Power BI

Introduction to Power BI

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Introduction

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Introduction

Who Am I?

I aim to empower people to make better decisions
by delightfully displaying data that matters.

Goals

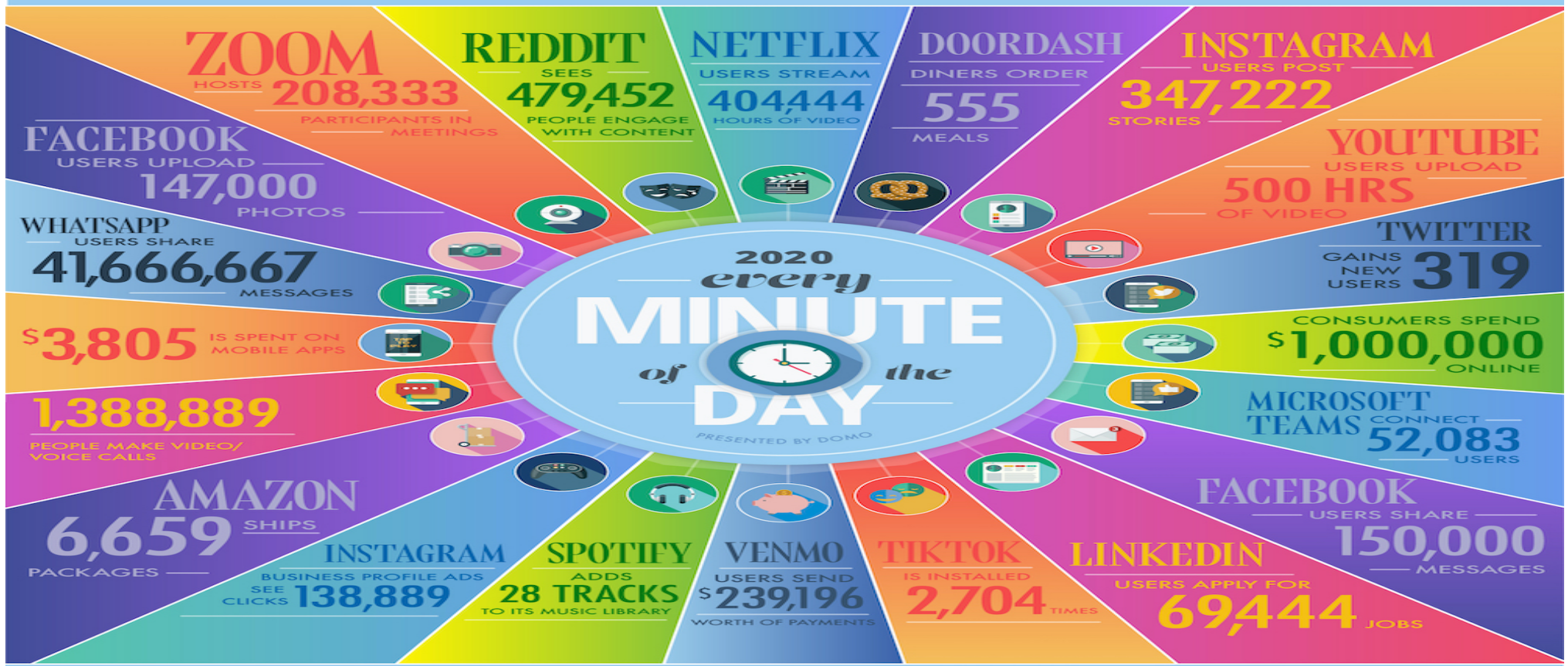
What I want you to be able to achieve

- How to connect to a data source
- How to do basic ETL (Extract Transform and Load)
- How to do basic data modeling
- How to create visualizations using dimensions and measures
- How to tell a story with data

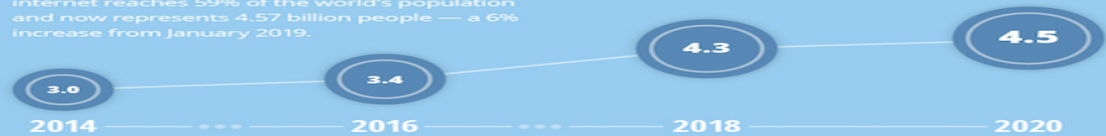
DATA NEVER SLEEPS 8.0

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 is here to help your business 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

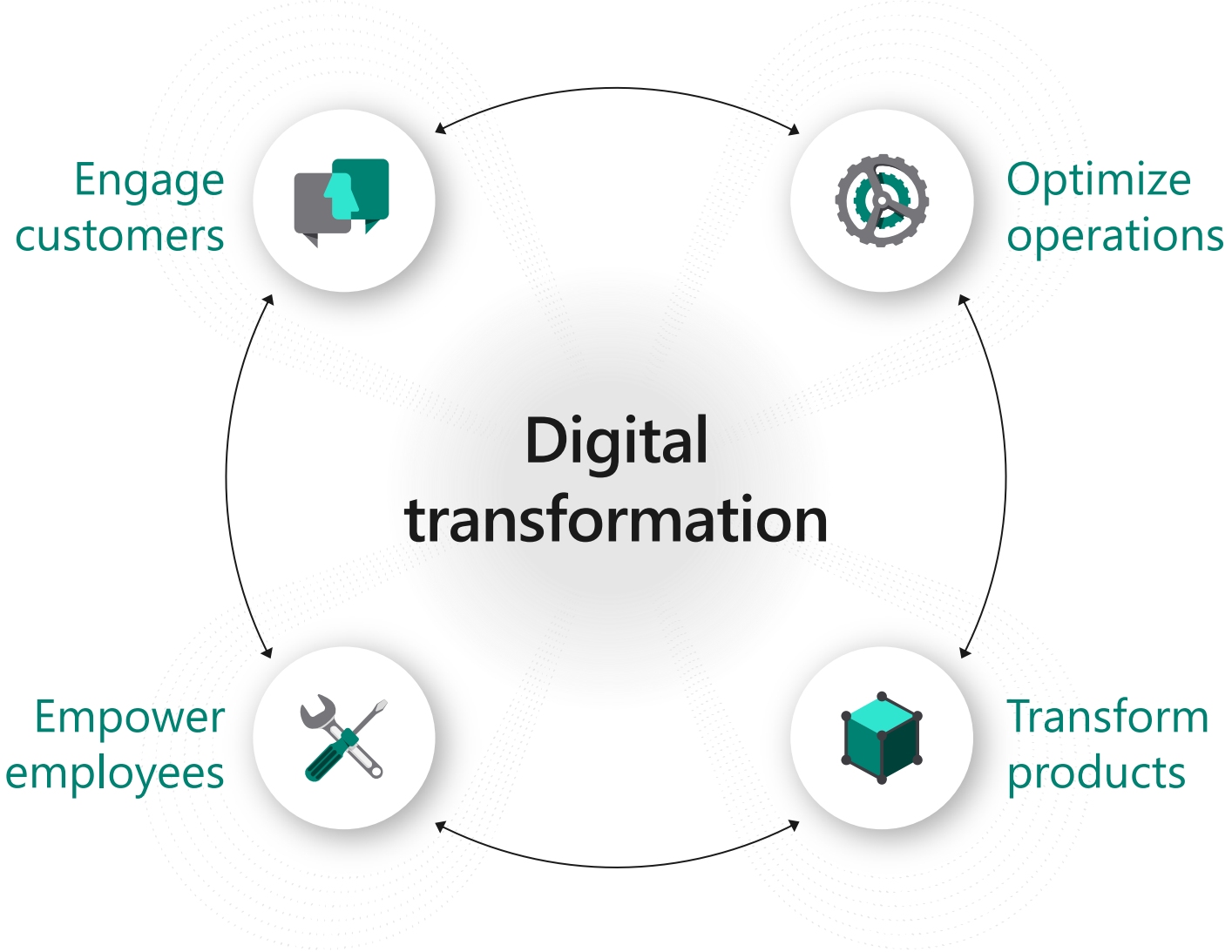
SOURCES: STATISTA, VISUAL CAPITALIST, BUSINESS INSIDER, GAMESPOT, TECHCRUNCH, OMNICORE AGENCY, DOORDASH, BUSINESS OF APPS, NEW YORK TIMES, MUSIC BUSINESS WORLDWIDE, INC., THE VERGE, INC., HOOTSUITE, DUSTIN STOUT, REDDIT, UBER, AMAZON, VOX

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

What is Business Intelligence?

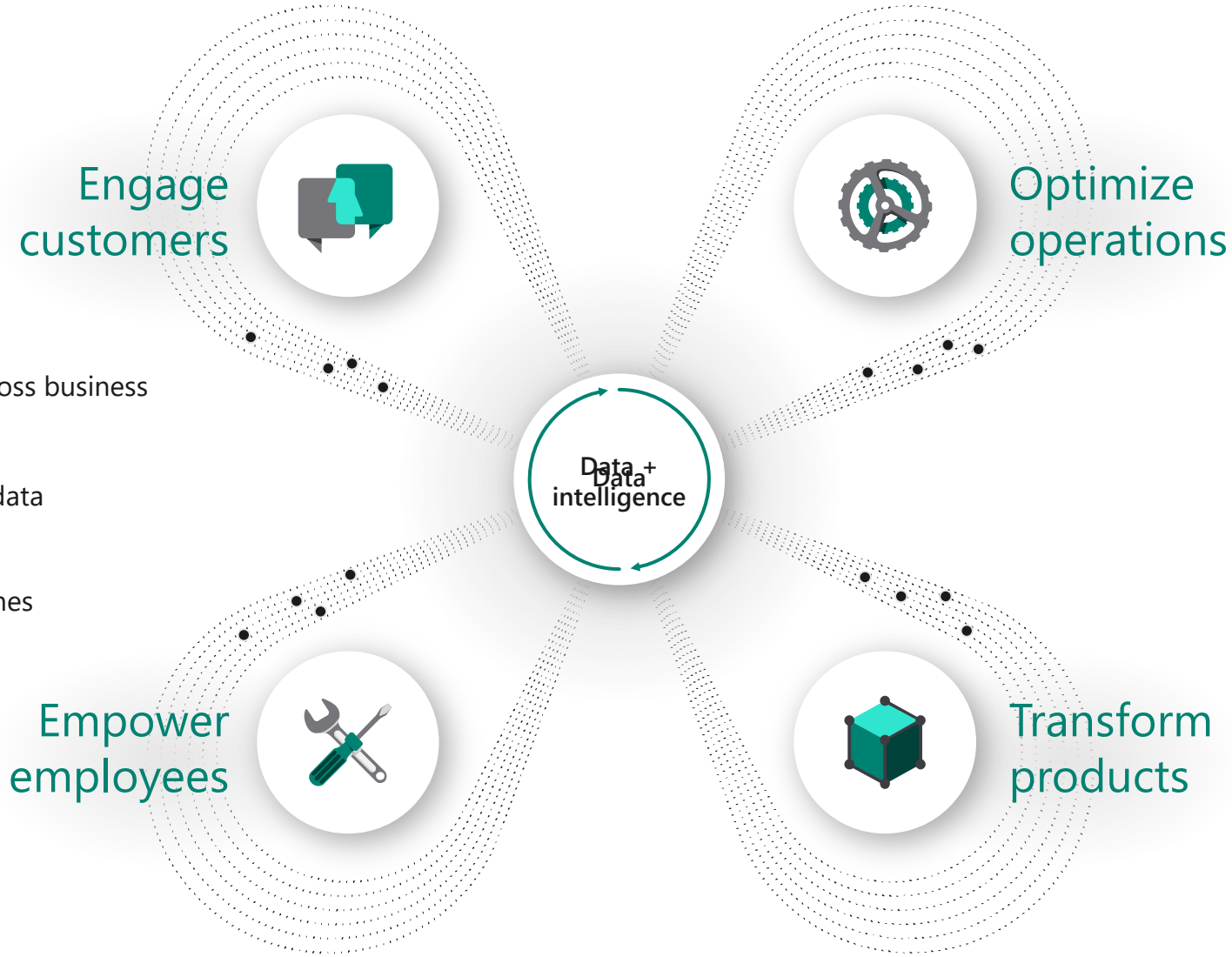
- Business intelligence (BI) leverages software and services to transform data into actionable insights that inform an organization's strategic and tactical business decisions. BI tools access and analyze data sets and present analytical findings in reports, summaries, dashboards, graphs, charts and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


Engage customers
Optimize operations
Digital transformation
Empower employees
Transform products

DIGITAL FEEDBACK LOOP

1. **Data**
   Capture digital signal across business
2. **Intelligence**
   Connect and synthesize data
3. **Action**
   Improve business outcomes



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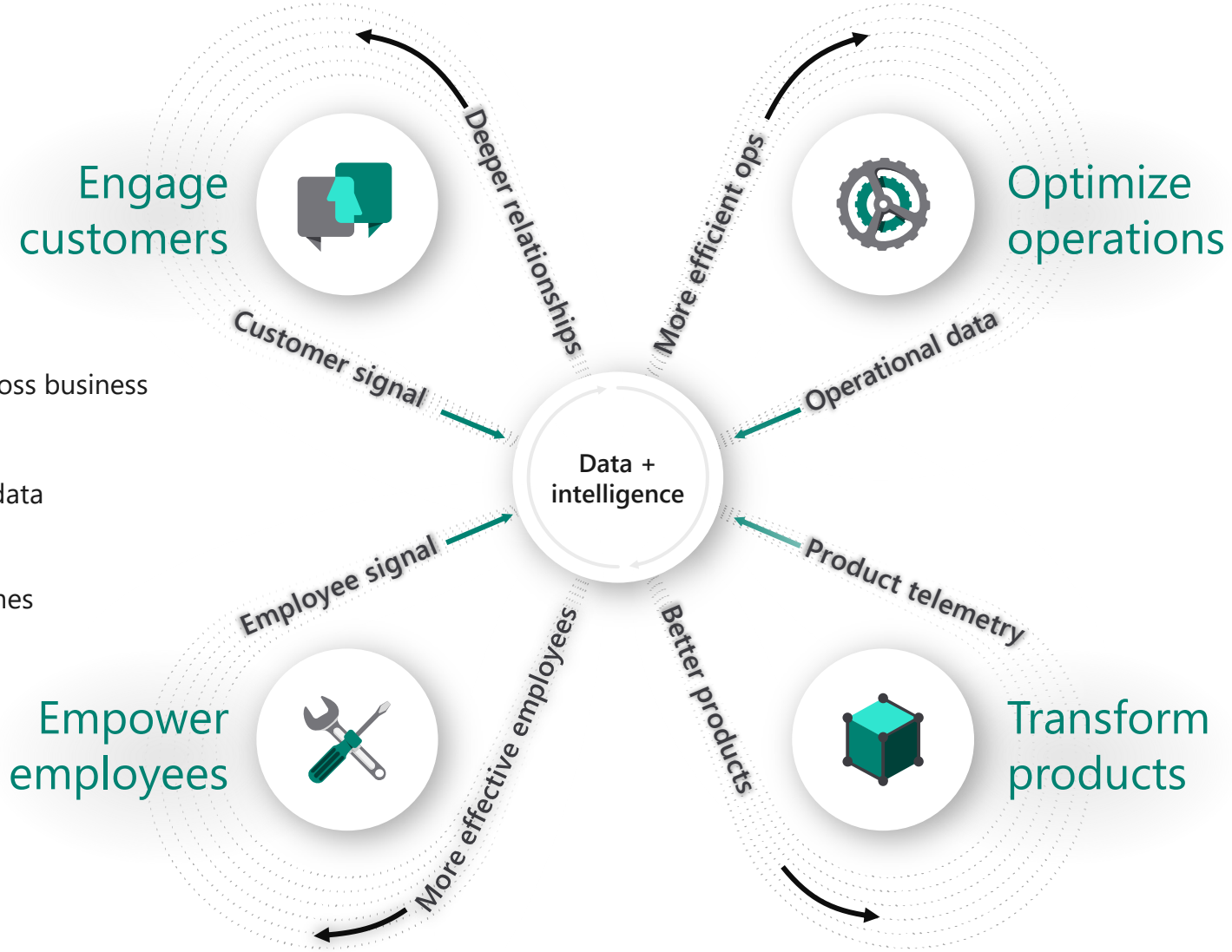
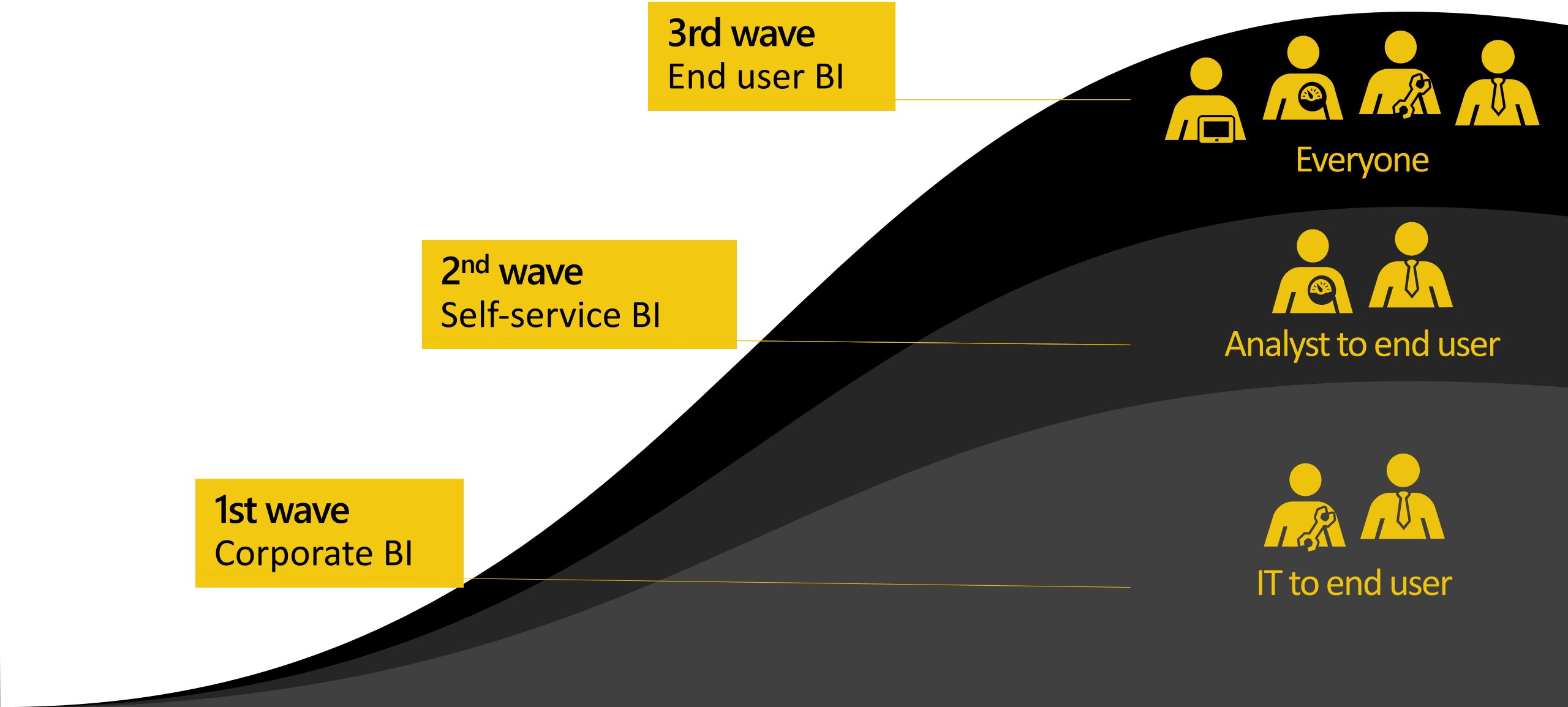
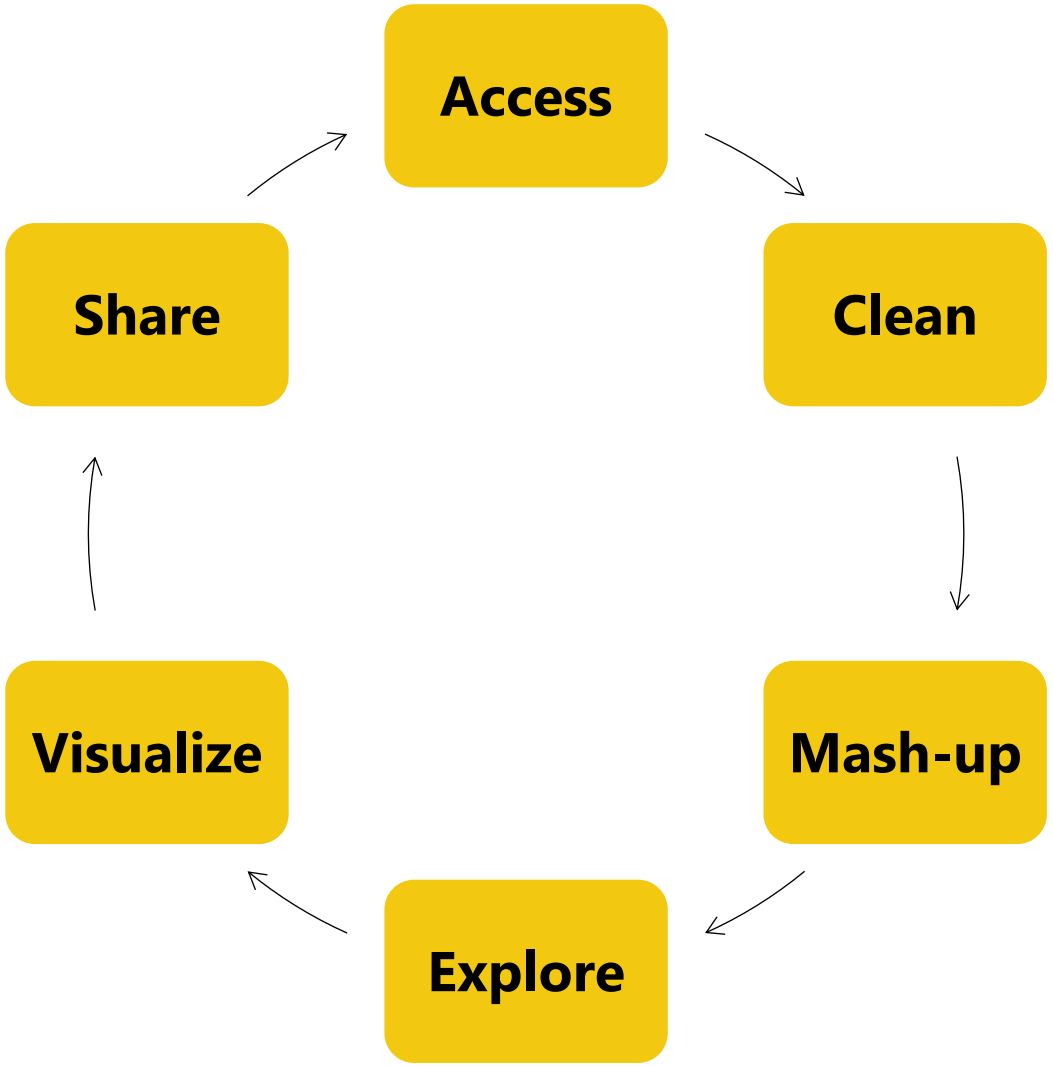


The Evolution of BI

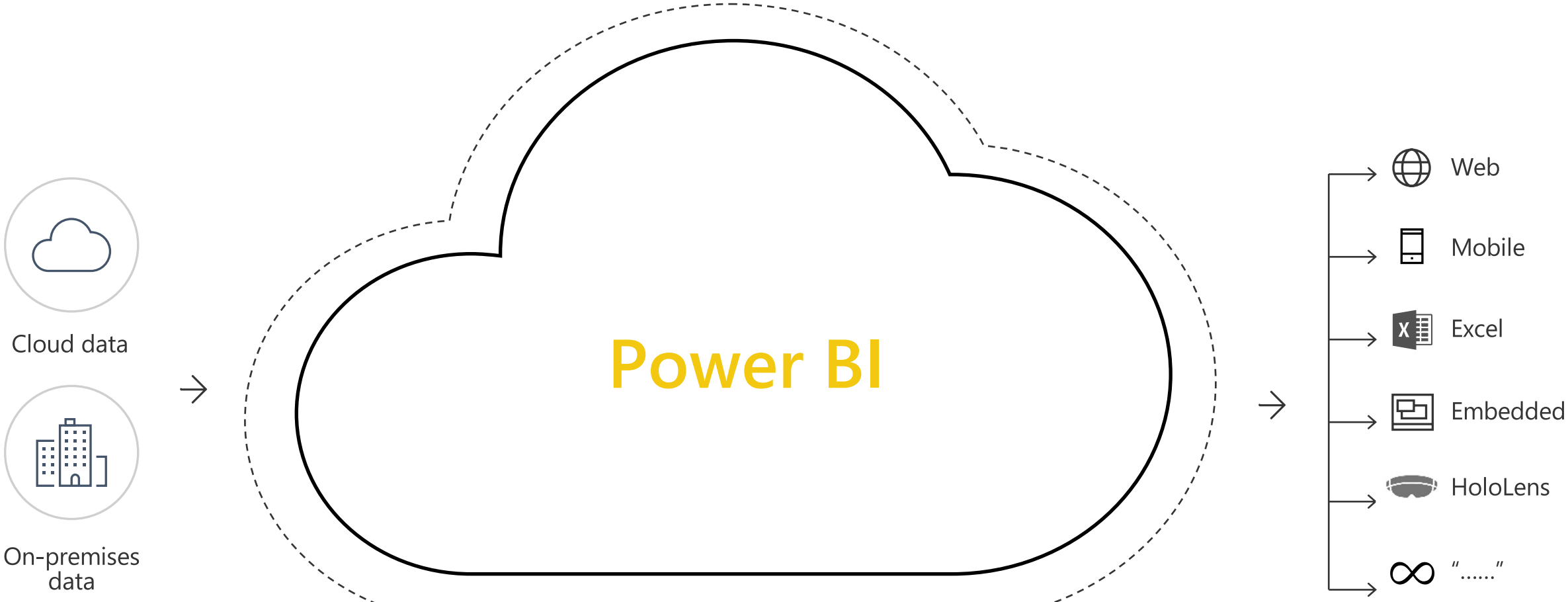


End User Needs



Power BI: experience your data

Any data, any way, anywhere



Access all your **DATA**

Data sources

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

Organizational
Corporate data sources or external data services

On-premises Data

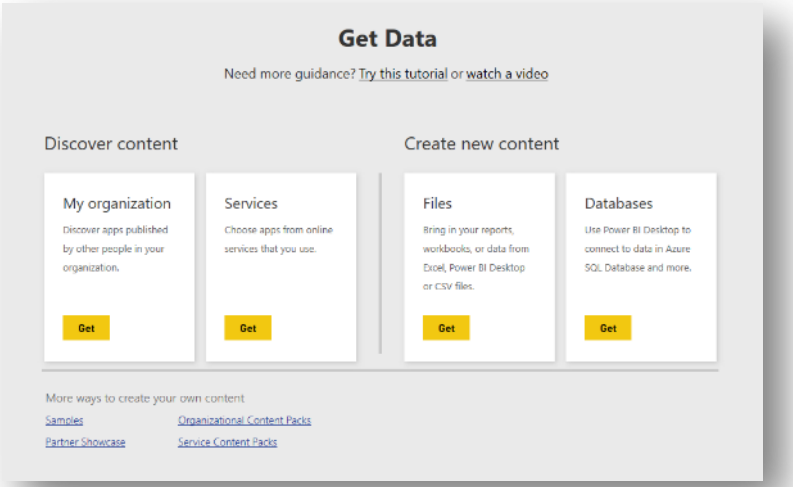
Azure services
Azure SQL, Stream Analytics…

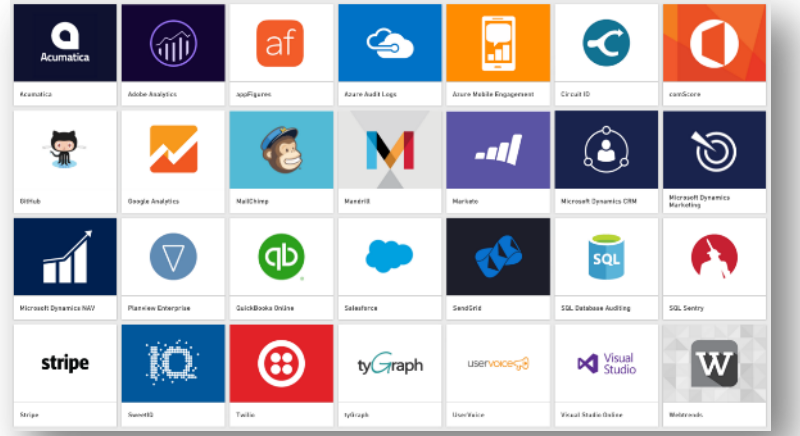
Excel files

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

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

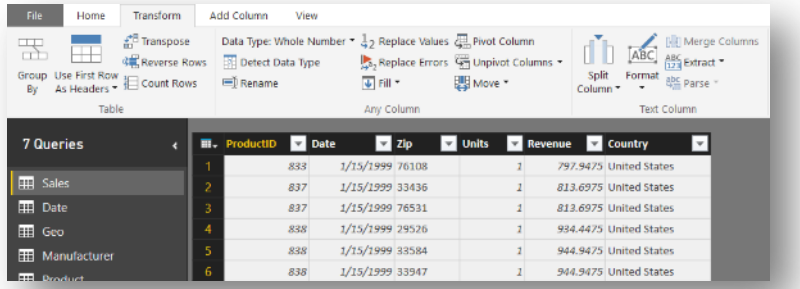
- Data from Applications
  - SaaS services that you already use
- Data from your organization
  - Content published by others in your org (Datasets and Dataflows)
- Big data and more
  - Azure data services, e.g. HDI, ASA, AML etc.
  - On-premises data sources, e.g. Oracle & SSAS
- Data from files
 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

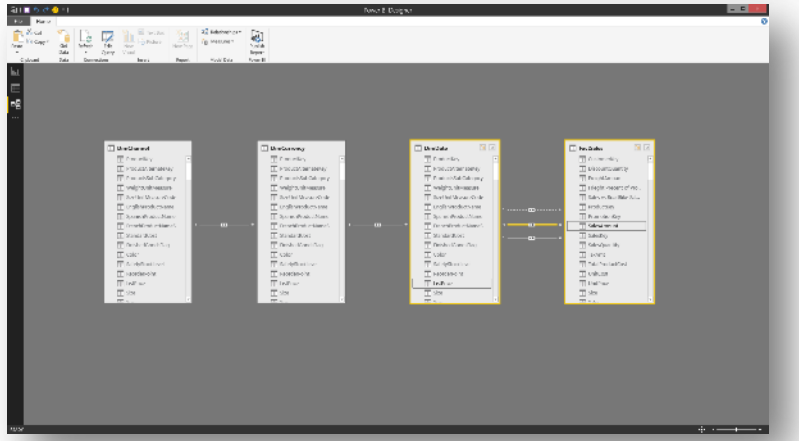




Clean and mash-up your **DATA**

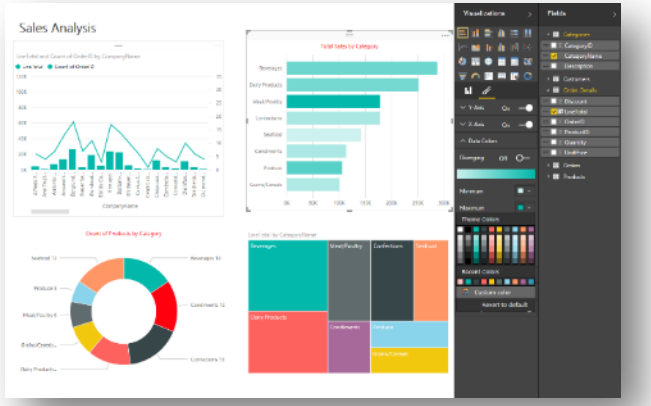
- Consolidate data from a broad range of sources
  - Merge or append queries to combine data from multiple queries into a single query
- Transform data to fit your needs using intuitive UI
  - Select data for inclusion
  - Cleanse data and remove errors
- Define calculations to generate new fields for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

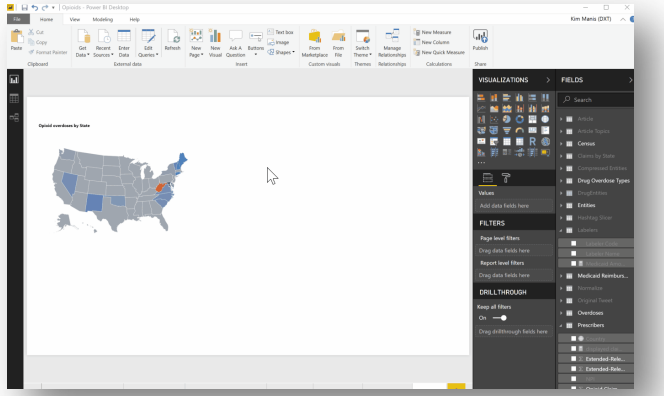




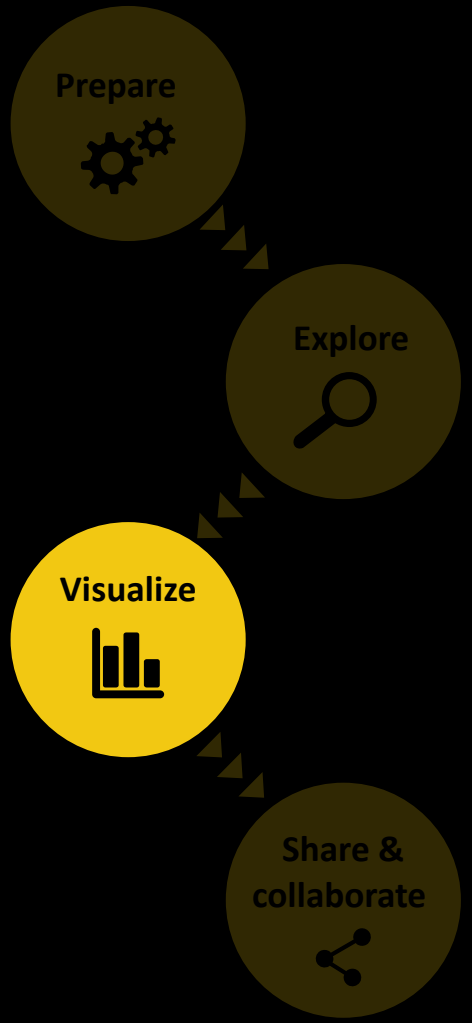
Explore your **DATA**

- 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

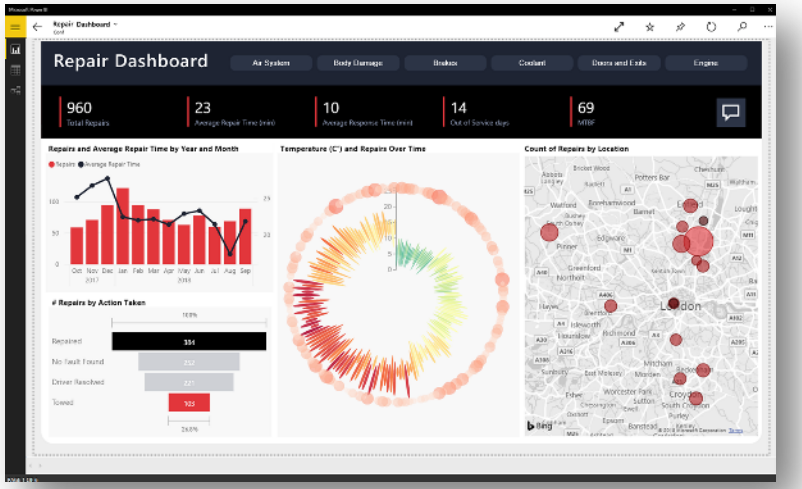


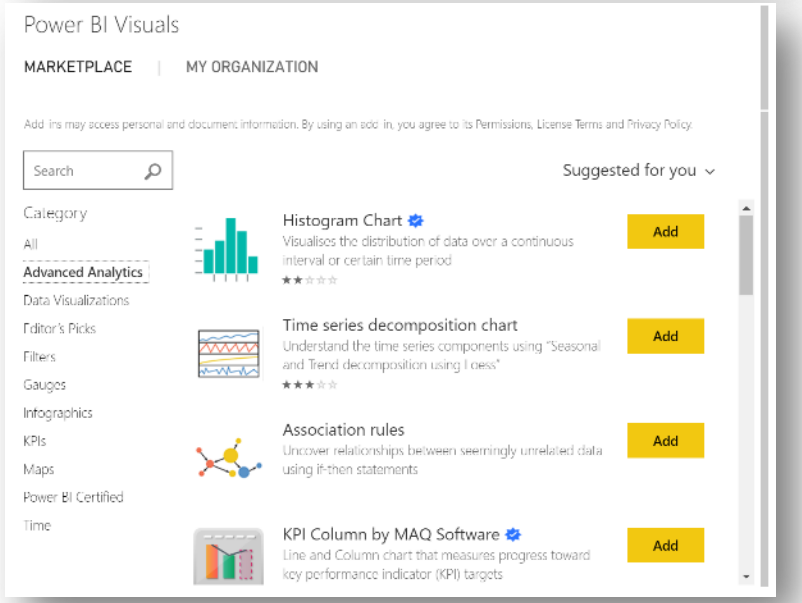


Visualize your **DATA**



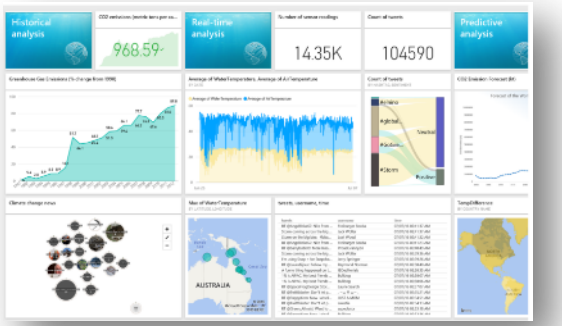
- Visualize data in a variety of ways
- Growing number of visualization types
  - Donuts, basic area, waterfall, filled maps, tree maps, funnel, gauges combo charts and more
  - Custom visuals available from Power BI Visuals Marketplace
  - Tools to develop, test, package new custom visuals
- Visualizations 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

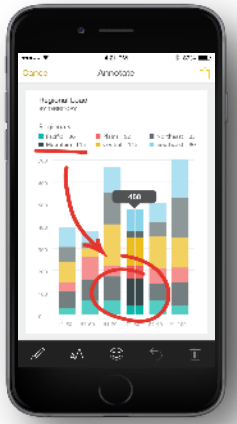


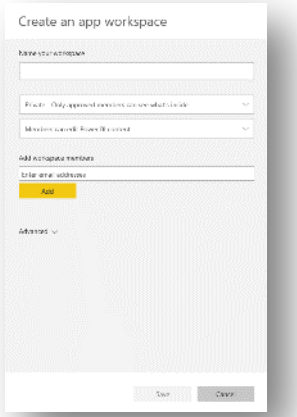


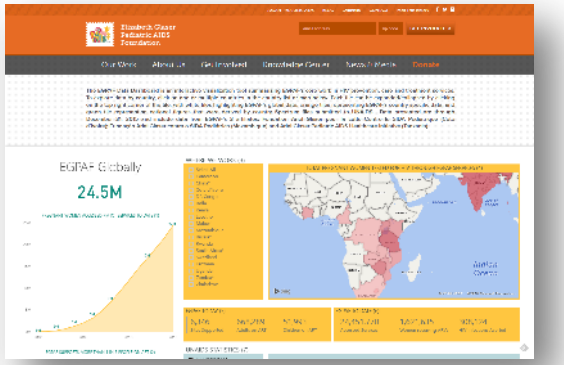
Bring your story to life with **DATA**

- 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**









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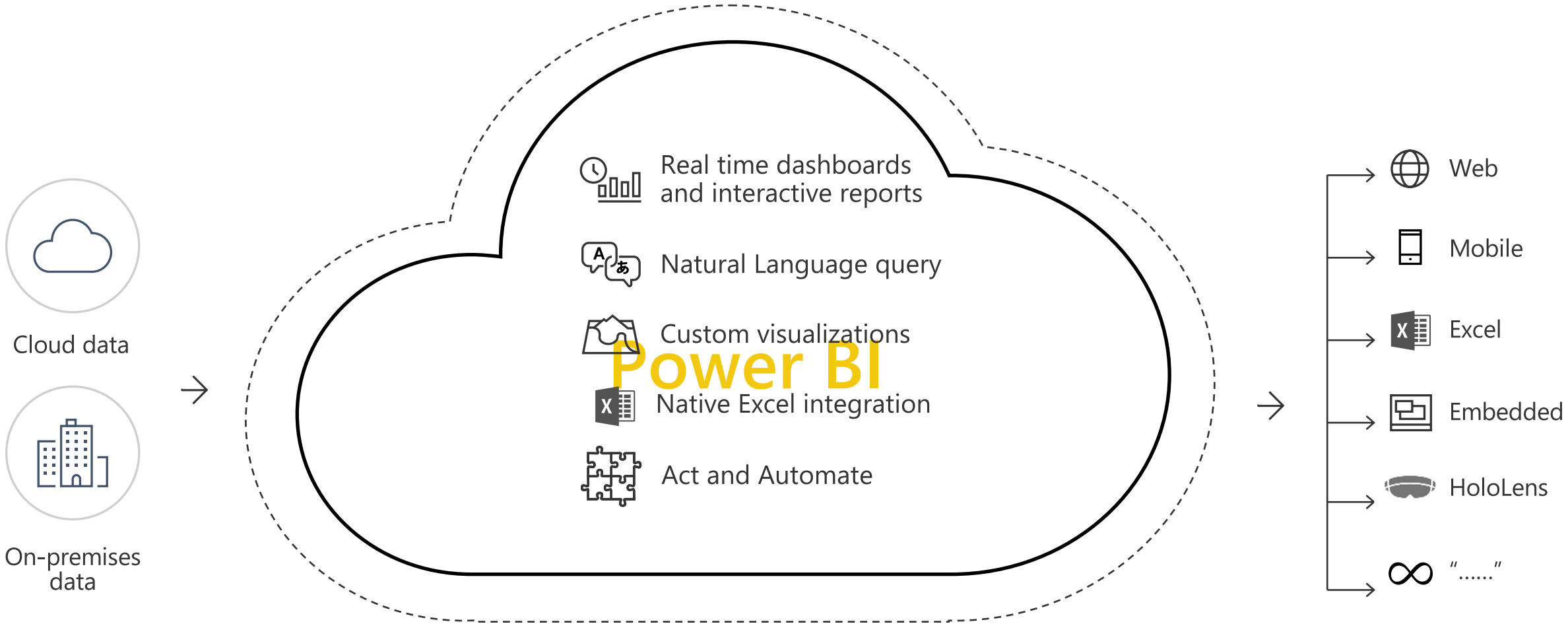
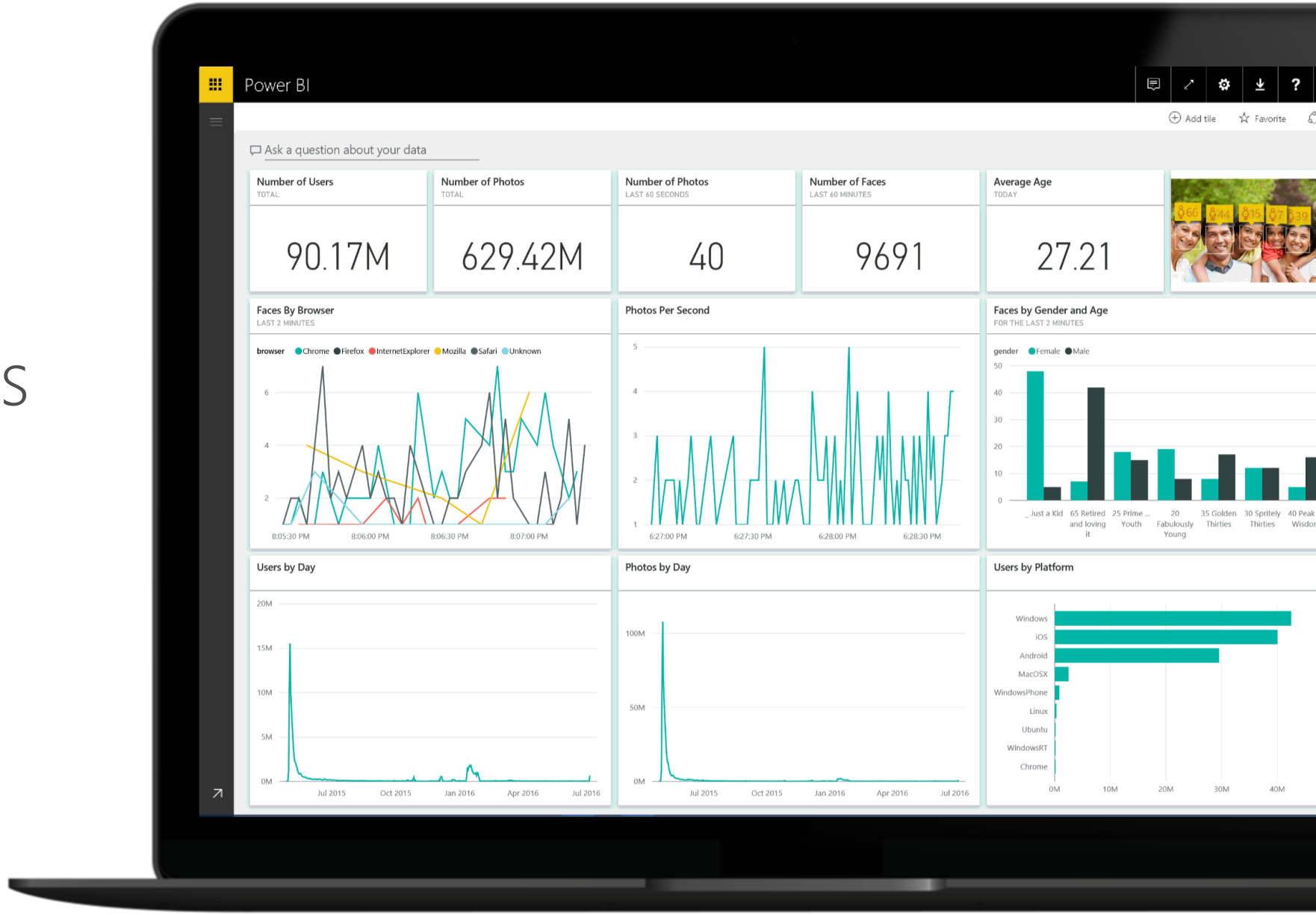
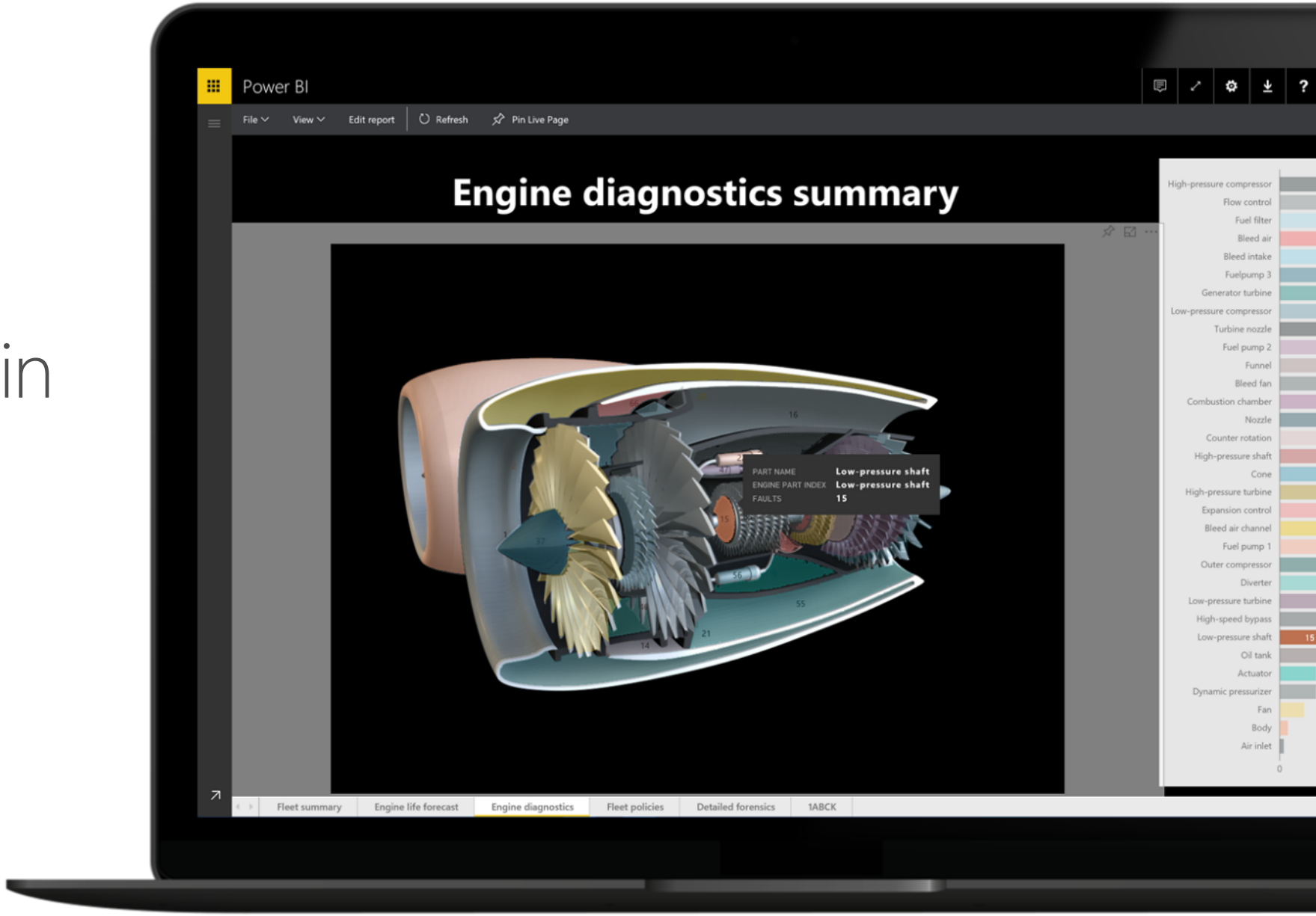


Run your business in real time with live dashboards

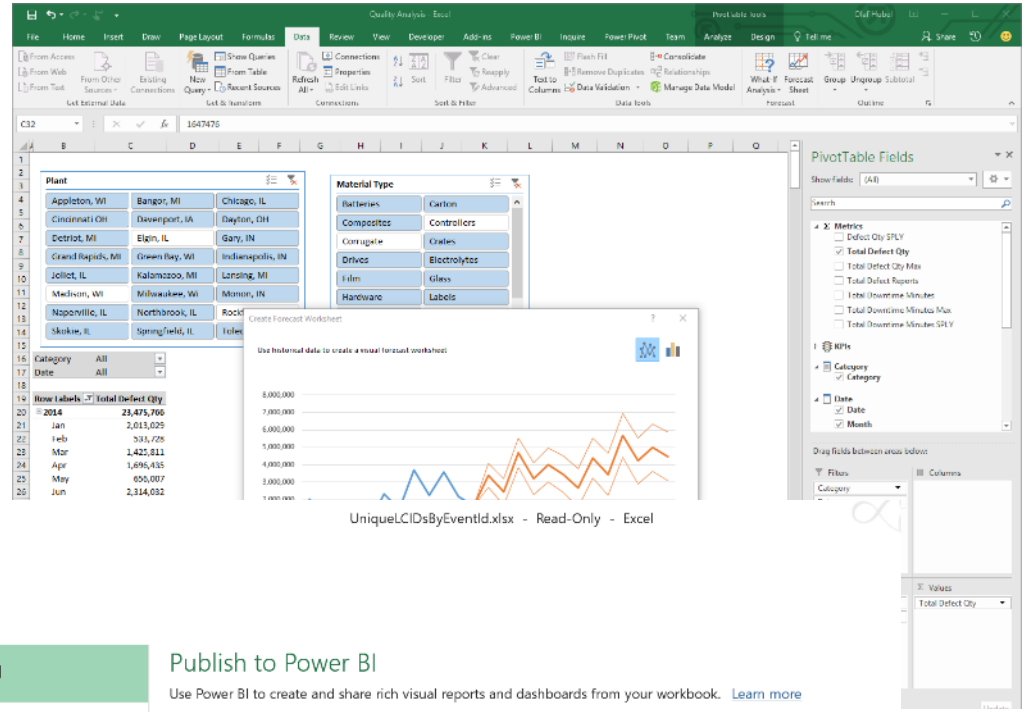


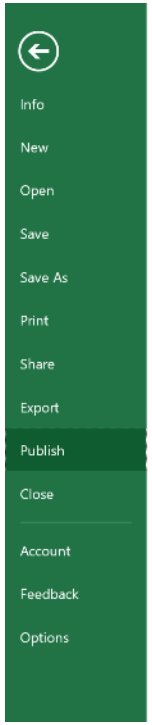
Ask questions of your data

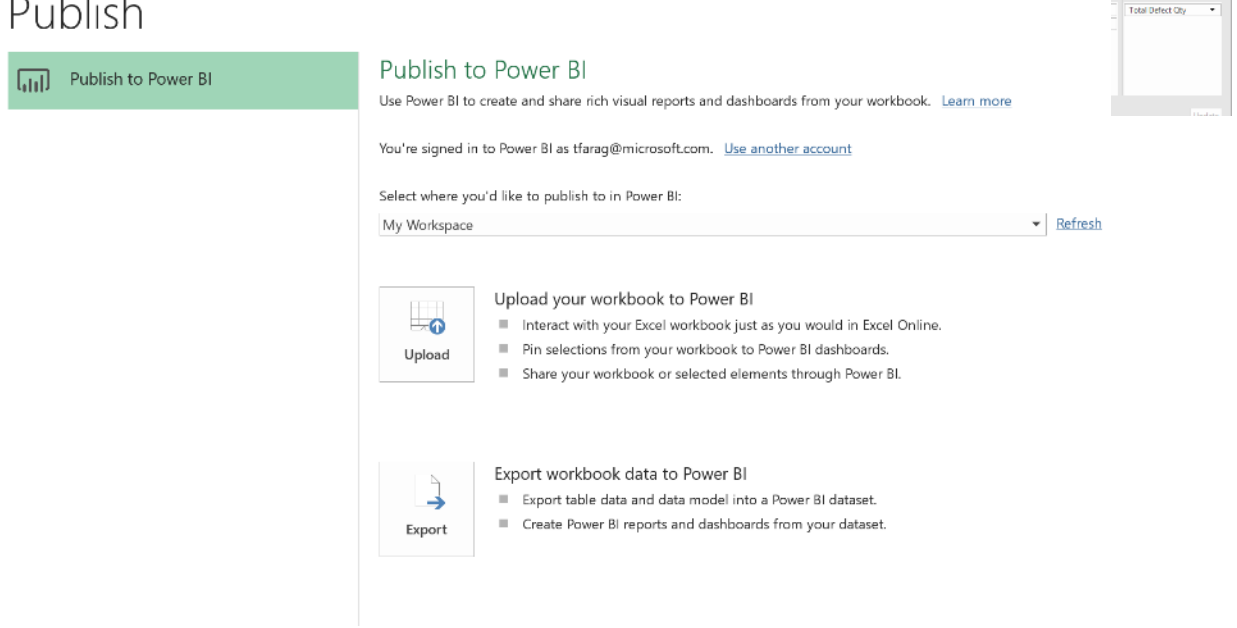
Visualize insights in the context of your business



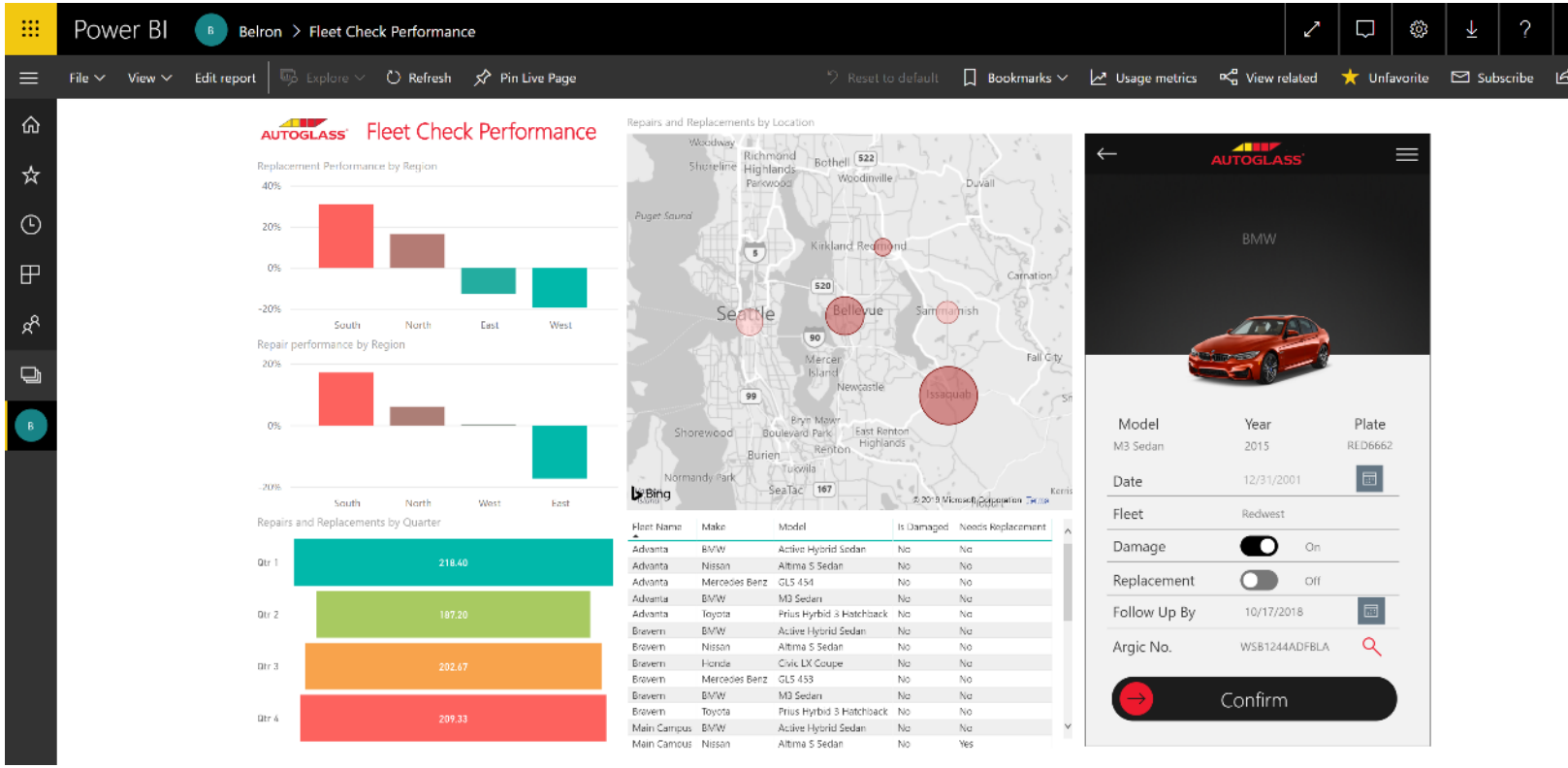
Deliver insights through deep integration with Excel



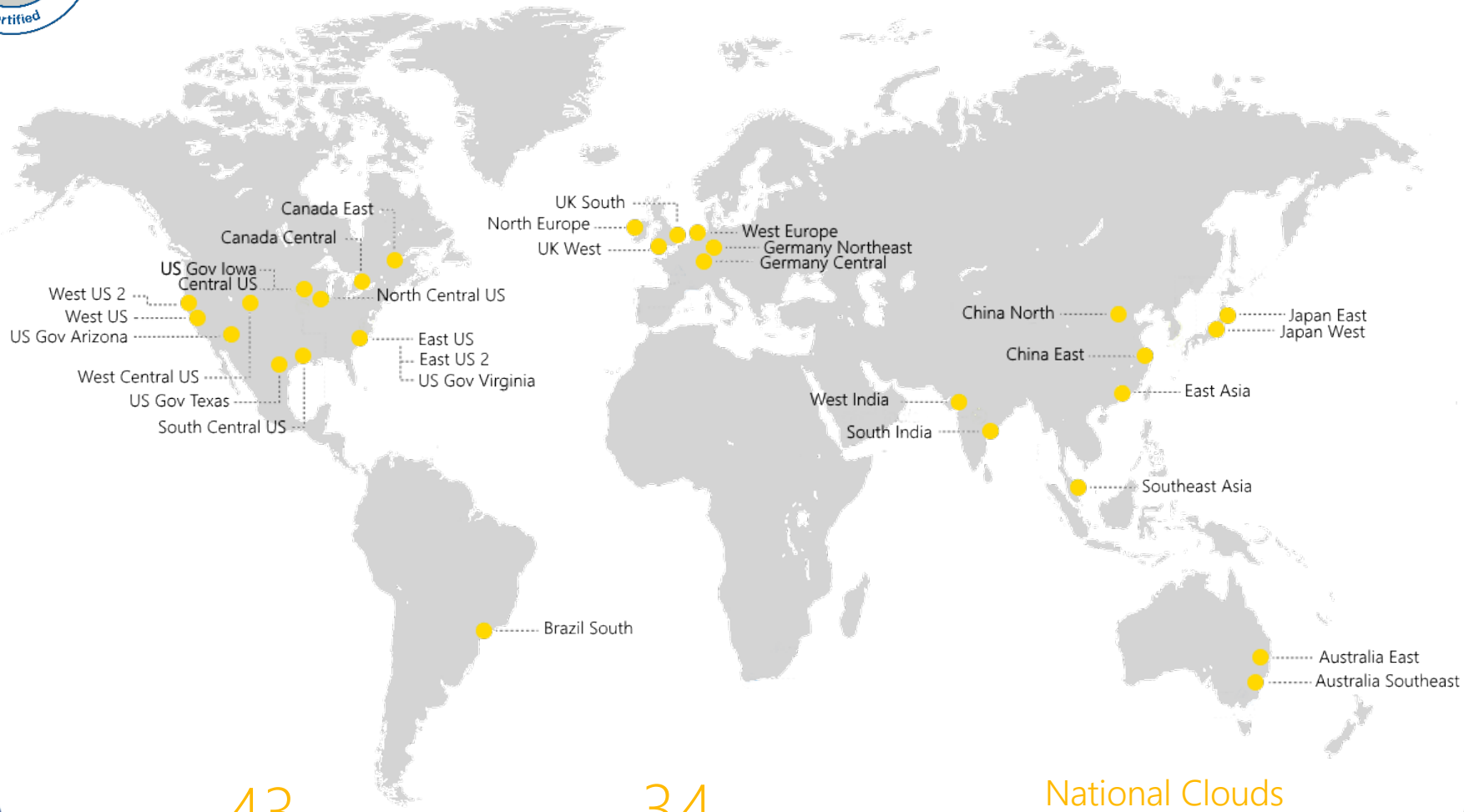




Get from insights to actions quickly



Largest Global Footprint



43
Languages

34
Primary and backup datacenters worldwide

National Clouds
US Government
China
Germany

ISO 27001 Certified

HIPAA

PCI Security Standards Council

EU Model Clauses

China GB 18030

cloud security alliance®

GOV.UK

FedRAMP

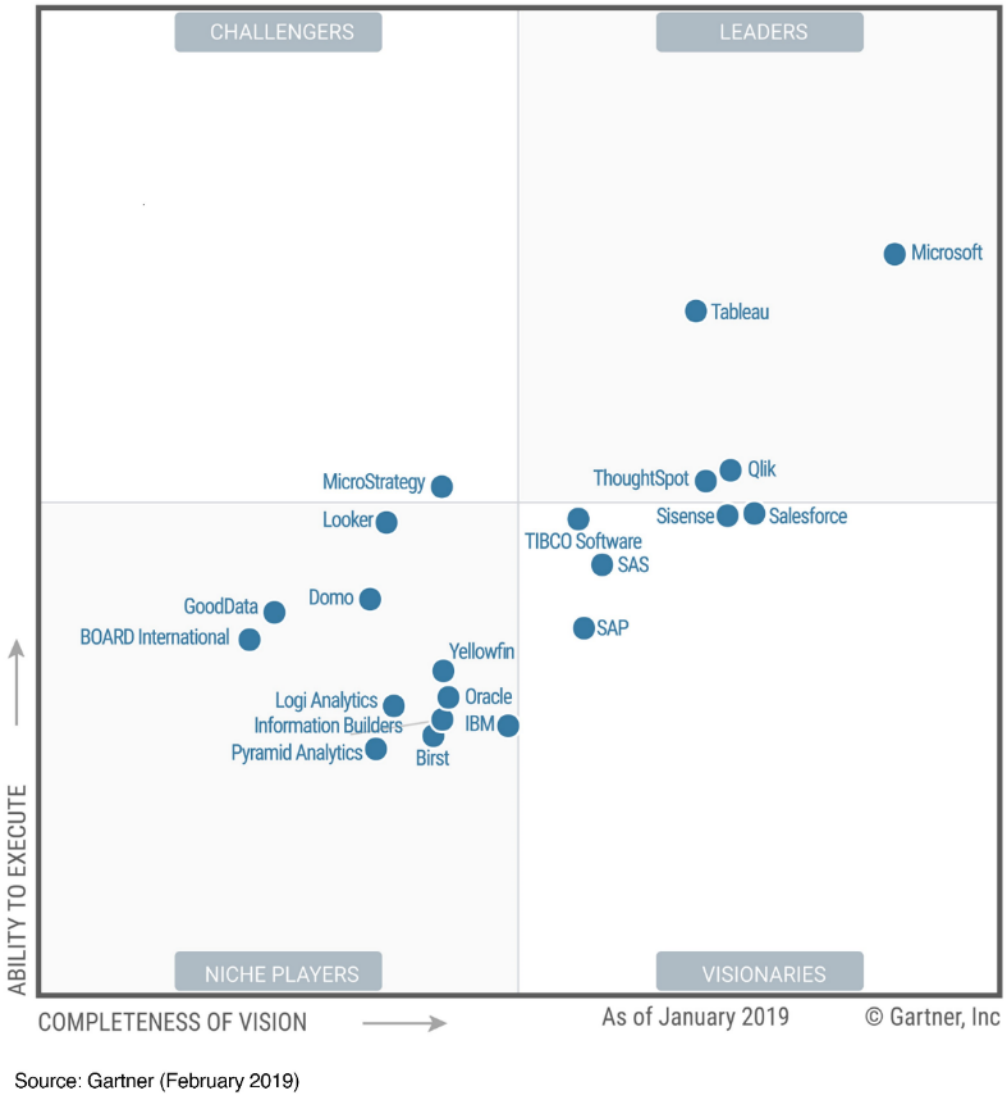
irap

Federal Office for Information Security

Gartner®

February 2019

A Leader in Analytics & BI Platforms*



Source: Gartner (February 2019)

***Gartner "Magic Quadrant for Analytics and Business Intelligence Platforms," by Cindi Howson, James Richardson, Rita Sallam, Austin Kronz, 11 February 2019**

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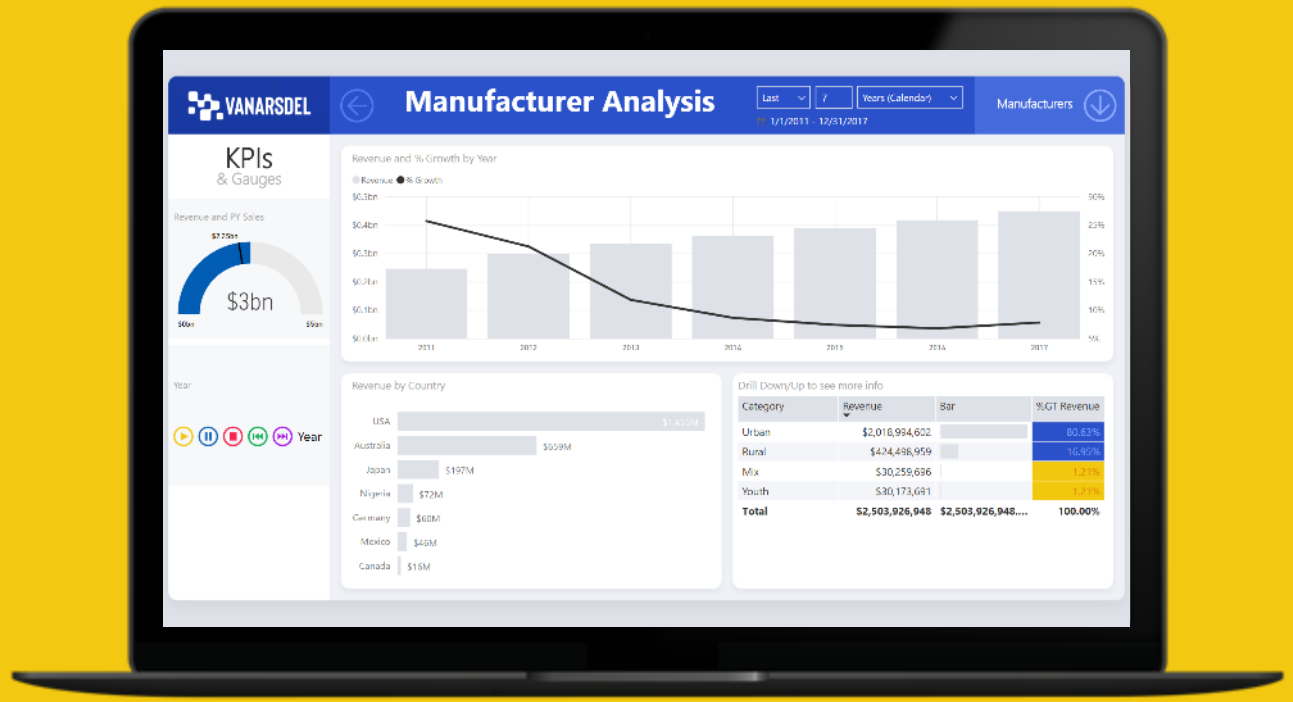
Business Intelligence Terminology



Dimensions

Descriptive/ Qualitative Information

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

Measures/Facts

Quantitative Information

- Expressed in numbers and can be counted and aggregated easily

DAX Functions

Data Analysis Expressions

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

- Examples:
  - SUM
  - AVERAGE
  - COUNT
  - DISTINCTCOUNT
  - SWITCH
  - TODAY

Scenario 1

How many shoes were sold in Tennessee in 2017?

Scenario 1

How many shoes were sold in Tennessee in 2017?

Dimension

Measure

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

Measure

Scenario 3

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

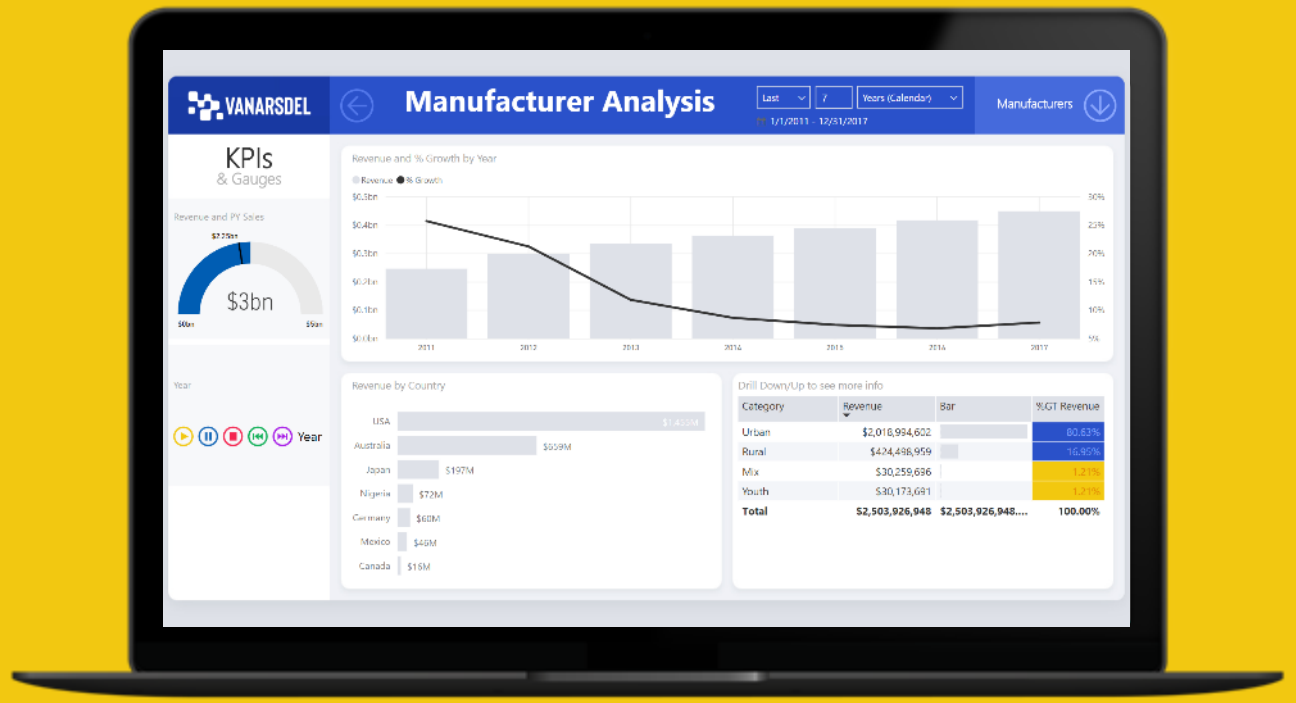
What percentage of those shoes were returned within one month? — Measure

Scenario 3

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

What percentage of those shoes were returned within one month? Measure

Basic Data Modeling



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

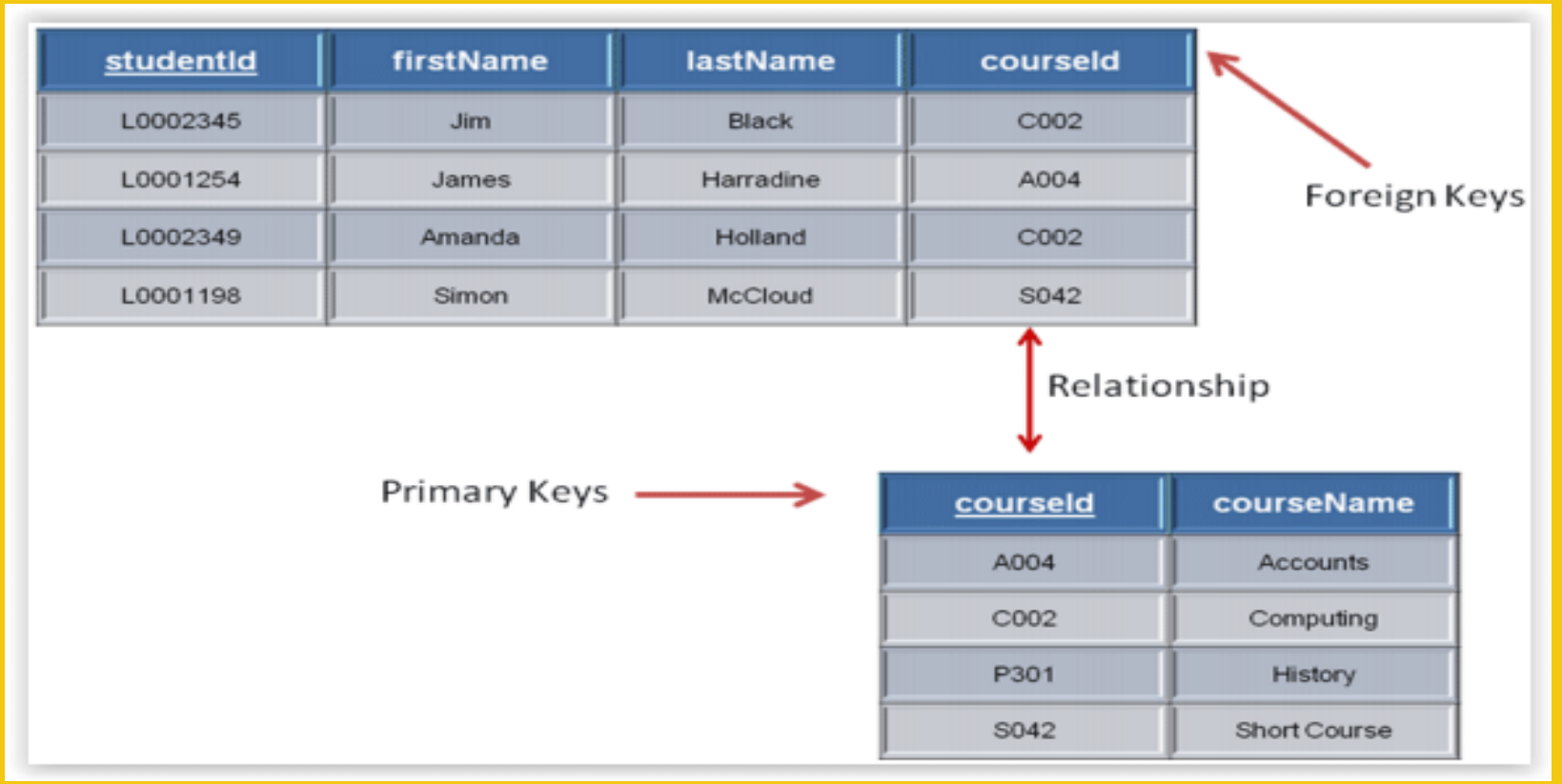
Flat File Example

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

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 DatabaseExample



Star Schema

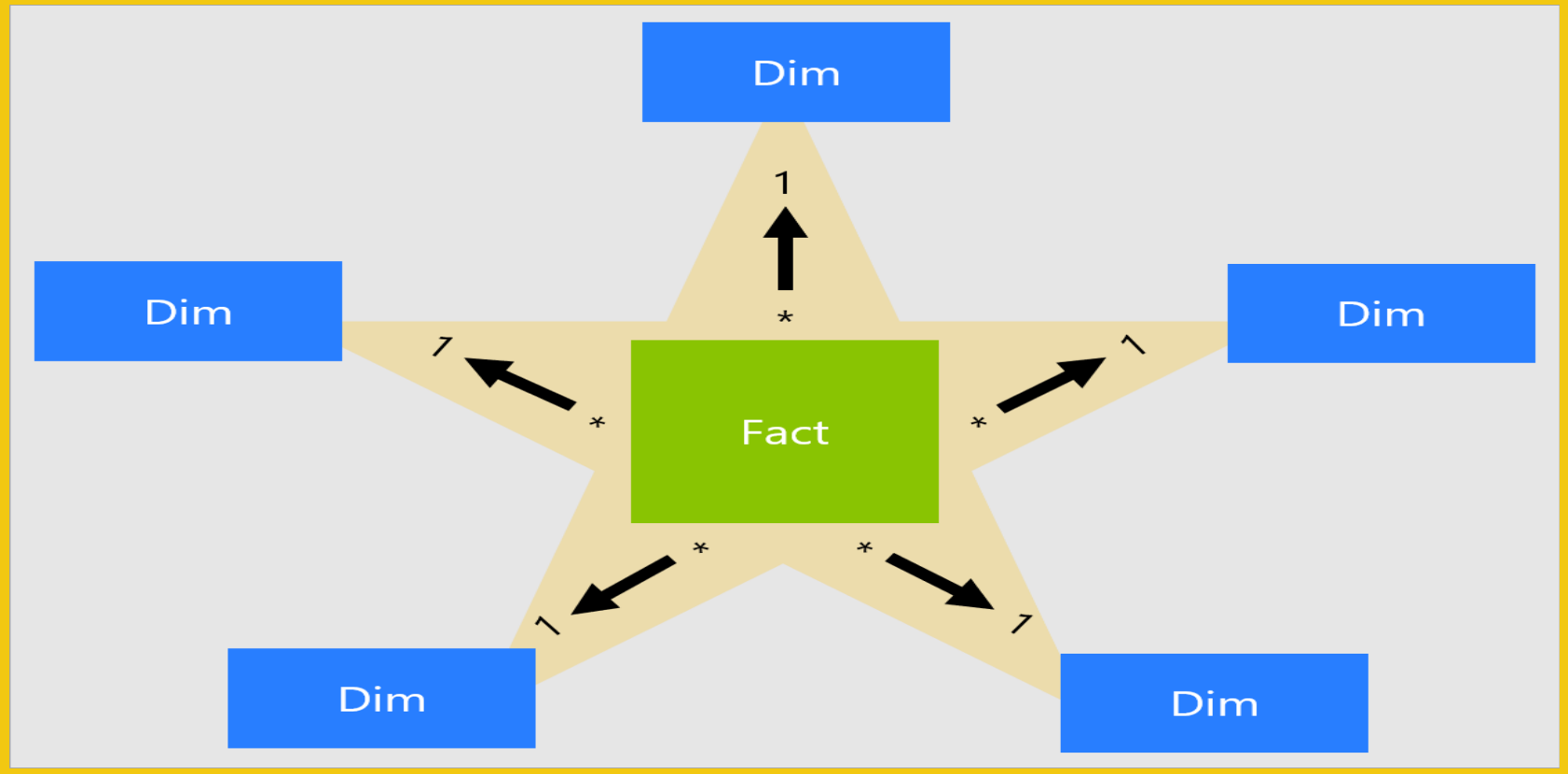
Star schema is a mature modeling approach widely adopted by relational data warehouses. It requires modelers to classify their model tables as either *dimension* or *fact*.

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.

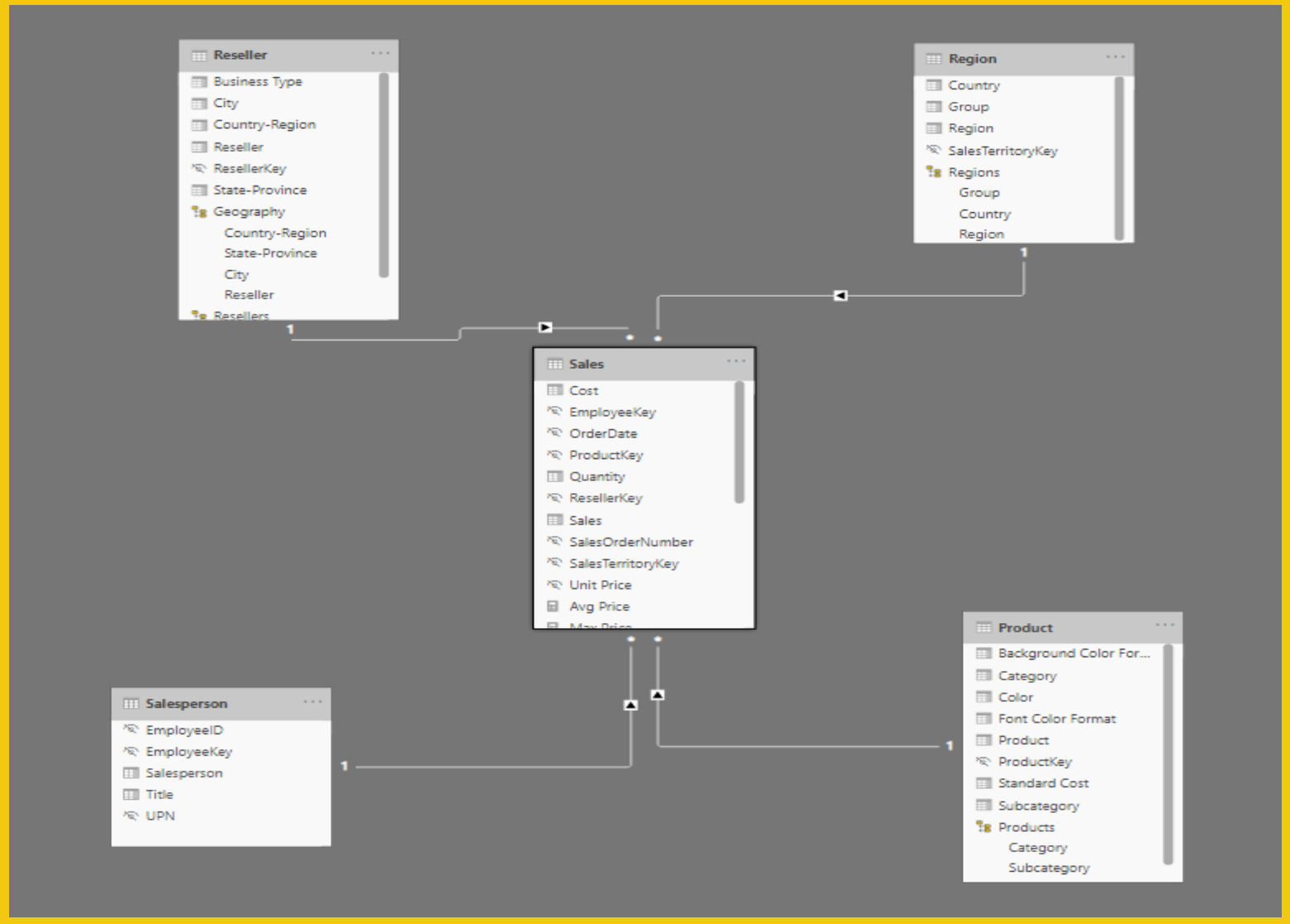
Fact tables store observations or events, and can be sales orders, stock balances, exchange rates, temperatures, etc. A fact table contains dimension key columns that relate to dimension tables, and numeric measure columns.

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.

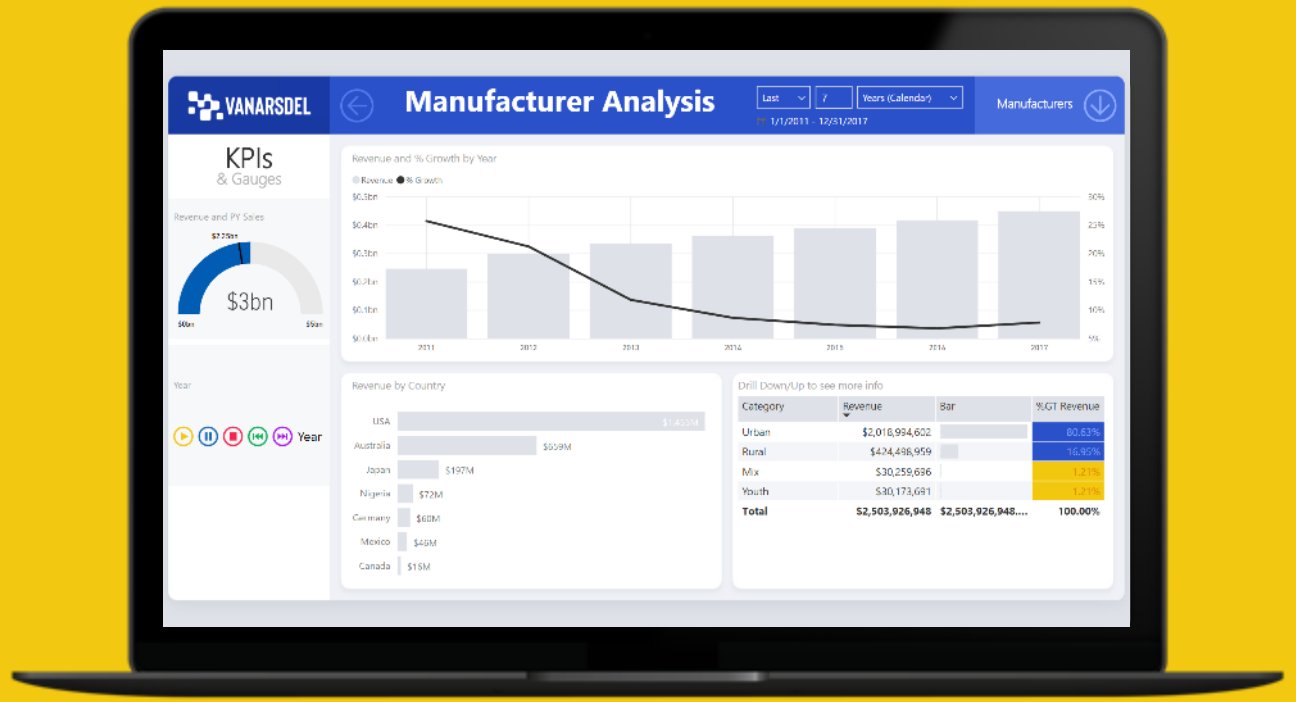
Star Schema Example



Star Schema Example



Power BI
Demo



Request from a stakeholder

I would like to know the total sales amount ($) broken out by year. I would also like to know the number of sales quantity broken out by year. I would like to know what product categories had the highest sales amount ($). I would also like to know what are our top 5 highest selling products. I would like to know the total sales amount and quantity for USA only.

Example 1

Create a bar chart showing sales broken out by year

Create a line chart showing quantity broken out by year

Create a chart of sales by category

Create a chart showing top 5 products

Create 2 cards of total sales and quantity

Example 2

Create a card of total sales for Germany

Create a card of total quantity for Canada

Create a bar chart of sales by 2019 only. Broken out by month

Create a line chart of quantity for 2019 only. Show this month

Create a chart that shows total sales by SalesPerson Title

Create a chart displaying the top 5 Salesperson with the highest dollar amount of sales

Power BI Tips and Tricks

Maps

Quick Measures

Measures

How To Tell A Story With Data

Storyboarding

Problem

-What are we trying to solve

Who

-Audience

-You

What

-Action

Mechanism

-PowerPoint?
-Power BI?
-Excel?
-Tableau

Tone

-Success/Failure?

How

-Possible types of graph/chart

Source: *storytelling with data: a data visualization guide for business professionals* (Wiley 2015)

Two main types of data visualization

- Exploration
- Explanation

Exploration

- Discover new areas of interest
- Pose new questions
- Discover new stories

Explanation

- Answer a question
- Support a decision
- Convey information
- Increase efficiency

The need to visualize data

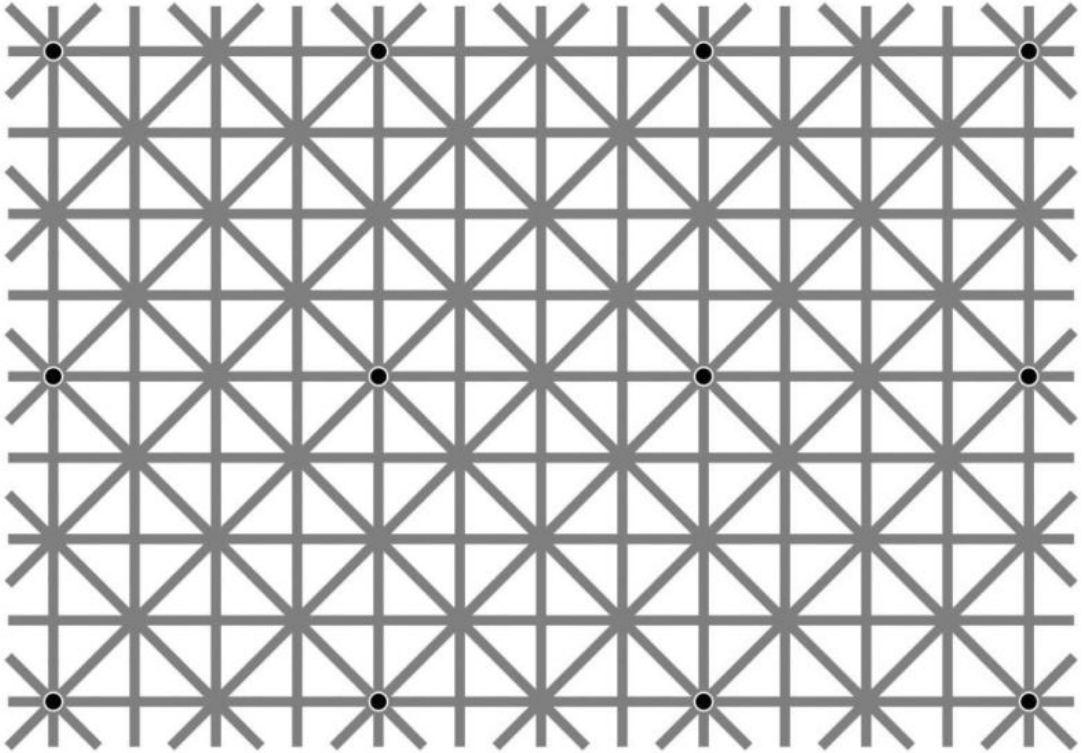
- Human brain processes images 60,000x faster than text.

-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

How many dots do you see at once?



Ninio’s Extension Illusion

How many dots do you see?

- There are 12 dots. It is difficult to see all of the dots because the grid prevents us from seeing the whole picture. If we removed the grid we could see all 12 dots, but when presented on a grid, our perception changes entirely.

- “Our visual system is lazy. Regular patterns are tempting because you can look at a small portion and think you have the whole thing figured out”- Martinez-Conde

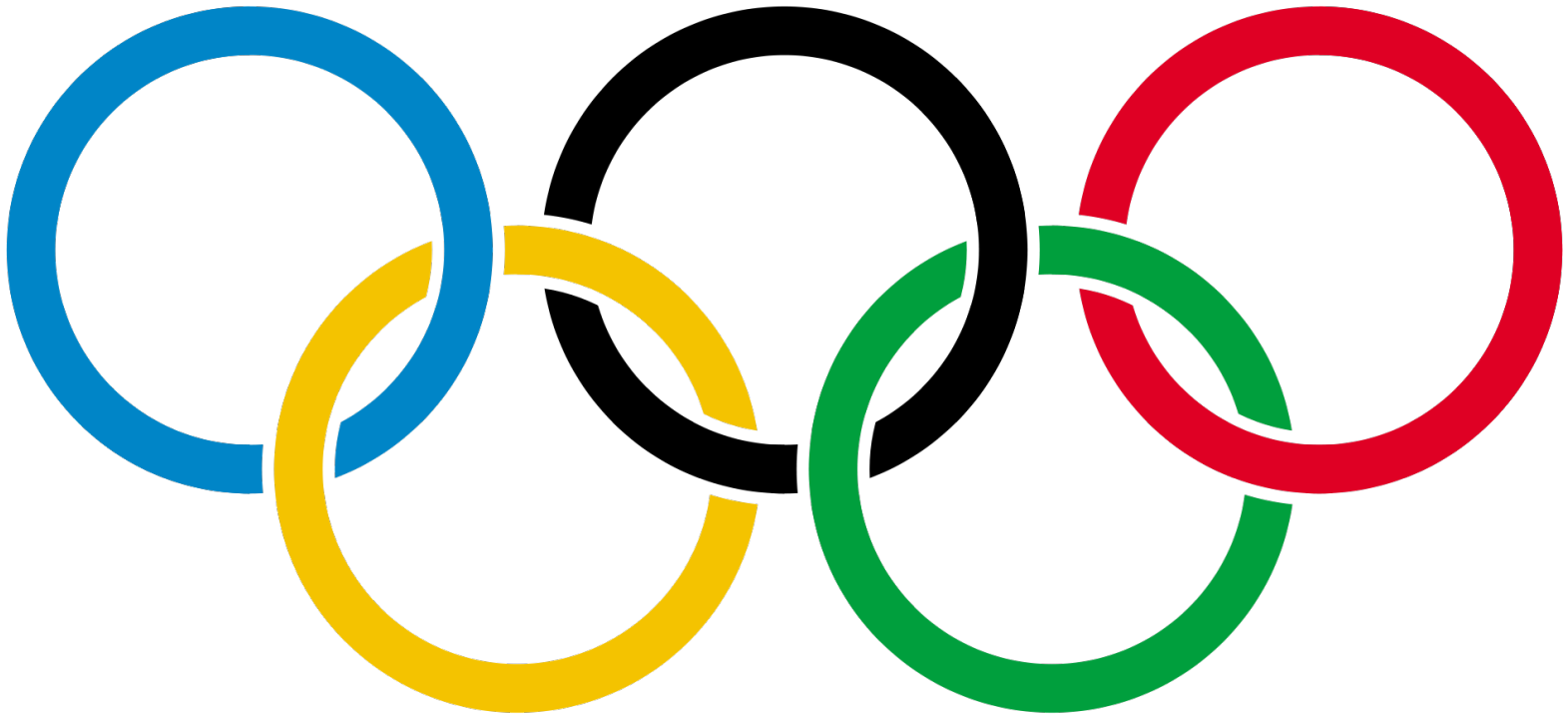
Ninio’s Extension Illusion

The Gestalt Principles

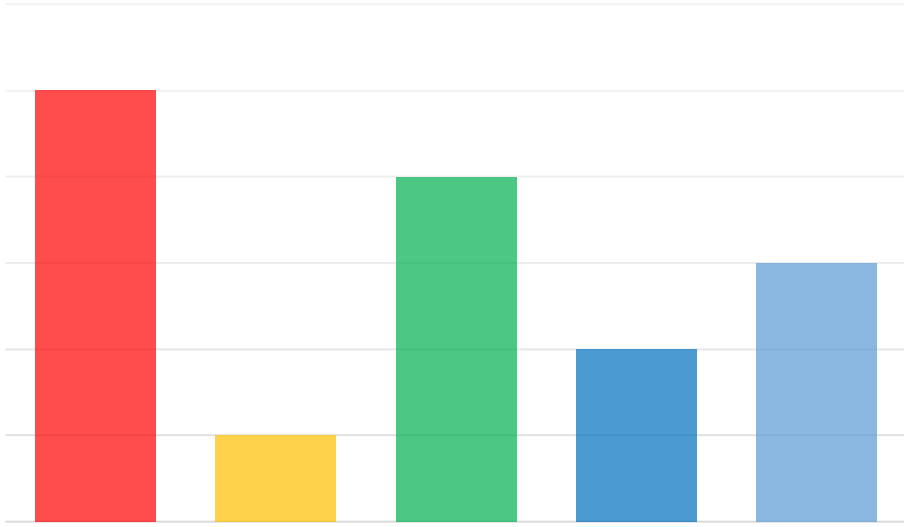
Gestalt

- 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

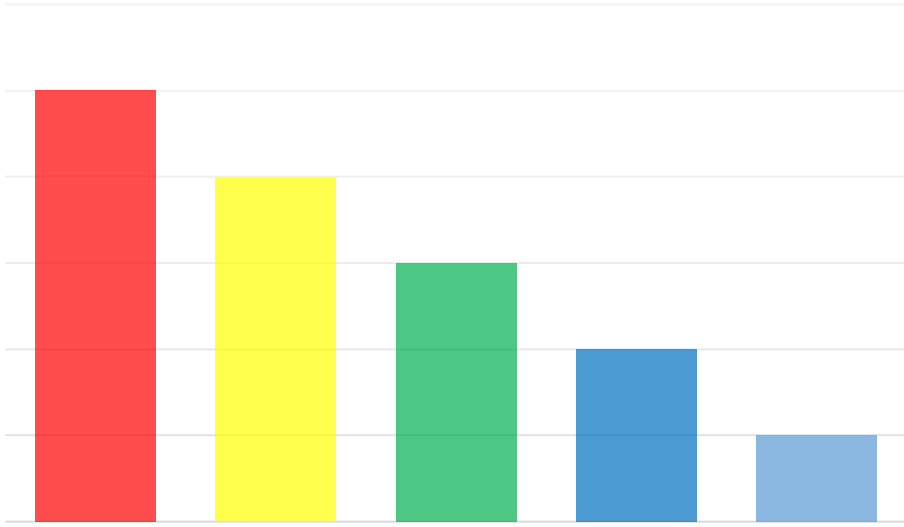
Law of Pragnanz



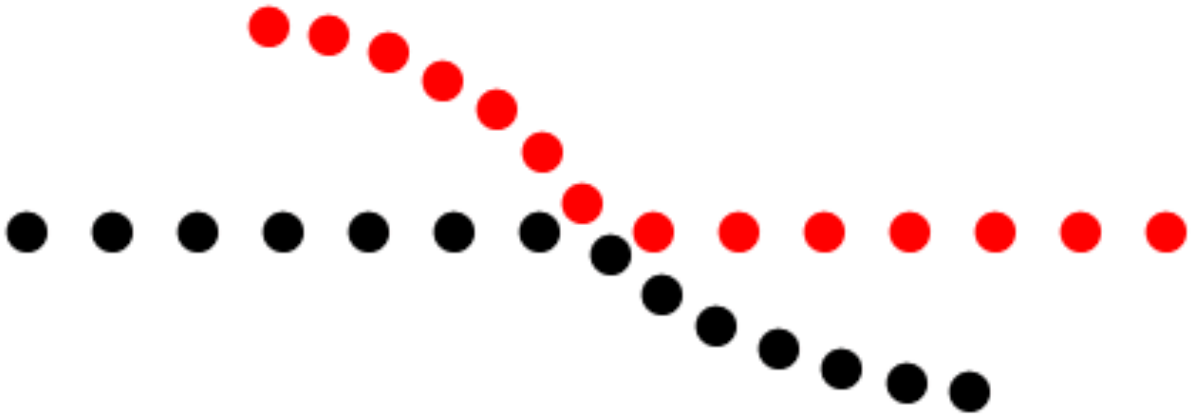
Law of Pragnanz



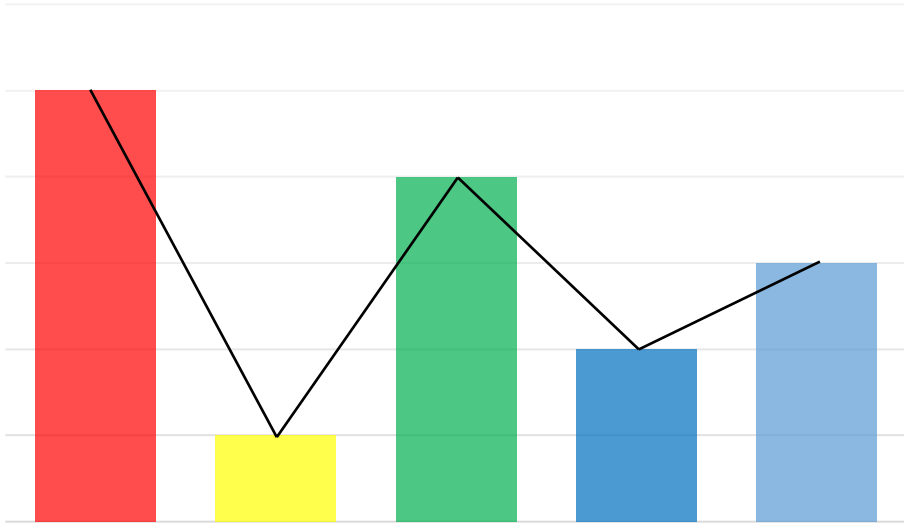
Law of Pragnanz



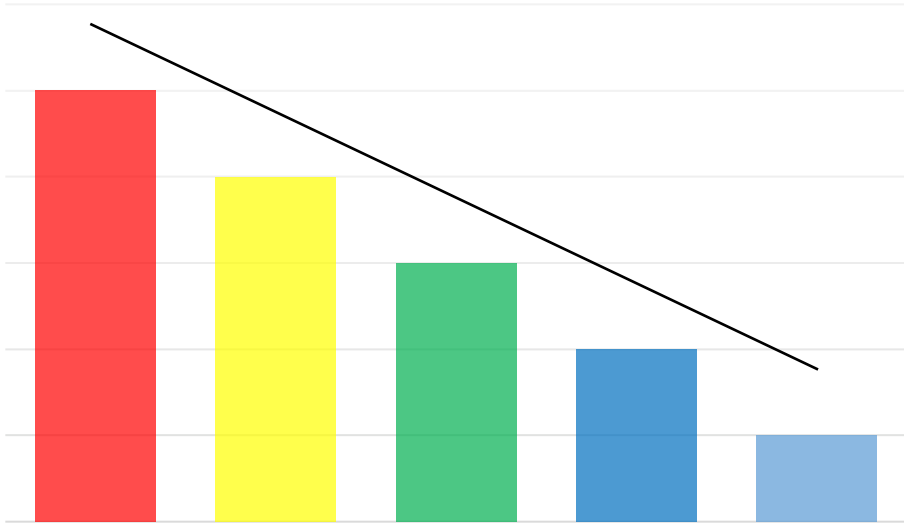
Law of Continuity



Law of Continuity

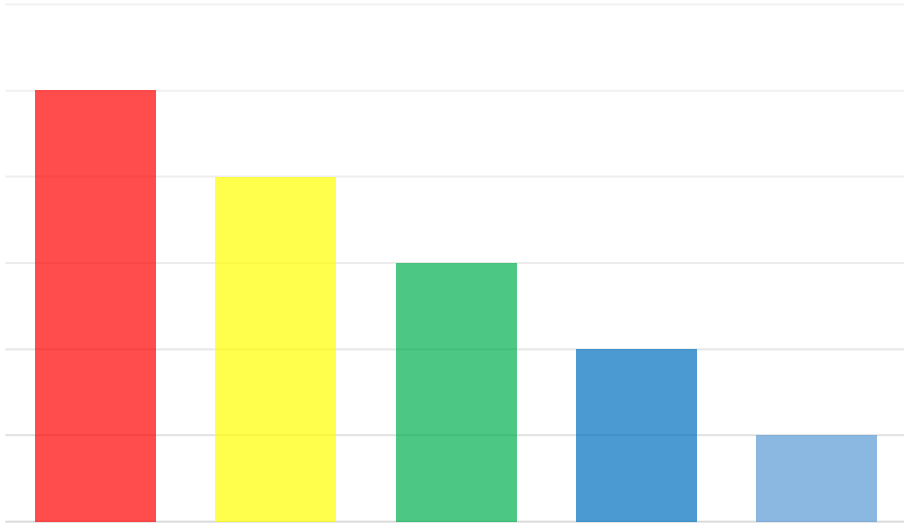


Law of Continuity

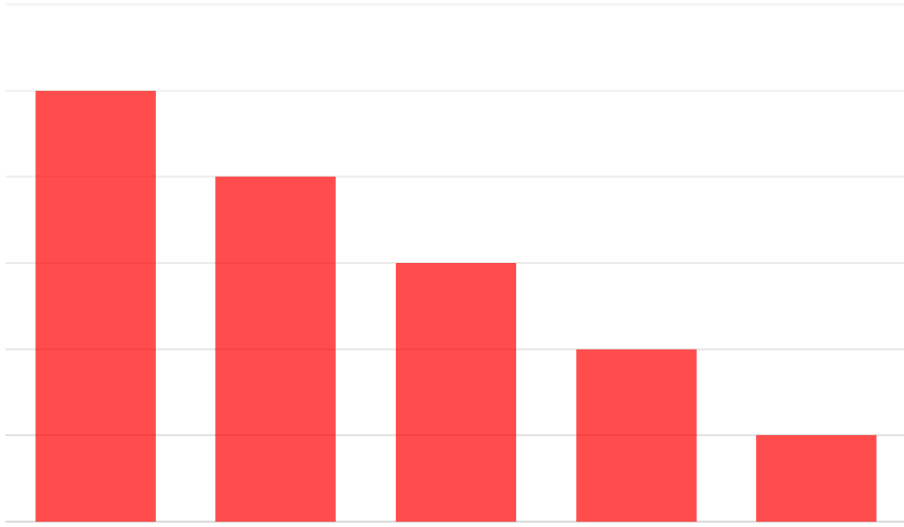


Law of Similarity

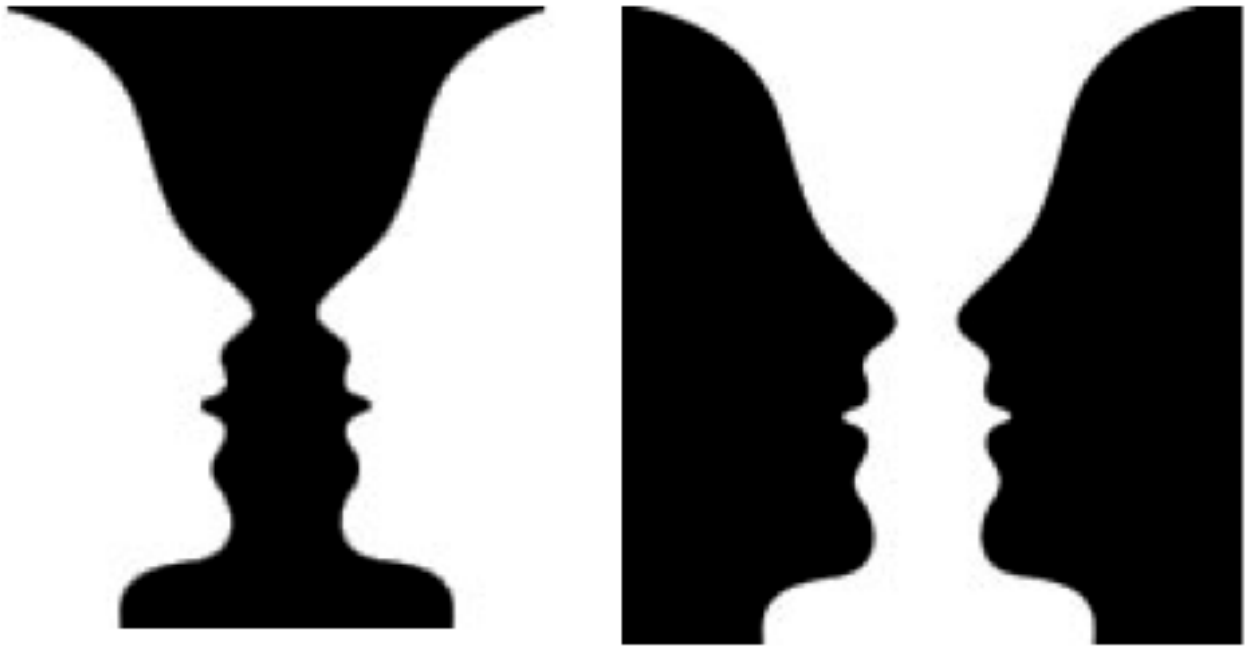
Law of Similarity



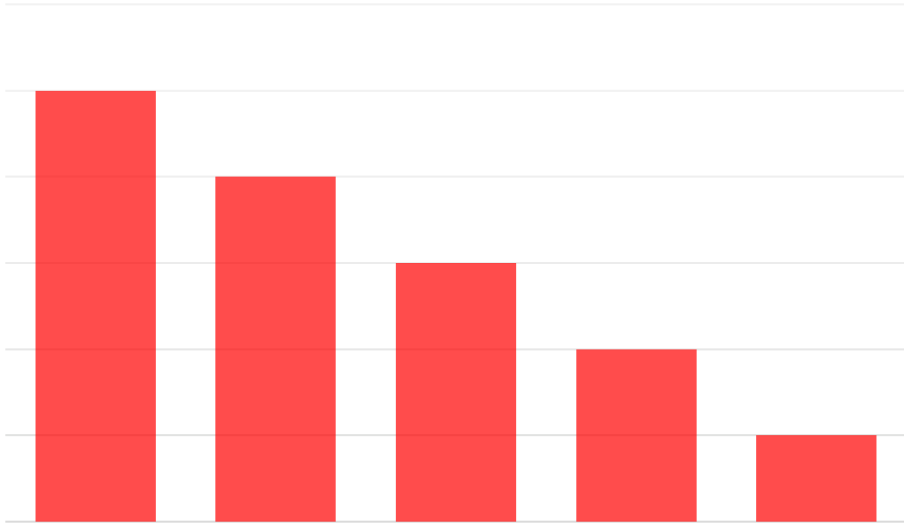
Law of Similarity



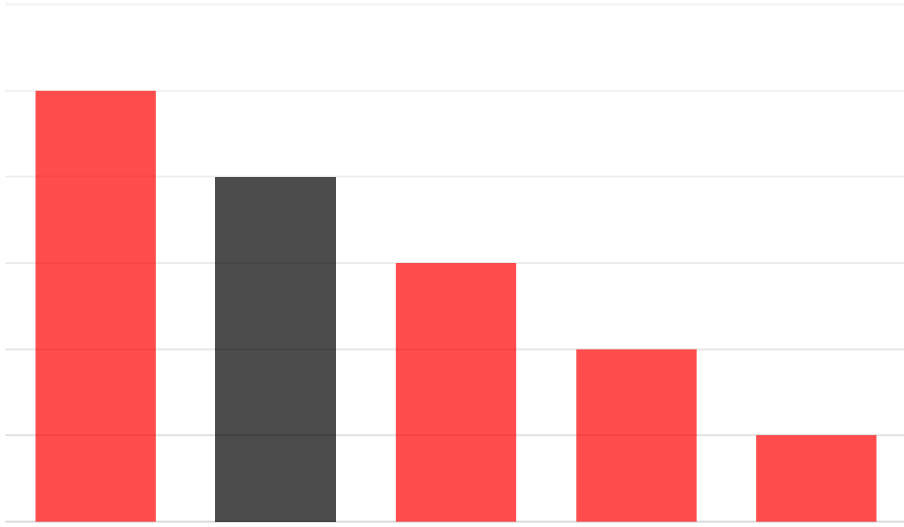
Law of Focal Point



Law of Focal Point

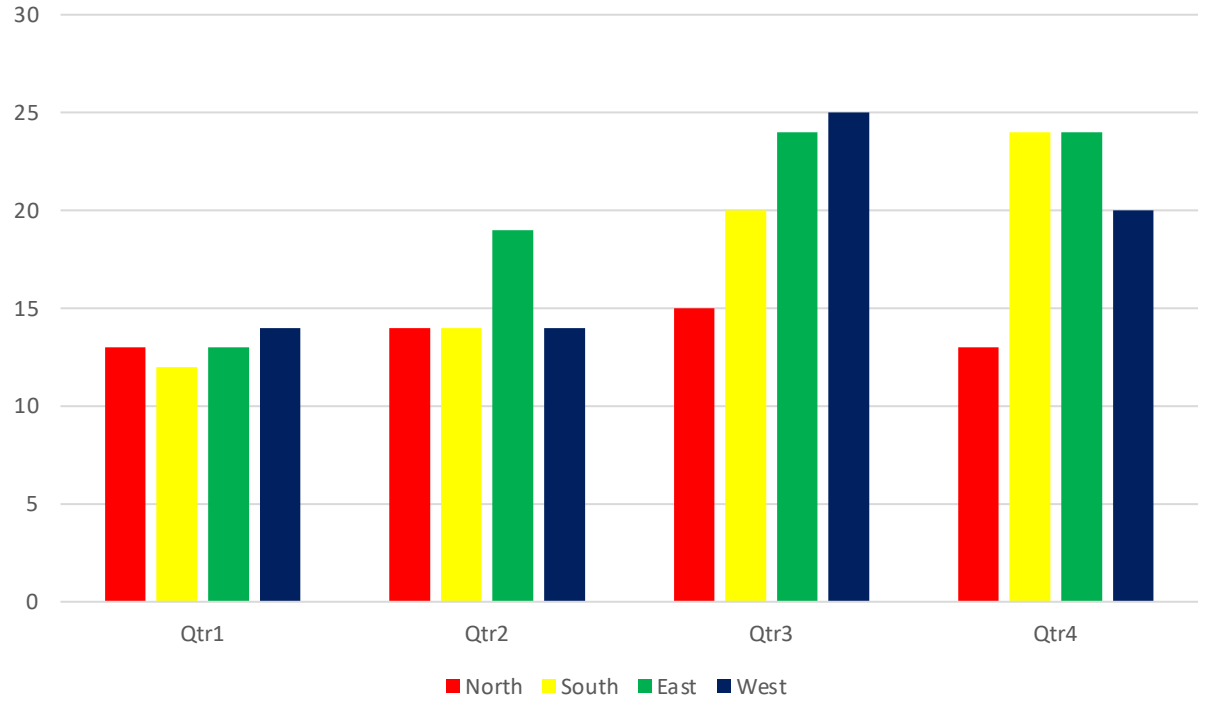


Law of Focal Point

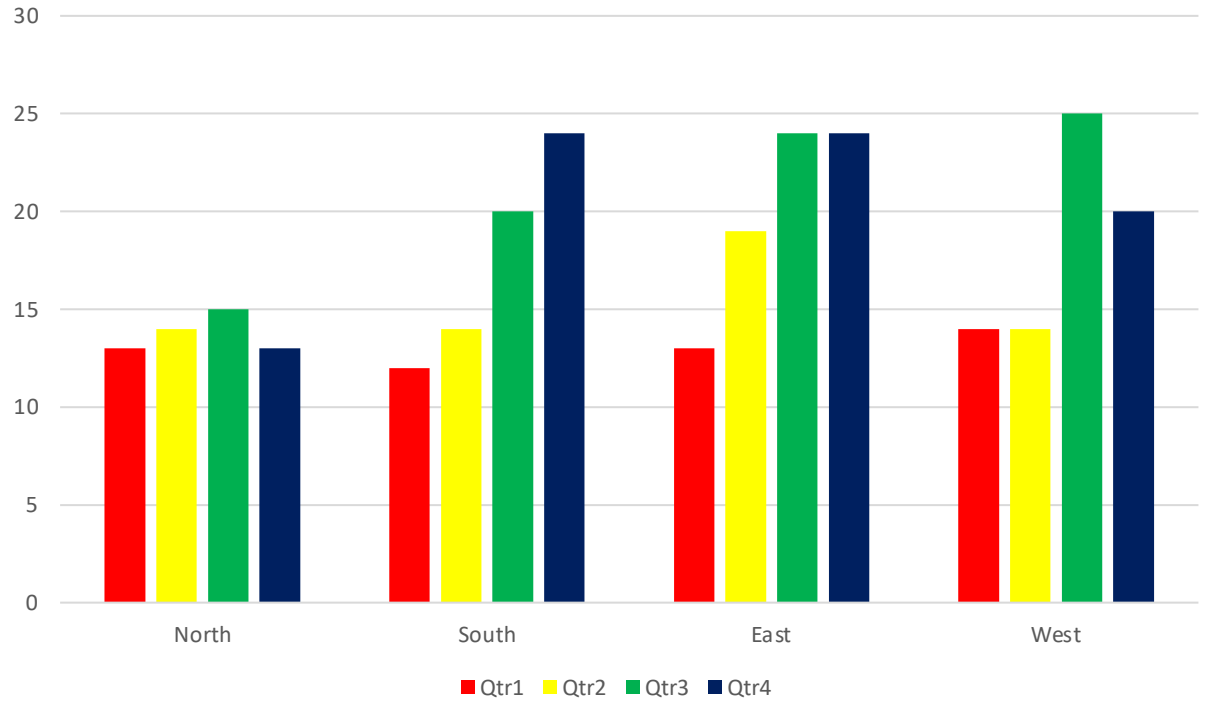


Law of Proximity

Law of Proximity



Law of Proximity



Resources

- 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

DATA

SORTED

ARRANGED

PRESENTED
VISUALLY

JOIN OUR THRIVING COMMUNITY

850K Active Community Members

100K+ Users touched in-person at Microsoft sponsored events

USER VOICE:

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16,432 Ideas Submitted

3,162 Active Ideas

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POWER BI USER GROUP

222 Independent Power BI User Groups World Wide

49,685 User Groups Members in over 60 countries

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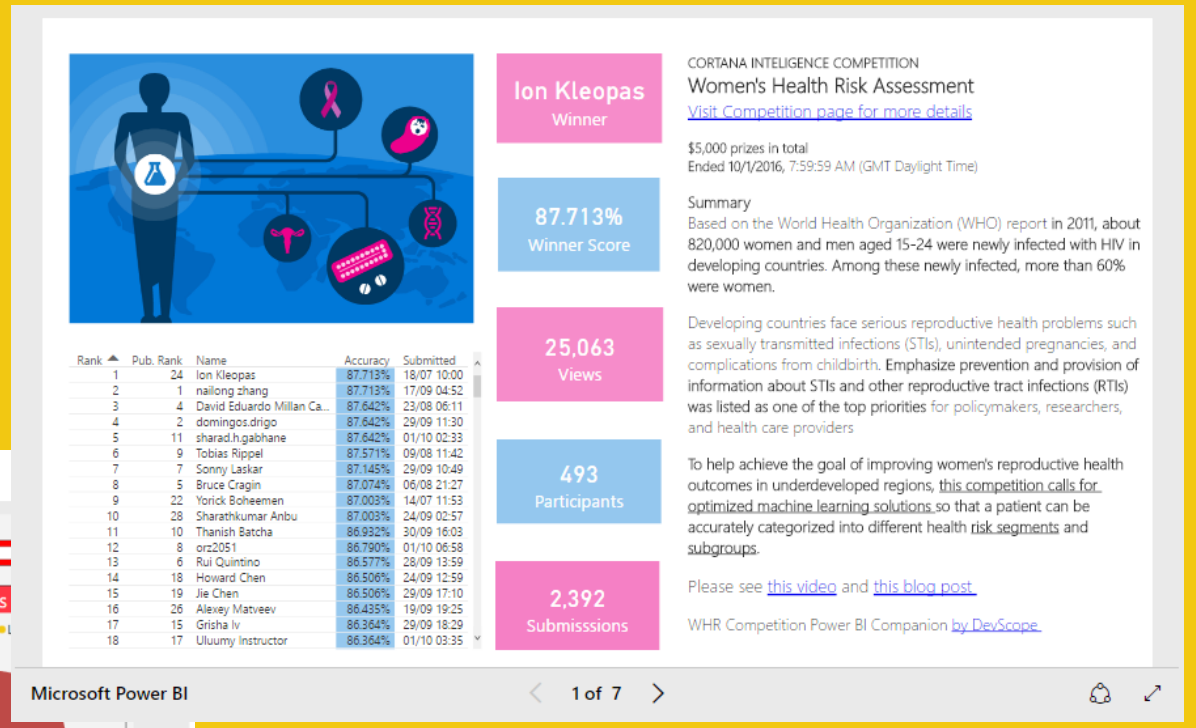
Explore and share your data stories



In the Data Stories Gallery

Resources:

- https://guyinacube.com/
- https://www.sqlbi.com/
- https://docs.microsoft.com/en-us/power-bi/
- https://docs.microsoft.com/en-us/learn/paths/data-analytics-microsoft/
- https://www.havensconsulting.net/blog-and-media

Goals

What I want you to be able to achieve

- How to connect to a data source
- How to do basic ETL (Extract Transform and Load)
- How to do basic data modeling
- How to create visualizations using dimensions and measures
- How to tell a story with data

Q&A

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