

# Why BI Tools?

## Power BI version

### Overview

What makes for good visualization?

We explore principles and best practices, then introduce the Power BI workflow with a guided walkthrough. Students load a single table into the Query Editor, perform some basic cleaning steps, then move to the Data Model where we create our first reports.

### Learning Objectives

In this lesson, students will:

- Understand the power of data visualization and components of good design
- Articulate the difference between dashboards, reports, and analysis
- Compare Power BI to other/similar BI platforms
- Load a table into Power BI and create a report

**Duration:** 3 hours



# Suggested Agenda - Why BI Tools? (1/2)

Time		Activity	Topics
0:00–0:10	10 mins	<u>Opening</u>	Today's Agenda & Learning Objectives
0:10–0:30	20 mins	<u>Topic Introduction</u>	Intro to Data Visualization
0:30–0:45	15 mins	<u>Topic Introduction</u>	Dashboards, Reports and Analysis
0:45–0:50	5 mins	<u>Topic Introduction</u>	Intro to BI Tools, What is Power BI?
0:50–1:05	15 mins	<u>Guided Practice</u>	Getting Started with Power BI
1:05–1:30	25 mins	<u>Guided Practice</u>	The Power Query Editor
1:30–1:40	10 mins	<u>Break</u>	
1:40–2:10	30 mins	<u>Guided Practice</u>	The Data Model
2:10–2:20	10 mins	<u>Guided Practice</u>	Filters and Formatting



# Suggested Agenda - Why BI Tools? (2/2)

Time		Activity	Topics
2:20–2:40	20 mins	<a href="#"><u>Independent Practice</u></a>	Build a Report
2:40–2:50	10 mins	<a href="#"><u>Guided Practice</u></a>	Saving your Data Model
2:50–3:00	10 mins	<a href="#"><u>Review &amp; Wrap Up</u></a>	Reflection, Exit Tickets



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# Hello, GAClient!

# Power BI Unit Overview

The objective of this unit is to equip you with the ability to perform end-to-end data analysis through visualization, from raw data sources to a fully functional dashboard for user distribution.

**Lesson 1: Why BI Tools?**

**Lesson 2: Wrangling + Exploring**

**Lesson 3: Exploratory Data Analysis**

**Lesson 4: Communicating Insights**

**Power BI Project**



# Today's Agenda

**Here's what we'll cover today:**

- Visual communication and design best practices
- Dashboards, Reports and Analysis
  - What they are and who uses which
- Differences between popular BI tools
- Navigating the Power BI Interface
- Our First Visualization



# Learning Objectives

After this lesson, you'll be able to:

- Understand the power of data visualization and components of good design
- Articulate the difference between dashboards, reports, and analysis
- Compare Power BI to other/similar BI platforms
- Load a table into Power BI and create a report





Computers Out:

# Prepare for Class

## Before we begin:

Please be prepared to access the following files for this lesson:

1. **DemoDashboard.pbix**
2. **DemoSalesOrderHeader.txt**



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# Why BI Tools?

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# Intro to Data Visualization





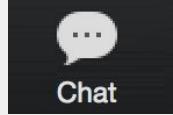
Real Cases:

# The Good, The Bad and The Ugly

Before we dive into building dashboards,  
let's have a think about what makes a good visualization.

Have a look at the next few visualizations.

What do you think?





## Real Cases:

# The Good, The Bad and The Ugly



## Question Of The Day

What should cost less: a gallon of gas or a gallon of milk?

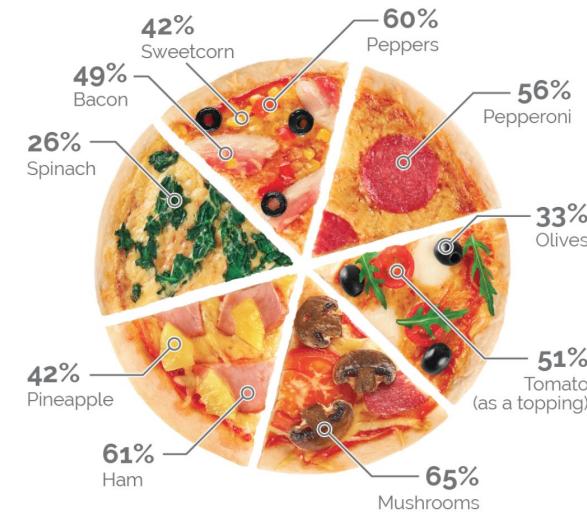
YES  
43%

NO  
57%

To record your answer to the Question of the Day and other polls about today's news, visit [www.post-journal.com](http://www.post-journal.com).

### Mushroom is the UK's most liked pizza topping

Generally speaking, which of the following toppings do you like on a pizza? Select as many as you like



Other items not depicted include: onions (62%), chicken (56%), beef (36%), chillies (31%), jalapeños (30%), pork (25%), tuna (22%), anchovies (18%), 2% of people say they only like Margherita pizzas

YouGov | [yougov.com](http://yougov.com)

February 26-28, 2017



## Real Cases:

# The Good, The Bad and The Ugly

### A Day in the Life

Average time Americans spent per day in 2014 compared with 2004

Personal care **0:47**  
0:47  
Education **0:25** 2014 (hours: min.)  
0:29 2004

Shopping **0:44**  
0:49

Watching TV **2:49**  
2:39

Sleeping **8:48**

8:33

Household-related **2:08**

1:49

Eating and drinking **1:10**

1:14

INCREASE  
DECREASE  
NO CHANGE

□ = one minute

Phone call, mail and email **0:08**  
0:11

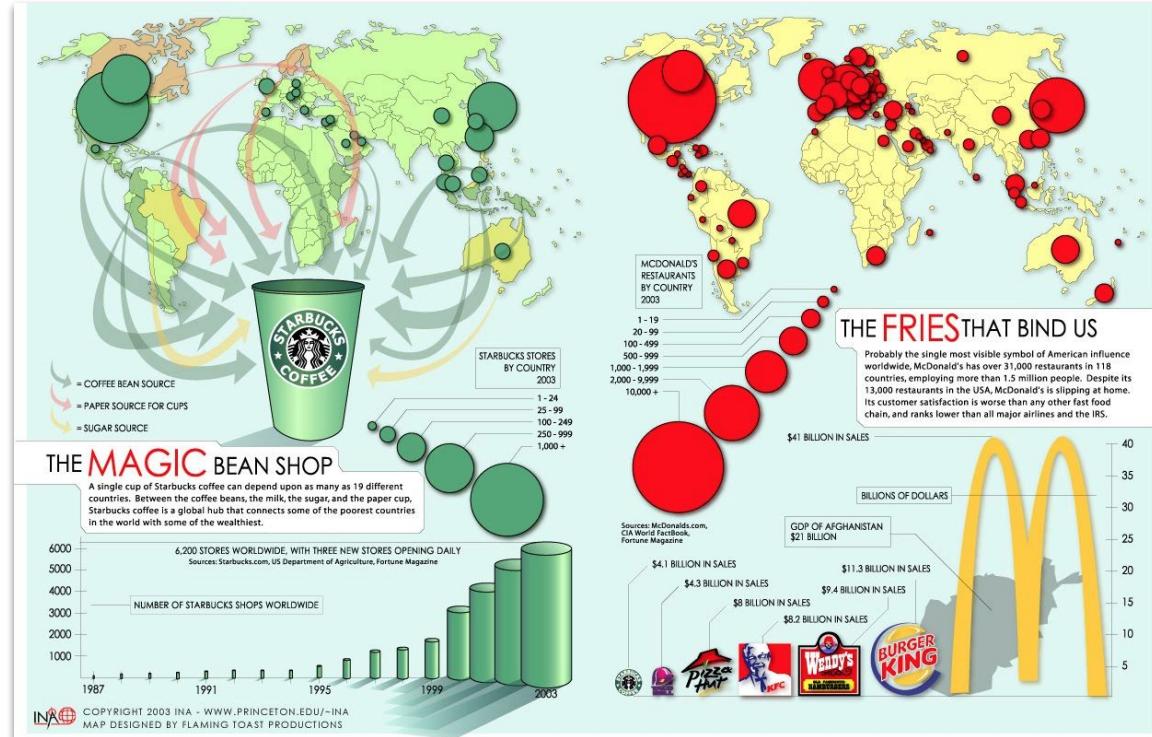
Work related **3:35**  
3:40

Caring for non-household members **0:11**  
0:16

Caring for household members **0:32**  
0:34

Other activities **0:14**  
0:08

Leisure and sports (excludes TV) **2:29**  
2:32



# Data Visualizations

What makes for **good visualization?**

In this section we'll:

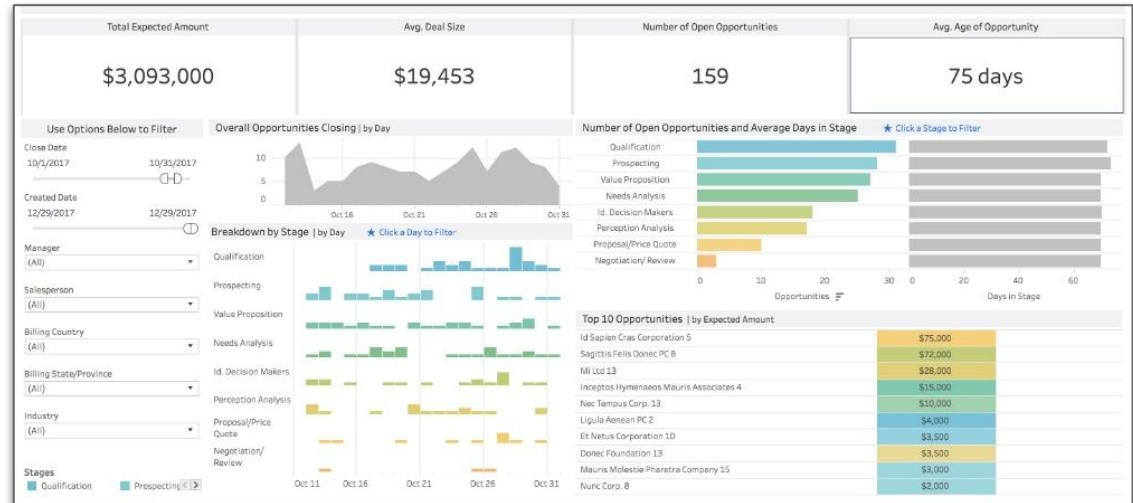
- explore good vs. bad visualizations
- determine dashboard best practices
- consider our audience



# Good Dashboard Design

## Guidelines:

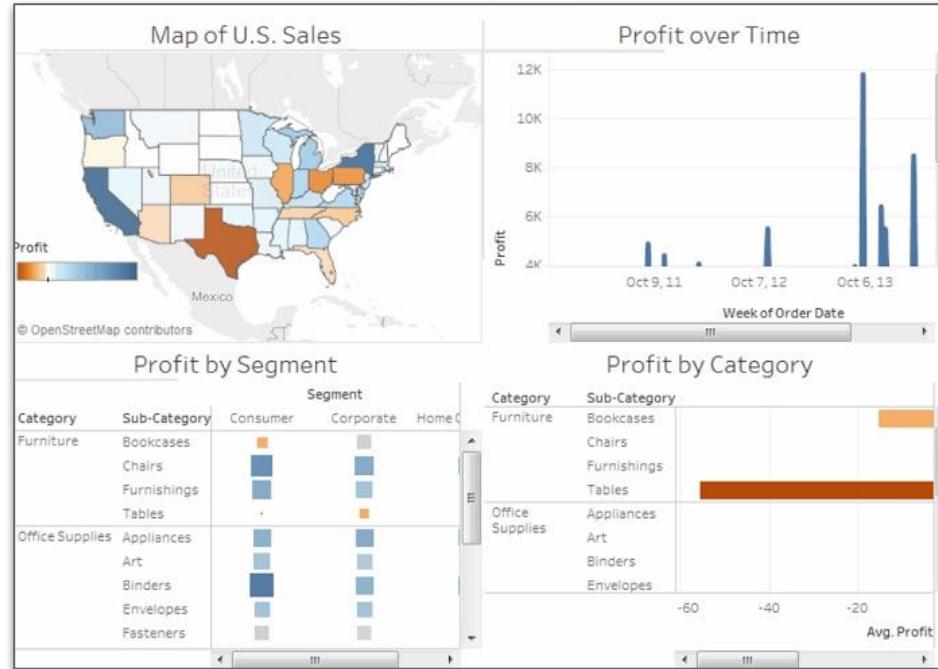
- Titles make sense
- KPIs are relevant
- Color schemes stay consistent
- Information follows a hierarchy
- Clean interface
- Less is more



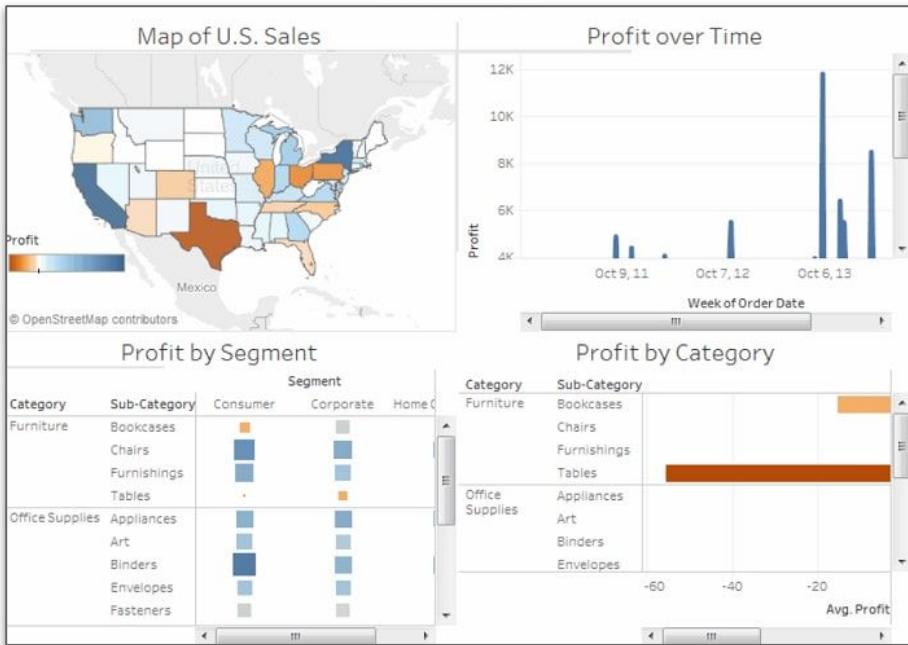
# Example No. 1

- Charts should be clean and uncluttered.

**What do you think of this example?**



# Example No. 1



- Contents are mashed up
- Interface is jumbled
- It is not clean or uncluttered

# Example No. 2

- Colors, legends, measures, and dimensions should be clear

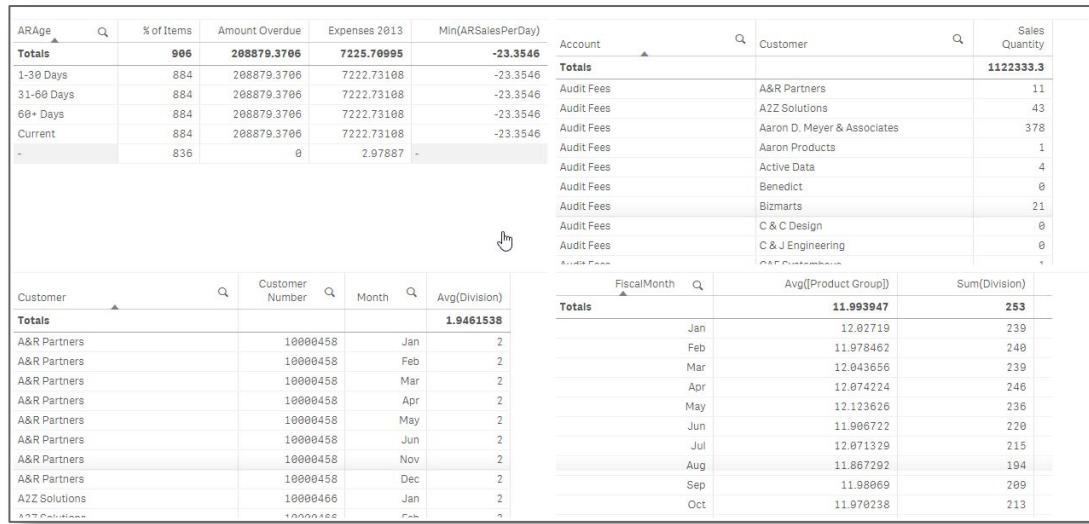
**What do you think of this example?**

ARAge	Q	% of Items	Amount Overdue	Expenses 2013	Min(ARSalesPerDay)	Account	Customer	Sales Quantity
<b>Totals</b>		<b>906</b>	<b>208879.3706</b>	<b>7225.70995</b>	<b>-23.3546</b>			<b>1122333.3</b>
1-30 Days		884	208879.3706	7222.73108	-23.3546	Audit Fees	A&R Partners	11
31-60 Days		884	208879.3706	7222.73108	-23.3546	Audit Fees	A2Z Solutions	43
60+ Days		884	208879.3706	7222.73108	-23.3546	Audit Fees	Aaron D. Meyer & Associates	378
Current		884	208879.3706	7222.73108	-23.3546	Audit Fees	Aaron Products	1
-		836	0	2.97887	-	Audit Fees	Active Data	4

Customer	Q	Customer Number	Month	Avg(Division)	FiscalMonth	Q	Avg([Product Group])	Sum(Division)
<b>Totals</b>				<b>1.9461538</b>	<b>Totals</b>		<b>11.993947</b>	<b>253</b>
A&R Partners		10000458	Jan	2	Jan		12.02719	239
A&R Partners		10000458	Feb	2	Feb		11.978462	240
A&R Partners		10000458	Mar	2	Mar		12.043656	239
A&R Partners		10000458	Apr	2	Apr		12.074224	246
A&R Partners		10000458	May	2	May		12.123626	236
A&R Partners		10000458	Jun	2	Jun		11.906722	220
A&R Partners		10000458	Nov	2	Jul		12.071329	215
A&R Partners		10000458	Dec	2	Aug		11.867292	194
A&R Partners		10000458	Jan	2	Sep		11.98069	209
A2Z Solutions		10000466	Feb	2	Oct		11.970238	213

# Example No. 2



The screenshot displays three distinct tables side-by-side:

- AR Aging:** A table showing the percentage of items overdue and expenses for different age groups. It includes columns for % of Items, Amount Overdue, Expenses 2013, Min(ARSalesPerDay), and Account.
- Customer Audit Fees:** A table listing audit fees for various customers. It includes columns for Customer, Sales Quantity, and Audit Fees.
- Divisional Sales:** A table showing average product group sales across different months. It includes columns for Month, Avg(Division), and Sum(Division).

- Data lacks description
- Too many tables
- Not enough summary



## Group Exercise:

10 Minutes



# What Are Some Good Design Principles?

## In your breakout group:



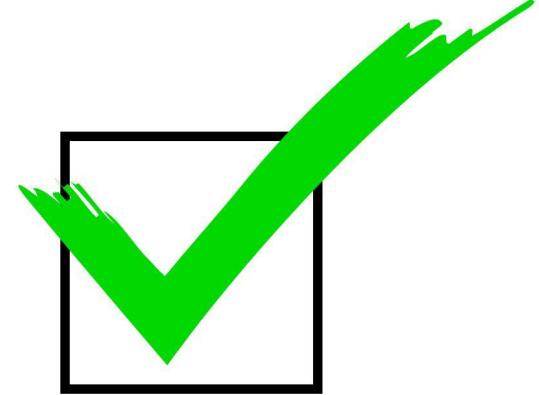
- Discuss any design pet peeves for dashboards/reports you have used in the past.
- Make a list of all the design principles that you can apply to creating visually appealing and legible charts.
- See how long you can make your list!

## Prepare to share!

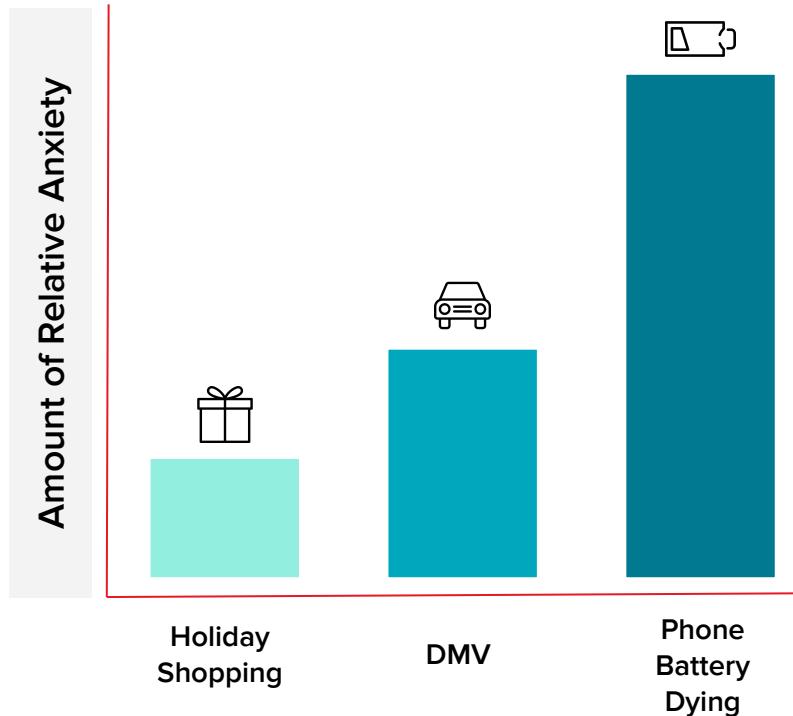


# Design Do's

- Simple charts are better charts
- Keep colors simple (too many colors will clash)
- Contrast neutral colors with emphasis colors
- Maintain consistent fonts, settings, and backgrounds across multiple charts
  - Assign colors a “job” so that they represent the same elements consistently (e.g., good/bad, critical/non-critical)



# Effective Visuals



1. Reduce Cognitive Load
2. Provide Instant Insight
3. Use Gestalt Principles

# Gestalt Principles (1900s, the Gestalt School of Psychology)

**Proximity** Elements nearby tend to be grouped in our minds.

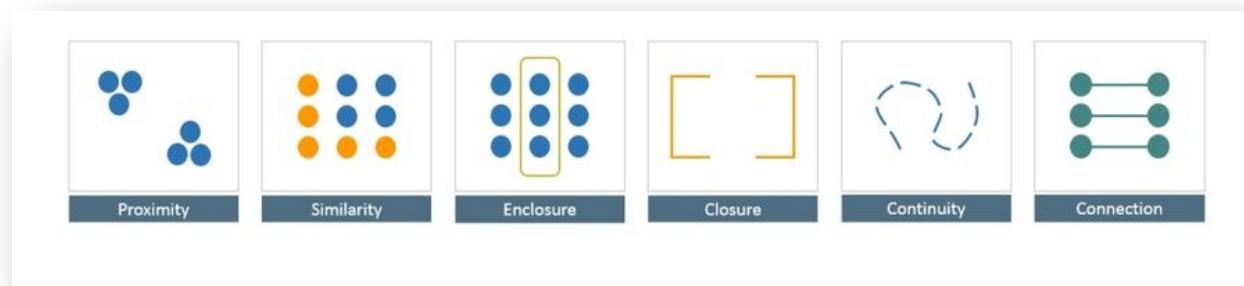
**Similarity** Our minds associate similar elements.

**Enclosure** If a border surrounds an object, its perceived as a group.

**Closure** If something is incomplete (partial border or just axis), it is still perceived as a closed structure.

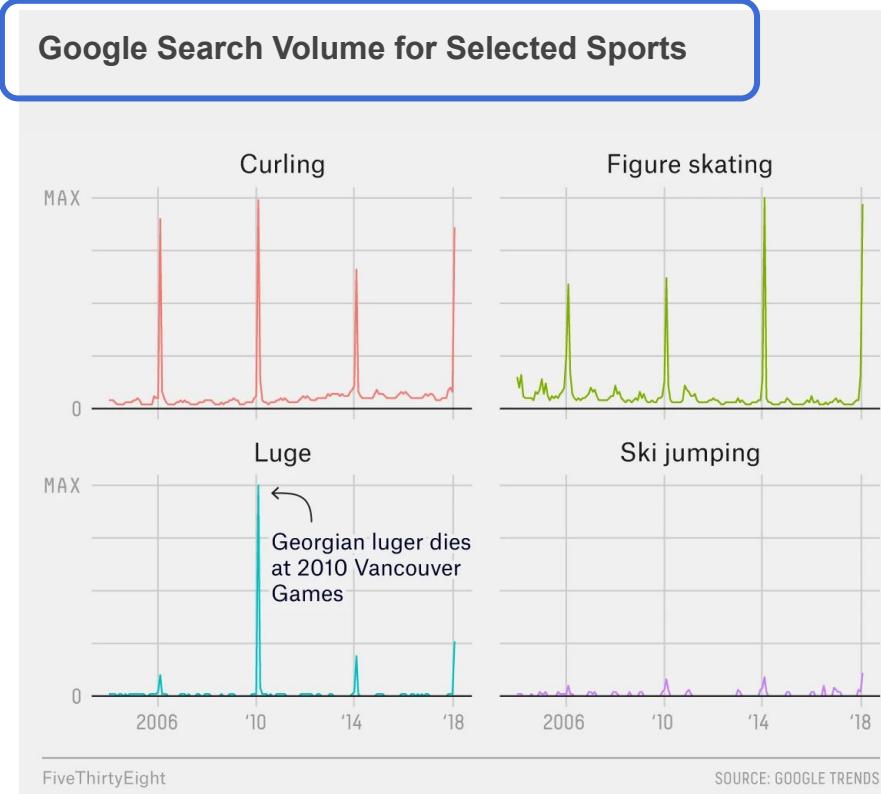
**Continuity** If a number of objects are aligned, we consider them as a continuum.

**Connection** If a set of objects are connected, we also see them as a group.



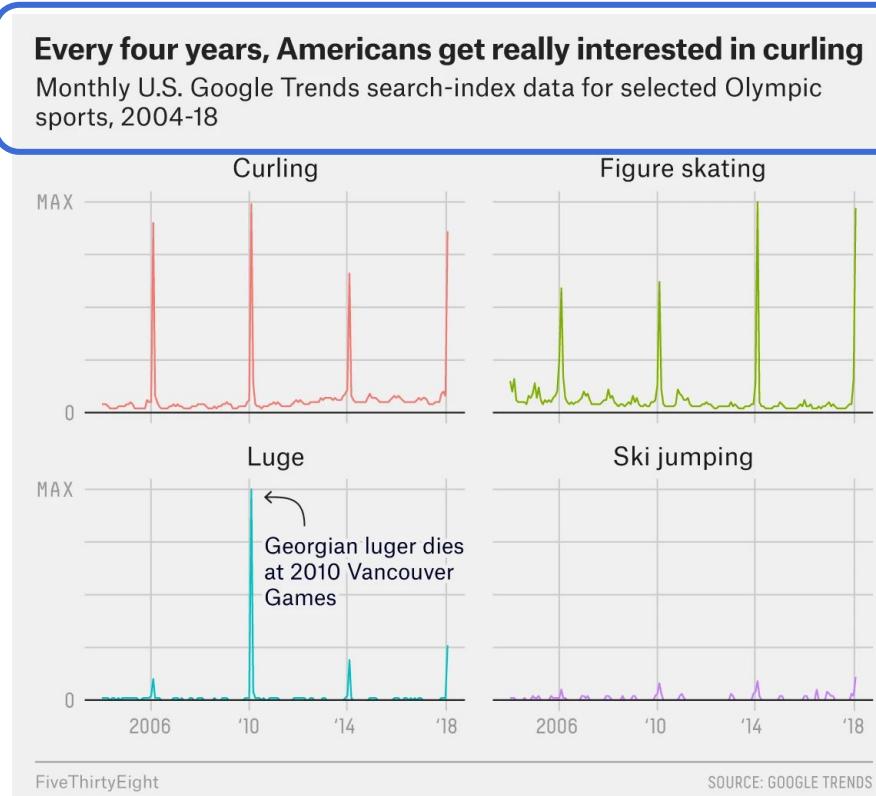
# Charts Should Tell A Story

This is **not**  
a great title...

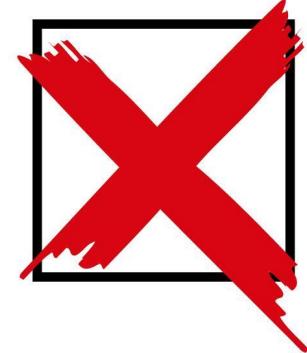


# Charts Should Tell A Story

This is a compelling title...



# Design Don'ts



- Avoid information overload
- Keep connections or relevant charts near each other
- Avoid distracting color schemes
- Don't give similar colors different meanings (red = good, red = bad)
- 3D is never ok!
- Double y-axes are confusing for most people
- Don't forget your audience!

**Have you ever watched a movie that had too many plots or characters?**

**What frustrated you about that experience?**

# Remember Your Audience

## Don't forget!

- Think about your audience (executive or engineer?)
- Consider target resolution (desktops or mobile?)
- Review the contrast and sizing of elements
- Be inclusive, be accessible



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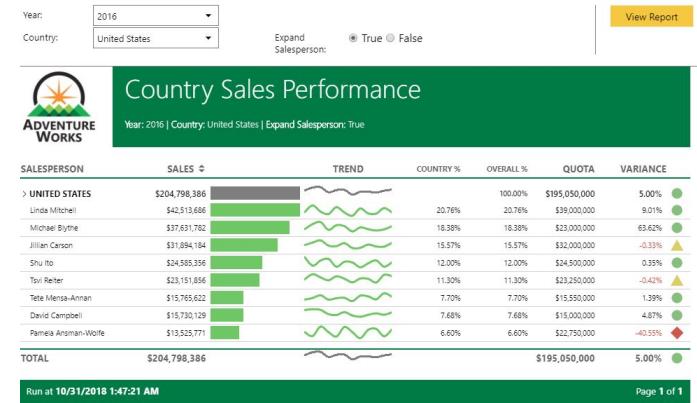
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# Reports, Dashboards and Analysis



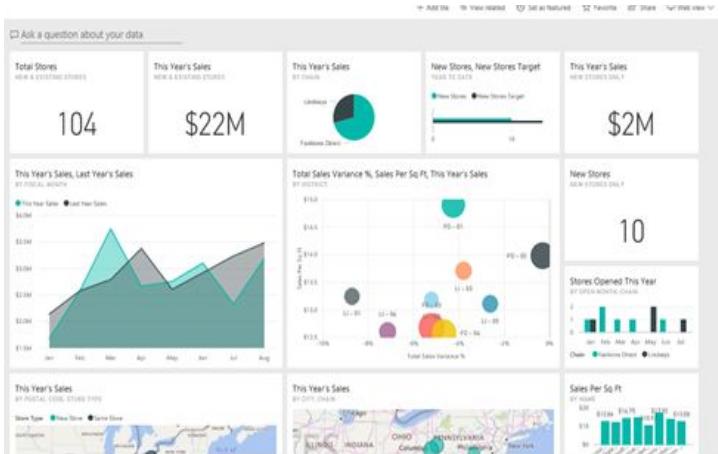
# Reports

- **Translate data** into information
- More **granular view** of data
- Used to measure the detailed performance
- **Static** - show a specific snapshot or aspect of business.  
e.g. comparing specific timeframes for consumer insights analysis.



# Dashboards

- Used to **summarize information** into digestible analytics and **highlight interesting and useful** aspects of your data.
- Dashboards are **dynamic** - providing at-a-glance visibility into business performance.

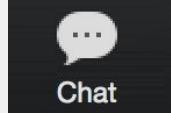




**Solo Exercise:**

## Share an Example

**In the chat write**



What is an example of a report that you use or see within your agency?

When does this report get sent and why?

# Analysis

Whereas reports and dashboards show *what is happening*, **analysis** focuses on **why it is happening** and providing recommendations on actions.

In other words, analysis  
**translates information into insights.**



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# Intro to BI Tools



# How the BI rivals stack up



## Power BI

- Free to use analytics tool integrated with Microsoft's Office suite
- User interaction with data employs a familiar drag-and-drop interface
- Shares many of the same functions from Excel, so mastering is easy with previous Excel experience
- Access from any device



- User-friendly interface allows non-technical users to quickly create custom dashboards
- Hyper Engine: in-memory columnar database
- Tableau "flow" allows incremental visual exploration
- Support for data "stories" with live connections for Q&A



- Robust, easy-to-use analytics tool
- Smart search feature enables system-suggested KPIs and charts
- Direct SQL integration using SQL script windows to customize imports and levels of aggregation
- Automated associative indexing of imported tables

# What is Power BI?



## High Level:

Power BI is a standalone Microsoft business intelligence product, which includes both desktop and web-based applications for loading, modeling, and visualizing data

- Business Intelligence (BI) platform
- Enterprise solution
- Desktop, mobile, cloud versions
- and more...



# What Makes Power BI Different?



- **Power BI will ingest data from virtually any source**

In addition to common sources such as SQL, Excel , text files etc. Power BI has many cloud-based connectors that allow users to easily connect to cloud content like Google Analytics, SalesForce.com, and lots more online software service providers.

- **Optimized performance for large datasets**

Vertipaq (the data modelling engine in Power BI and Excel) creates a highly compressed database that loads fully into memory for rapid performance.

It is not unusual for a database to compress between 600% –1200%, meaning a 1GB database will compress down to an operating size of between 85MB – 170MB.

# What Makes Power BI Different?



- **Brand new visualization engine and open source visualizations**

Microsoft shares its visualization source code so that any capable developer can develop their own visualizations and share them with the community.

- **Built for users familiar with Excel, but it's not Excel**

While it is relatively easy for Excel users to get started Microsoft has brought the rigour and structure from SQL Server Analysis Services into this product.

- **Mobile apps**

Microsoft has built mobile apps for Apple and Android (and Windows mobile of course).

# Key Features

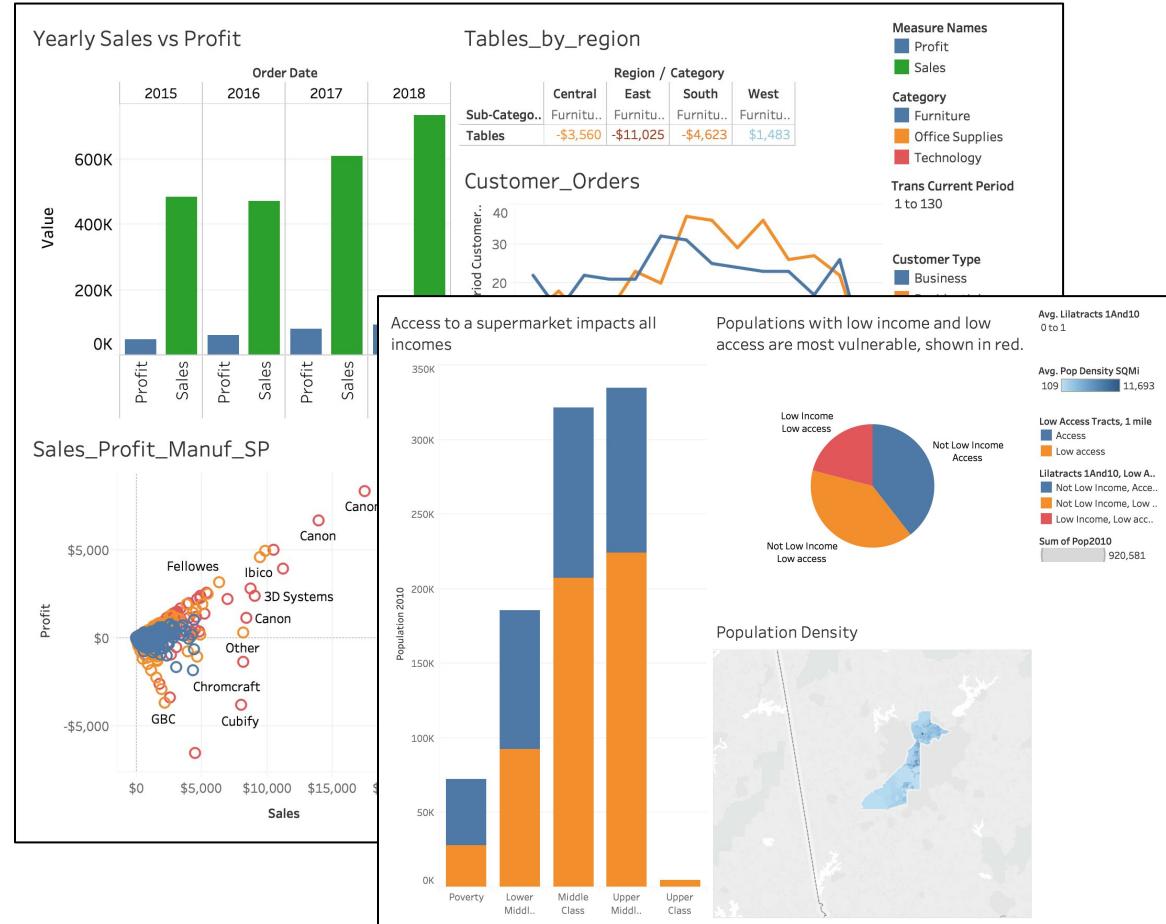
## Interactive Visual Analytics

- Many different data sources can be used.
- All are interactive and filtering is a breeze.
- Self-service:  
Build your own worksheets, charts, dashboards, stories, and more!



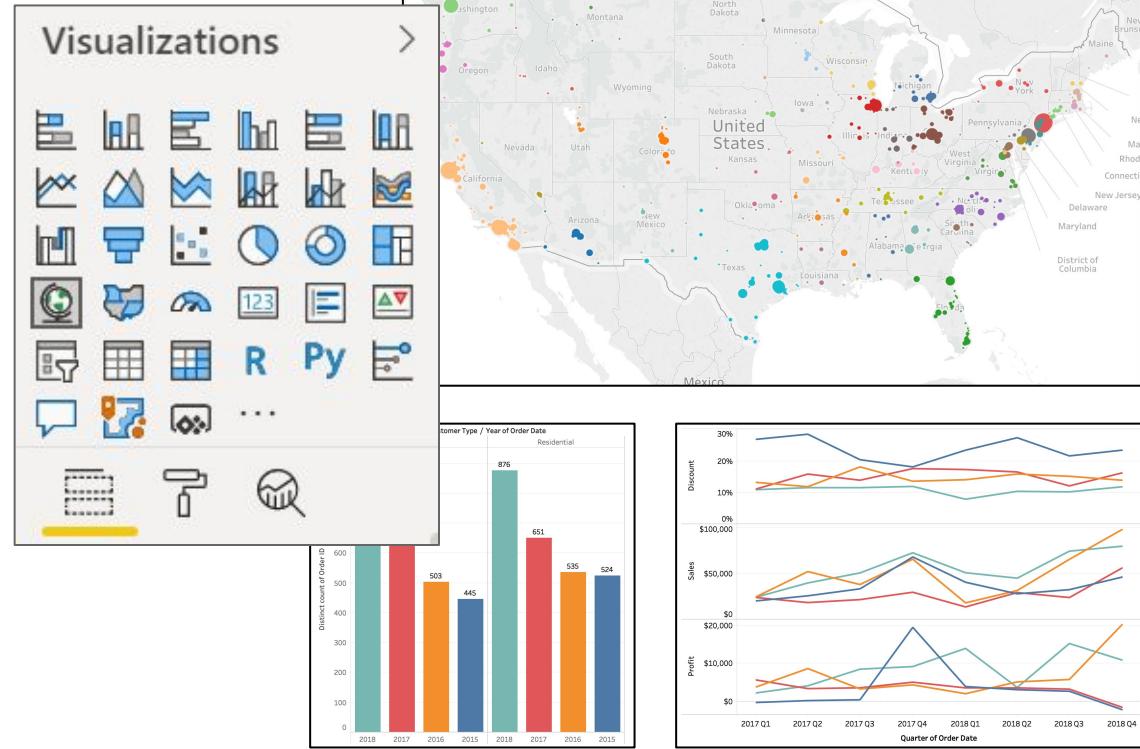
# Dashboards

- Power BI lets you create great dashboards!
- Quick feedback on filtering, searching, and charting
- Full BI experience



# Chart Options

- Lots of chart options
- Additional options via extensions
- Visualize all your data



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# What Does Good Look Like?





Solo Exercise:

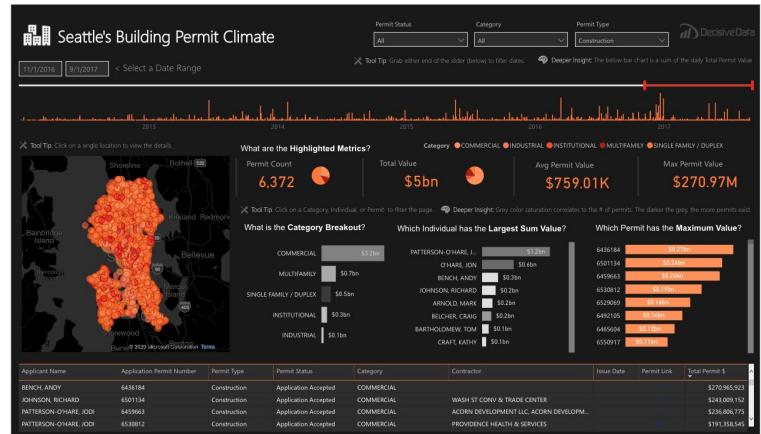
# Dashboard Scavenger Hunt

10 minutes



Go to [this dashboard](#)

1. How many permit types are there?
2. What time frame does this dashboard cover?
3. Who were the top 3 contractors in terms of \$ (only for issued permits)?
4. What was the average permit value for Jon O'Hare's multifamily construction applications?
5. Which applicant had the permit issued with the highest value in 2014?





## Discussion:

# Dashboard Scavenger Hunt

- How easy or hard was it to find the information?
- What was the user experience like?
- Did the format and/or interactivity affect the content?

Remember to help guide your users when you design your dashboards.

Can they find the information in an intuitive manner?

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# Guided Walkthrough: Getting Started with Power BI





## Guided Walk-Through:

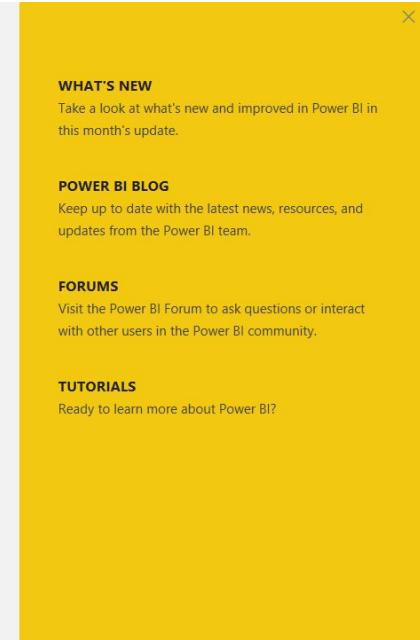
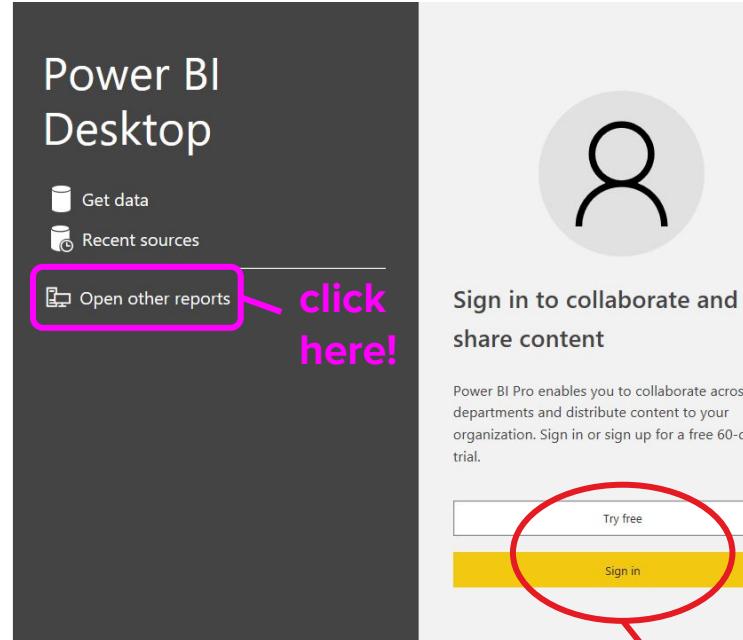
# Launch Power BI Desktop

After installing Power BI and launching it for the first time, you may see this screen



Ignore the middle section. We won't be using Power BI Pro.

Click on  
**Open other reports**

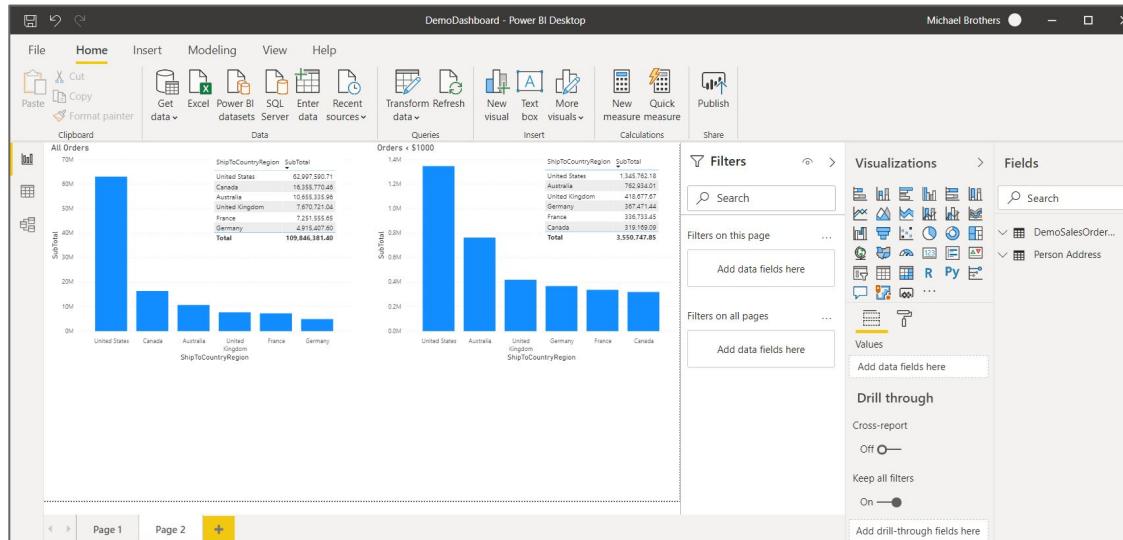




# Guided Walk-Through: A Glimpse of What's To Come

Open **DemoDashboard.pbix**

You should see something like this:





## Guided Walk-Through:

# A Glimpse of What's To Come

Power BI automatically defaults to the Report view.  
*The current view is indicated by the yellow bar.*

The screenshot shows the Power BI Desktop interface with the title bar "DemoDashboard - Power BI Desktop". The ribbon menu is visible with options like File, Home, Insert, Modeling, View, and Help. The Home tab is selected, indicated by a yellow bar. The Data section of the ribbon shows recent sources and a "Transform Refresh data" button. Below the ribbon, there are three main sections: "Report view" (containing a bar chart), "Data view" (containing a grid icon), and "Model view" (containing a cube icon). The "Report view" section has a pink border around it. On the right side, there are "Filters", "Visualizations", and "Fields" panes, each with search bars and dropdown menus. The "Filters" pane shows filters for "ShipToCountryRegion" and "SubTotal". The "Visualizations" pane shows various chart and table icons. The "Fields" pane shows fields for "DemoSalesOrder..." and "Person Address". A legend on the left identifies the three views: Report view (bar chart), Data view (grid), and Model view (cube).



## Guided Walk-Through:

# A Glimpse of What's To Come

The screenshot shows the Power BI Desktop application window. The ribbon at the top includes File, Home, Insert, Modeling, View, Help, and Table tools tabs. The Home tab is selected. Below the ribbon are various icons for data sources like Excel, Power BI datasets, and SQL Server. The main area is divided into several panes: a left navigation pane with a 'Clipboard' icon (1), a 'Filters' pane (2) containing filters for 'Filters on this page' and 'Filters on all pages', a 'Visualizations' pane (3) showing a grid of chart thumbnails (4), and a 'Fields' pane (5) listing loaded queries. The 'Fields' pane also includes sections for 'Values' and 'Drill through'.

1. **Ribbon** - displays common tasks
2. **Canvas area** - where visualizations are created and arranged
3. **Page tabs** - select and add report pages
4. **Filters pane** - filter data on the fly
5. **Visualizations pane** - select charts, apply value & axis settings, set formatting options
6. **Fields pane** - contains loaded queries. Fields, measures and hierarchies can be dragged into the Filters and Visualizations panes, or directly onto the canvas.

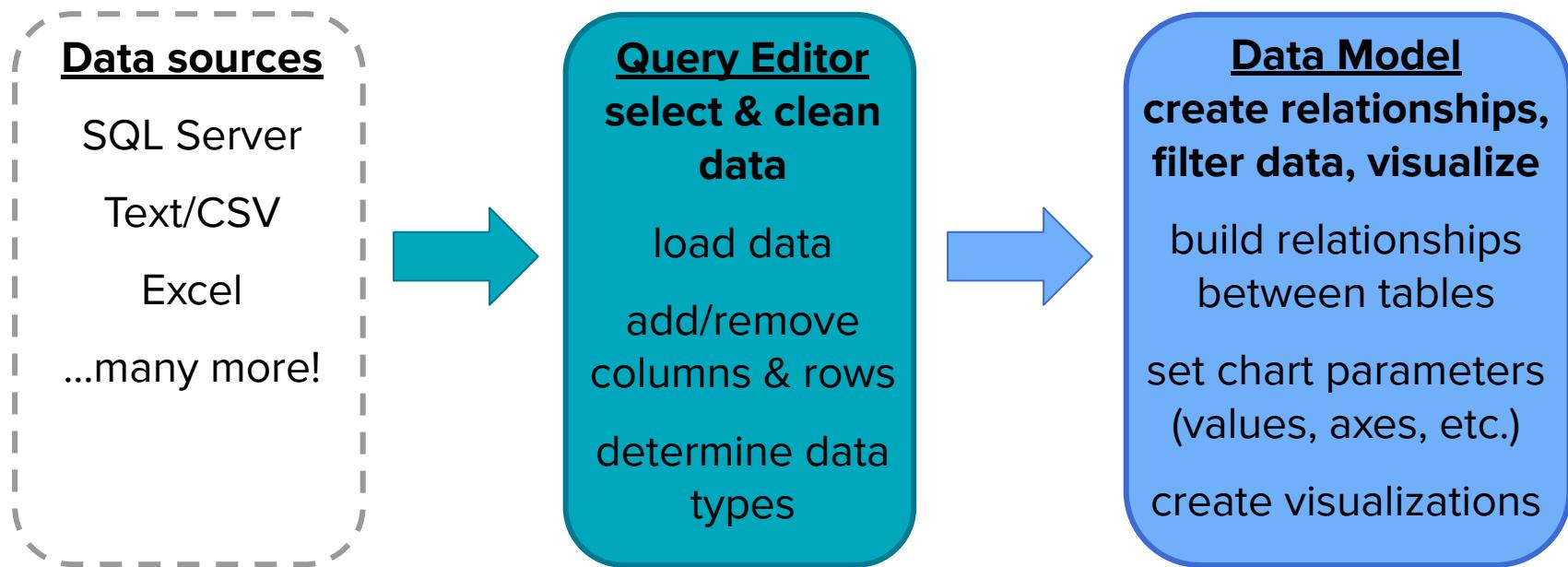
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# Guided Walkthrough: The Power Query Editor



# The Power BI Workflow





## Guided Walk-Through:

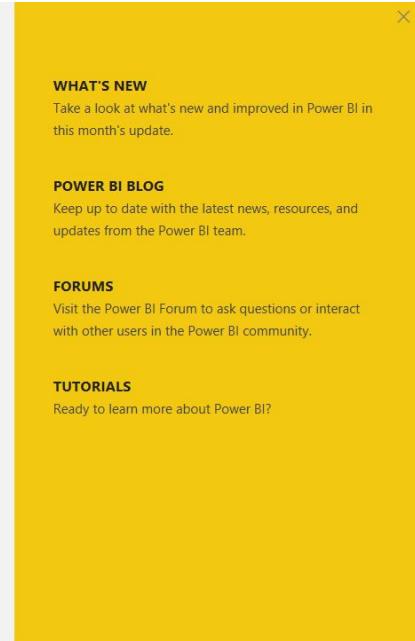
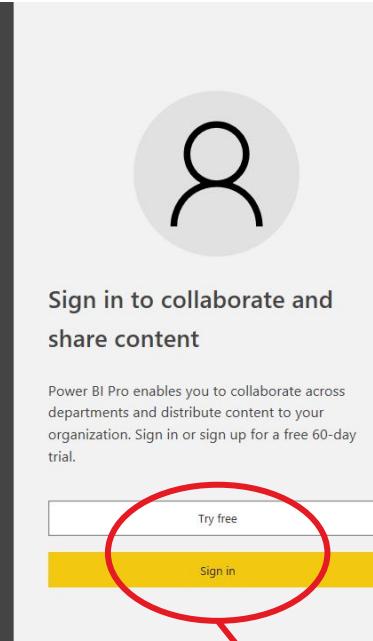
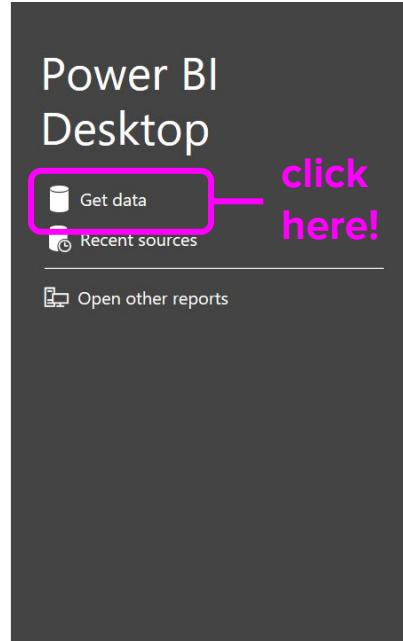
# Open the Query Editor

After installing Power BI and launching it for the first time, you may see this screen



Ignore the middle section. We won't be using Power BI Pro.

Click on **Get data**

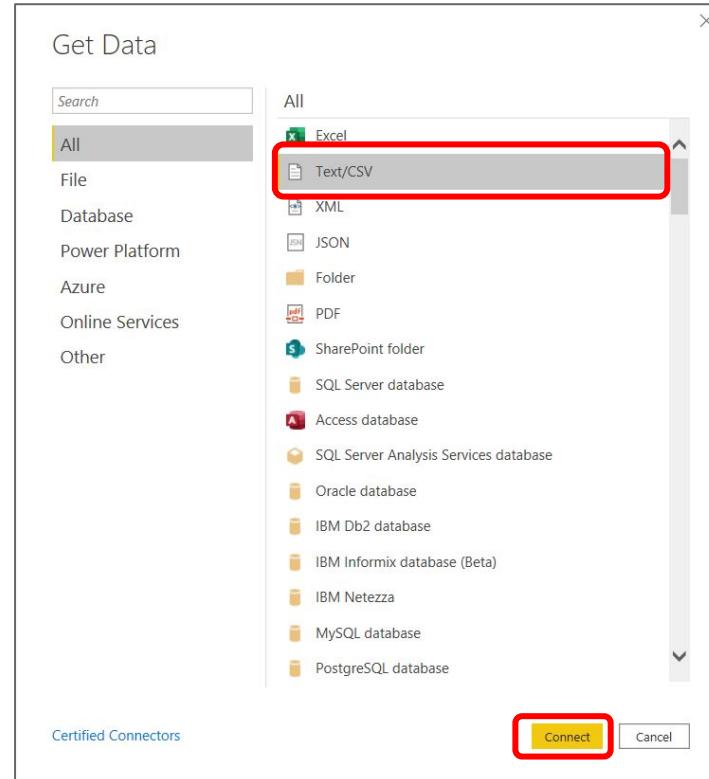




## Guided Walk-Through:

# Open the Query Editor

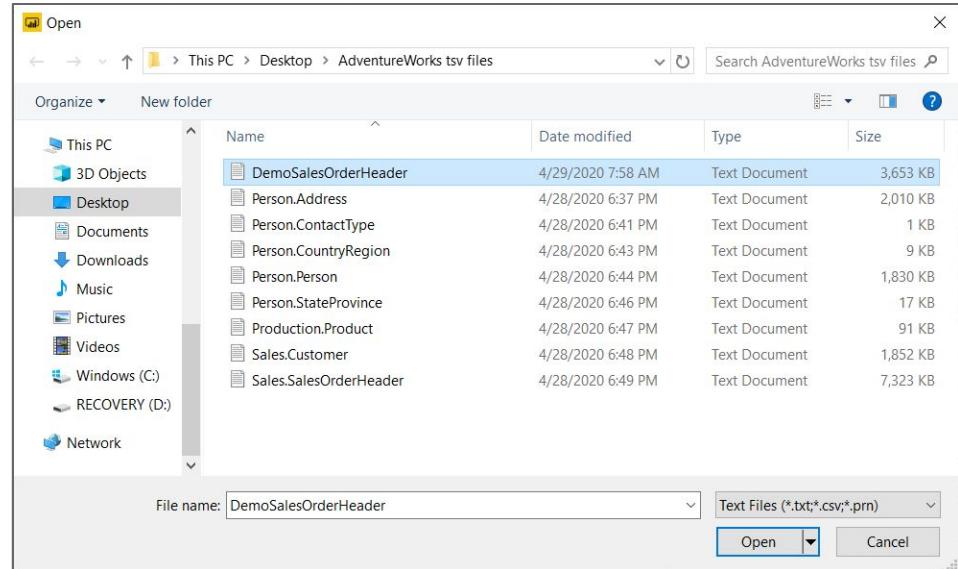
Select **Text/CSV** from  
the *Get Data* popup  
and hit **Connect**





# Guided Walk-Through: Open the Query Editor

Find **DemoSalesOrderHeader.txt**  
and hit **Open**





## Guided Walk-Through:

# Open the Query Editor

***This is important!***

We're not ready to load data into our Data Model yet, so hit **Transform Data**

DemoSalesOrderHeader.txt

File Origin Delimiter Data Type Detection

1252: Western European (Windows) Tab Based on first 200 rows

SalesOrderID	CustomerID	SalesPersonID	TerritoryID	CurrencyRateID	SubTotal	TaxAmt	Freight	TotalDue	ShipToAddress
43659	29825	279	5	null	20565.6206	1971.5149	616.0984	23153.2339	42525 Austell Ro
43660	29672	279	5	null	1294.2529	124.2483	38.8276	1457.3288	6055 Shawnee Ir
43661	29734	282	6	4	32726.4786	3153.7696	985.553	36865.8012	2573 Dufferin St
43659	29825	279	5	null	20565.6206	1971.5149	616.0984	23153.2339	42525 Austell Ro
43660	29672	279	5	null	1294.2529	124.2483	38.8276	1457.3288	6055 Shawnee Ir
43661	29734	282	6	4	32726.4786	3153.7696	985.553	36865.8012	2573 Dufferin St
null	null	null	null	null	null	null	null	null	
null	null	null	null	null	null	null	null	null	
null	null	null	null	null	null	null	null	null	
43662	29994	282	6	4	28832.5289	2775.1646	867.2389	32474.9324	2500 University /
43663	29565	276	4	null	419.4589	40.2681	12.5838	472.3108	3065 Santa Marg

< >

**Transform Data** Cancel

click this!



# Guided Walk-Through: Open the Query Editor

We now see our data inside the Query Editor.

Note that two steps were performed automatically:

- **Promoted Headers** - column headers were set using the first row of data
- **Changed Type** - data types were changed from text to whatever Power BI felt was appropriate

The screenshot shows the Power Query Editor interface with a table of data. The table has four columns: SalesOrderID, CustomerID, SalesPersonID, and TerritoryID. The first row contains the column headers. The 'APPLIED STEPS' section on the right is highlighted with a pink box and shows two steps: 'Promoted Headers' and 'Changed Type'. The 'Properties' section shows the query is named 'DemoSalesOrderHeader'.

	SalesOrderID	CustomerID	SalesPersonID	TerritoryID
1	43659	29825	279	
2	43660	29672	279	
3	43661	29734	282	
4	43659	29825	279	
5	43660	29672	279	
6	43661	29734	282	
7	null	null	null	
8	null	null	null	
9	null	null	null	
10	43662	29994	282	
11	43663	29565	276	
12	43664	29898	280	
13	43665	29580	283	
14	43666	30052	276	
15	43667	29974	277	
16	43668	29614	282	
17				

17 COLUMNS, 999+ ROWS Column profiling based on top 1000 rows

PREVIEW DOWNLOADED AT 2:14 PM



## Guided Walk-Through:

# Data Cleaning: Remove Columns

Select the **IsOnlyStateProvinceFlag** column (second from the right), and hit *Remove Columns* in the Home ribbon

click this!

The screenshot shows the Power Query Editor interface. At the top, there's a ribbon with tabs like File, Home, Transform, etc. Below the ribbon is a toolbar with icons for Close & Apply, New, Recent, Enter Data, Data source settings, Manage Parameters, Refresh Preview, Advanced Editor, Properties, and a dropdown for Manage. The main area is a table with four columns: Province, ShipToPostalCode, IsOnlyStateProvinceFlag, and ShipToCountryRegion. The 'IsOnlyStateProvinceFlag' column is highlighted with a yellow background. On the far right of the ribbon, there's a 'Manage Columns' section with a 'Remove Columns' button, which is also highlighted with a red box and a red arrow pointing to it. To the right of the table, there's a 'Query Settings' pane with sections for Properties (Name: DemoSalesOrderHeader) and Applied Steps (Source, Promoted Headers, Changed Type). The bottom of the screen shows a status bar with '17 COLUMNS, 999+ ROWS' and 'Column profiling based on top 1000 rows'.



## Guided Walk-Through:

# Cleaning Data - Removing Rows

Notice our data has  
duplicate rows (4,5,6)  
and empty rows (7,8,9)

To remove empties,  
select the  
**SalesOrderID** column,  
click the Remove Rows  
down-arrow, and select  
*Remove Blank Rows*

The screenshot shows the Power Query Editor interface with the 'SalesOrderID' column selected. The 'Transform' tab is active. A red box highlights the 'Remove Rows' button in the toolbar, and another red box highlights the 'Remove Blank Rows' option in the dropdown menu.

	SalesOrderID	CustomerID	TerritoryID
1	43659	29825	
2	43660	2967	
3	43661	2973	
4	43659	29825	
5	43660	29672	279
6	43661	29734	282
7	null	null	null
8	null	null	null
9	null	null	null
10	43662	29994	282
11	43663	29565	276
12	43664	29898	280
13	43665	29580	283
14	43666	30052	276
15	43667	29974	277
16	43668	29614	282
17			

16 COLUMNS, 999+ ROWS Column profiling based on top 1000 rows

PREVIEW DOWNLOADED AT 2:49 PM



## Guided Walk-Through:

# Cleaning Data - Removing Rows

Notice our data has  
duplicate rows (4,5,6)  
and empty rows (7,8,9)

To remove duplicates,  
select the  
**SalesOrderID** column,  
click the Remove Rows  
down-arrow, and select  
*Remove Duplicates*

The screenshot shows the Power Query Editor interface. In the center, there is a table with three columns: SalesOrderID, CustomerID, and TerritoryID. The SalesOrderID column contains many duplicate values (e.g., 43659 appears multiple times). To the right of the table, the 'Transform' tab is selected in the ribbon. Under the 'Transform' tab, there is a 'Remove Rows' button with a downward arrow. A red box highlights this button. When the arrow is clicked, a dropdown menu appears with several options: 'Remove Top Rows', 'Remove Bottom Rows', 'Remove Alternate Rows', 'Remove Duplicates' (which is also highlighted with a red box), 'Remove Blank Rows', and 'Remove Errors'. The 'Remove Duplicates' option is described as 'Removes rows with identical values in the selected column'. On the far right, the 'APPLIED STEPS' pane shows a list of actions taken on the query, with 'Removed Blank Rows' being the most recent step.



## Guided Walk-Through:

# Load Cleaned Data into the Data Model

That's it!

Our data is clean and ready for analysis.

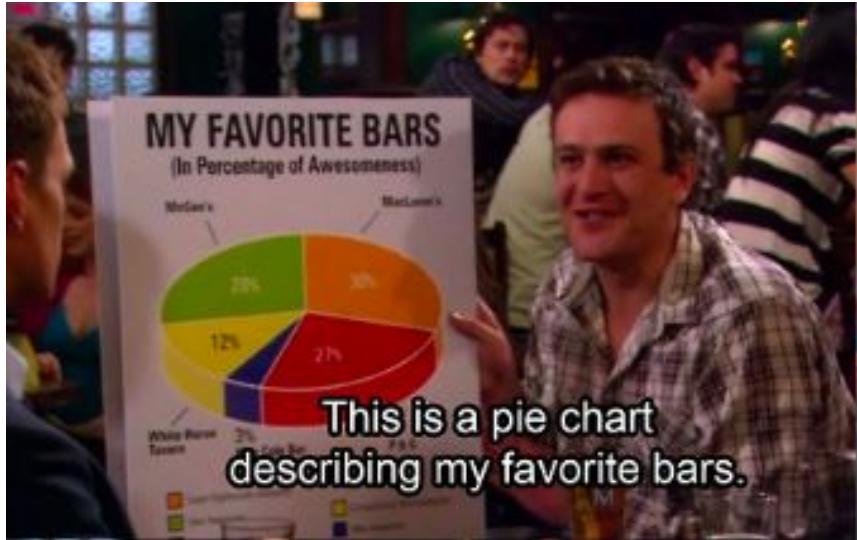
To load our Data Model click *Close & Apply* in the Home ribbon.

The screenshot shows the Power Query Editor interface. The ribbon has tabs for File, Home, Transform, Add Column, View, Tools, Help, and Properties. The Home tab is selected. A red box highlights the 'Close & Apply' button in the ribbon. The main area displays a table with four columns: SalesOrderID, CustomerID, SalesPersonID, and TerritoryID. The table has 16 columns and 999+ rows. The bottom status bar indicates '16 COLUMNS, 999+ ROWS' and 'Column profiling based on top 1000 rows'. On the right side, there are sections for 'Query Settings' (Name: DemoSalesOrderHeader), 'PROPERTIES' (Name: DemoSalesOrderHeader, All Properties), and 'APPLIED STEPS' (Source, Promoted Headers, Changed Type, Removed Columns, Removed Blank Rows, Removed Duplicates). A note at the bottom right says 'PREVIEW DOWNLOADED AT 3:03 PM'.

# Stretch Break



# Welcome back!



Advanced Analytics

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# Guided Walkthrough: The Data Model





# Guided Walk-Through: Navigating Power BI Desktop

**Report View**

**Data View**

**Model View**

The screenshot shows the Power BI Desktop application window titled "Untitled - Power BI Desktop". The ribbon is visible at the top with tabs: File, Home, Insert, Modeling, View, and Help. The "Home" tab is selected, indicated by a yellow underline. Below the ribbon, there are several toolbars and panes.

- Clipboard:** Includes Cut, Copy, Paste, and Format painter.
- Data:** Includes Get data (with sub-options for Excel, Power BI datasets, SQL Server, Enter data, and Recent sources), Transform (with sub-options for Refresh data, New visual, Text box, More visuals, and Publish).
- Queries:** Includes Transform, Refresh data, New visual, Text box, More visuals, and Publish.
- Insert:** Includes New visual, Text box, More visuals, and Publish.
- Calculations:** Includes New measure and Quick measure.
- Share:** Includes Publish.

On the left side, there are three large red boxes pointing to the icons for Report View, Data View, and Model View, which are located in the ribbon under the Home tab.

**Report View:** Represented by a chart icon.

**Data View:** Represented by a grid icon.

**Model View:** Represented by a cube icon.

**Filters:** A pane on the right containing sections for Filters on this page and Filters on all pages, each with an "Add data fields here" button.

**Visualizations:** A pane listing various visualization types like Bar charts, Line charts, etc.

**Fields:** A pane listing fields from the "DemoSalesOrderHeader" table, including:

- CurrencyRateID
- CustomerID
- Freight
- SalesOrderID
- SalesPersonID
- ShipToAddressLine1
- ShipToAddressLine2
- ShipToCity
- ShipToCountryRegion
- ShipToPostalCode
- ShipToStateProvince
- ShipToStateProvinceCode
- SubTotal
- TaxAmt
- TerritoryID
- TotalDue

At the bottom, there is a navigation bar with "Page 1" and a plus sign, and a "Drill through" section with options for Off, On, and Keep all filters.



# Guided Walk-Through: A Simple Bar Chart

In the **Visualizations** pane, click on *Stacked column chart*

Expand the size of the chart to fill the Report window.

The screenshot shows the Power BI Desktop interface with the following details:

- Home Tab:** Selected tab.
- Data Tab:** Contains options for Paste, Cut, Copy, Format painter, Get data (from Excel, Power BI datasets, SQL Server, Enter data, Recent sources), Transform data, Refresh data, New visual, Text box, More visuals, Insert, New measure, Quick measure, Calculations, and Publish.
- Visualizations Pane:** On the right side, it lists various visualization types such as Stacked column chart, Line chart, Map, etc. A red box highlights the "Stacked column chart" icon, with the text "click this!" written above it in red.
- Fields Pane:** Shows a list of fields from the DemoSalesOrderHeader table, including CustomerID, Freight, SalesOrderID, SalesPersonID, ShipToAddressLine1, ShipToAddressLine2, ShipToCity, ShipToCountryRegion, ShipToPostalCode, ShipToStateProvince, SubTotal, TaxAmt, TerritoryID, and TotalDue.
- Report Window:** Displays a simple bar chart with five bars of increasing height.
- Page Navigation:** At the bottom left, there are buttons for Page 1, Page 2, and a plus sign.



# Guided Walk-Through: A Simple Bar Chart

In the **Fields** pane,  
click & drag the  
**SubTotal** field over  
to **Value**

The screenshot shows the Power BI Desktop interface with a bar chart visual on the canvas. The chart has a single blue bar extending from the bottom to the top of the chart area. In the top ribbon, the 'Home' tab is selected. On the right side, the 'Fields' pane is open, listing various fields from the 'DemoSalesOrderHeader' table. A red box highlights the 'SubTotal' field under the 'Value' section. Another red box with the text 'drag this!' points to the same 'SubTotal' field in the Fields pane. The 'Filters' pane is also visible, showing a filter for 'SubTotal is (All)'.

Untitled - Power BI Desktop

Michael Brothers

File Home Insert Modeling View Help Format Data / Drill

Cut Copy Format painter

Get data Excel Power BI datasets SQL Server Enter data Recent sources

Transform data New visual Text box More

New visual Quick measure measure

Insert Calculations Share Publish

Clipboard SubTotal

Filters

Search

Filters on this visual

SubTotal is (All)

Add data fields here

Filters on this page

Add data fields here

Filters on all pages

Add data fields here

Value

SubTotal

Axis

Legend

Tooltips

Drill through

Visualizations

Fields

Search

DemoSalesOrderHeader

- $\Sigma$  CurrencyRateID
- CustomerID
- Freight
- $\Sigma$  SalesOrderID
- $\Sigma$  SalesPersonID
- ShipToAddressLine1
- ShipToAddressLine2
- ShipToCity
- ShipToCountryRegion
- ShipToPostalCode
- ShipToStateProvince
- ShipVia
- ShipToZip

$\Sigma$  SubTotal

- TaxAmt
- $\Sigma$  TerritoryID
- TotalDue



# Guided Walk-Through: A Simple Bar Chart

In the **Fields** pane,  
click & drag the  
**ShipToCountryRegion**  
field over to **Axis**

The screenshot shows the Power BI Desktop interface with a bar chart titled "SubTotal by ShipToCountryRegion". The Y-axis is labeled "SubTotal" and ranges from 0M to 5M. The X-axis is labeled "ShipToCountryRegion" and lists "United States", "Canada", "Australia", "United Kingdom", "France", and "Germany". The bars are blue. The "Fields" pane on the right is open, showing the "ShipToCountryRegion" field under the "DemoSalesOrderHeader" category. A red box highlights the "ShipToCountryRegion" field in the "Axis" section of the "Fields" pane. A red arrow points from the text in the main content area to this highlighted field. Another red box highlights the "ShipToCountryRegion" field in the "Value" section of the "Fields" pane. A red arrow points from the text "drag this!" to this highlighted field.

ShipToCountryRegion	SubTotal
United States	~4.5M
Canada	~1.8M
Australia	~1.2M
United Kingdom	~1.0M
France	~0.8M
Germany	~0.6M



# Guided Walk-Through: A Map Chart

In the **Visualizations**  
pane, click on *Map*

The screenshot shows the Power BI Desktop interface with a world map visualization titled "SubTotal by ShipToCountryRegion". The map highlights regions like North America, Europe, and Asia with blue dots. The Power BI ribbon is visible at the top, and the "Visualizations" pane on the right is open. A red arrow points to the "Map" icon in the "Visualizations" pane, which is highlighted with a red box. The "Fields" pane on the far right lists various data fields.

**click this!**

Untitled - Power BI Desktop

Michael Brothers

File Home Insert Modeling View Help Format Data / Drill

Get data Refresh New visual More visuals New measure Publish

Filters

Search

Filters on this visual

ShipToCountryRegion is (All)

SubTotal is (All)

Add data fields here

Filters on this page

Add data fields here

Filters on all pages

Add data fields here

Location

ShipToCountryRegion

Legend

Add data fields here

Latitude

Add data fields here

Longitude

Add data fields here

Size

SubTotal

Visualizations

Fields

DemoSalesOrderHeader

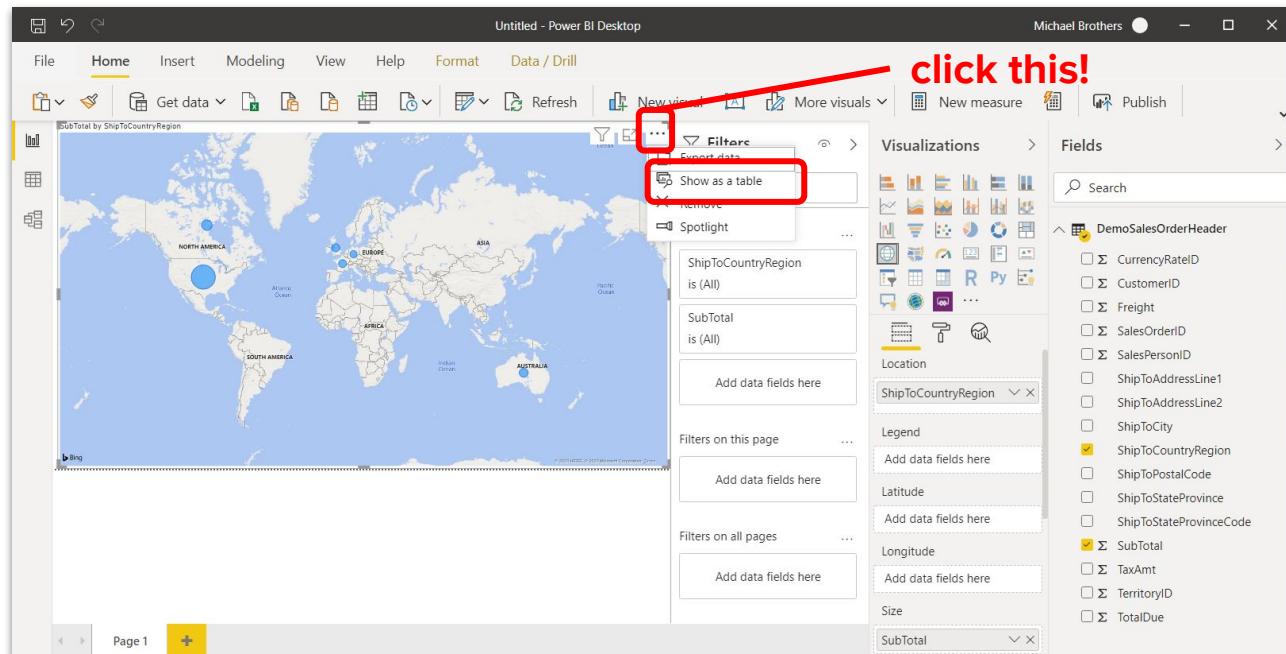
- $\Sigma$  CurrencyRateID
- $\Sigma$  CustomerID
- $\Sigma$  Freight
- $\Sigma$  SalesOrderID
- $\Sigma$  SalesPersonID
- ShipToAddressLine1
- ShipToAddressLine2
- ShipToCity
- ShipToCountryRegion
- ShipToPostalCode
- ShipToStateProvince
- ShipToStateProvinceCode
- $\Sigma$  SubTotal
- $\Sigma$  TaxAmt
- $\Sigma$  TerritoryID
- $\Sigma$  TotalDue



# Guided Walk-Through: A Map Chart

In the Map chart,  
click on the ellipsis  
[...] to open the  
dropdown

Select  
*Show as a table*



The screenshot shows the Power BI Desktop interface with a world map visual titled "SubTotal by ShipToCountryRegion". The ribbon is visible with "Home" selected. The filter pane is open, and the "ShipToCountryRegion" dropdown is expanded. A red box highlights the ellipsis (...) button in the top right corner of the filter pane. A red arrow points to this button with the text "click this!" overlaid in red. The filter pane also shows other filters like "SubTotal" (is (All)), "Latitude", "Longitude", and "Size". The Fields pane on the right lists various data fields.

Untitled - Power BI Desktop

Michael Brothers

File Home Insert Modeling View Help Format Data / Drill

Get data Refresh New visual More visuals New measure Publish

Visualizations Fields

Search

DemoSalesOrderHeader

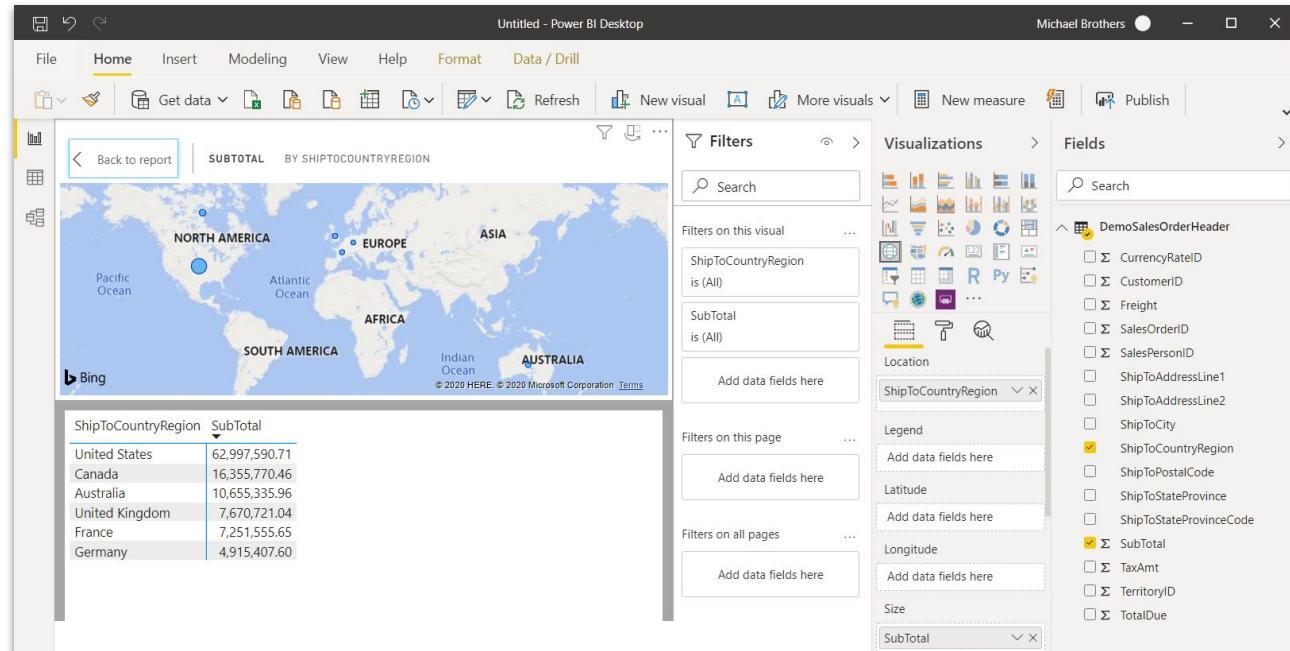
- $\Sigma$  CurrencyRateID
- $\Sigma$  CustomerID
- Freight
- SalesOrderID
- SalesPersonID
- ShipToAddressLine1
- ShipToAddressLine2
- ShipToCity
- ShipToCountryRegion
- ShipToPostalCode
- ShipToStateProvince
- ShipToStateProvinceCode
- SubTotal
- TaxAmt
- TerritoryID
- TotalDue



# Guided Walk-Through: A Map Chart

**That's it!**

In the next section  
we'll apply filters and  
formatting to reports.



Advanced Analytics

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# Introduction: Filters and Formatting



# Guided Walk-Through: Introduction to Filters

In the Report view open a new page and click *Stacked column chart*.  
Expand the chart to fill about half the screen.

The screenshot shows the Power BI Report view interface. The ribbon is visible at the top with tabs like File, Home, Insert, Modeling, View, Help, Format, Data / Drill, and Share. The Home tab is selected. On the left, there's a navigation pane with 'Page 1' and 'Page 2' tabs, where 'Page 2' is highlighted with a red box and a red circle labeled '1'. In the center, a stacked column chart is displayed. To the right of the chart is a vertical ribbon panel containing sections for Filters, Visualizations, and Fields. The 'Visualizations' section is highlighted with a red box and a red circle labeled '2'. The 'Fields' section lists various data fields from the 'DemoSalesOrder...' table. A red circle labeled '3' points to the chart area.



# Guided Walk-Through: Introduction to Filters

As we did before, drag **ShipToCountryRegion** to Axis, and **SubTotal** to Value.

The screenshot shows the Power BI desktop interface with a bar chart titled "SubTotal by ShipToCountryRegion". The chart displays the following data:

ShipToCountryRegion	SubTotal
United States	~65M
Canada	~18M
Australia	~12M
United Kingdom	~8M
France	~7M
Germany	~6M

The Power BI ribbon is visible at the top, showing the Home tab is selected. The Filters pane on the right side of the interface is open, showing the following settings:

- Filters on this visual:**
  - ShipToCountryRegion is (All)
  - SubTotal is (All)
  - Add data fields here
- Filters on this page:**
  - Add data fields here
- Filters on all pages:**
  - Add data fields here

Red arrows point to the "ShipToCountryRegion" filter under "Axis" and the "SubTotal" filter under "Value", both of which have checkboxes checked and are highlighted with red boxes.



# Guided Walk-Through: Introduction to Filters

Next, make a copy of the column chart.

The screenshot shows the Microsoft Power BI desktop interface. The ribbon is visible at the top with the 'Home' tab selected. The 'Clipboard' section of the ribbon has a red box around the 'Copy' button. Below the ribbon, there are two identical column charts titled 'SubTotal by ShipToCountryRegion'. The first chart is on the left, and the second is on the right. Both charts show the same data: Sales Total (Y-axis, 0M to 70M) versus ShipToCountryRegion (X-axis: United States, Canada, Australia, United Kingdom, France, Germany). The United States has the highest sales total, followed by Canada, Australia, United Kingdom, France, and Germany. To the right of the charts, the 'Filters' pane is open, showing filters for 'ShipToCountryRegion' (is (All)) and 'SubTotal' (is (All)). The 'Visualizations' and 'Fields' panes are also visible on the right side of the interface.

ShipToCountryRegion	Sales Total
United States	~65M
Canada	~18M
Australia	~12M
United Kingdom	~10M
France	~8M
Germany	~6M



# Guided Walk-Through: Introduction to Filters

Click and drag the SubTotal field into a new Filter box.

Set the filter to show items when the value is less than 1000. Click *Apply Filter*

The screenshot shows the Power BI desktop interface with two visualizations and the Filter pane open.

**Visualizations:**

- A bar chart titled "SubTotal by ShipToCountryRegion" showing SubTotal values for different countries. The data is approximately: United States (~65M), Canada (~18M), Australia (~12M), United Kingdom (~10M), France (~8M), Germany (~5M).
- A second bar chart titled "SubTotal by ShipToCountryRegion" showing the same data, with the Y-axis ranging from 0.0M to 1.4M.

**Filter Pane:**

- The "Filters" pane is open, showing a search bar and a dropdown menu.
- A red box highlights the "SubTotal" filter condition: "SubTotal is less than 1000".
- Below it, the "Show items when the value is less than" dropdown is set to "1000".
- At the bottom of the filter pane, a red box highlights the "Apply filter" button.

**Fields:**

- The Fields pane lists various fields from the DemoSalesOrder... table, including ShipToCountryRegion, SalesOrderID, SalesPersonID, and SubTotal.
- A red box highlights the "SubTotal" field under Value.



# Guided Walk-Through: Introduction to Formatting

Change the title on each chart. Select the left chart, click the Format button, open Title, and type "All Orders". Repeat with "Orders < \$1000" on the right.

The screenshot shows the Microsoft Power BI interface with two bar charts displayed. The left chart shows Sales Total by ShipToCountryRegion with values ranging from 0M to 60M. The right chart shows Sales Total by ShipToCountryRegion with values ranging from 0.0M to 1.2M. Both charts have a blue color scheme and are grouped by ShipToCountryRegion.

The ribbon at the top is visible, with the 'Format' tab selected. A red circle highlights the 'Format painter' icon in the clipboard group. Another red circle highlights the 'Queries' section in the Data group, which contains a filter for 'Orders < \$1000'. A red arrow points from this section to the right chart.

The 'Format' ribbon tab is open, showing various options for visualizations and fields. A red box highlights the 'format' icon in the 'Visualizations' group. Another red box highlights the 'Title' section under 'Format' where the text 'Orders < \$1000' is entered.

ShipToCountryRegion	Sales Total (Left Chart)	Sales Total (Right Chart)
United States	60M	1.2M
Canada	15M	0.8M
Australia	10M	0.6M
United Kingdom	8M	0.4M
France	7M	0.3M
Germany	5M	0.2M



# Guided Walk-Through: Introduction to Formatting

Challenge: How Might You Add Tables to Each Chart?

The screenshot shows the Microsoft Power BI desktop interface. On the left, there is a bar chart titled "All Orders" showing SalesTotal for different countries. The chart has a legend indicating "ShipToCountryRegion". The data table below the chart lists sales for United States, Canada, Australia, United Kingdom, France, and Germany, totaling 109,446,381.40.

On the right, there is another bar chart titled "Orders < \$1000" showing SalesTotal for the same countries. This chart also has a legend indicating "ShipToCountryRegion". The data table below it lists sales for United States, Australia, United Kingdom, Germany, France, and Canada, totaling 3,550,747.65.

The ribbon menu at the top includes Home, Insert, Modeling, View, and Help. The Home tab is selected. The ribbon also contains sections for Data, Queries, Insert, Calculations, and Share.

On the right side of the interface, there are three main panels:

- Filters:** A search bar and two dropdown menus for "Filters on this page" and "Filters on all pages", both labeled "Add data fields here".
- Visualizations:** A list of visualization icons including charts, maps, and tables.
- Fields:** A search bar and a list of fields from the "DemoSalesOrder..." table, such as CurrencyRate, CustomerID, Freight, SalesOrderID, SalesPersonID, ShipToAddress, ShipToCity, ShipToCountry, ShipToPostCode, ShipToState, SubTotal, TaxAmt, and Total.

At the bottom, there are navigation buttons for "Page 1", "Page 2", and a plus sign icon, along with a "Add drill-through fields here" button.

Advanced Analytics

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# Independent Practice: Build a Report





Solo Exercise:

# Now You Try!

10 minutes



In the Report View, add a new page (Page 3) and experiment with different charts.

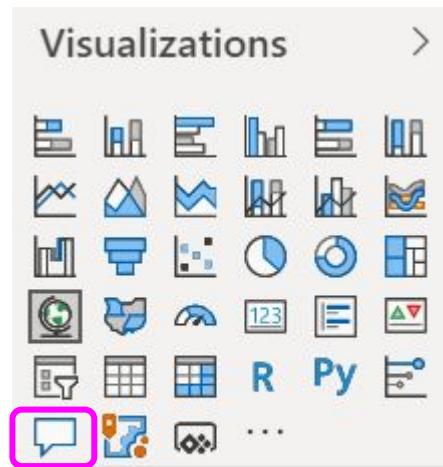
The screenshot shows the Microsoft Power BI ribbon interface. The Home tab is selected. A context menu is open over a blank report area, displaying sections for Filters, Visualizations, and Fields. In the Fields section, a list of fields from the 'DemoSalesOrder' table is shown, including SalesOrderID, CustomerID, Freight, SalesPersonID, ShipToAddress, ShipToCity, ShipToCountry, ShipToPostCode, ShipToState, SubTotal, and TaxAmt. At the bottom of the ribbon, the page navigation bar shows 'Page 1', 'Page 2', 'Page 3' (which is highlighted with a red box), and a plus sign for adding a new page.



Solo Exercise:

## Bonus Activity

Power BI has a unique visualization called “Q&A”. This adds an intelligent query tool to your dashboard where the user can enter queries in “everyday language” not unlike a chat bot. The more you query your data the more intelligent this visual becomes.



**Let's take a few minutes to explore this visualization!!**

Ask a question about your data

Try one of these to get started

[top geo states by sum of score](#)

[top geo states by total units R12Ms](#)

[what is the total units by geo state](#)

Show all suggestions



Discussion:

## Reflection

Discuss the prompts below with a partner:

- Describe something you'd like to be able to do with your **data** using Power BI.
- Describe something you'd like to be able to do with your **charts** using Power BI.



**Be ready to share!**

Advanced Analytics

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# Guided Walkthrough: Saving the Data Model





Guided Walk-Through:

# Saving the Data Model

Remember earlier when we opened **DemoDashboard.pbix**?

We're about to create our own **.pbix file** from the current data model.

Remember - this isn't technically a dashboard!

(Not yet, anyway)



# Guided Walk-Through: Saving the Data Model

Click on File, then Save As. Give your dashboard a unique name.

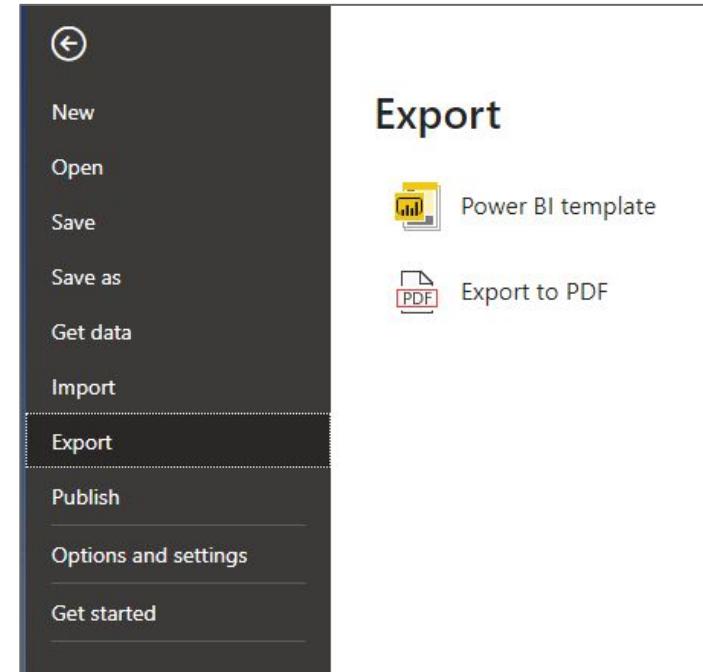
The screenshot shows the Microsoft Power BI desktop application interface. On the left, there is a 'Save As' dialog box with a red box highlighting the 'File name:' field, which contains 'MyDashboard'. Below it, the 'Save as type:' dropdown is set to 'Power BI file (\*.pbix)'. At the bottom right of the dialog are 'Save' and 'Cancel' buttons. To the right of the dialog, the main Power BI window is visible, showing the ribbon with 'Michael Brothers' as the current workspace. The ribbon tabs include 'Visualizations' and 'Fields'. Under 'Fields', a list of data fields is displayed, starting with 'DemoSalesOrder...'. The 'Values' section is also visible. At the bottom of the Power BI window, there are navigation buttons for 'Page 1', 'Page 2', 'Page 3', and a yellow 'Next' button.



## Guided Walk-Through: Saving the Report

Another way to share your report  
is to **export it to PDF**.

Each page of the report becomes a  
separate page in the PDF file.



# What Happens When Data Changes?

By saving our model we've recorded a **snapshot in time**.

The tables and visuals are *static*.

However, our Data Model also retains the *connections* to our data; all we need to do is hit **Refresh** to load in newer data.



Advanced Analytics

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Let's Review!



# What Did We Just Cover?

In this lesson, we:

- agreed on components of good visual design
- articulated the difference between dashboards, reports, and analysis
- differentiated Power BI from other/similar BI platforms
- navigated the Power BI interface
- loaded data into Power BI, performed basic cleaning, and created reports
- saved a model and exported a report to PDF

# Finish That Sentence

What are your biggest takeaways from today?



“Something that really got me thinking is...”

“The best thing I got out of today is...”

“I discovered...”

“I still want to learn about...”

“I was surprised that...”

# Ask Me Anything!



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**Don't Forget Your  
Exit Tickets!**



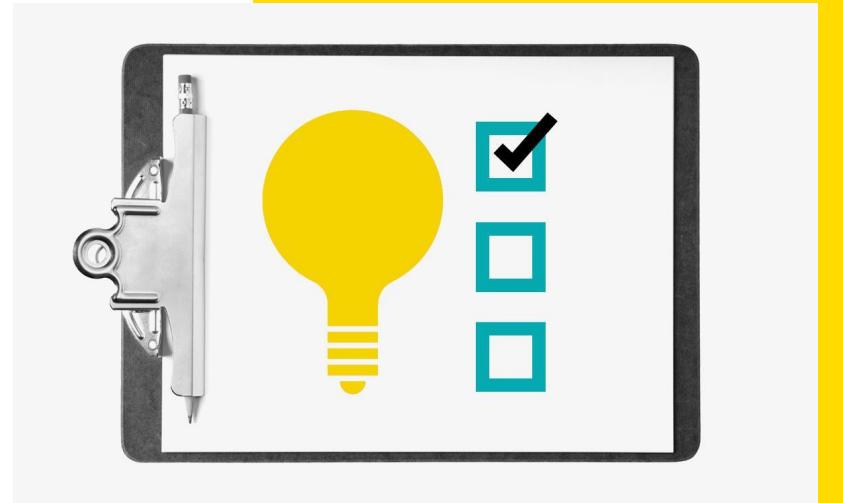
# A Few Good Resources

Power BI Official Documentation:

<https://docs.microsoft.com/en-us/power-bi/>

Use Q&A to explore your data with natural language:

<https://docs.microsoft.com/en-us/power-bi/create-reports/power-bi-tutorial-q-and-a>



See you next time!

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**Thank you!**