



Power BI

# Introduction

Current role: Senior Data Analyst at Mitsui

Email: [zoe.teets@gmail.com](mailto:zoe.teets@gmail.com)

Tools:

SQL (T-SQL)

Power BI

Azure

ACL Analytics & Highbond Robots

May 11th @ 6pm - NSS Roundtable about tips to identify a good work environment from an interview

# Recap

# Agenda

- Understand the need for and value of data visualization
- Why Power BI?
- The Dashboard Process (the infinite loop of improvement)
- Power BI Terminology
- ETL -> Explore & Visualize -> Tell a Story
- Advanced Topics
- Demo

Understand the need for and value of  
data visualization

**DOMO**

# DATA NEVER SLEEPS 8.0

How much data is generated *every minute*?

In 2020, the world changed fundamentally—and so did the data that makes the world go round. As COVID-19 swept the globe, nearly every aspect of life—from work to working out—moved online, and people depended more and more on apps and the Internet to socialize, educate and entertain ourselves. Before quarantine, just 15% of Americans worked from home. Now over half do. And that's not the only big shift: In our 8th edition of Data Never Sleeps, we bring you the latest stats on how much data is being created in every digital minute—a trend that shows no sign of stopping.



The world's Internet population is growing significantly year over year. As of April 2020, the Internet reaches 59% of the world's population and now represents 4.57 billion people—a 6% increase from January 2019.



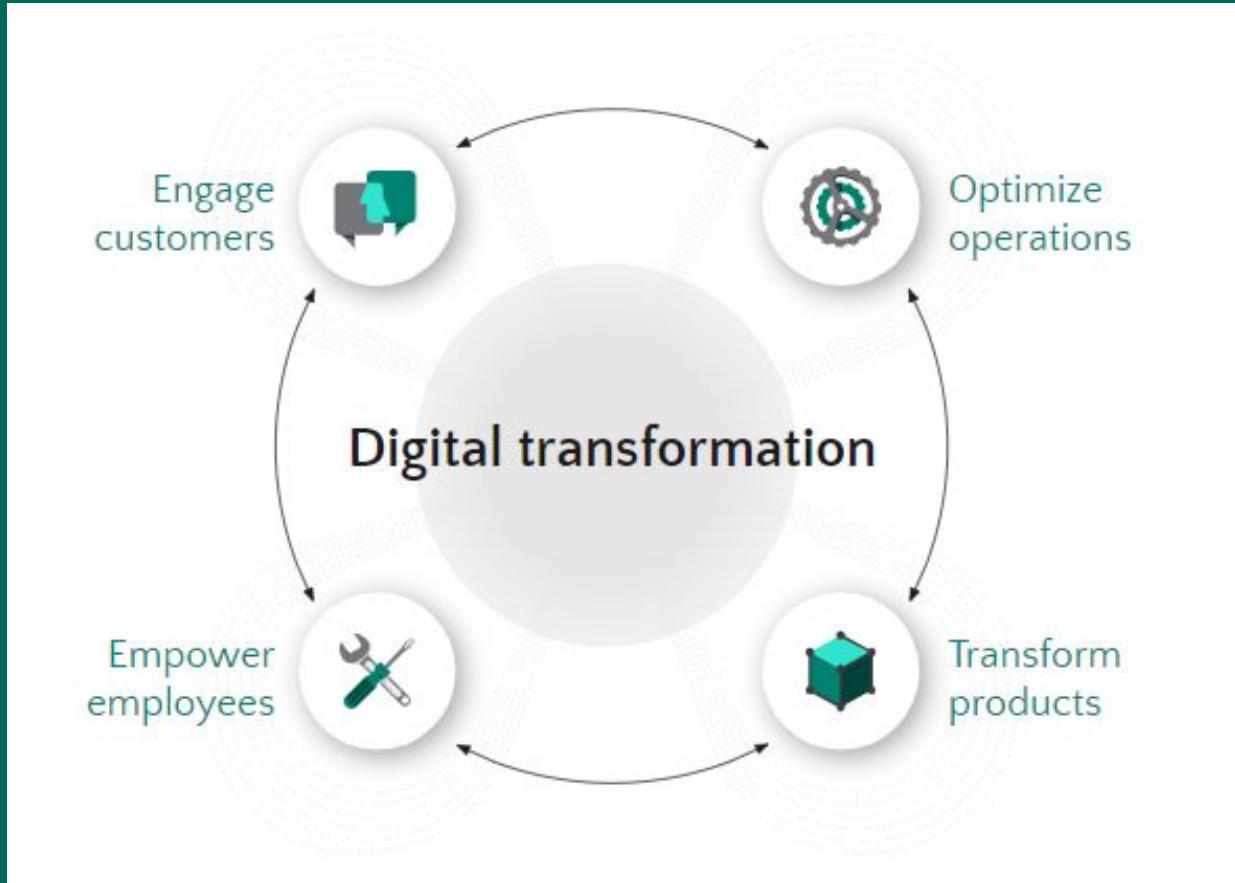
GLOBAL INTERNET POPULATION GROWTH 2014–2020  
(IN BILLIONS)

As the world changes, businesses need to change with the times—and that requires data. Every click, swipe, share or like tells you something about your customers and what they want. And Domo gives them the tools to make sense of all of it. Domo gives you the power to make data-driven decisions at any moment, on any device, so you can make smart choices in a rapidly changing world.

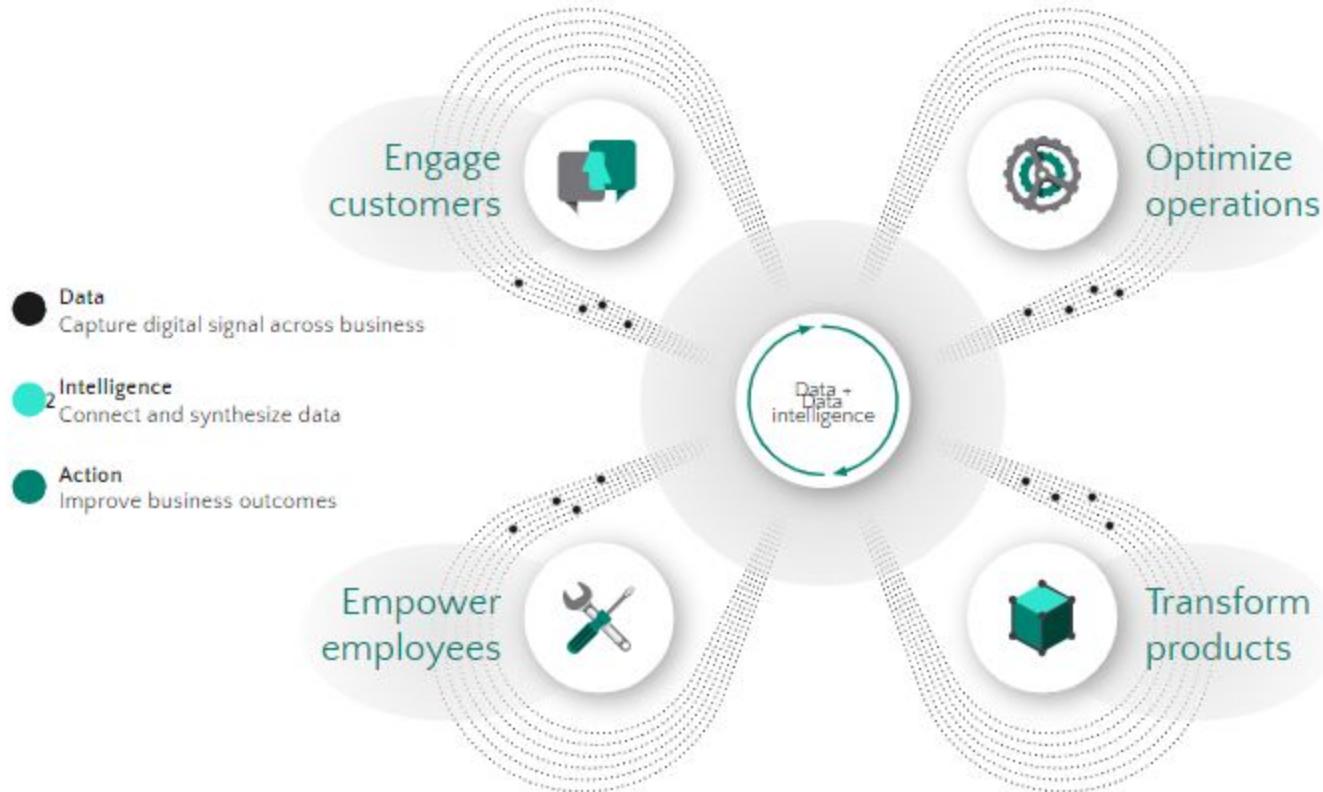
Learn more at [domo.com](https://domo.com)

SOURCES: STATISTA, VISUAL CAPITALIST, BUSINESS INSIDER, GAMESENSE, TECHCRUNCH, OMNICORE, AGENCY, DOORDASH, BUSINESS OF APPS, NEW YORK TIMES, MUSIC BUSINESS WORLDWIDE, INC., THE VERGE, INC., HIGHSUITE, DUSTIN STOUT, REDDIT, UBER, AMAZON, VOX

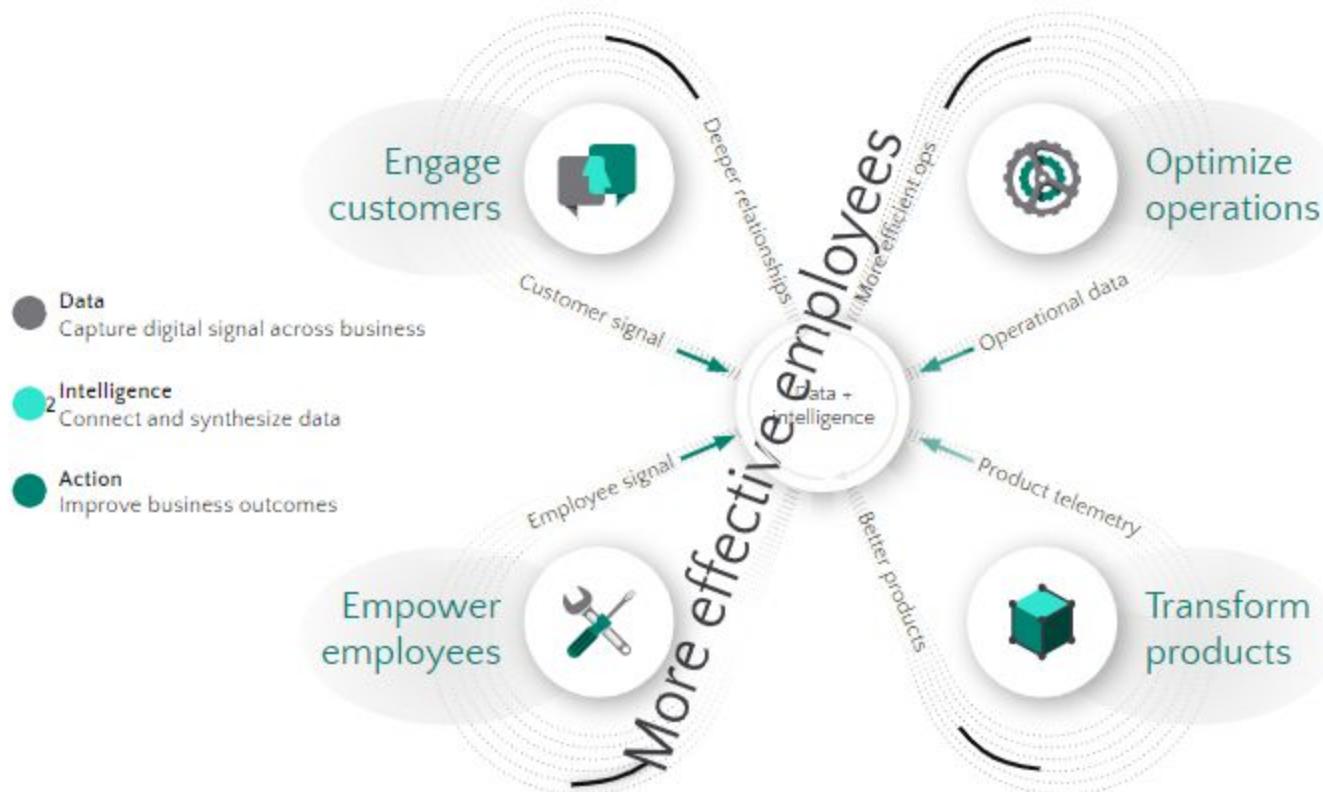




## DIGITAL FEEDBACK LOOP



## DIGITAL FEEDBACK LOOP



# Business Intelligence

What do you think of when you hear the phrase “Business Intelligence”?

# Business Intelligence

Business intelligence (BI) leverages software and services to transform data into actionable insights that inform an organization's strategic and tactical business decisions. BI tools access and analyze data sets and present analytical findings in reports, summaries, dashboards, graphs, charts and maps to provide users with detailed intelligence about the state of the business.

Source:

<https://www.cio.com/article/2439504/business-intelligence-definition-and-solutions.html>

# Business Intelligence Example

Publix wants to open a new location. They need to rely on unbiased data to make a profitable decision. What do they need to know?

# The need to visualize data

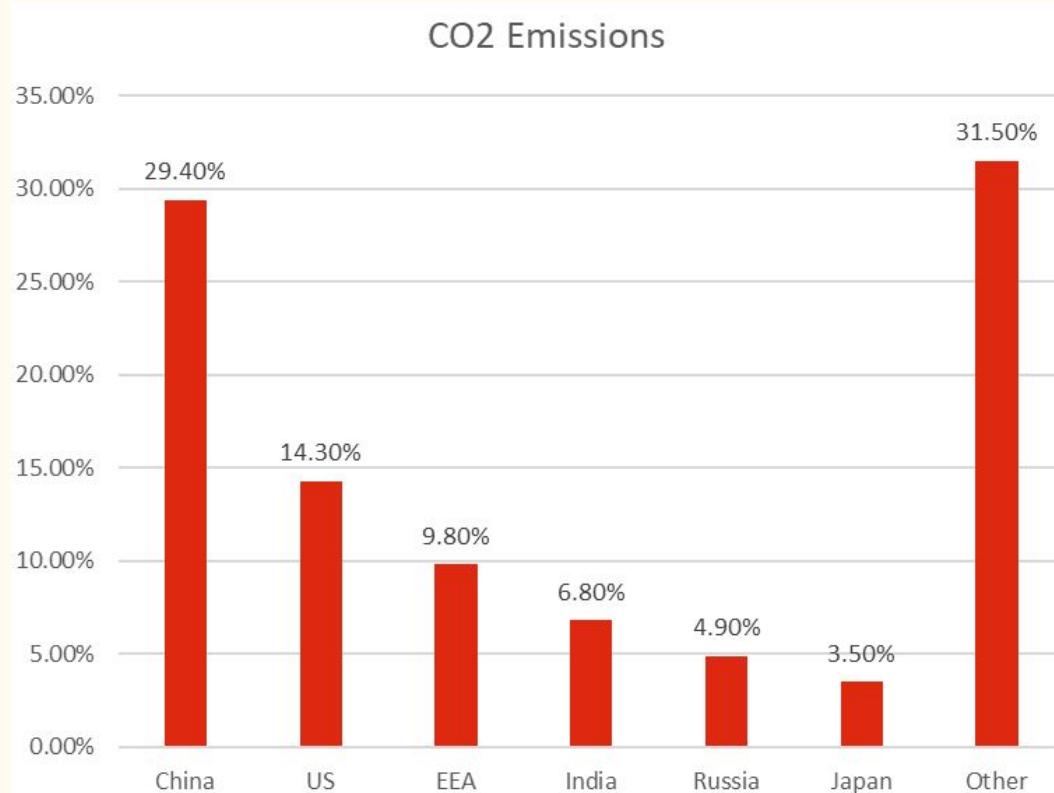
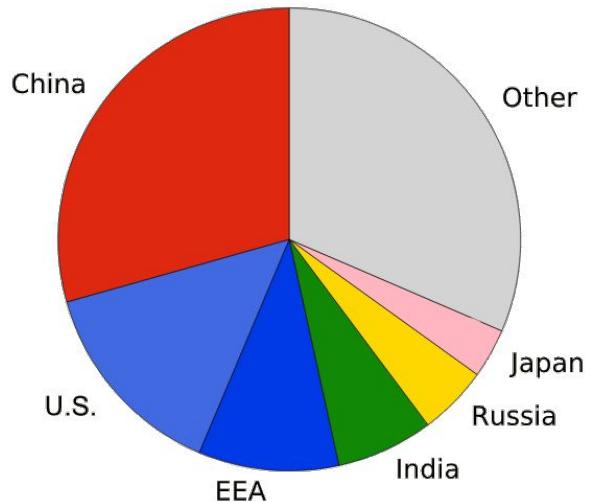
- Human brain processes images 60,000x faster than text.

-Persuasion and the Role of Visual Presentation Support: The UM/3M Study, 1986

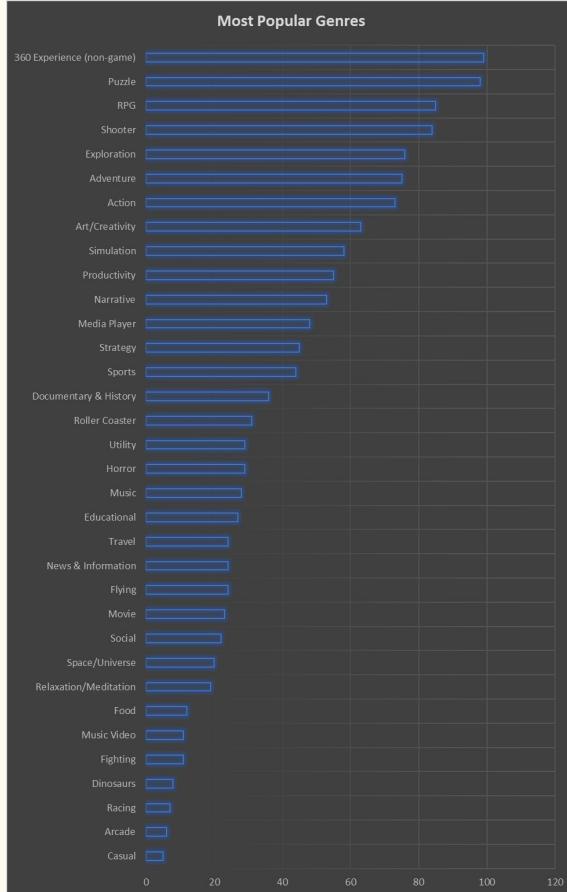
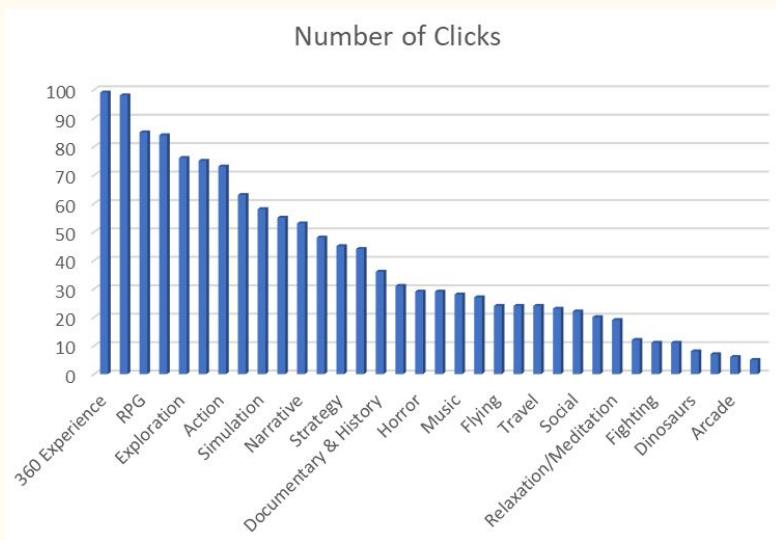
- 90 percent of the information transmitted to the brain is visual.

-MIT News, January 16, 2014

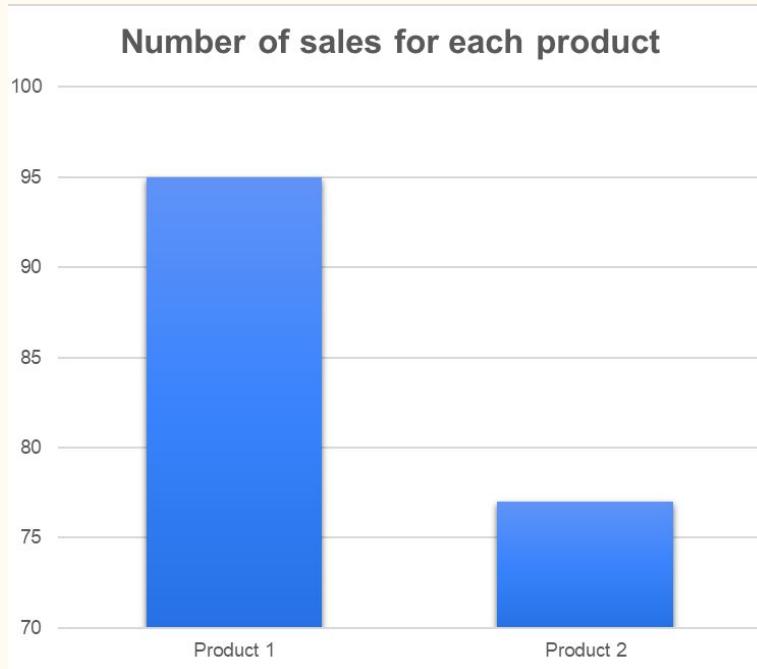
# Which one is better?



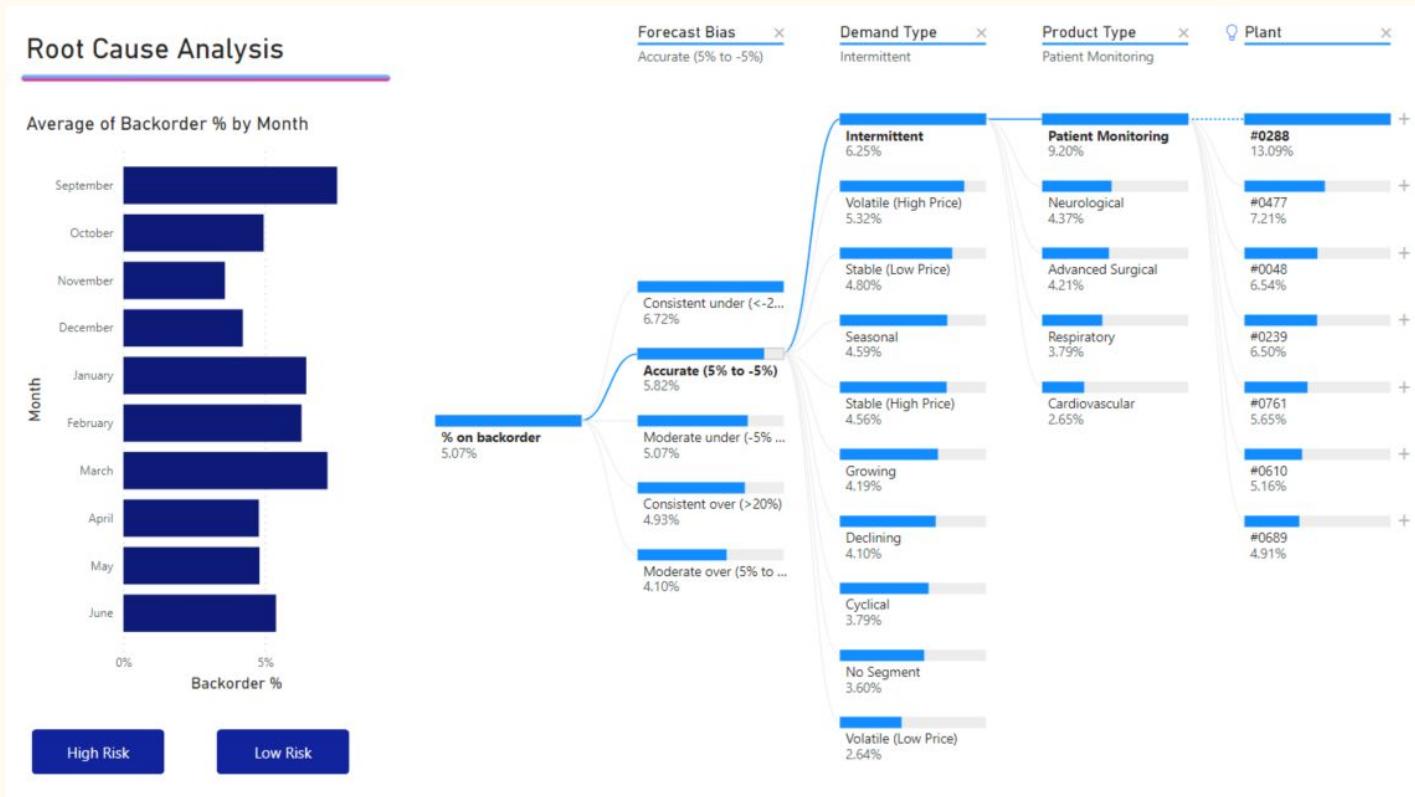
# Which one is better?



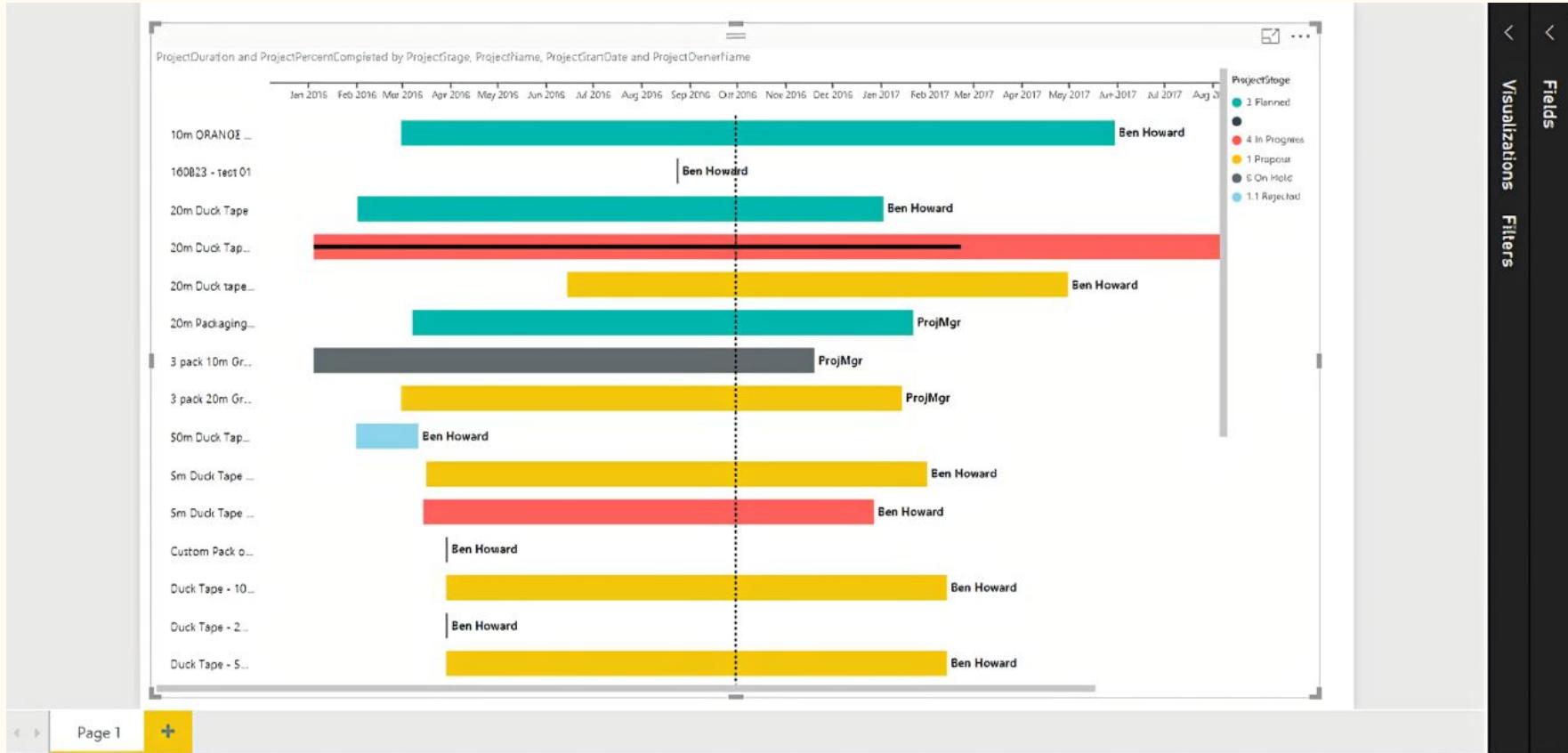
# Which one is better?



# Decomposition Tree



# Gantt Chart

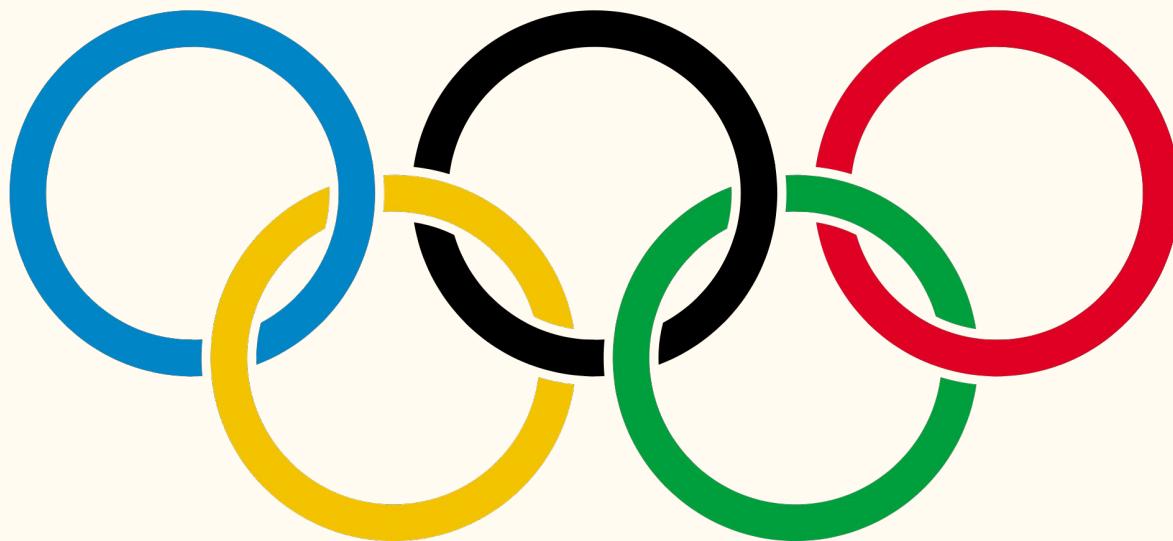


# The Gestalt Principles

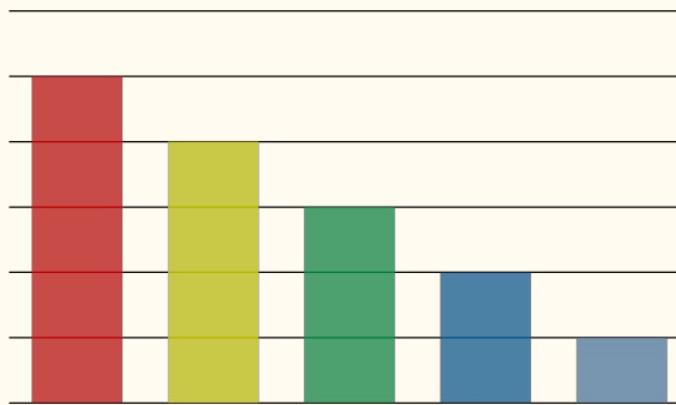
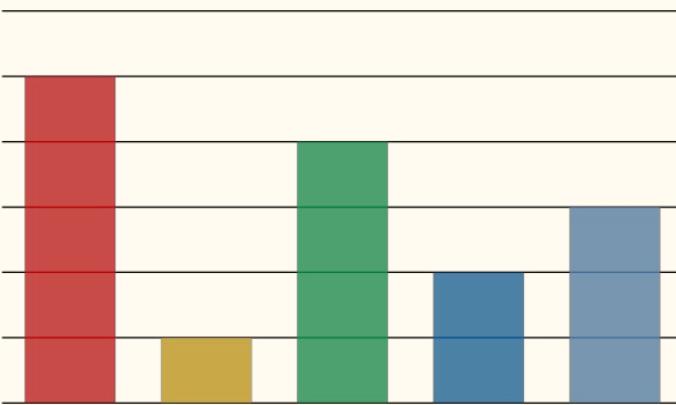
# Gestalt

- Introduced by Christian von Ehrenfels
- Psychological term meaning unified whole
  - The whole is different (not greater) than the sum
- Gestalt Effect –
  - Ability of the mind to generate whole images from a collection of parts

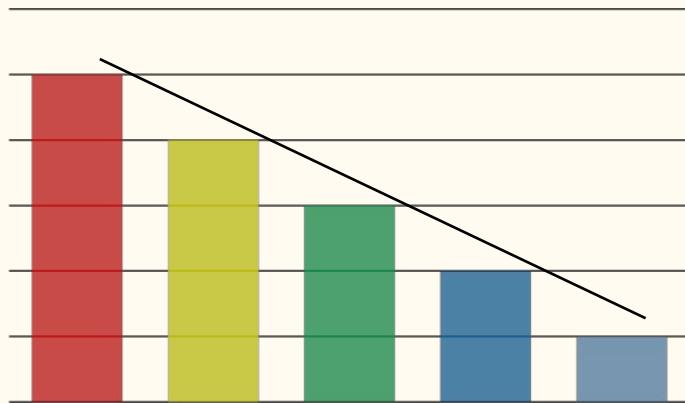
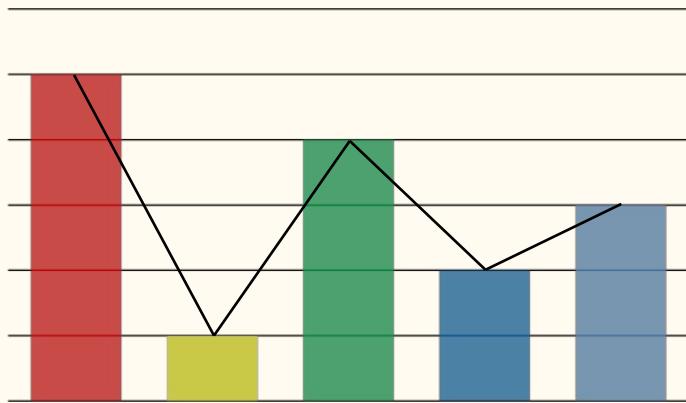
# Law of Pragnanz



# Law of Pragnanz



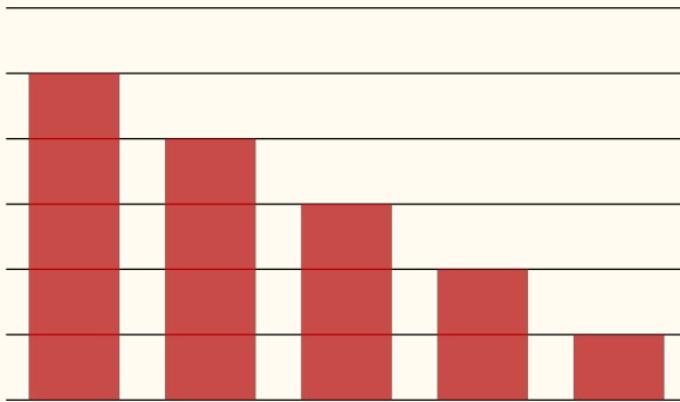
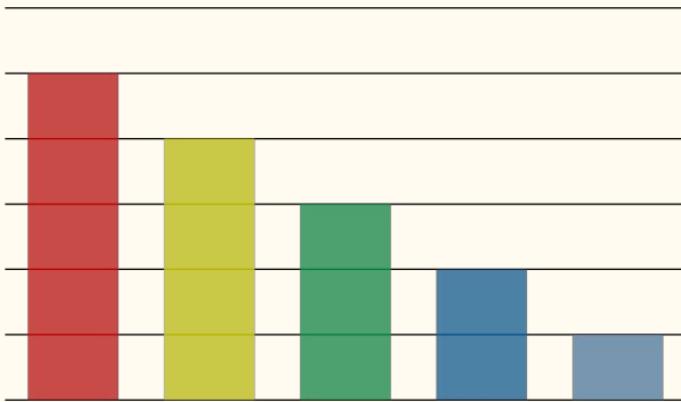
# Law of Continuity



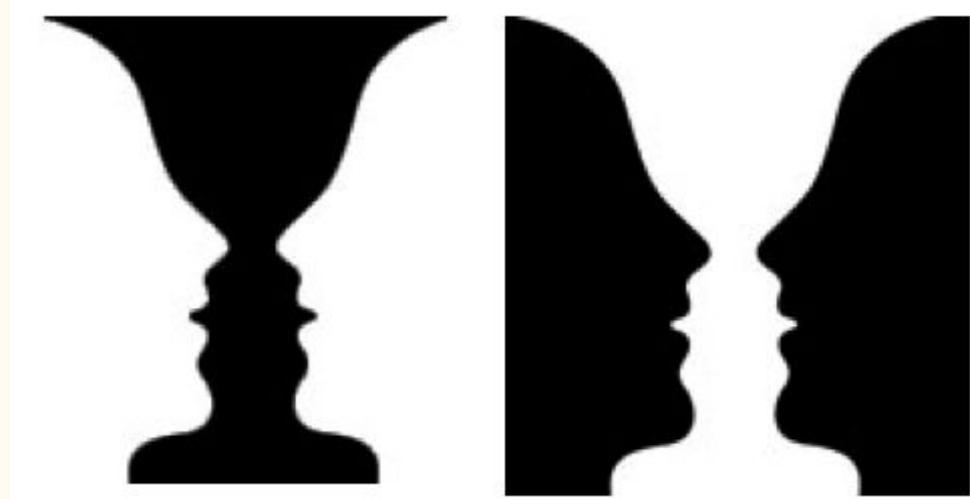
# Law of Similarity



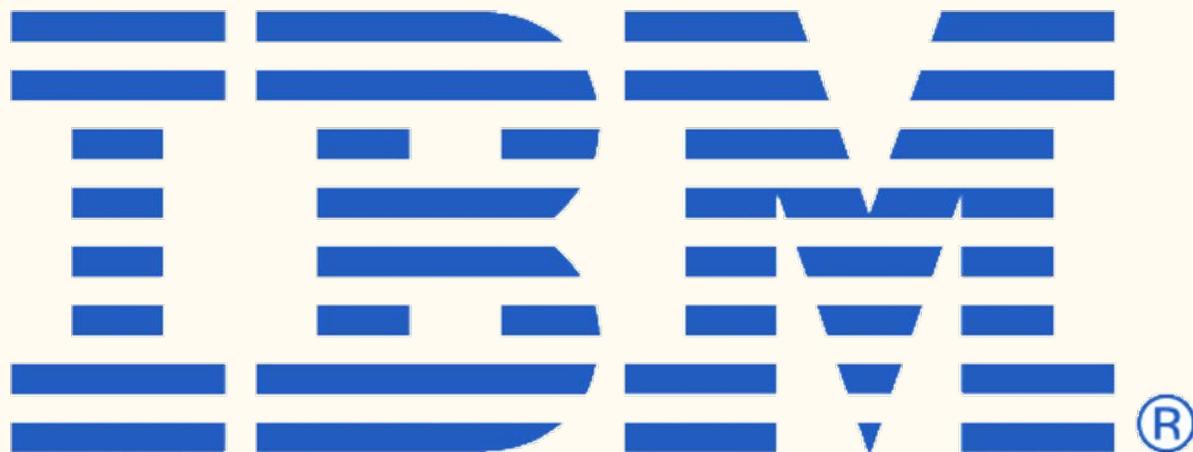
# Law of Similarity



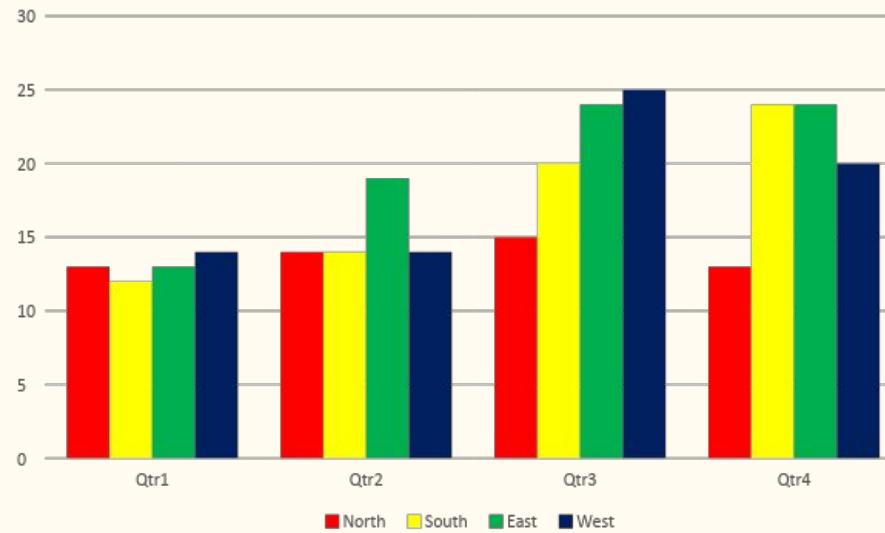
# Law of Focal Point



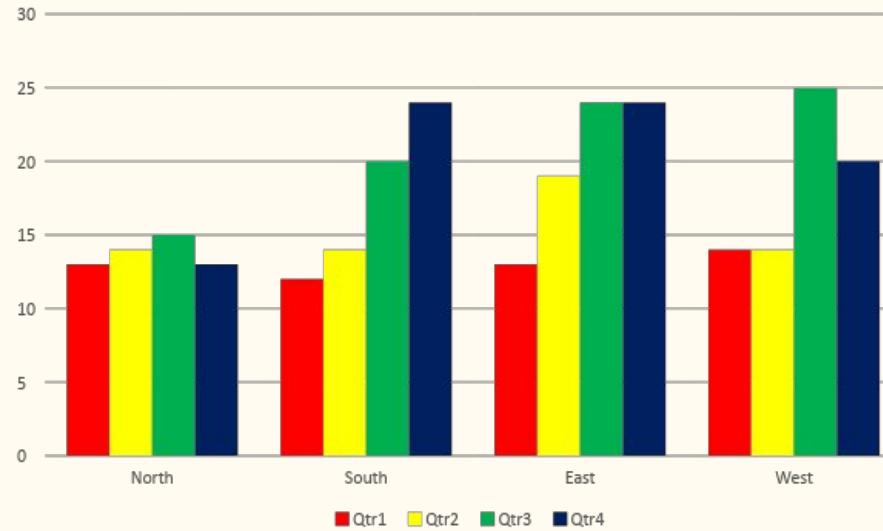
# Law of Proximity



# Law of Proximity



# Law of Proximity



# Resources

- Gestalt Psychology – [http://en.wikipedia.org/wiki/Gestalt\\_psychology](http://en.wikipedia.org/wiki/Gestalt_psychology)
- Color Matters – <http://www.colormatters.com>
- CVD Color Lab - <http://colorlab.wickline.org/colorblind/colorlab/>
- Coblis - <http://www.color-blindness.com/coblis-color-blindness-simulator/>
- Data Visualization Catalogue - <https://datavizcatalogue.com/search.html>

# Why Power BI?



# Largest Global Footprint



China GB 18030

43  
Languages

34  
Primary and backup  
datacenters worldwide

National Clouds  
US Government  
China  
Germany





**JOIN OUR THRIVING  
COMMUNITY**

**850k** Active Community  
Members

**100k+** Users in-person at Microsoft  
sponsored events

**USER VOICE:** **103,431** Users    **16,432** Ideas Submitted    **3,162** Active Ideas



**ENGAGE WITH A  
USER GROUP**



**222**

Independent Power BI User  
Groups World Wide

**49,685**

User Groups Members  
in over 60 countries

**Join your local PUG today!**  
[pbiusergroup.com](http://pbiusergroup.com)

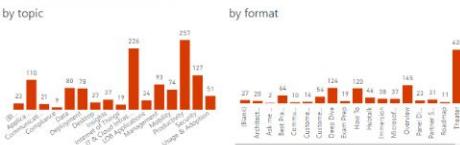
# Explore and share your data stories

Data Stories Gallery - Microsoft Ignite Session Browser

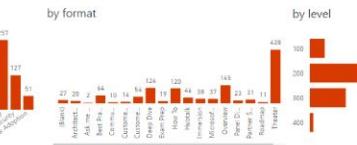
## Microsoft Ignite

### Session Browser

by topic



by format



### tyGraph

by level



1,266 Sessions

1019 Speakers

Location

- Select All
- (Blank)
- A1
- A32
- A39
- A311 - A312
- A313 - A314
- A315 - A316
- A402 - A403
- A404 - A405
- A411 - A412

Data Stories Gallery : Analysis of the Congress of the Republic of Peru

Day	Start	Session Code	Duration	Level	Title
Sunday	9/25/2016 9:00:00 AM	PRB01	480	300	Build an Office
Sunday	9/25/2016 9:00:00 AM	PRB01	480	300	Build an Office
Sunday	9/25/2016 9:00:00 AM	PRB02	480	200	Bulle cross-star
Sunday	9/25/2016 9:00:00 AM	PRB02	480	200	Bulle cross-star
Sunday	9/25/2016 9:00:00 AM	PRB03	480	200	Get started with
Sunday	9/25/2016 9:00:00 AM	PRB04	480	200	Dashboard in a
Sunday	9/25/2016 9:00:00 AM	PRB05	480	200	DEV Immersion
Sunday	9/25/2016 9:00:00 AM	PRB05	480	200	DEV Immersion
Sunday	9/25/2016 9:00:00 AM	PRB06	480	200	DevOps Hatchet
Sunday	9/25/2016 9:00:00 AM	PRB07	480	200	Get Microsoft's

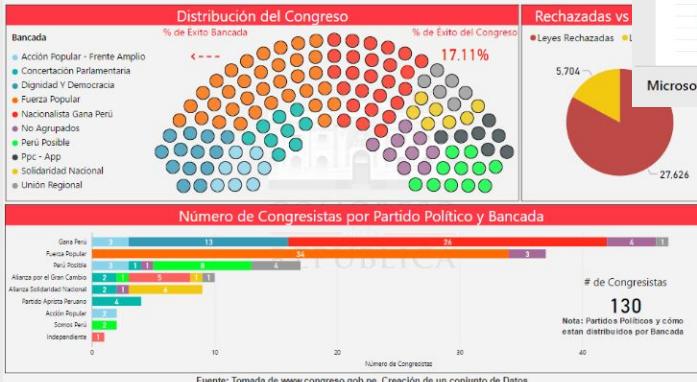
Microsoft Power BI

Select All (Blank) Sunday

09:00 AM 09:15 AM 09:50 AM 10:00 AM 10:15 AM

Microsoft Power BI

## Resultados por Bancada Perú 2011-2016



Ion Kleopas  
Winner

87.713%  
Winner Score

25,063 Views

493 Participants

2,392 Submissions

CORTANA INTELLIGENCE COMPETITION  
Women's Health Risk Assessment  
[Visit Competition page for more details](#)

\$5,000 prizes in total  
Ended 10/1/2016, 7:59:59 AM (GMT Daylight Time)

**Summary**  
Based on the World Health Organization (WHO) report in 2011, about 820,000 women and men aged 15-24 were newly infected with HIV in developing countries. Among these newly infected, more than 60% were women.

Developing countries face serious reproductive health problems such as sexually transmitted infections (STIs), unintended pregnancies, and complications from childhood. Emphasize prevention and provision of information about STIs and other reproductive tract infections (RTIs) was listed as one of the top priorities for policymakers, researchers, and health care providers.

To help achieve the goal of improving women's reproductive health outcomes in underdeveloped regions, this competition calls for optimized machine learning solutions so that a patient can be accurately categorized into different health risk segments and subgroups.

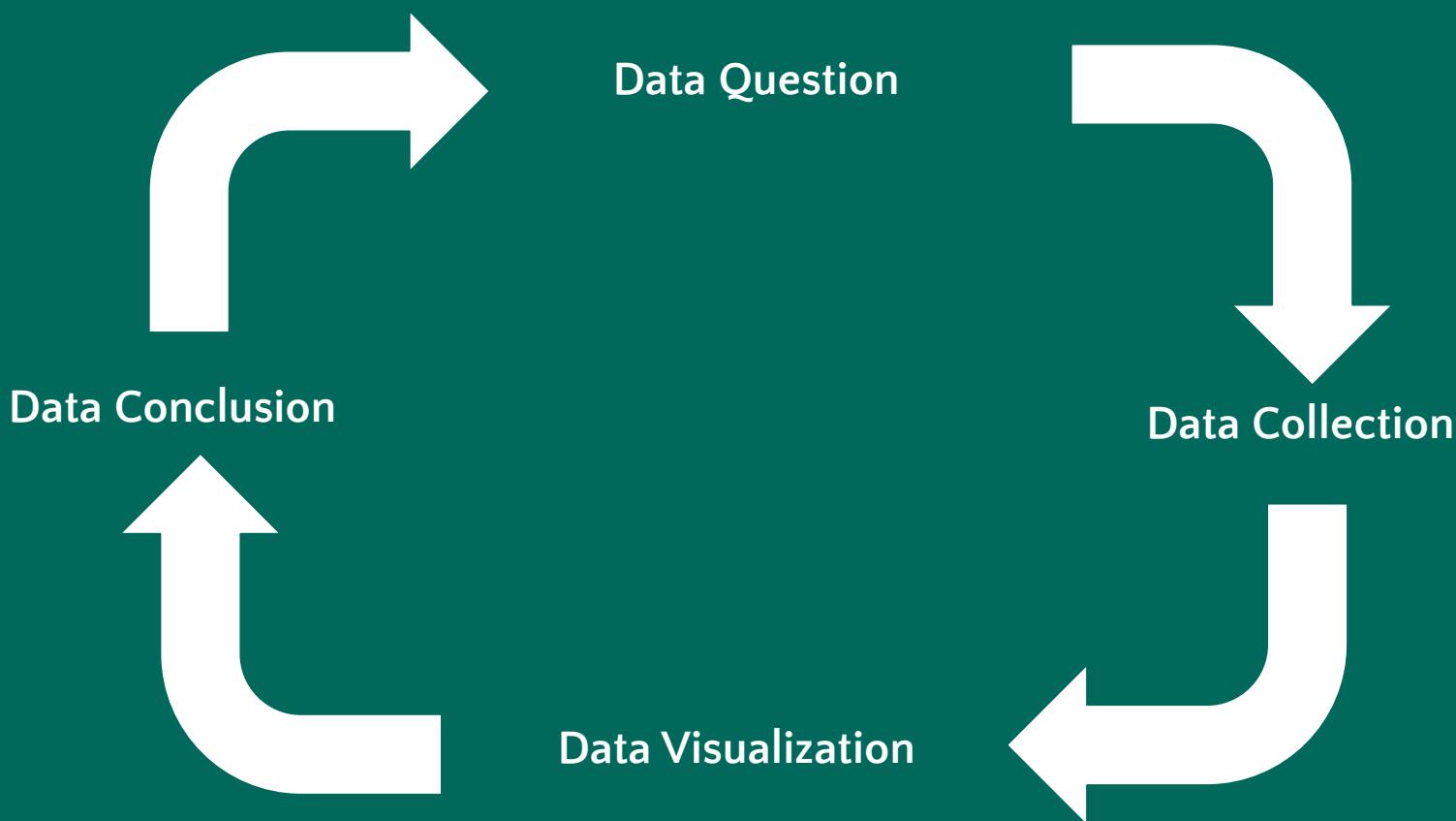
Please see [this video](#) and [this blog post](#).

WHR Competition Power BI Companion by DevScope



In the Data Stories Gallery

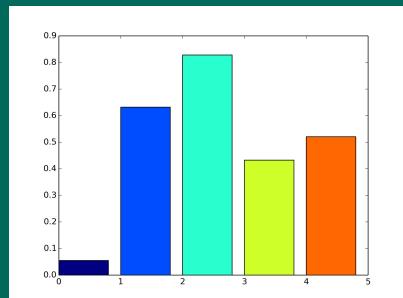
# The Dashboard Process

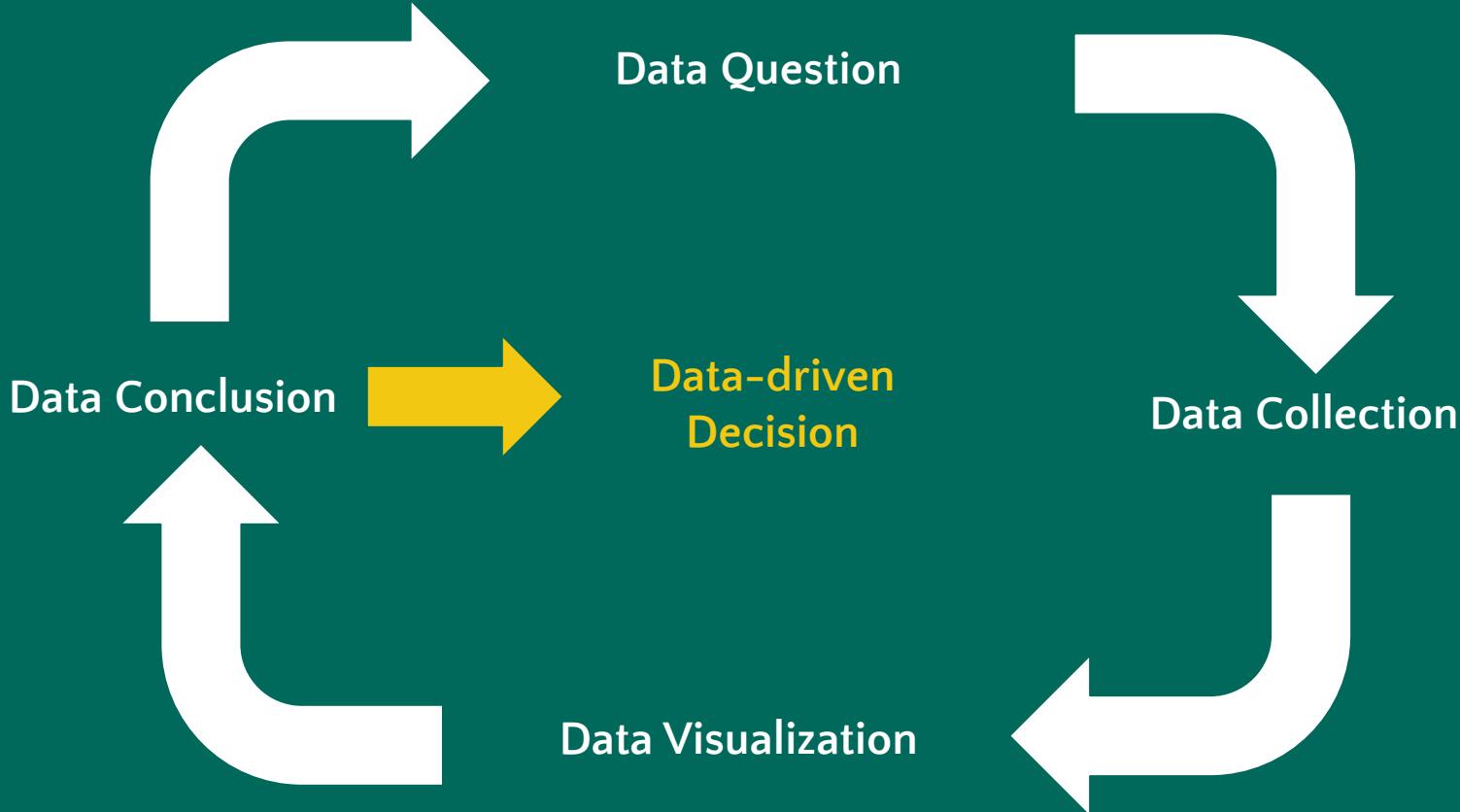


Data Conclusion

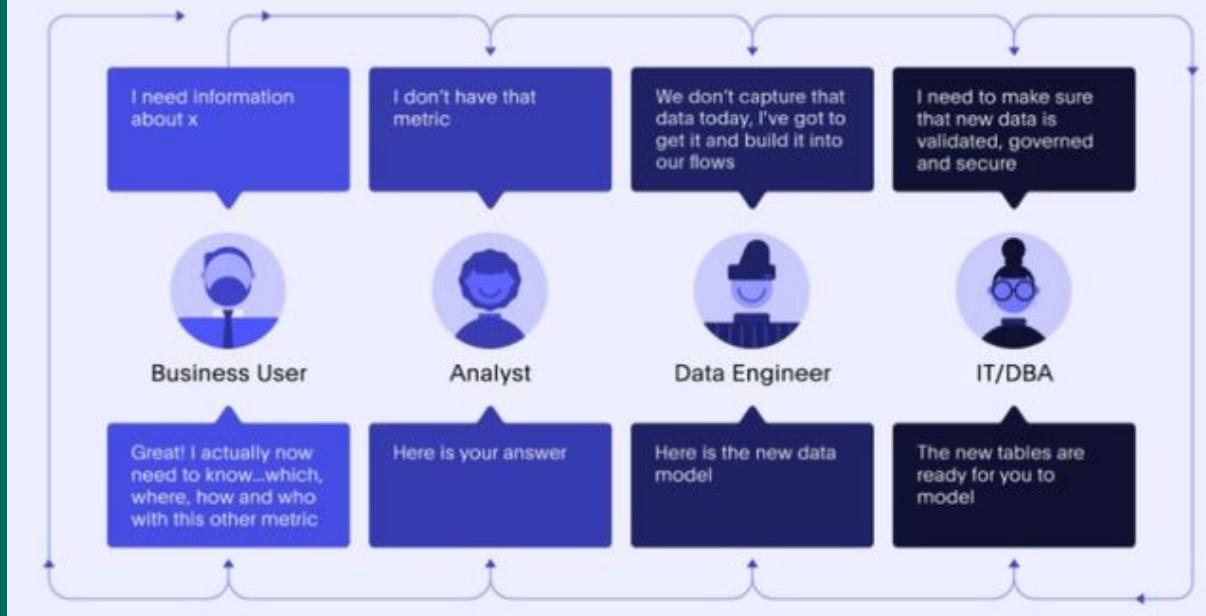
What product  
has the highest  
profit margin?

`SELECT profit_margin  
FROM product_pricing  
GROUP BY product`





# The infinite loop of dashboard insanity



# Power BI Terminology

Facts

Dimensions

# Dimensions

Descriptive/ Qualitative Information

- Color
- Country
- Region
- State
- City
- Person
- Gender
- Age
- Dates

# Facts

## Quantitative Information

- Expressed in numbers and can be counted and aggregated easily

# Scenario 1

How many shoes were sold in Tennessee in 2017?

# Scenario 1

How many **shoes** were **sold** in **Tennessee** in **2017**?

**Dimension**

**Fact**

# Scenario 2

How many kids under the age of 10 bought red Nikes in the USA in 2018?

# Scenario 2

How many kids under the age of 10 bought red Nikes in the USA in 2018?

Dimension

Fact

# Scenario 3

How many kids under the age of 10 bought red Nikes in the USA in 2018

What percentage of those shoes were returned within one month?

Dimension

Fact

# Scenario 3

How many kids under the age of 10 bought red Nikes in the USA in 2018?

What percentage of those shoes were returned within one month?

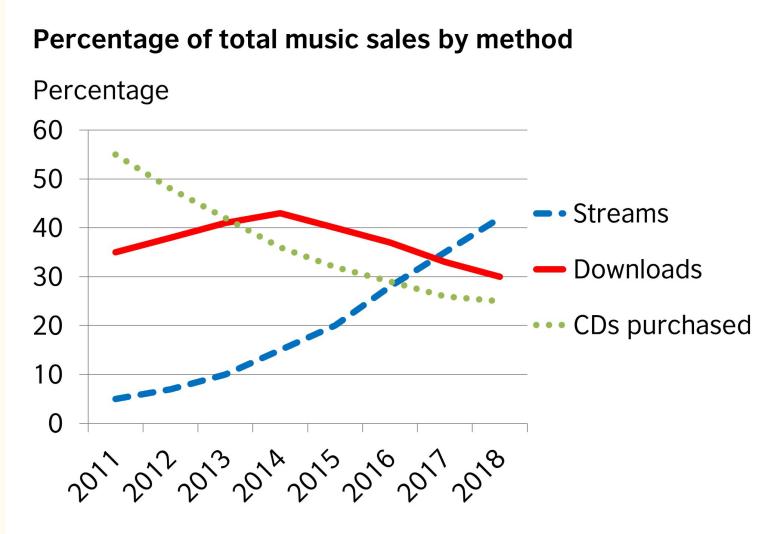
Dimension

Fact

# How to create visualizations using facts & dimensions

# Facts & Dimensions

Fact



Dimension

SELECT FACT  
FROM TABLE  
GROUP BY DIMENSION

# How to do basic ETL (Extract, Transform, and Load)

Extract: How to connect to a data source

# Data sources



**SaaS solutions**  
e.g. *Marketo, Salesforce, GitHub, Google Analytics*



**Organizational**  
*Corporate data sources or external data services*



**On-premises Data**



**Azure services**  
*Azure SQL, Stream Analytics...*



**Excel files**



**Power BI Desktop files**  
*Data from files, databases, Azure, and other sources*

Connect to 80+ data sources, both on-premises and cloud

- Data from Applications
  - SaaS services that you already use
- Data from your organization
  - Content published by others in your org (Datasets and Dataflows)
- Big data and more
  - Azure data services, e.g. HDI, ASA, AML etc.
  - On-premises data sources, e.g. Oracle & SSAS
- Data from files
  - Import data from Text, CSV, Excel and Power BI Desktop files

# Access all your DATA

**Get Data**  
Need more guidance? Try this tutorial or watch a video

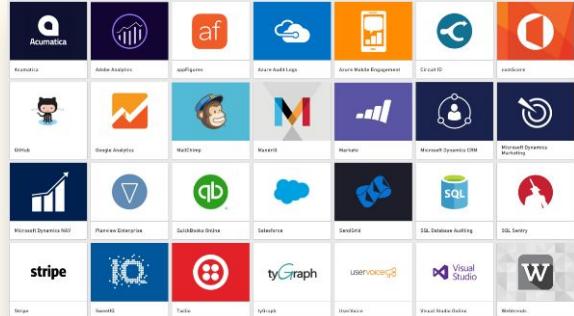
Discover content

My organization	Services	Files	Databases
Discover apps published by other people in your organization.	Choose apps from online services that you use.	Bring in your reports, workbooks, or data from Excel, Power BI Desktop or CSV files.	Use Power BI Desktop to connect to data in Azure SQL, Database and more.
<a href="#">Get</a>	<a href="#">Get</a>	<a href="#">Get</a>	<a href="#">Get</a>

Create new content

More ways to create your own content

Samples	Organizational Content Packs
Partner Showcase	Service Content Packs



financial report tutorial - Power BI Desktop

File Home Insert Modeling View Help

Paste Cut Copy Format painter Clipboard

Get data workbook hub Server data Enter Dataverse Recent sources

Common data sources

- Excel workbook
- Power BI datasets
- Dataflows
- Dataverse
- SQL Server
- Analysis Services
- Text/CSV
- Web
- OData feed
- Blank query
- Power BI Template Apps

Select or drag

More...



## SQL Server database

Server ⓘ

Database (optional)

Data Connectivity mode ⓘ

Import

DirectQuery

▲ Advanced options

Command timeout in minutes (optional)

SQL statement (optional, requires database)

```
Select  
Profit  
,Discounts  
,Month  
From financials
```

Include relationship columns

Navigate using full hierarchy

Enable SQL Server Failover support

OK

Cancel

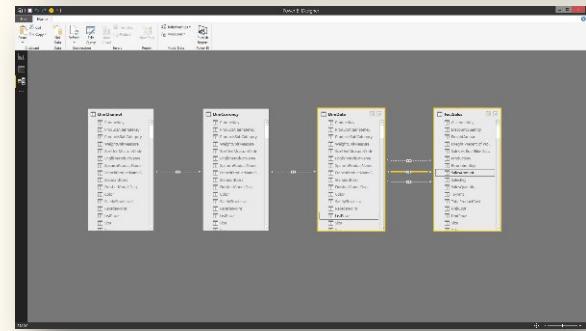
# Transform: Clean your data

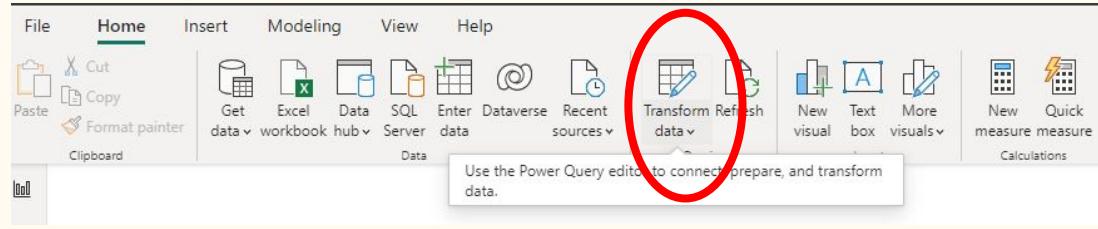
# Clean and mash-up your DATA



- Consolidate data from a broad range of sources
  - Merge or append queries to combine data from multiple queries into a single query
- Transform data to fit your needs using intuitive UI
  - Select data for inclusion
  - Cleanse data and remove errors
- Define calculations to generate new fields for use in reports
- Develop advanced analytics using a combination of measures and relationships
  - Uncover correlations, highlight exceptions and understand business outcomes

A screenshot of a data processing interface. At the top, there's a ribbon with tabs: File, Home, Transform, Add Column, and View. Under the Transform tab, there are several options: Data Type (Whole Number), Replace Values, Pivot Column, Reverse Rows, Detect Data Type, Replace Errors, Unpivot Columns, Move, Split Column, Format, and Merge Columns. Below the ribbon, there's a section titled "7 Queries" which lists "Sales", "Date", "Geo", "Manufacturer", and "Product". To the right, there's a table with columns: ProductID, Date, Zip, Units, Revenue, and Country. The table has 6 rows of data. The "Revenue" column shows values like 797.9475, 813.6975, 813.6975, 954.4475, 944.9425, and 944.9425, all for United States.





The screenshot shows the Power Query Editor window with the following details:

- File**: Opened file: cosmetics\_report\_powerBI
- Home**: Selected tab
- Transform**: Active tab
- Add Column**, **View**, **Tools**, **Help**: Other tabs
- Queries [4]**: Skincare, Perfume, Makeup, Tools
- Current Step**: #Table.TransformColumnTypes(#"Promoted Headers", {{"id", Int64.Type}, {"brand", type text}, {"category", type text}, {"name", type text}, {"size", type text}, {"rating", type number}})
- Data Preview**: Shows 12 rows of data with columns: id, brand, category, name, size, rating.
- Properties**: Name: Skincare
- Applied Steps**: Promoted Headers, Changed Type
- Query Settings**: Preview downloaded at 12:42 PM

id	brand	category	name	size	rating
2270927	Algenist	Moisturizers	GENIUS Sleeping Collagen	2 oz / 60 mL	12 rating
1582477	Algenist	Moisturizers	GENIUS Ultimate Anti-Aging Cream	no size	
1328853	Algenist	Eye Creams & Treatments	Complete Eye Renewal Balm	0.5 oz / 15 mL	
1420223	Algenist	Face Sunscreen	SUBUME DEFENSE Ultra Lightweight UV Defense Fluid SPF 50	no size	
1644376	Algenist	Eye Creams & Treatments	GENIUS Ultimate Anti-Aging Eye Cream	0.5 oz / 15 mL	
2211753	Algenist	Face Masks	ALIVE Prebiotic Balancing Mask	1.7 oz / 50 mL	
1328822	Algenist	Moisturizers	Regenerative Anti-Aging Moisturizer	no size	
1357847	Algenist	Moisturizers	Overnight Restorative Cream	2 oz / 60 mL	
1649771	Algenist	Face Wash & Cleansers	GENIUS Ultimate Anti-Aging Melting Cleanser	5 oz / 150 mL	
1772821	Algenist	Eye Creams & Treatments	POWER Advanced Wrinkle Fighter 560 <sup>®</sup> Eye Serum	0.5 oz / 15 mL	
2282408	Algenist	Moisturizers	GENIUS Collagen Calming Relief	1.35 oz / 40 mL	
1345748	Algenist	Face Oils	Advanced Anti-Aging Repairing Oil	1 oz / 30 mL	

# Load: Close & Apply

cosmetics\_report\_powerBI - Power BI Desktop

File Home Insert Modeling View Help

cosmetics\_report\_powerBI - Power Query Editor

File Home Transform Add Column View Tools Help

Cut Copy Paste Clipboar... New Recent Enter Data Data source settings Manage Parameters Refresh Preview Advanced Editor Choose Re Columns Manage Col... Close & Apply Close New Query Data Sources Parameters Query Manage Col... Close

Queries [4]

Skincare Perfume Makeup Tools

= Table.TransformColumnTypes(#"Promoted Headers", {{"id", Int64.Type}, {"brand", Any.Type}, {"category", Any.Type}})

	A <sup>B</sup> id	A <sup>B</sup> brand	A <sup>B</sup> category
● Valid	100%	100%	100%
● Error	0%	0%	0%
● Empty	0%	0%	0%

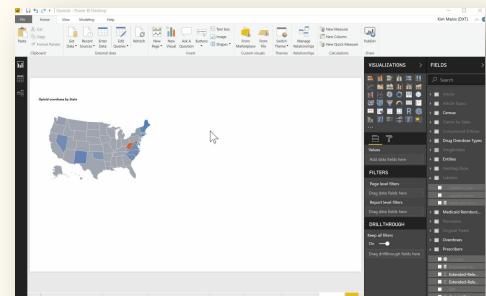
Valid Error Empty

# How to tell a story with data

# Explore your DATA



- Explore data in a variety of ways and across multiple visualizations using drag and drop canvas
- Dig deeper into your reports
  - Drill-down in your hierarchical data
  - Filter, sort, hover over and highlight data
- Leverage Quick Insights to find insights in your data
- Ask questions of your data in natural language with Q&A
  - Type questions in plain language
  - Q&A intelligently filters, sorts, aggregates, groups and displays data based on the question



# Visualize your DATA



- Visualize data in a variety of ways
- Growing number of visualization types
  - Donuts, basic area, waterfall, filled maps, tree maps, funnel, gauges combo charts and more
  - Custom visuals available from Power BI Visuals Marketplace
  - Tools to develop, test, package new custom visuals
- Visualizations on report page are connected – select value in one visualization to change other visualizations
- Full screen pop out mode for report visuals to show additional details



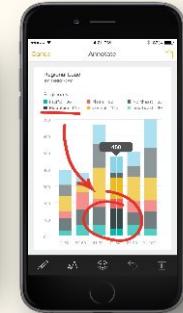
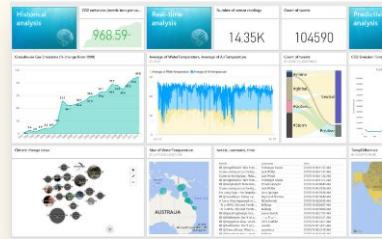
A screenshot of the Power BI Visuals Marketplace. It shows a search bar and a list of available visualizations categorized under "Advanced Analytics" and "Data Visualizations". Each visualization has a preview, a rating, and an "Add" button.

- Histogram Chart**: Visualizes the distribution of data over a continuous interval or certain time period. Rating: ★★★☆☆.
- Time series decomposition chart**: Understand the time series components using "Seasonal and Trend decomposition using Loess". Rating: ★★★★★.
- Association rules**: Uncover relationships between seemingly unrelated data using If-then statements. Rating: ★★★★★.
- KPI Column by MAQ Software**: Line and Column chart that measures progress toward key performance indicator (KPI) targets. Rating: ★★★★★.

# Bring your story to life with DATA



- Save Power BI Desktop report files and easily publish them to powerbi.com
- Access dashboards using native mobile apps for Windows, iOS and Android
- Share as appropriate with other Power BI users in your organization
- Package your reports in apps for easy consumption and control
- Easily embed interactive Power BI visualizations in blog posts, websites, through emails or social media With **Power BI Publish to web**



# EXECUTIVE SALES

\$2,297,201

SALES

\$286,397

PROFIT

37,873

QUANTITY

15.6%

AVG. DISCOUNT

## CONSUMER

\$1,161,401

SALES



## CORPORATE

\$706,146

SALES



## HOME OFFICE

\$429,653

SALES





# The Queen's Gambit



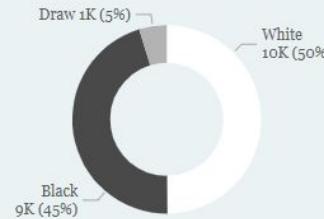
20,058  
Total Games

15,635  
Total Players

13.8  
Avg. Game Time (Mins)

5.2  
Avg. Extra Time (Mins)

## Winner % by Color



## Victory Status by Color



## Top 10 Openings

Sicilian Defense	1,299	1,203	2,632
French Defense	653	689	1,412
Queen's Pawn Game	602	570	1,233
Italian Game	451	483	981
King's Pawn Game	441	440	917
Queen's Gambit	512	912	
Ruy Lopez	451	858	
English Opening	520		720
Scandinavian Defense	516		716
Philidor Defense	691		

## Top 10 Opening Codes

A00	570	398	1,007
C00	389	417	844
D00	360	341	739
B01	332	358	716
C41	267	396	691
C20	355	299	675
A40	261	338	618
B00	218	365	611
B20	320	223	567
C50	268	240	538

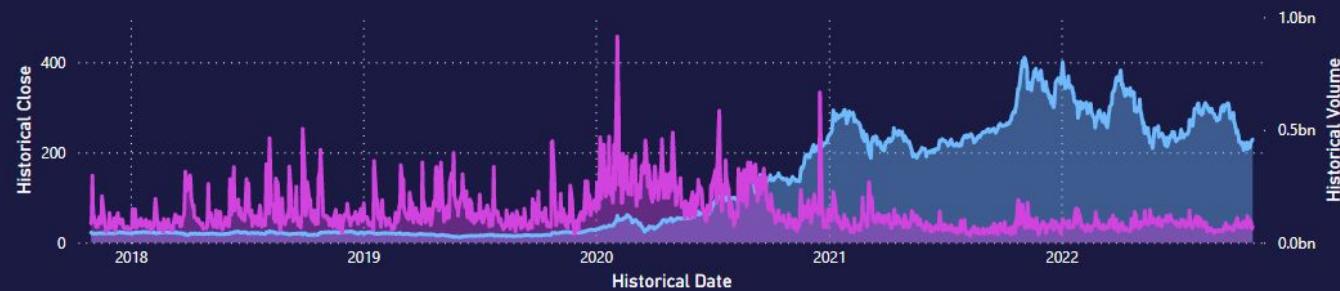
## Initial Moves Split



Report By: Udit Kumar Chatterjee

### Historical Close and Historical Volume by Historical Date

● Historical Close ● Historical Volume



Historical Date

10/31/2017 10/28/2022



### Historical High by Historical Date

Historical High

0

2018

2019

2020

2021

2022

Historical Date



# Data Modeling (advanced)

# Flat File Database Structure

A flat-file database is a database stored in a file called a flat file. Records follow a uniform format, and there are no structures for indexing or recognizing relationships between records. The file is simple. A flat file can be a plain text file, or a binary file. Relationships can be inferred from the data in the database, but the database format itself does not make those relationships explicit

# Flat File Example

StudentId	firstName	lastName	courseld
L0002345	Jim	Black	C002
L0001254	James	Harradine	A004
L0002349	Amanda	Holland	C002
L0001198	Simon	McCloud	S042
L0023487	Peter	Murray	P301
L0018453	Anne	Norris	S042

# Star Schema

**Star schema** is a mature modeling approach widely adopted by relational data warehouses. It requires modelers to classify their model tables as either *dimension* or *fact*.

**Dimension tables** describe business entities—the *things* you model. Entities can include products, people, places, and concepts including time itself. A dimension table contains a key column (or columns) that acts as a unique identifier, and descriptive columns.

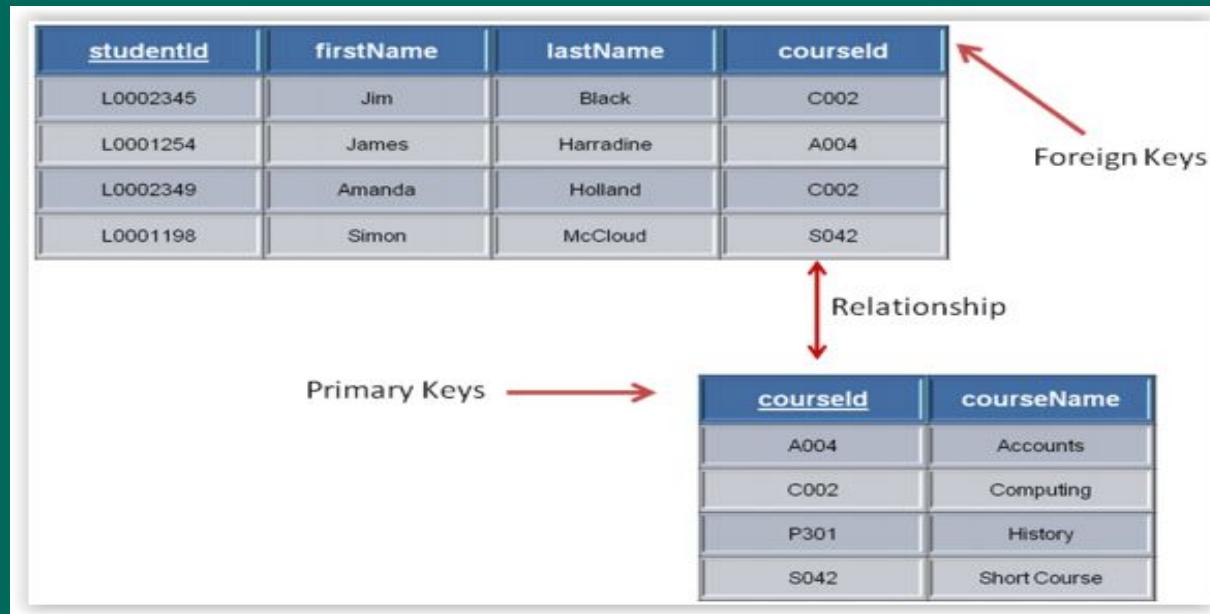
**Fact tables** store observations or events, and can be sales orders, stock balances, exchange rates, temperatures, etc. A fact table contains dimension key columns that relate to dimension tables, and numeric measure columns.

Generally, dimension tables contain a relatively small number of rows. Fact tables, on the other hand, can contain a very large number of rows and continue to grow over time.

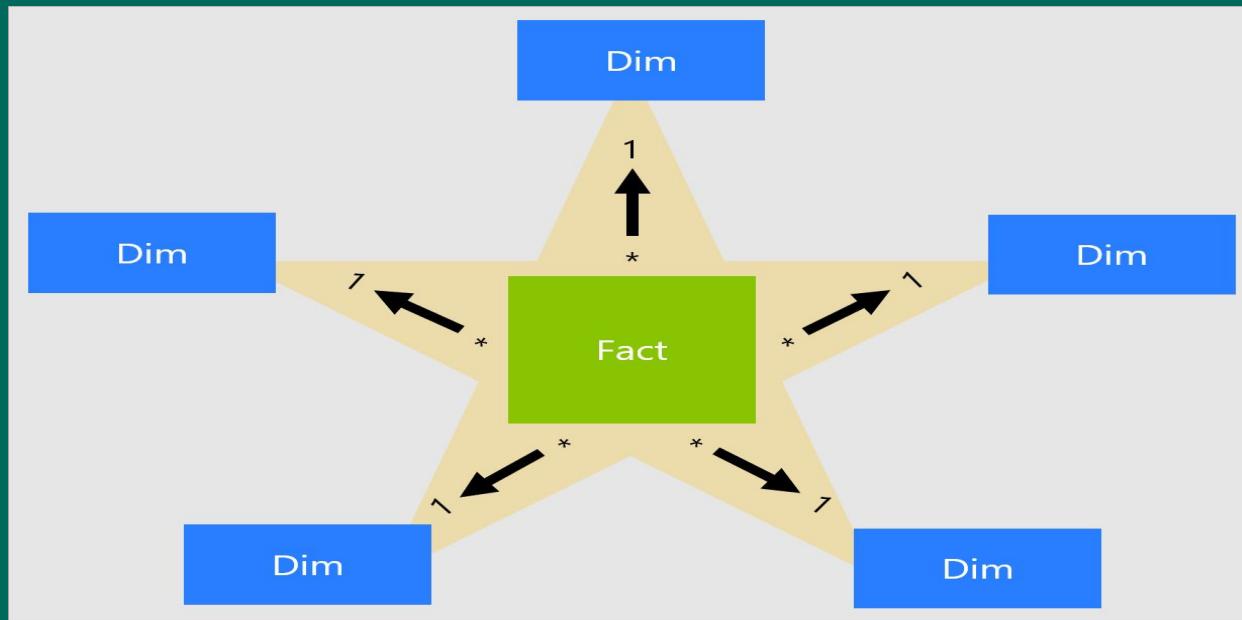
# Relational Database

A relational database is a digital database based on the relational model of data. A software system used to maintain relational databases is a relational database management system (RDBMS). Many relational database systems have an option of using the SQL (Structured Query Language) for querying and maintaining the database.

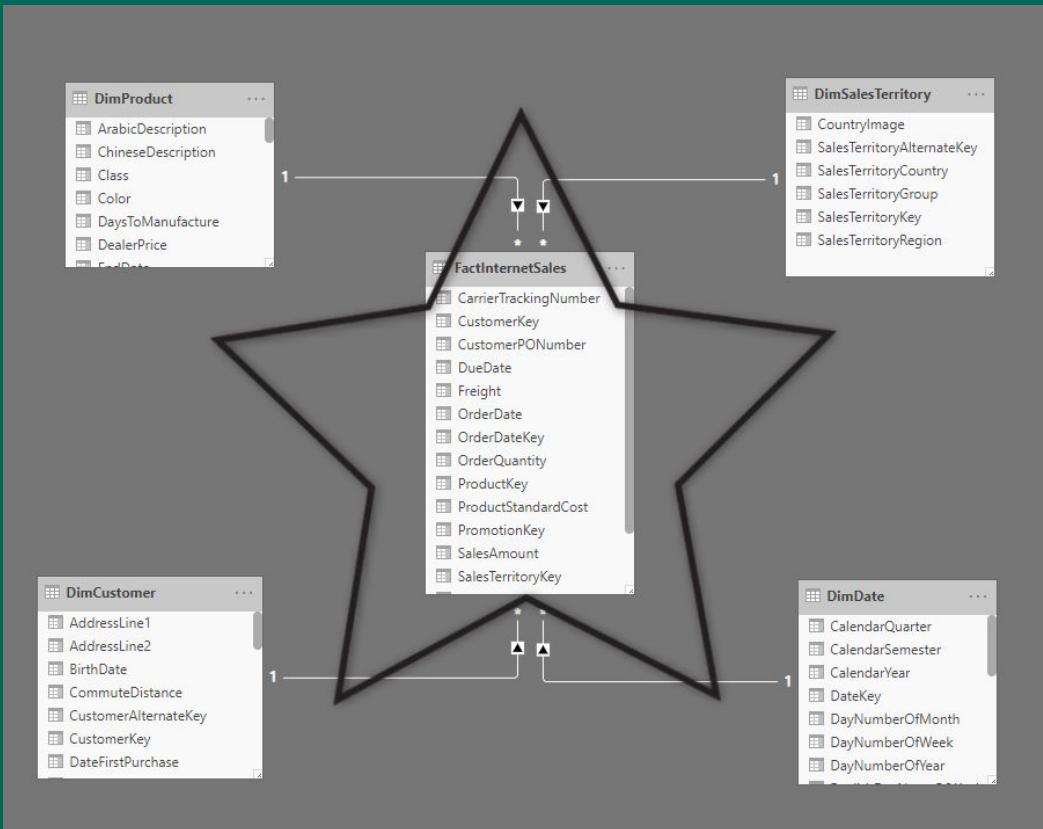
# Relational Database Example



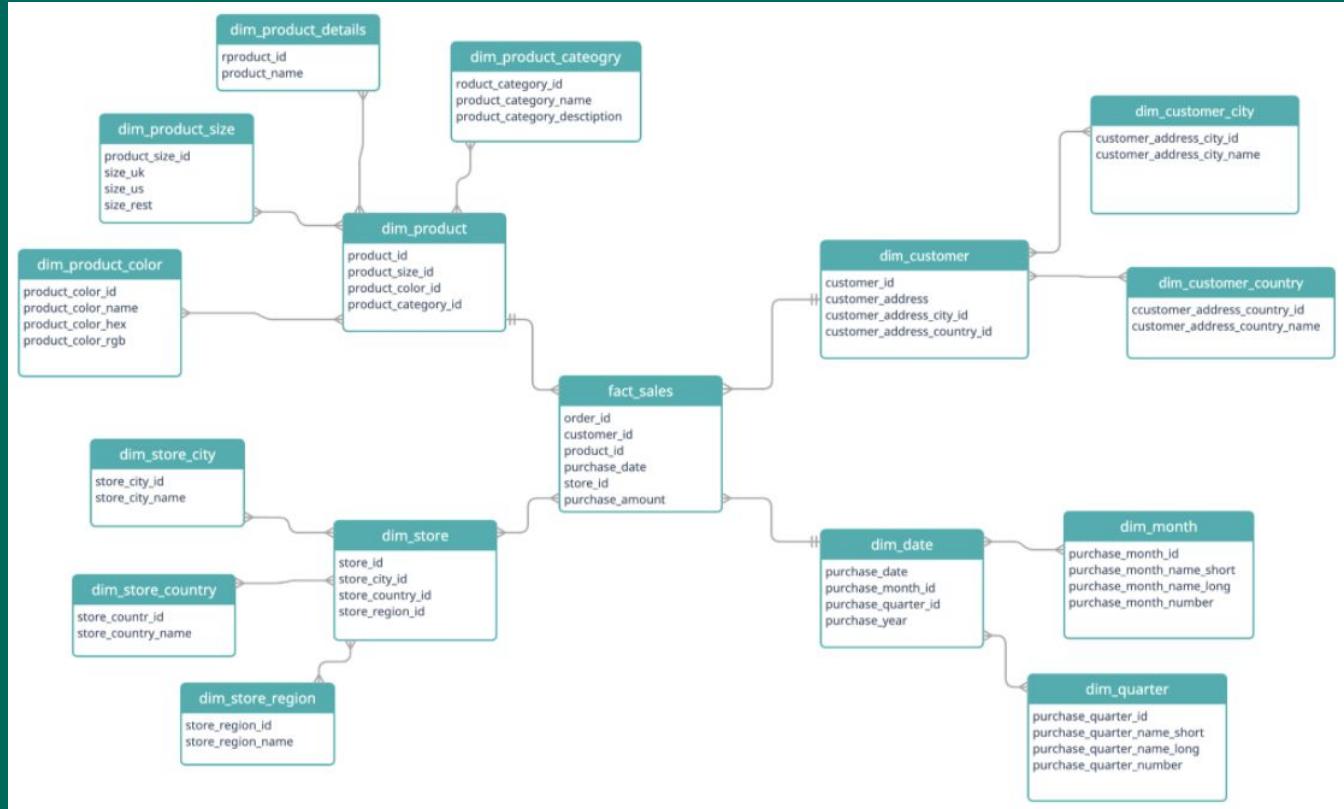
# Star Schema Example



# Star Schema Example



# Snowflake Schema Example



# Advanced Power BI Terminology

DAX

Measures VS Calculated Columns

M code

Row-Level Security

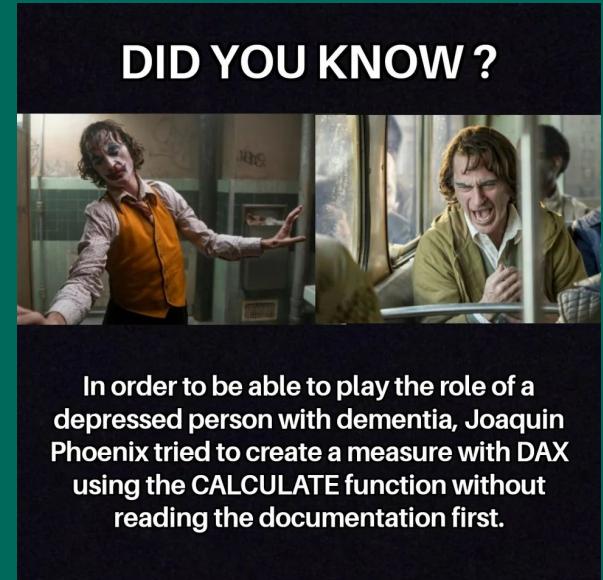
# DAX Functions

## Data Analysis Expressions

- <https://docs.microsoft.com/en-us/dax/dax-function-reference>

- Examples:

- SUM
- AVERAGE
- COUNT
- DISTINCTCOUNT
- SWITCH
- TODAY
- CALCULATE



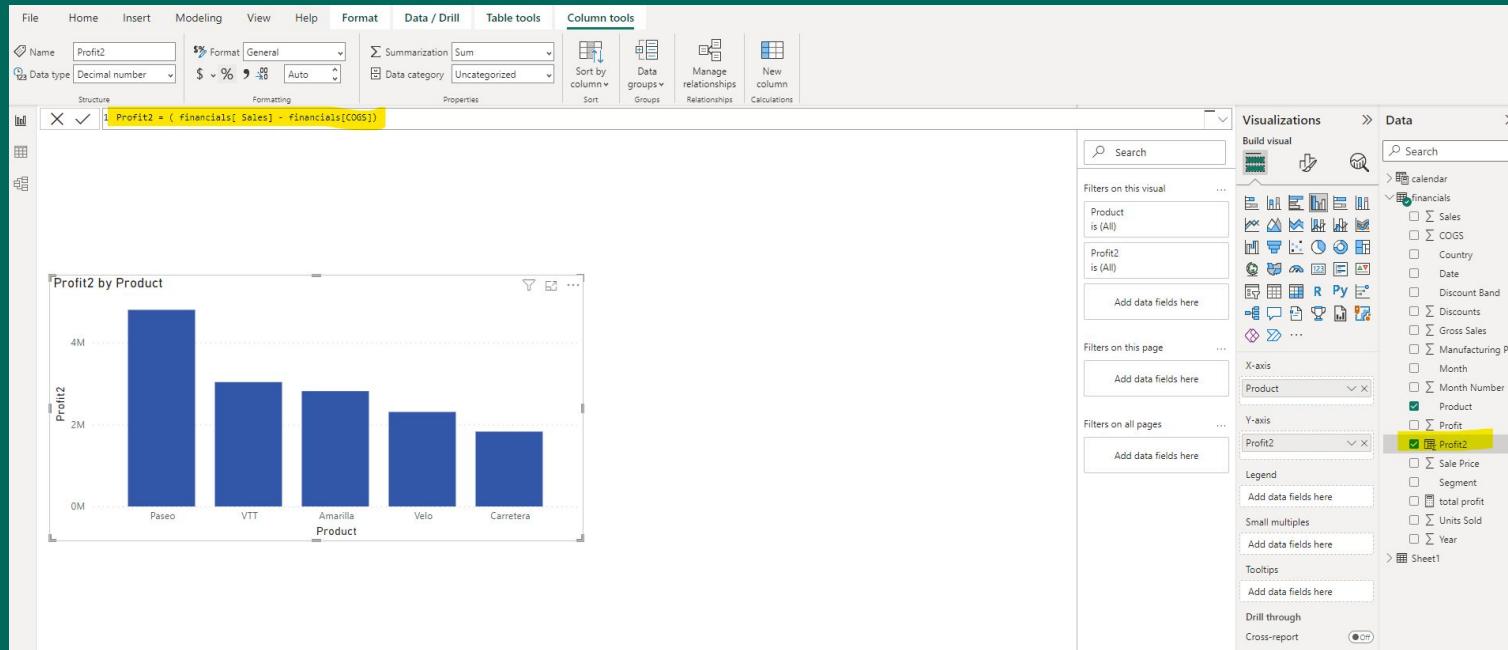
In order to be able to play the role of a depressed person with dementia, Joaquin Phoenix tried to create a measure with DAX using the CALCULATE function without reading the documentation first.

# Calculated Columns

A calculated Column will create a new column in your table that is calculated row by row

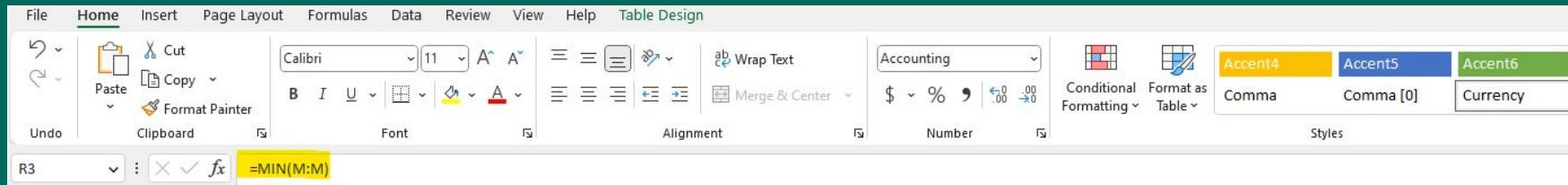
# Calculated Columns

A Calculated Column will create a new column in your table that is calculated row by row



# Measures

A measure will aggregate values from many rows in a table



The screenshot shows a Microsoft Excel interface with a table selected. The formula bar at the top displays the formula `=MIN(M:M)`. The table has columns labeled Segment, Country, Product, Discount Band, Units Sold, Manufacturer, Sale Price, Gross Sales, Discounts, Sales, COGS, Calculated Column, Profit, and Measure. The data includes various categories like Government, Midmarket, and Channel Partners across countries like Canada, Germany, France, Mexico, and Montana. The 'Measure' column contains numerical values, some of which are formatted with parentheses, indicating negative values.

Segment	Country	Product	Discount Band	Units Sold	Manufacturer	Sale Price	Gross Sales	Discounts	Sales	COGS	Calculated Column	Profit	Measure	
Government	Canada	Carretera	None	1618.5	\$ 3.00	\$ 20.00	\$ 32,370.00	\$ -	\$ 32,370.00	\$ 16,185.00	\$ 16,185.00	\$ 16,185.00	\$ (40,617.50)	
Government	Germany	Carretera	None	1321	\$ 3.00	\$ 20.00	\$ 26,420.00	\$ -	\$ 26,420.00	\$ 13,210.00	\$ 13,210.00	\$ 13,210.00	\$ (40,617.50)	
Midmarket	France	Carretera	None	2178	\$ 3.00	\$ 15.00	\$ 32,670.00	\$ -	\$ 32,670.00	\$ 21,780.00	\$ 21,780.00	\$ 10,890.00	\$ 10,890.00	\$ (40,617.50)
Midmarket	Germany	Carretera	None	888	\$ 3.00	\$ 15.00	\$ 13,320.00	\$ -	\$ 13,320.00	\$ 8,880.00	\$ 8,880.00	\$ 4,440.00	\$ 4,440.00	\$ (40,617.50)
Midmarket	Mexico	Carretera	None	2470	\$ 3.00	\$ 15.00	\$ 37,050.00	\$ -	\$ 37,050.00	\$ 24,700.00	\$ 24,700.00	\$ 12,350.00	\$ 12,350.00	\$ (40,617.50)
Government	Germany	Carretera	None	1513	\$ 3.00	\$ 350.00	\$ 529,550.00	\$ -	\$ 529,550.00	\$ #####	\$ #####	\$ 136,170.00	\$ 136,170.00	\$ (40,617.50)
Midmarket	Germany	Montana	None	921	\$ 5.00	\$ 15.00	\$ 13,815.00	\$ -	\$ 13,815.00	\$ 9,210.00	\$ 9,210.00	\$ 4,605.00	\$ 4,605.00	\$ (40,617.50)
Channel Partners	Canada	Montana	None	2518	\$ 5.00	\$ 12.00	\$ 30,216.00	\$ -	\$ 30,216.00	\$ 7,554.00	\$ 7,554.00	\$ 22,662.00	\$ 22,662.00	\$ (40,617.50)
Government	France	Montana	None	1899	\$ 5.00	\$ 20.00	\$ 37,980.00	\$ -	\$ 37,980.00	\$ 18,990.00	\$ 18,990.00	\$ 18,990.00	\$ 18,990.00	\$ (40,617.50)
Channel Partners	Germany	Montana	None	1545	\$ 5.00	\$ 12.00	\$ 18,540.00	\$ -	\$ 18,540.00	\$ 4,635.00	\$ 4,635.00	\$ 13,905.00	\$ 13,905.00	\$ (40,617.50)
Midmarket	Mexico	Montana	None	2470	\$ 5.00	\$ 15.00	\$ 37,050.00	\$ -	\$ 37,050.00	\$ 24,700.00	\$ 24,700.00	\$ 12,350.00	\$ 12,350.00	\$ (40,617.50)

# Measures

A measure will aggregate values from many rows in a table

The screenshot shows the Power BI desktop interface. The ribbon at the top has the 'Measure tools' tab selected. In the center, there is a visual displaying the value '-40.62K' under the heading 'Minimum Profit'. The formula bar at the top shows the DAX code: 'Minimum Profit = MIN(financials[Profit])'. On the right side, the 'Data' pane is open, showing the data model with tables like 'financials' and various measures such as Sales, COGS, and Profit.

Name: Minimum Profit

Format: General

Data category: Uncategorized

Measure tools

Home table: financials

Structure:

Format:

Properties:

Calculations:

Search:

Filters on this visual:

Minimum Profit is (All)

Add data fields here

Filters on this page:

Add data fields here

Fields:

Minimum Profit

Drill through:

Cross-report:

Keep all filters

Add drill-through fields here

Search:

financials

Sales

COGS

Country

Date

Discount Band

Discounts

Gross Sales

Manufacturing P...

Month

Month Number

Product

Profit

Profit2

Sale Price

Segment

Units Sold

Year

Sheet1

# M Code

- [Power Query M formula language reference - PowerQuery M | Microsoft Learn](#)

M code is written for you when you use the Power Query Editor in Transform Data.

M code can be used for Query Folding (advanced) which will improve the speed of your reports.

- Example:

The screenshot shows the Power Query Editor interface. The formula bar at the top contains the M code: `= Source{[Item="financials",Kind="Table"]}[Data]`. The main area displays a table with four rows and several columns. The ribbon at the top has tabs like File, Home, Transform, Add Column, View, Tools, and Help. The Home tab is selected. On the right side, there are two panes: 'Query Settings' and 'APPLIED STEPS'. The 'APPLIED STEPS' pane shows a list with 'Source' and 'Navigation' highlighted. The 'Properties' pane on the right shows the query name as 'financials'.

Segment	Region	Category	Product	Discount Band	Avg Units Sold	Avg Manufacturing Price	Avg Sale Price	Avg Gross Sales
1	Government	Canada	Carretera	None	1618.5	3	20	
2	Government	Germany	Carretera	None	1321	3	20	
3	Midmarket	France	Carretera	None	2178	3	15	
4	Midmarket	Germany	Carretera	None	888	3	15	

# Row-Level Security & Object-Level Security

Row-level security (RLS) with Power BI can be used to restrict data access for given users. Filters restrict data access at the row level, and you can define filters within roles. In the Power BI service, members of a workspace have access to datasets in the workspace.

[Row-level security \(RLS\) with Power BI - Power BI | Microsoft Learn](#)

Object-level security (OLS) enables model authors to secure specific tables or columns from report viewers. For example, a column that includes personal data can be restricted so that only certain viewers can see and interact with it. In addition, you can also restrict object names and metadata. This added layer of security prevents users without the appropriate access levels from discovering business critical or sensitive personal information like employee or financial records. For viewers that don't have the required permission, it's as if the secured tables or columns don't exist.

[Object-level security \(OLS\) with Power BI - Power BI | Microsoft Learn](#)

# Resources:

- <https://guyinacube.com/>



- <https://www.sqlbi.com/>
- <https://docs.microsoft.com/en-us/power-bi/>
- <https://docs.microsoft.com/en-us/learn/patterns/data-analytics-microsoft/>
- <https://community.powerbi.com/>
- Transforming a flat file to a star schema: [\(78\) Data Modeling \(Star Schema ✨\) in Power BI – Creating Dimension Tables - YouTube](https://www.youtube.com/watch?v=78Data%20Modeling%20(Star%20Schema%20%F0%9F%98%A5)%20in%20Power%20BI%20-%20Creating%20Dimension%20Tables)



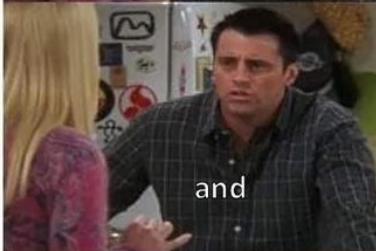




Auto detect  
table  
relationships

@powerbi\_memes

Me after a hard  
day's work, loading  
and editing 10 data  
tables and clicking  
close and apply



# Demo time