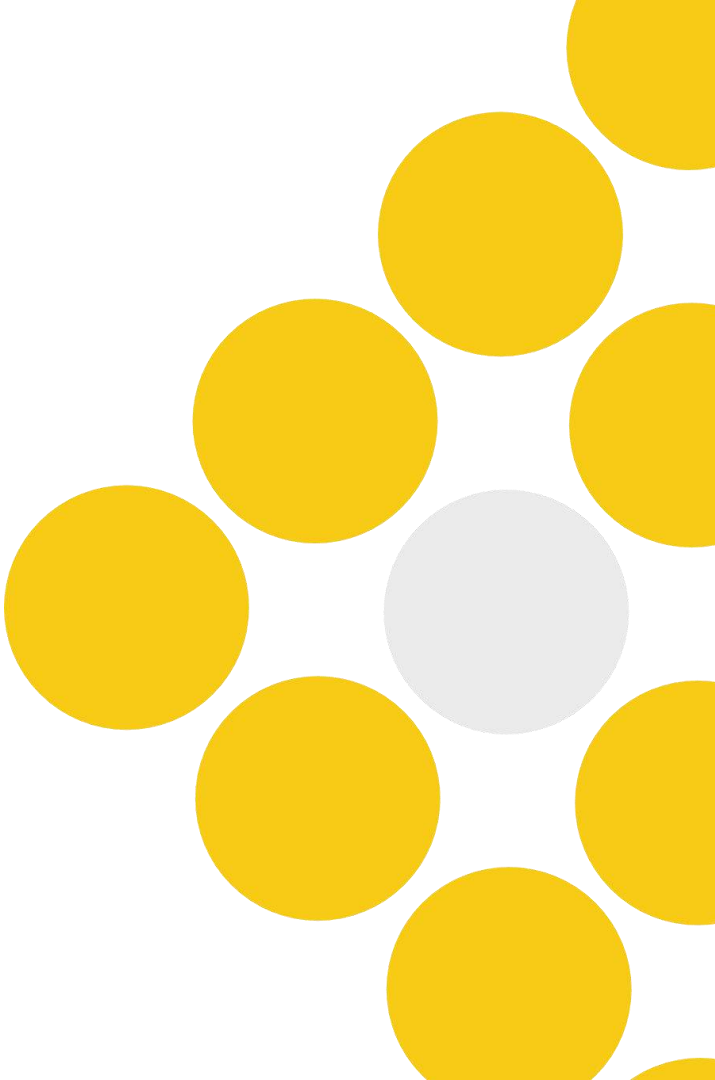
Sub-Category	Central	East	South	West	Total
Accessories	4,375.45	2,901.49	3,104.85	10,099.61	**20,481.39**
Appliances	3,782.60	1,640.42	1,783.94	1,162.92	**8,369.88**
Art	565.00	1,496.27	364.36	1,432.45	**3,858.08**
Binders	1,115.33	8,066.63	9,993.17	2,237.40	**21,412.53**
Bookcases	3,212.85	8,201.54	261.96	2,158.64	**13,834.99**
Chairs	9,601.26	6,020.01	7,447.01	7,740.82	**30,809.09**
Copiers				9,359.83	**9,359.83**
Envelopes	348.07	1,080.08	590.51	90.67	**2,109.33**
Fasteners	98.11	183.36	10.74	89.44	**381.66**
Furnishings	1,650.85	4,012.20	1,069.34	3,524.51	**10,256.89**
Labels	287.67	507.61	586.08	152.97	**1,534.34**
Machines	18,144.36	6,212.30	8,265.46		**32,622.12**
Paper	1,113.12	2,341.60	535.07	2,396.45	**6,386.24**
Phones	11,453.34	4,761.17	4,507.86	10,314.13	**31,036.50**
Storage	6,387.31	7,019.56	1,275.72	7,127.04	**21,809.64**
Supplies	246.53	809.26	1,007.06	328.80	**2,391.65**
Tables	4,628.00	4,238.14	2,760.83	12,849.64	**24,476.61**
Total	**67,009.85**	**59,491.64**	**43,563.96**	**71,065.32**	**241,130.77**

Sum of Sales by State and Person

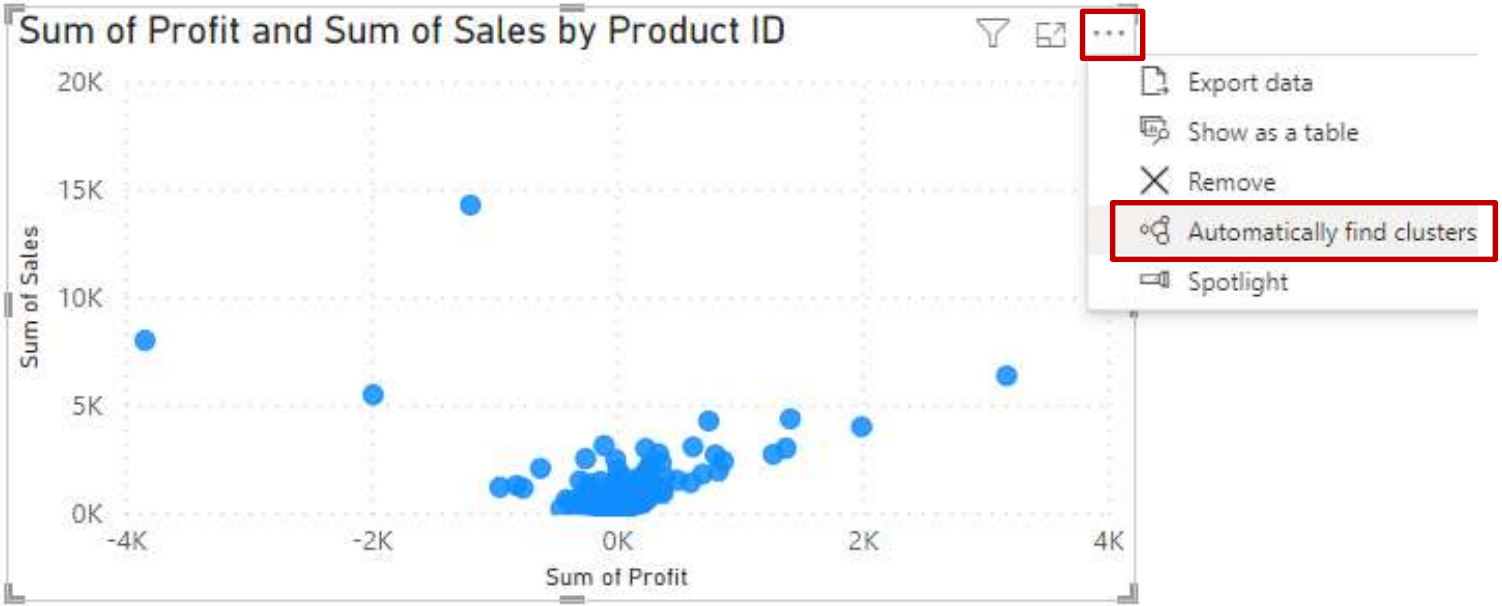


Workshop 3

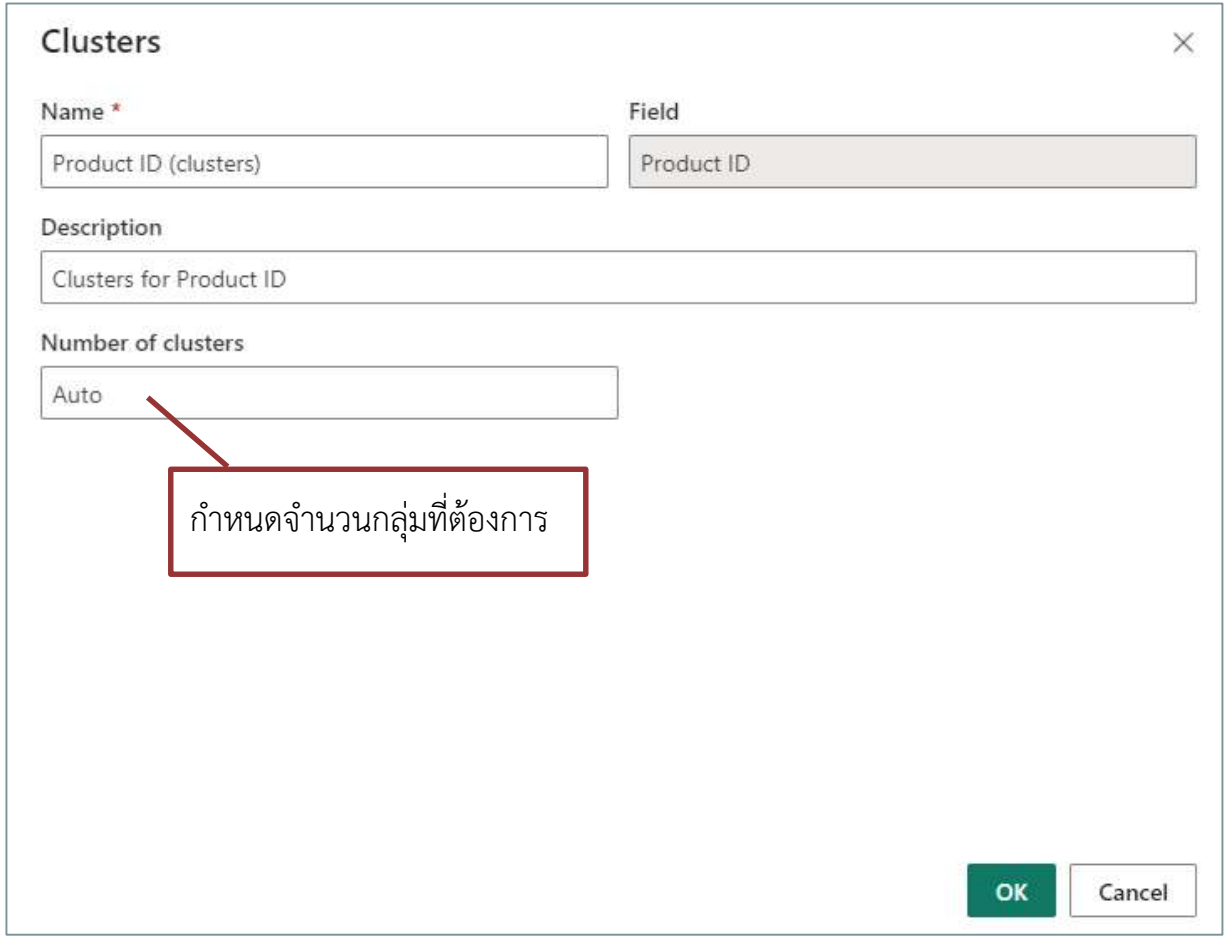
- Clustering



Workshop 3-1

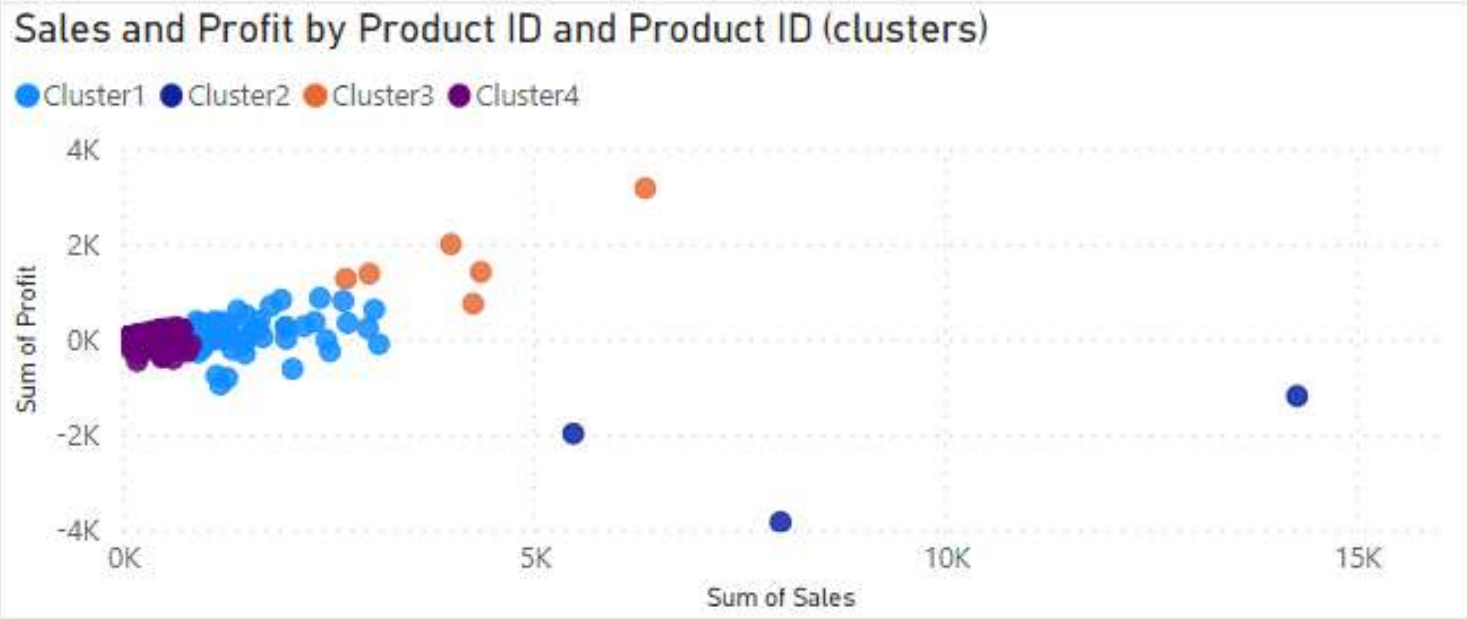

Sum of Profit and Sum of Sales by Product ID
20K
15K
10K
5K
0K
Sum of Sales
-4K
-2K
0K
2K
4K
Sum of Profit
Export data
Show as a table
Remove
Automatically find clusters
Spotlight

Workshop 3-1


Clusters
Name *
Product ID (clusters)
Field
Product ID
Description
Clusters for Product ID
Number of clusters
Auto
กำหนดจำนวนกลุ่มที่ต้องการ
OK
Cancel

Workshop 3-1

- จะได้ผลลัพธ์ของการจัดกลุ่ม



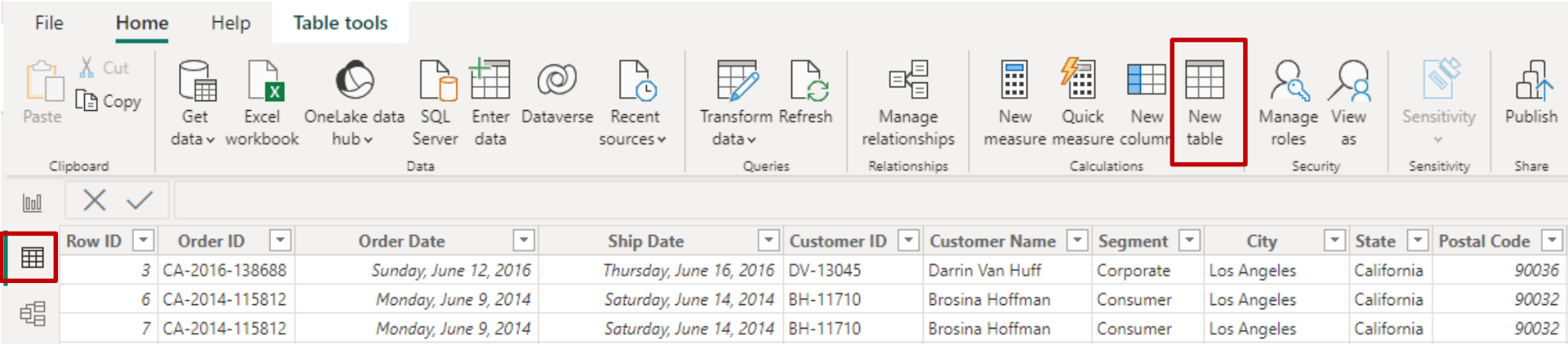
Workshop 3-2: จัดกลุ่มลูกค้า

- คลิกขวาที่ตาราง Orders เลือก New measure
- สร้าง Measure ด้วยกัน 4 ตัว ดังนี้

```
TotalSalesAmt = SUM(Orders[Sales])

OrderCount = COUNTROWS(Orders)

LastOrderDate = MAX(Orders[Order Date])

AvgSalesAmt = DIVIDE([TotalSalesAmt], Orders[OrderCount])
```

Workshop 3-2: สร้างตาราง Customer

- เลือกมุมมอง Data > คลิก New table



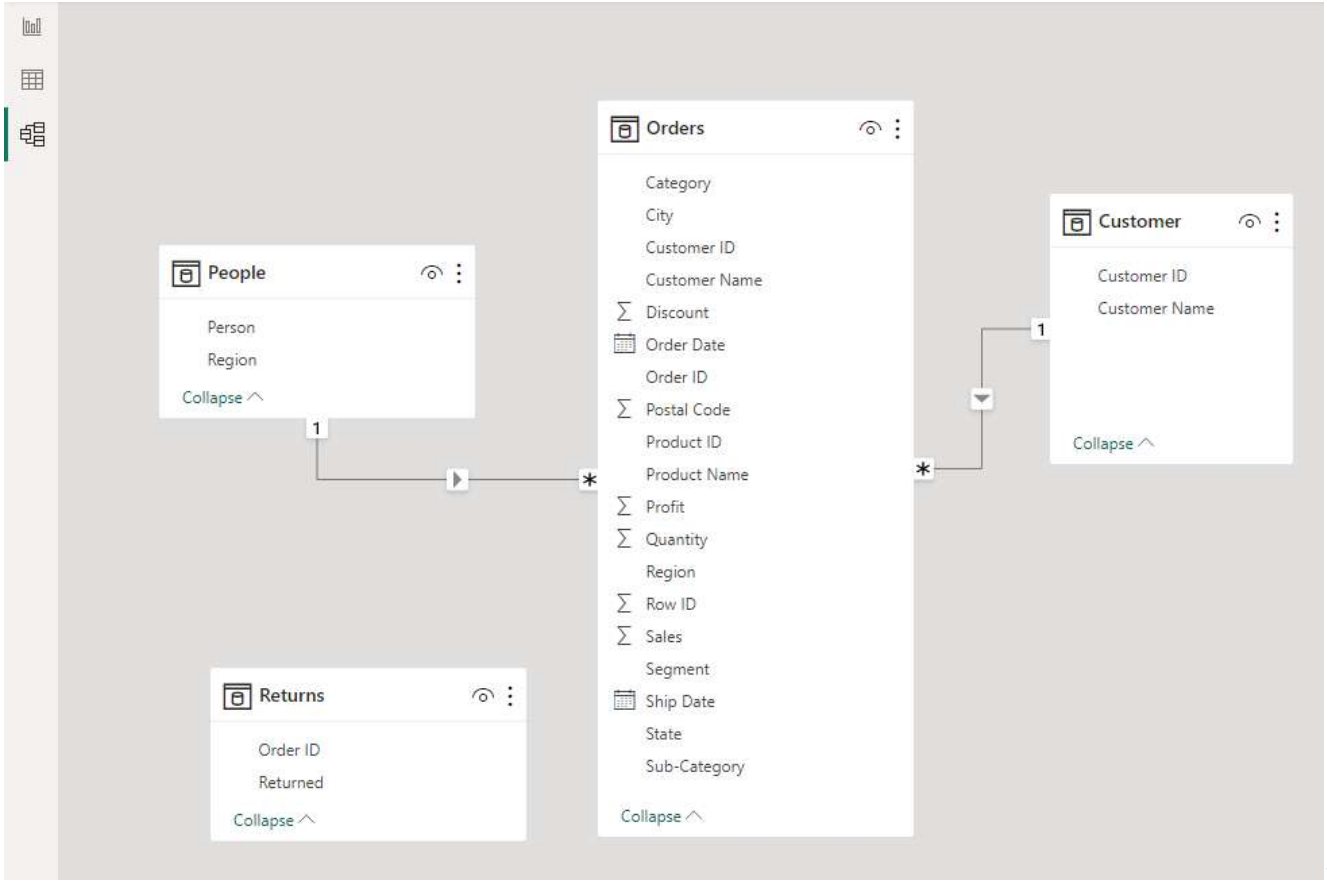
Row ID	Order ID	Order Date	Ship Date	Customer ID	Customer Name	Segment	City	State	Postal Code
3	CA-2016-138688	Sunday, June 12, 2016	Thursday, June 16, 2016	DV-13045	Darrin Van Huff	Corporate	Los Angeles	California	90036
6	CA-2014-115812	Monday, June 9, 2014	Saturday, June 14, 2014	BH-11710	Brosina Hoffman	Consumer	Los Angeles	California	90032
7	CA-2014-115812	Monday, June 9, 2014	Saturday, June 14, 2014	BH-11710	Brosina Hoffman	Consumer	Los Angeles	California	90032

- เขียน DAX เพื่อสร้างตาราง ดังนี้

```
Customer = all(orders[customer ID], Orders[Customer Name])
```

Workshop 3-2: New table

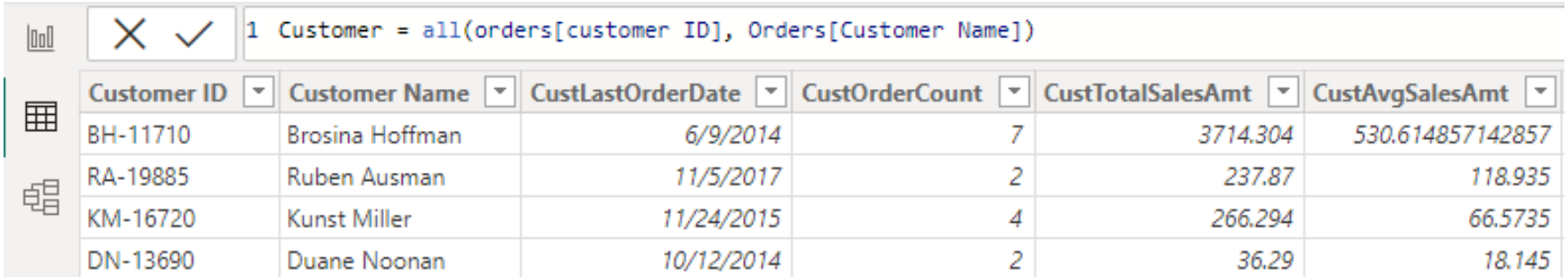
- สร้าง Relationship



Workshop 3-2: Calculated Column

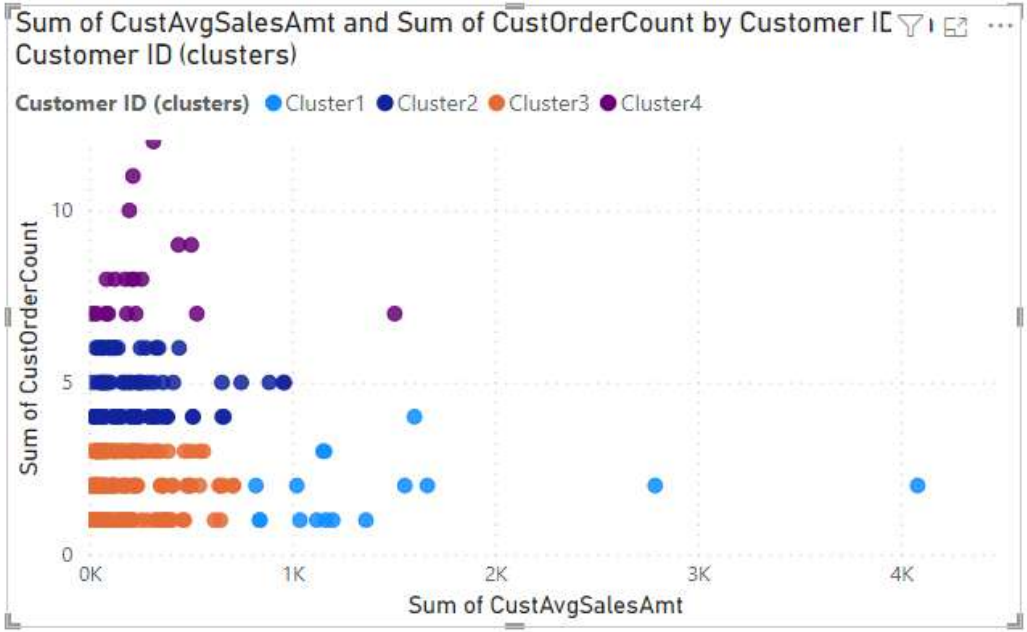
- คลิกขวาที่ตาราง Customer เลือก New column
- เขียน DAX เพื่อสร้าง column ด้วยกัน 4 ตัว ดังนี้

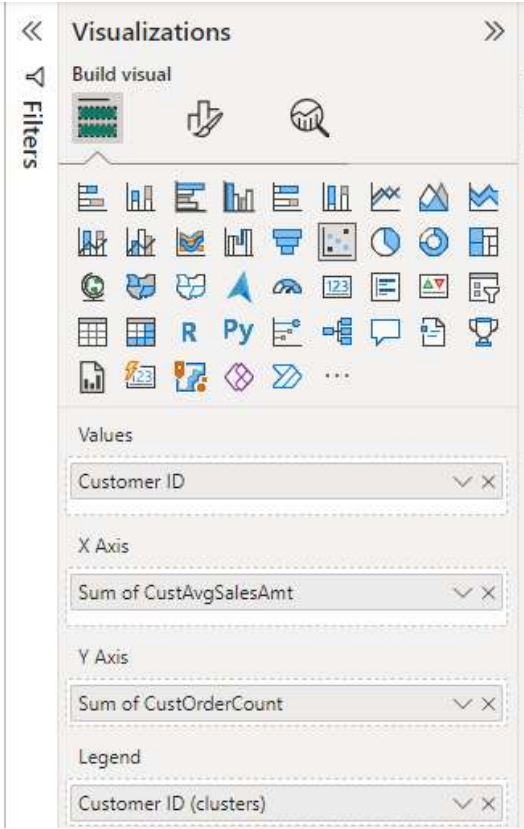
```
CustLastOrderDate = [LastOrderDate]

CustOrderCount = [OrderCount]

CustTotalSalesAmt = [TotalSalesAmt]

CustAvgSalesAmt = [AvgSalesAmt]
```

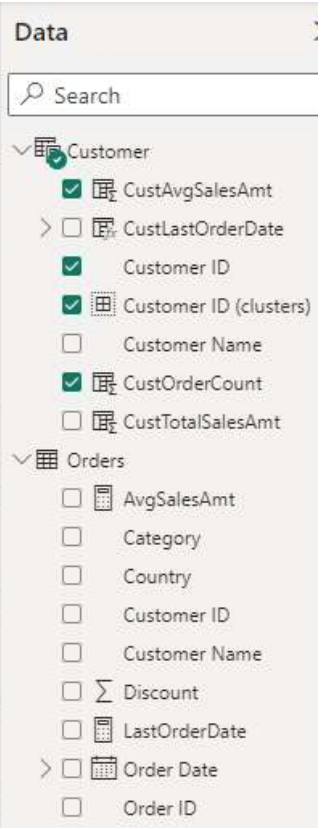


Customer ID	Customer Name	CustLastOrderDate	CustOrderCount	CustTotalSalesAmt	CustAvgSalesAmt
BH-11710	Brosina Hoffman	6/9/2014	7	3714.304	530.614857142857
RA-19885	Ruben Ausman	11/5/2017	2	237.87	118.935
KM-16720	Kunst Miller	11/24/2015	4	266.294	66.5735
DN-13690	Duane Noonan	10/12/2014	2	36.29	18.145

Workshop 3-2

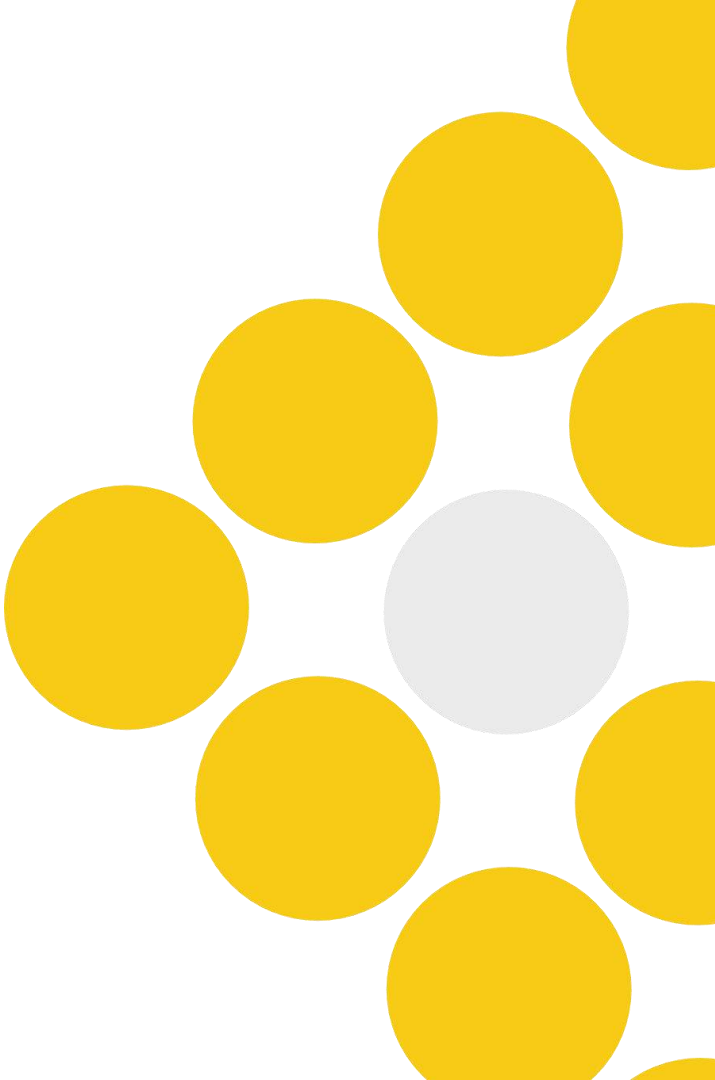

Sum of CustAvgSalesAmt and Sum of CustOrderCount by Customer ID
Customer ID (clusters)
Customer ID (clusters) Cluster1 Cluster2 Cluster3 Cluster4
Sum of CustOrderCount
10
5
0
0K
1K
2K
3K
4K
Sum of CustAvgSalesAmt


Filters
Visualizations
Build visual
Values
Customer ID
X Axis
Sum of CustAvgSalesAmt
Y Axis
Sum of CustOrderCount
Legend
Customer ID (clusters)


Data
Search
Customer
CustAvgSalesAmt
CustLastOrderDate
Customer ID
Customer ID (clusters)
Customer Name
CustOrderCount
CustTotalSalesAmt
Orders
AvgSalesAmt
Category
Country
Customer ID
Customer Name
Discount
LastOrderDate
Order Date
Order ID

Workshop 4

- การตรวจจับข้อมูลที่ผิดปกติ (Analytics Anomaly Detection)



Workshop 4:

Anomaly Detection เป็นเครื่องมือในการตรวจจับข้อมูลที่ผิดปกติ

ข้อดี

- มีคำอธิบายสำหรับสิ่งผิดปกติ เพื่อช่วยในการวิเคราะห์สาเหตุที่แท้จริง

ข้อจำกัด

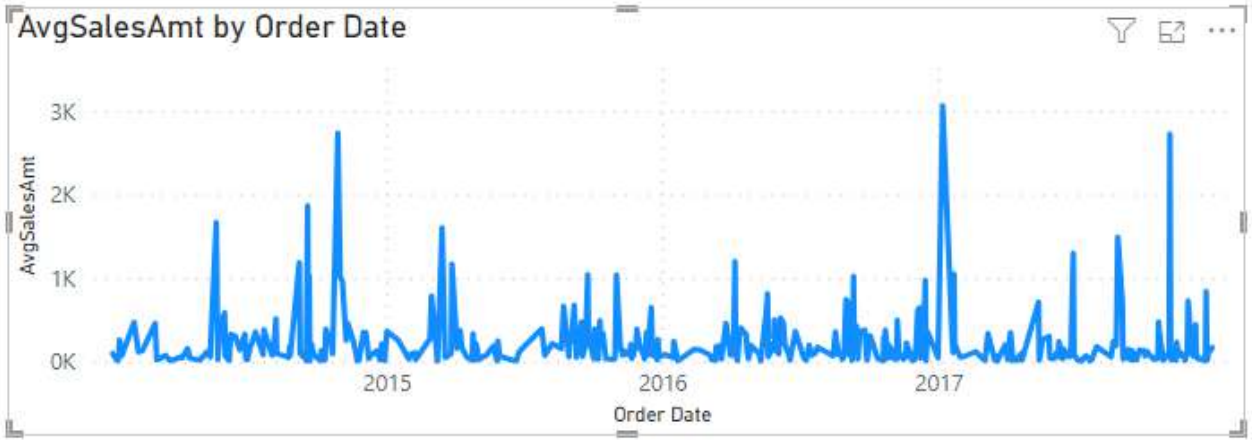
- รองรับการตรวจหาสิ่งผิดปกติสำหรับ Line Chart ที่มีข้อมูลอนุกรมเวลาในเขตข้อมูลแกนเท่านั้น
- ไม่รองรับการตรวจหาสิ่งผิดปกติที่มีคำอธิบายแผนภูมิ ค่าหลายค่า หรือค่ารองใน Line Chart
- การตรวจหาสิ่งผิดปกติต้องการจุดข้อมูลอย่างน้อย 12 จุดขึ้นไป
- เส้นพยากรณ์/ต่ำสุด/สูงสุด/เฉลี่ย/มัธยฐาน/เปอร์เซ็นต์ไทล์ ใช้ไม่ได้กับการตรวจหาสิ่งผิดปกติ
- ไม่รองรับ Direct Query ผ่านแหล่งข้อมูล SAP, Power BI Report Server, การเชื่อมต่อแบบ Live Connection ไปยัง Azure Analysis Services และ SQL Server Analysis Services
- ไม่รองรับการเจาะลึกเพื่อไปยังระดับถัดไปในลำดับชั้น (Hierarchy)

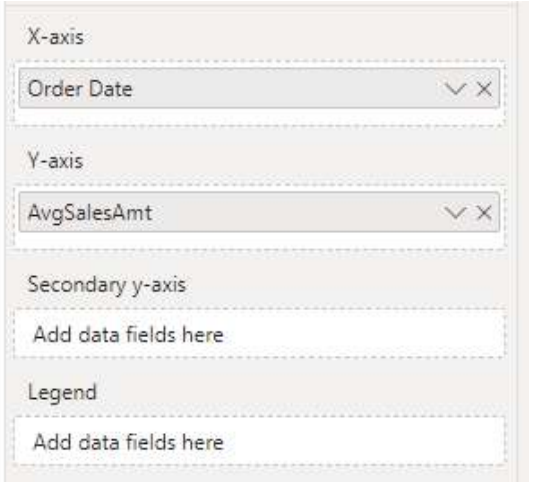
Workshop 4:

- ที่หน้าต่าง Visualizations คลิกเลือก Line chart

ที่ Fields Tool

- X-Axis > เลือก Order Date จากตาราง Orders
- Y-Axis > เลือก AvgSalesAmt จากตาราง Orders

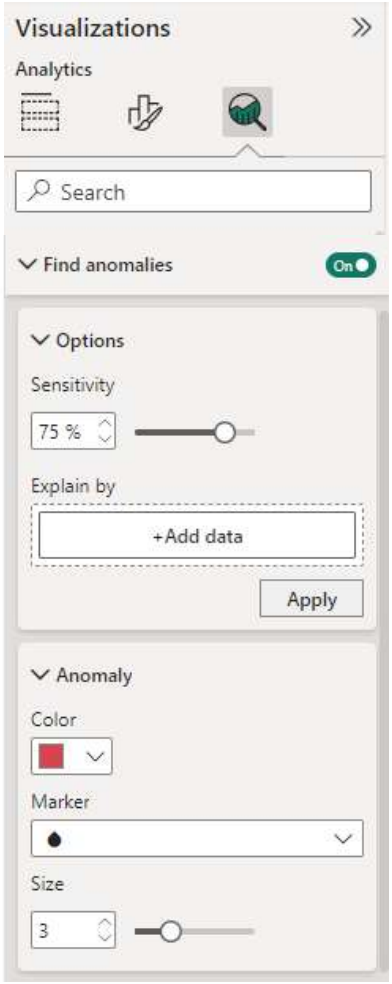




Workshop 4:

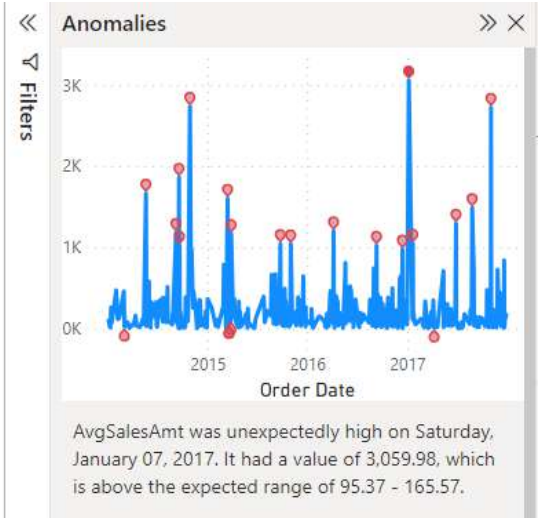
ที่ Analytic Tool

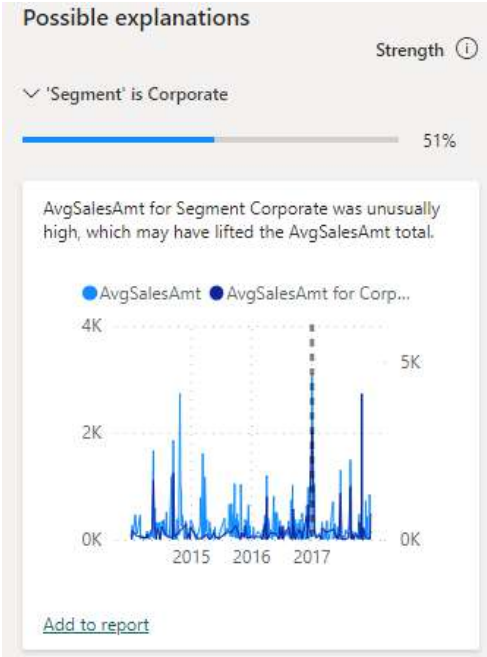
- เลือกเปิด (On) เมนู Find anomalies



Workshop 4:

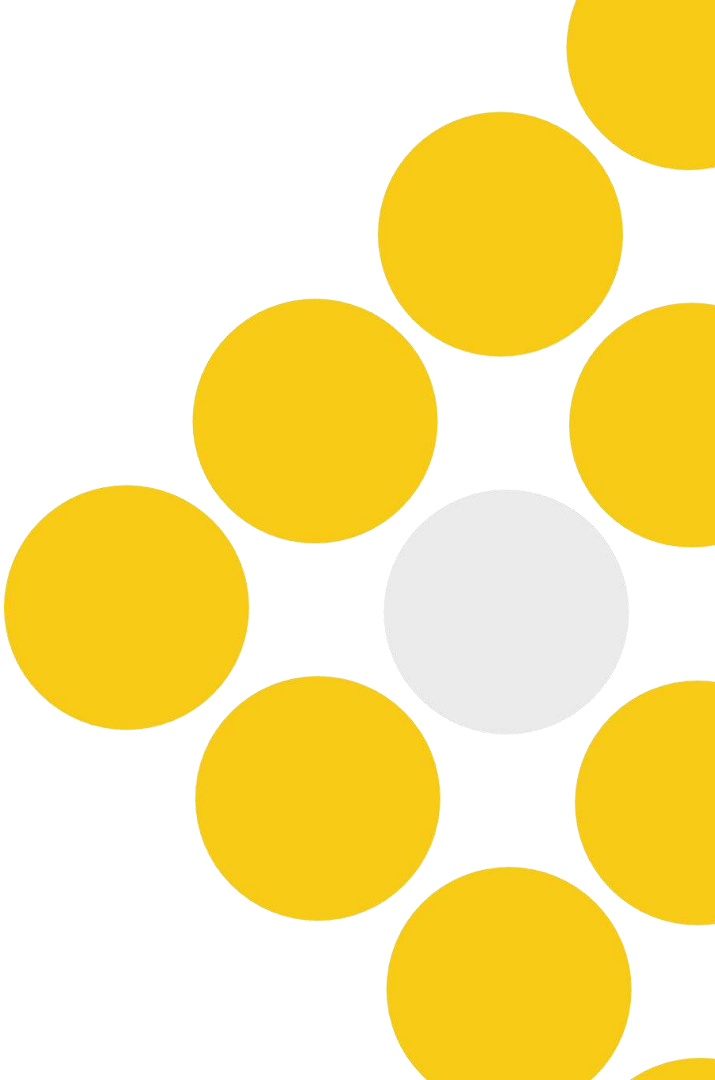
- เมื่อคลิกที่เครื่องหมาย Anomaly detection จะปรากฏหน้าต่างที่อธิบายสิ่งผิดปกติของข้อมูล
- ถ้าสามารถตรวจหาปัจจัยที่เกี่ยวข้องกับสิ่งผิดปกติได้ จะแสดงผลอยู่ในส่วนของ Possible explanations



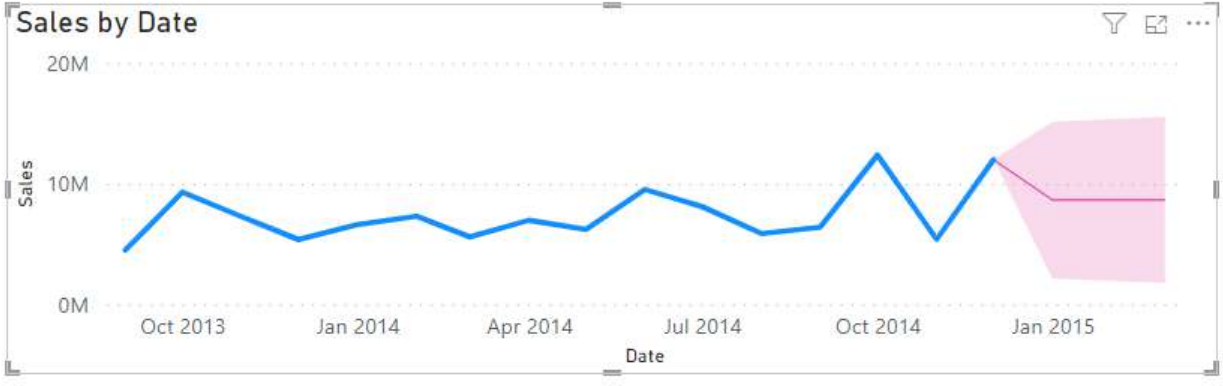


Workshop 5

- การพยากรณ์ข้อมูลเบื้องต้น (Forecasting)



Workshop 5



- ที่หน้าต่าง Visualizations คลิกเลือก Line chart

ที่ Fields Tool

- X-Axis > เลือก Date
- Y-Axis > เลือก Sales