

DATA SOCIETY:

Data Analysis with PowerBI

Day 1

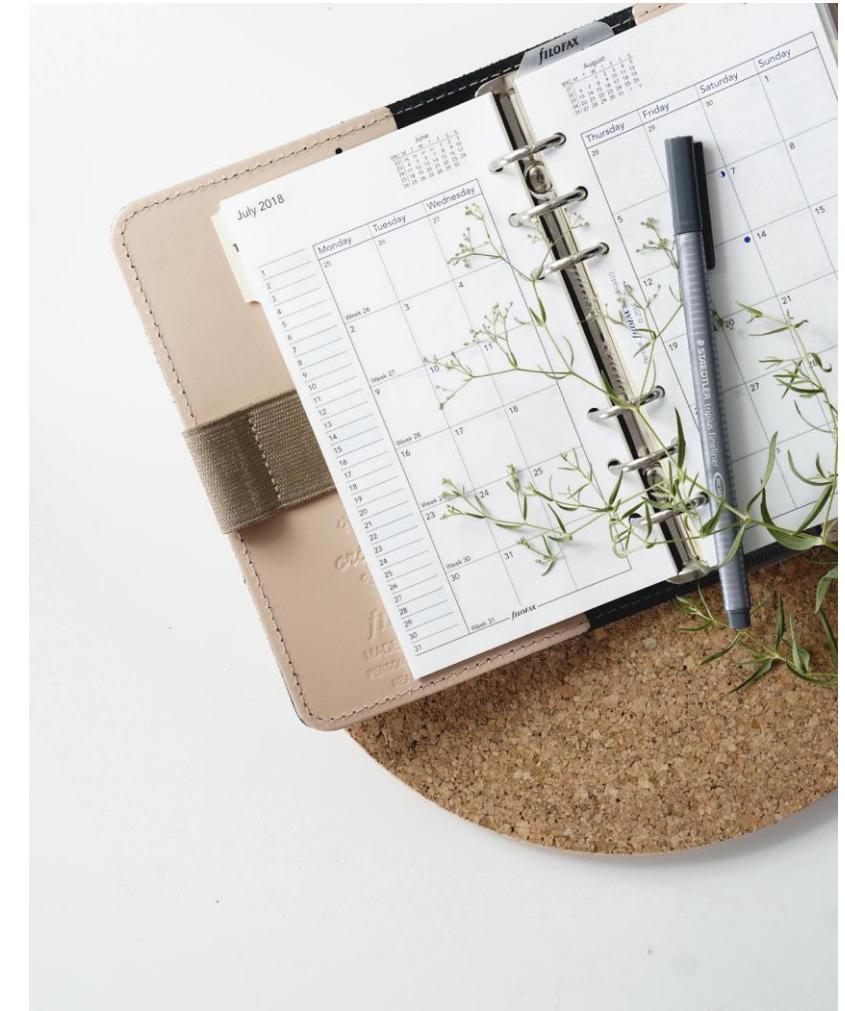
“One should look for what is and not what he thinks should be.”

- Albert Einstein



Welcome!

- Hours and breaks
 - 4 days
 - 11 am – 2 pm
 - 1-2 short breaks each class
- Materials:
 - PDF slide decks, Datasets, lab and exercise files



Best practices for virtual classes

1. Find a quiet place, free of as many distractions as possible.
Headphones are recommended.
2. Stay on mute unless you are speaking-but feel free to unmute!!
3. Remove or silence alerts from cell phones, e-mail pop-ups, etc.
4. Participate in activities and ask questions.



Who we are

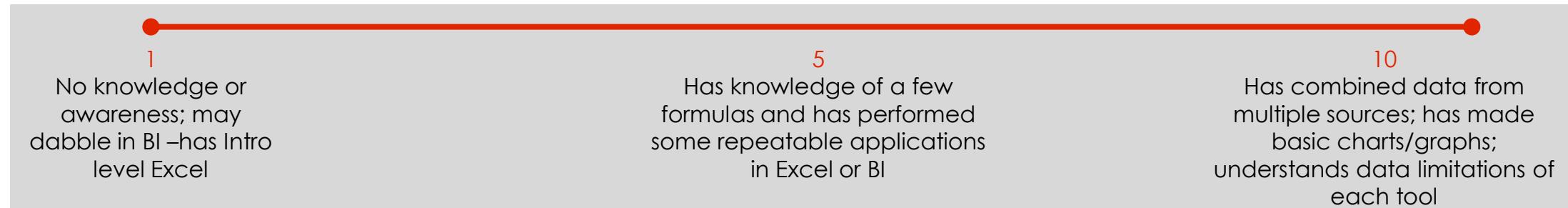
Data Society's mission is to *integrate Big Data and machine learning best practices across entire teams* and empower professionals to identify new insights

- We provide:
 - High-quality data science training programs
 - Customized executive workshops
 - Custom software solutions and consulting services
- Since 2014, we've worked with thousands of professionals to make their data work for them



Polling question

What you rate your current Power BI literacy level on a scale of 1-10



Today, we'll learn how to:

1. Create reports in Power BI
2. Build a reporting layer for your data dashboard

Prework

If needed, review the following:

1. [Overview of Power BI Desktop](#) - 4 minutes
2. [Getting started with Power BI Desktop](#) - 9 minutes
1. [Connect to data sources in Power BI Desktop](#) - 8 minutes

Outline for today

1. What is Power BI and business intelligence?
2. Review the four layers of Power BI
3. Build your first BI report

What is BI and Power BI?

Business Intelligence is a set of techniques and tools for the **acquisition** and transformation of raw data into **meaningful information** for **business analysis** purposes

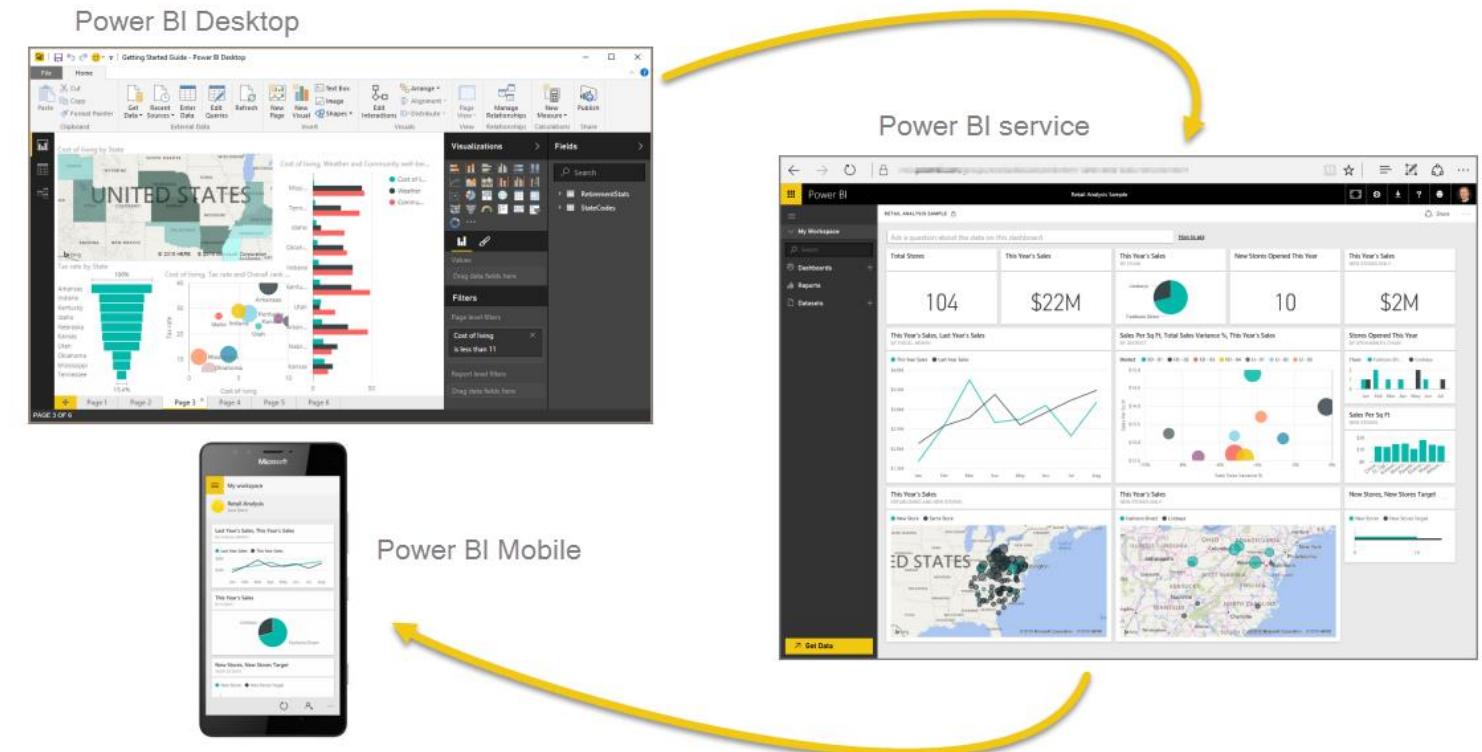
Power BI is a business analytics tool that allows you to:

- **Visualize** your data
- **Share** insights across your organization
- **Embed** insights in your **app or website**
- **Connect** to hundreds of data sources and bring your data to life with live customized **dashboards and interactive reports**

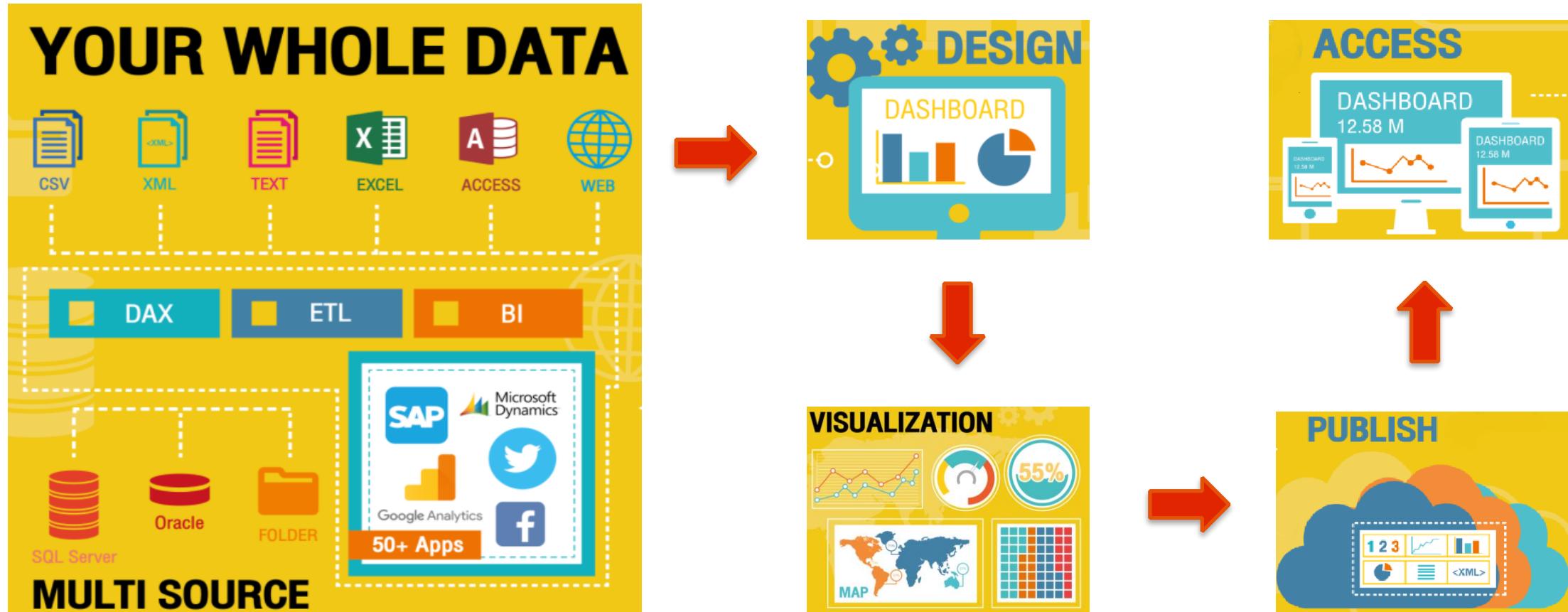


The ways you can use Power BI

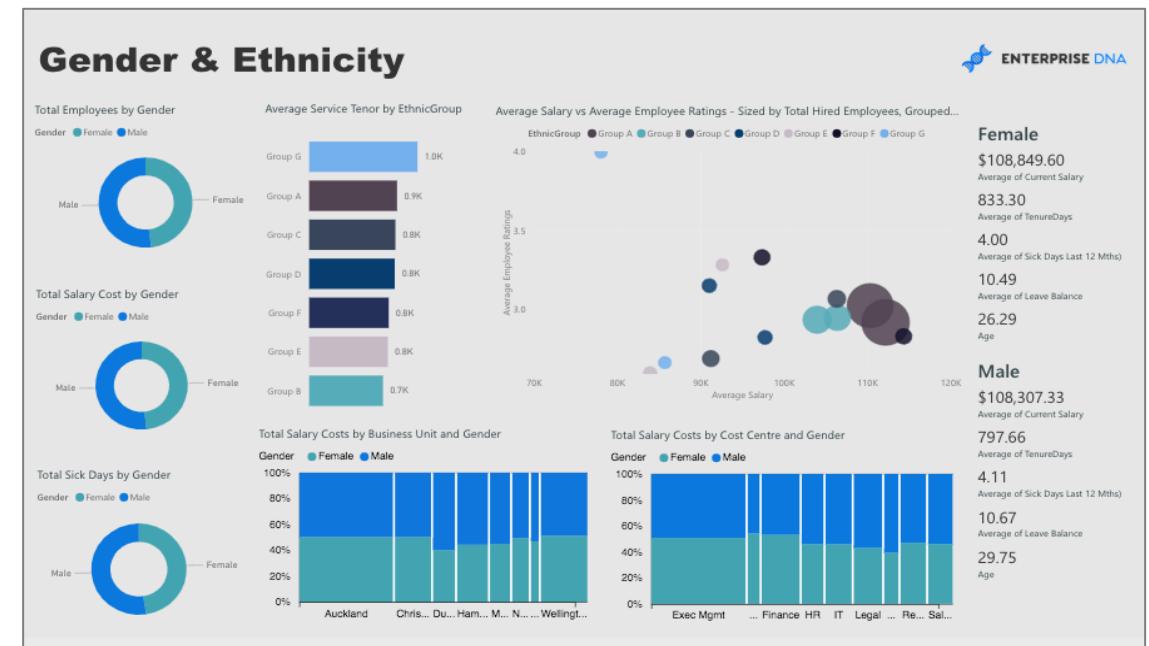
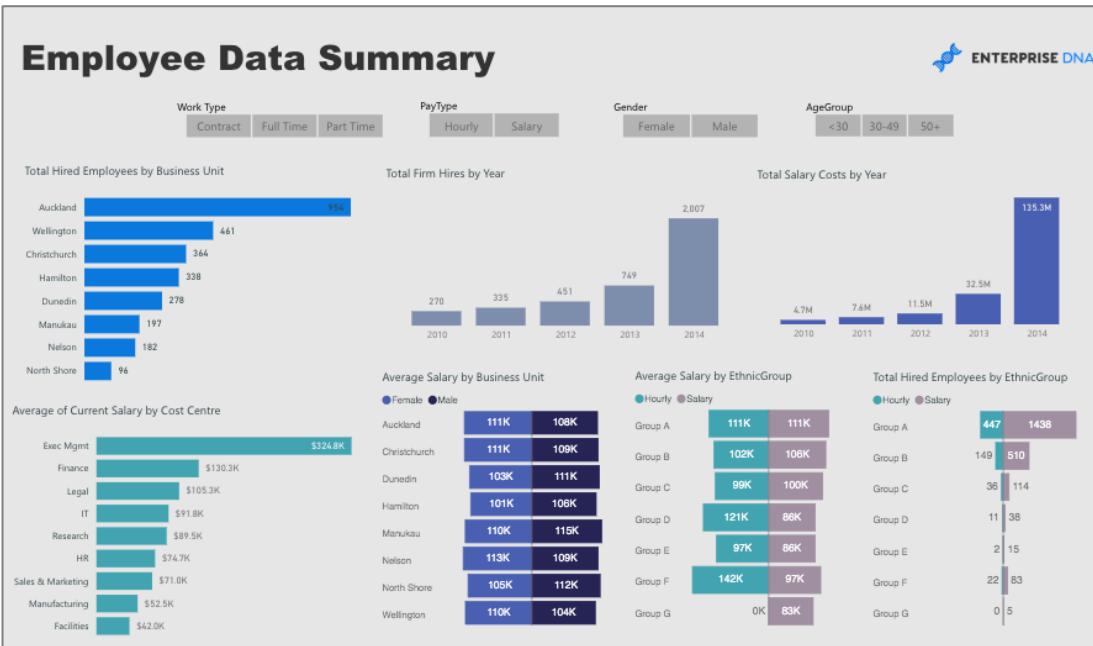
- **Power BI Desktop** is the platform where you can transform and shape data in addition to developing your model
- **Power BI Web Service** is where you go to publish reports to your organization and set up automatic data refresh. This ensures everyone has the latest information
- **Power BI Mobile app** allows you to connect to and interact with your cloud and on-premises data, reports and dashboards



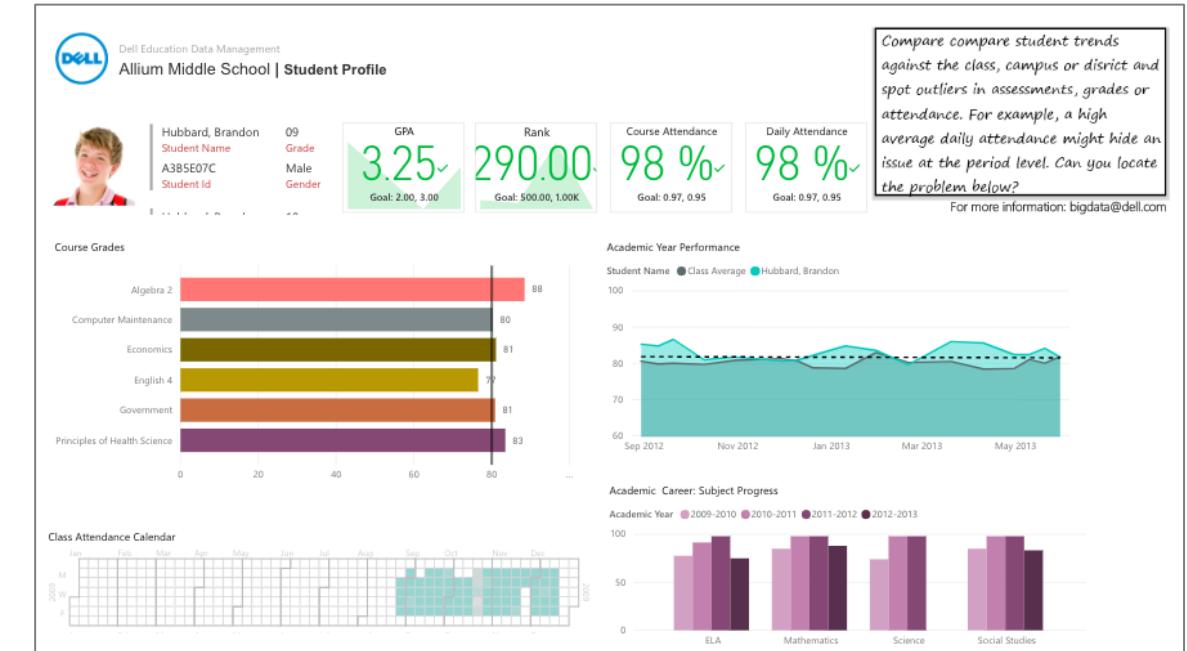
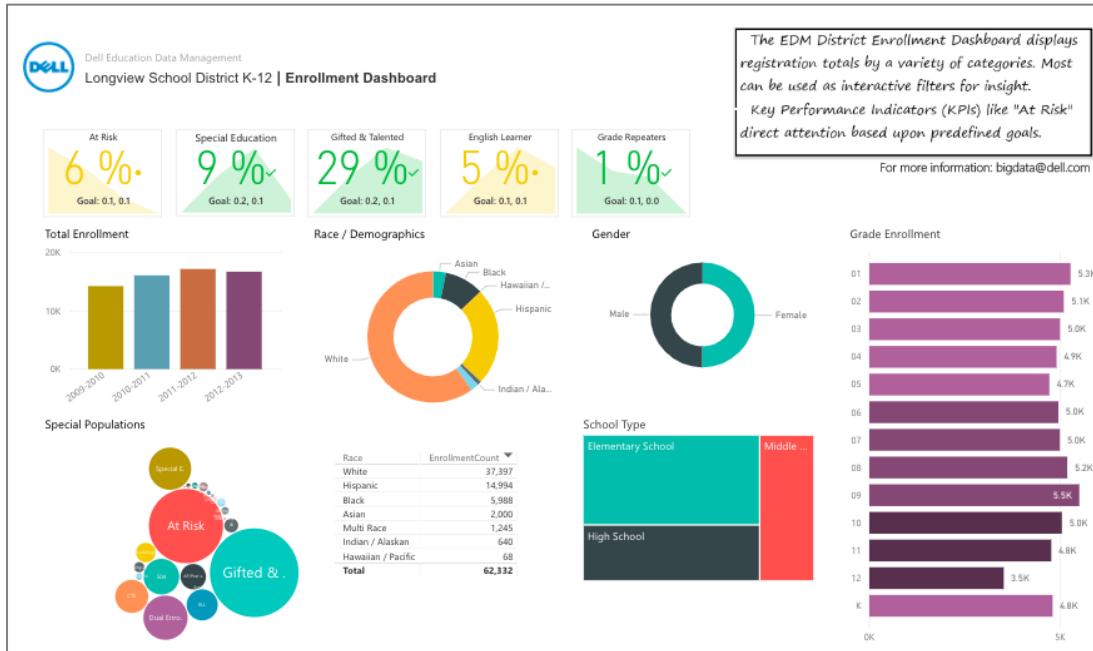
Logical structure of Power BI



Power BI for Human Resources



Power BI for Education



Education Data Management

Power BI for Healthcare

EGPAF Globally

5,207 Health facilities supported

29,286,887 Pregnant women reached with PMTCT services

1,914,574 Women on ARV

1,616,832 Individuals receiving ART

EGPAF/Ariel has provided over **29 million women** with services to prevent transmission of HIV

Choose a country:

-
-
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Pregnant Women Accessed PMTCT Services to Date

Year	Number of Women (M)
2000	1M
2005	2M
2010	9M
2015	29M

Impact

318,237 Number of HIV Infections Averted

91,766 Number of Lives Saved due to ART

Bing © 2019 HERE, © 2019 Microsoft Corporation [Terms](#)

Elizabeth Glaser Pediatric AIDS Foundation

Until no child has AIDS.

Indicator	Value
Children receiving ART	87,648
HIV-positive pregnant women who received ART to reduce the risk of MTCT (B+)	24,533
Individuals who received HIV testing Services (HTS) and received their test results	3,323,828
Pregnant women reached with PMTCT services to date	28,392,730
Estimated number of babies born HIV free due to EGPAF programs to date	318,237
Pregnant Women on ARV to date	1,707,258
Estimated number of lives saved through EGPAF's provision of ART	91,766
Adults receiving ART	1,529,184
Infants who received their first virologic test within 0-2 months	17,946
Individuals screened for TB	1,413,233

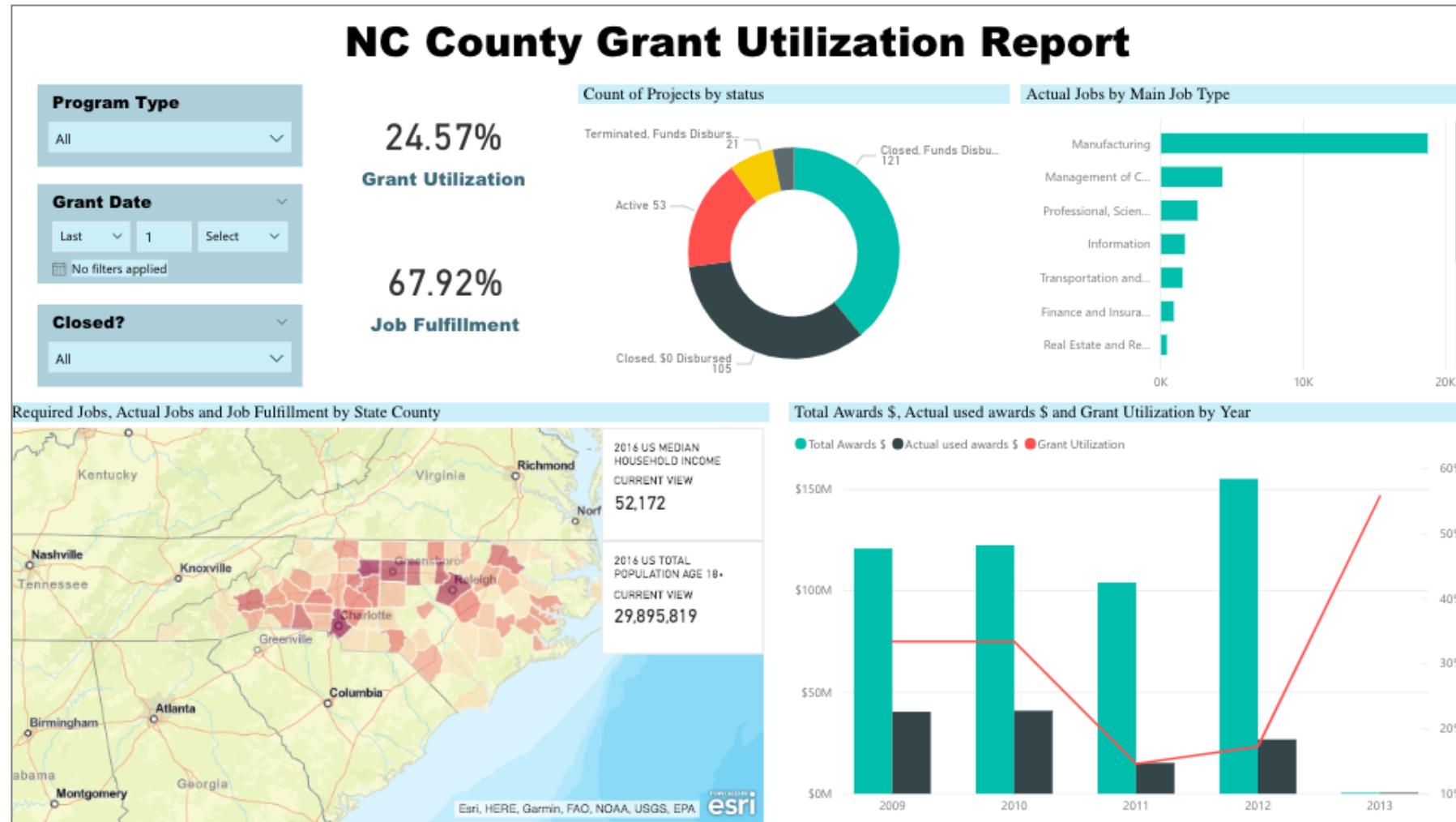


Elizabeth Glaser
Pediatric AIDS
Foundation

*Until no
child has
AIDS.*

EGPAF Global Data Dashboard

Power BI for Finance

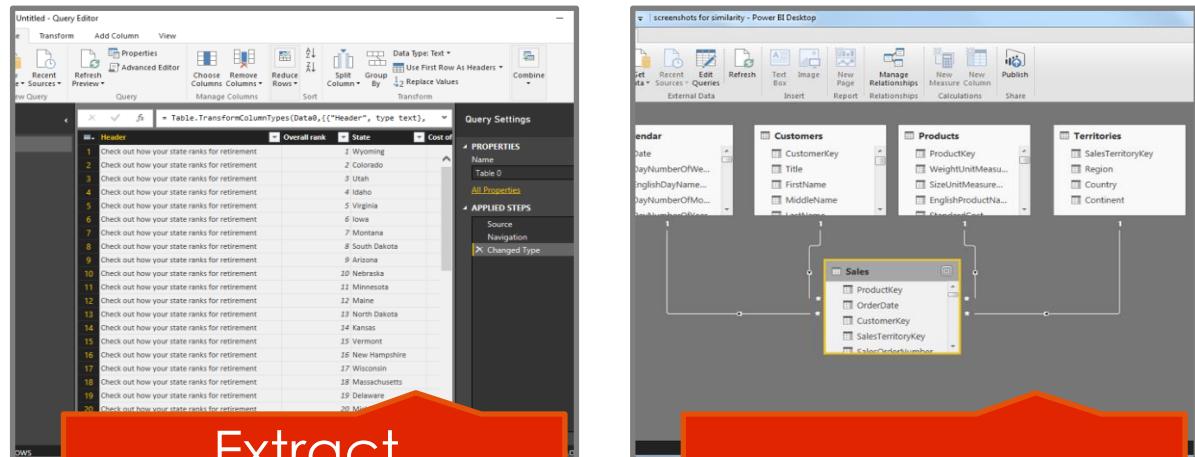


Outline for today

1. What is Power BI and business intelligence?
2. Review the four layers of Power BI
3. Build your first BI report

The 4 Layers of Power BI

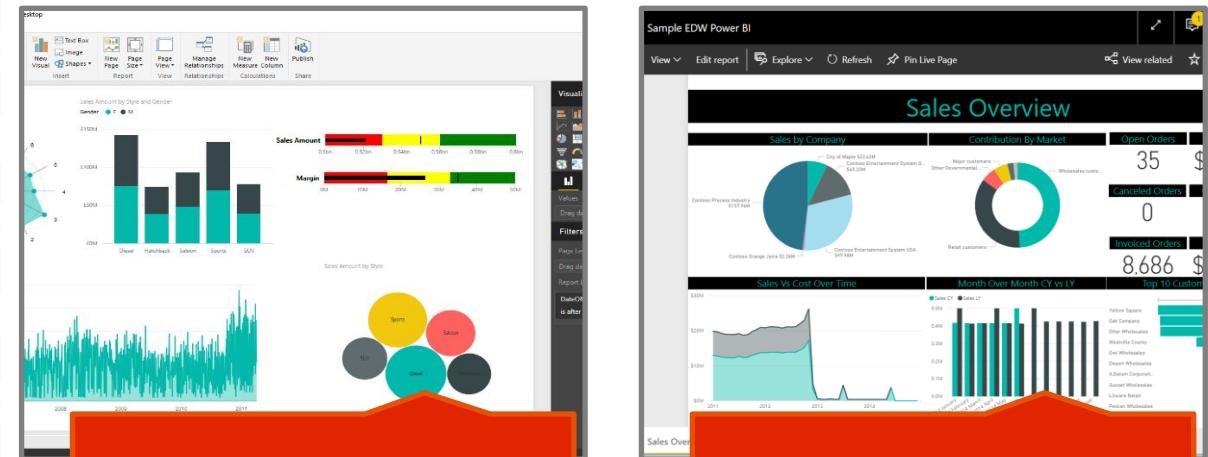
Model Developer



Extract,
Transform and
Load (ETL)

Data Modeling

Report Developer



Report Design



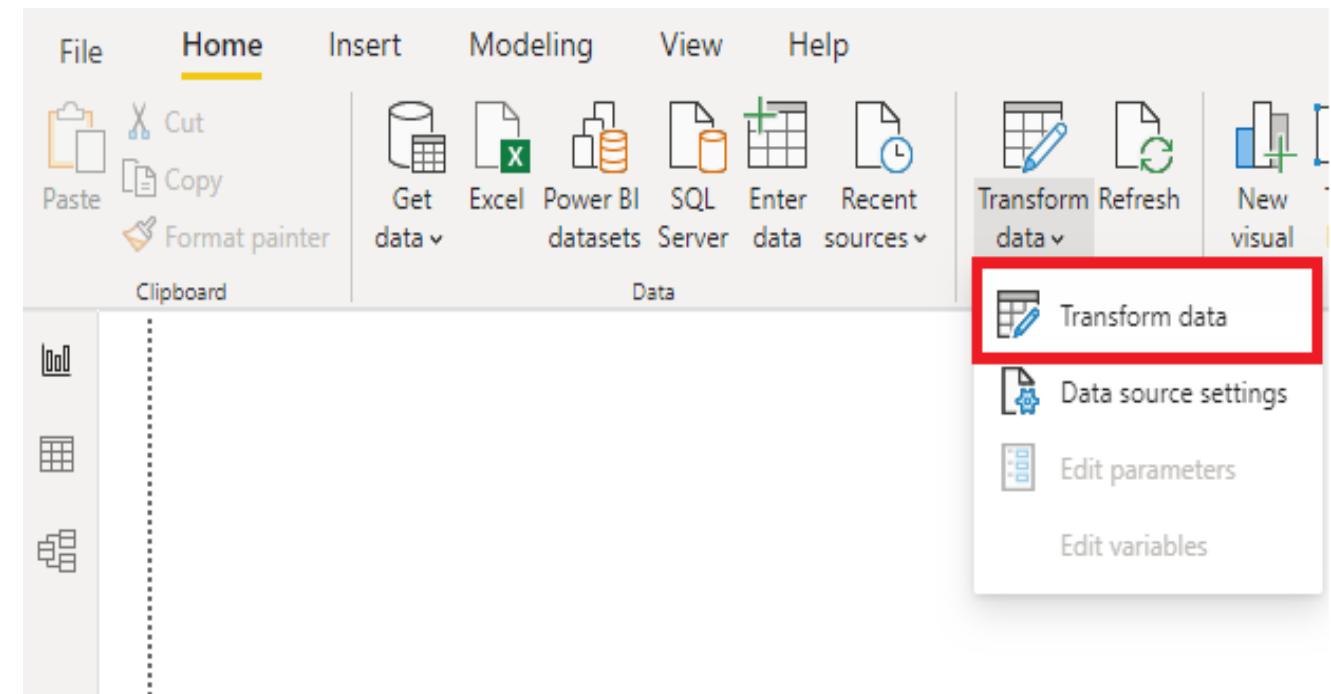
Web Portal

Layer 1: Extract, Transform, Load (ETL)

- **ETL** is the process that extracts data from a different source system, transforms and loads the data into a data warehouse system
- **Power Query** is the ETL tool in Power BI

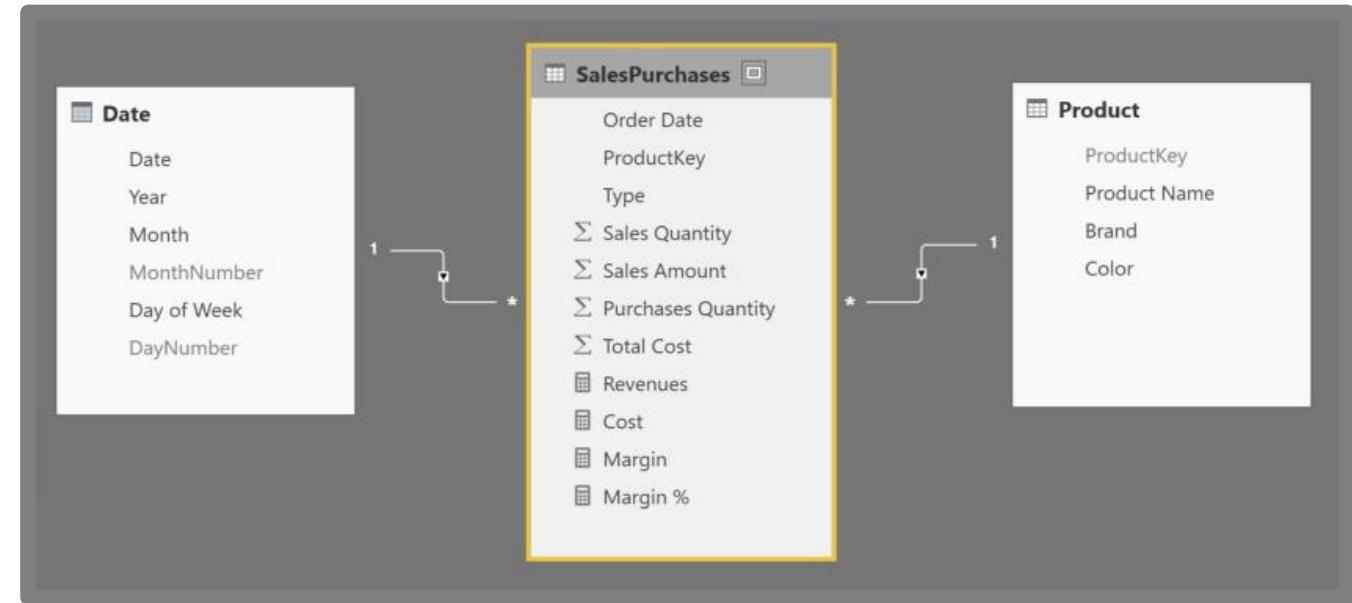
Power Query allows you to:

- Connect to various data sources
- Transform your data
- Create reports and develop insights

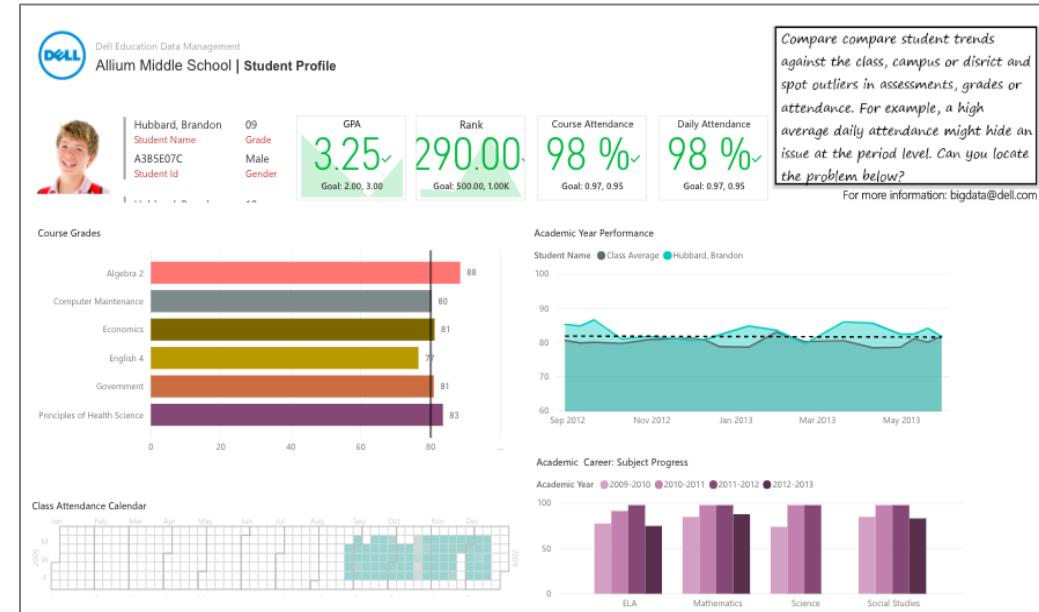
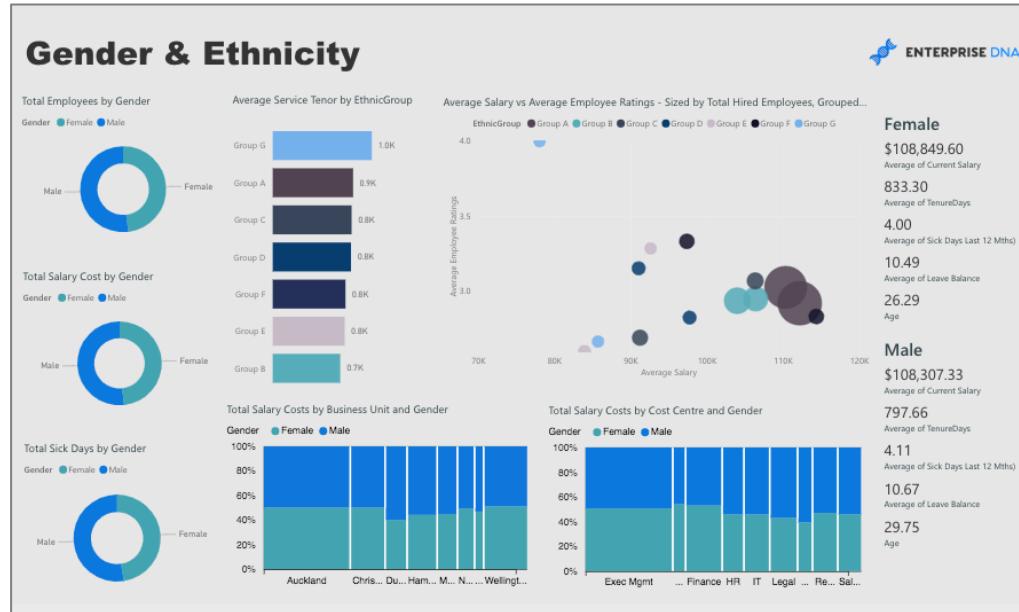


Layer 2: Data Modeling

- **Data modeling** is the process of documenting systems through diagrams, text and symbols to represent how data needs to flow
- Data Modeling involves:
 - Using **multiple** tables from multiple sources
 - Combining tables in a way that creates a model that suits your needs
 - Creating your own **custom calculations** and assigning new metrics to view specific segments of your data



Layer 3: Report Design



Layer 4: Web Portal

The screenshot shows the Power BI Home (preview) interface. At the top, it greets the user with "Good afternoon, Maggie". Below this, a banner says "Welcome to your Power BI home" and "Everything you need in one place. Your top visuals are displayed for easy consumption. Your favorites, frequent, and recent are close at hand. And you can explore learning opportunities to improve your Power BI experience." A "Got It" button is present. To the right of the banner is a thumbnail of a mobile device displaying a Power BI dashboard.

The main content area features a dashboard titled "Human Resources Sample". It includes several visualizations:

- A bar chart titled "New Hire Count, Active Employee ... BY REGION, ETHNICITY" showing counts for Group A, Group B, and Group C across different regions and ethnicities.
- A bar chart titled "Bad Hires as % of Actives BY AGE GROUP" showing percentages for age groups <30, 30-49, 50+, and Total.
- A stacked bar chart titled "New Hire Count, New Hires Same P... BY MONTH" showing monthly counts for New Hires, New Hires Same Month, and Actives Total.
- A large text element "10K" indicating a total count.
- A bar chart titled "Hires (<60 Days of Employment) BY REGION, ETHNICITY" showing counts for Group A, Group B, and Group C.
- A donut chart titled "New Hire Count BY GENDER" showing the distribution between Female and Male.

At the bottom, there is a section titled "Favorites + frequent" featuring five items, each with a star icon:

- Content Dashboard
- ContentDashboard
- Customer Profitability Sample
- Customer Profitability Sample
- Customer Profitability Sample

Knowledge Check 1



Outline for today

1. What is Power BI and business intelligence?
2. Review the four layers of Power BI
3. Build your first BI report

Objectives for Lab 1

- Make sure you have received the Microsoft credentials to login into Power BI
- Open Power BI Desktop and login
- Upload data from “Lab 1 Data” sheet in Lab 1 folder
- Create a report
- Upload report to PowerBI.com ‘My workspace’

Refer to Lab 1 folder in Lab Files

Download Power BI Desktop

Microsoft | Power BI Products Pricing Solutions Partners Learn Community Sign in Sign up free

Getting started with Power BI Desktop

Less data prep, more data wow

Visually explore your data with a freeform drag-and-drop canvas, modern data visualizations, and simple report authoring.

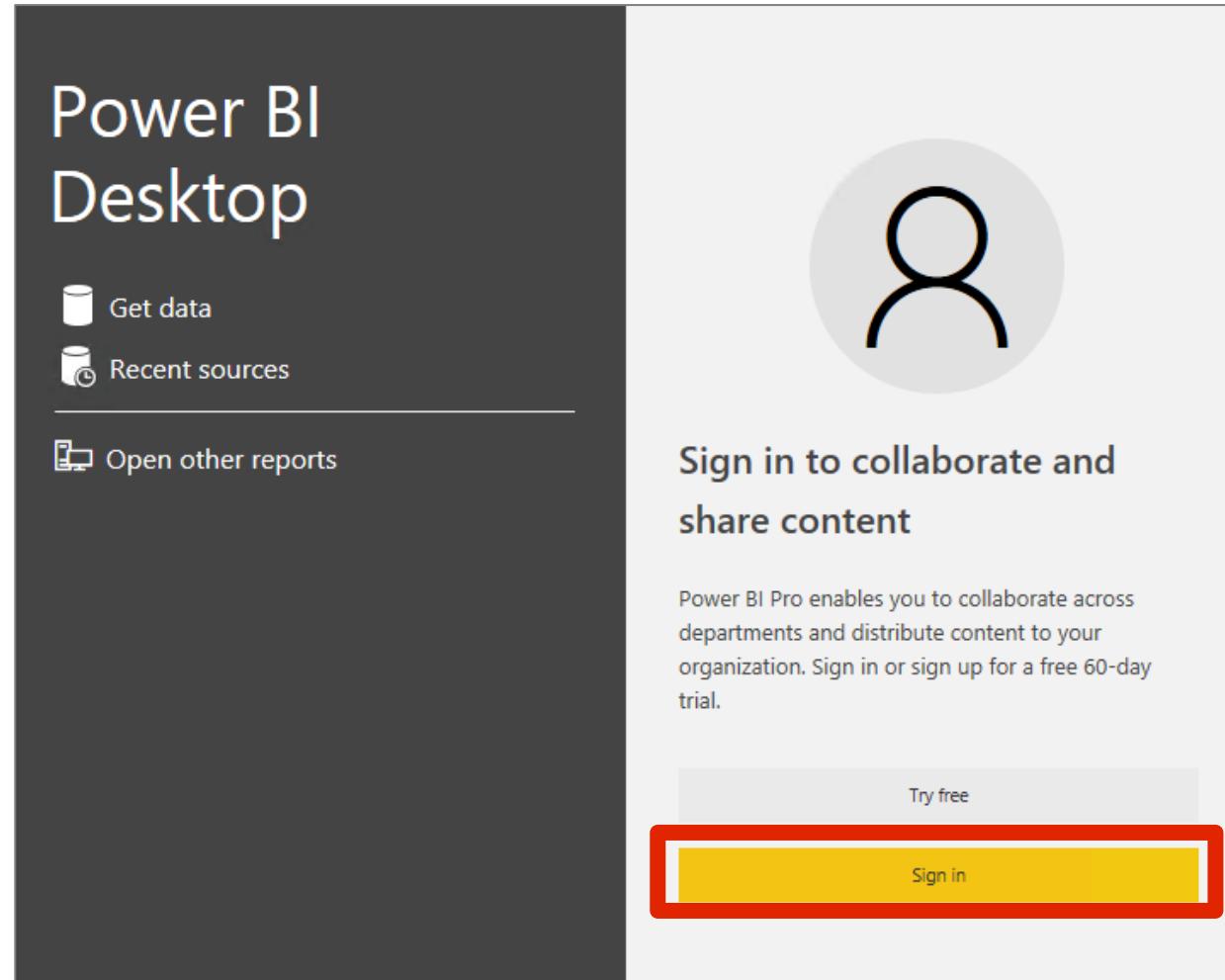
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[ADVANCED DOWNLOAD OPTIONS >](#)

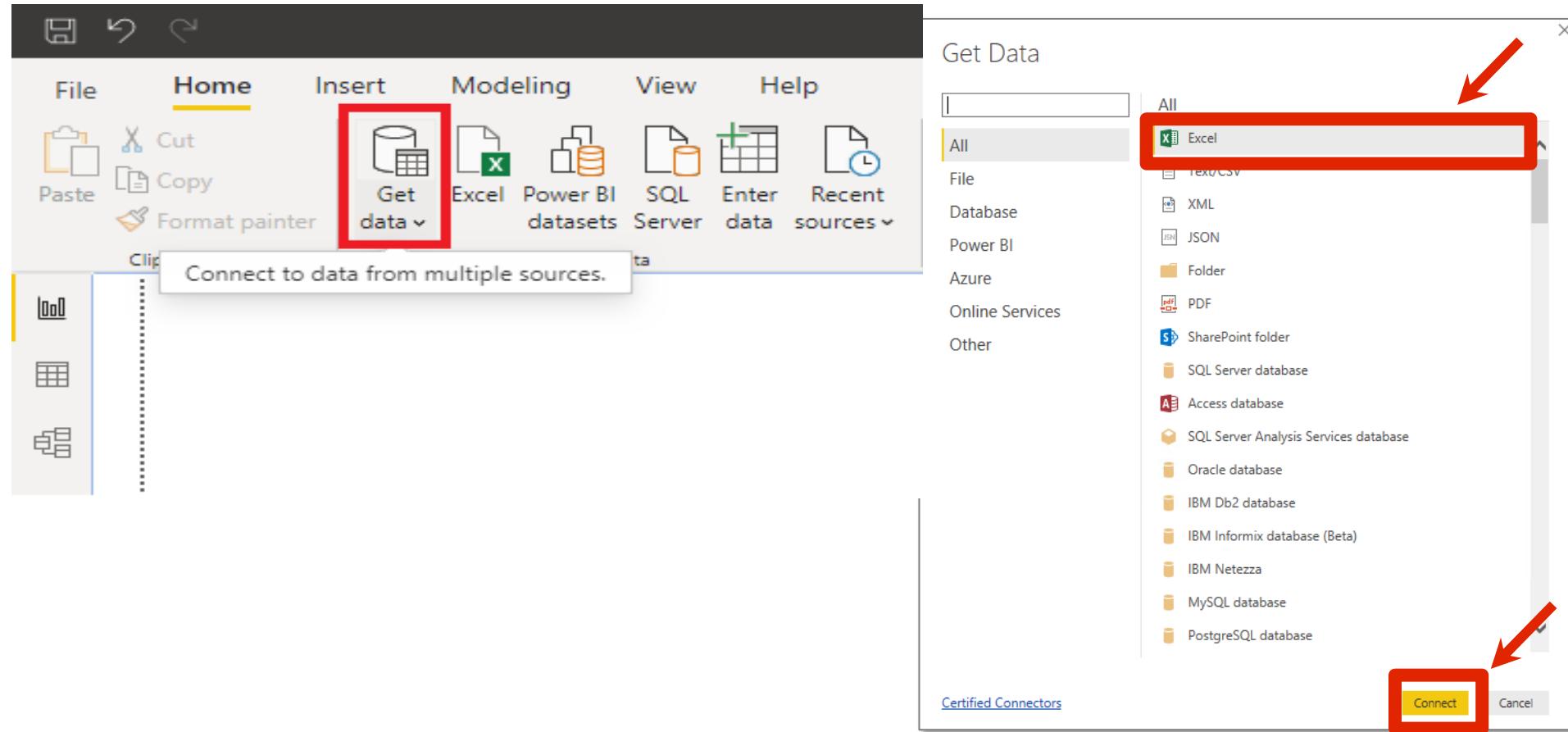


<https://www.microsoft.com/en-us/download/details.aspx?id=58494>

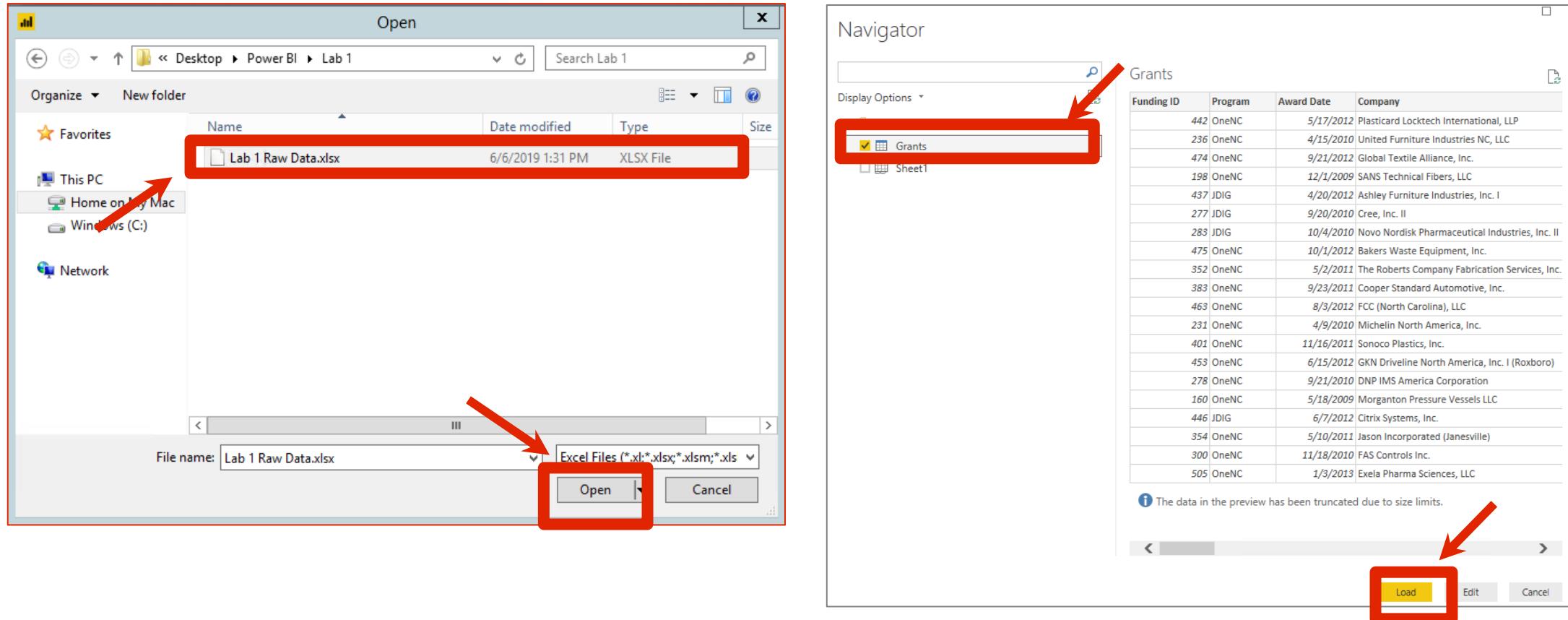
Sign in to Power BI account



Get data



Load data



Power BI dashboard overview

The screenshot shows the Microsoft Power BI desktop application. The interface includes a ribbon at the top with tabs like File, Home, Insert, Modeling, View, and Help. Below the ribbon are sections for Data, Queries, Insert, Calculations, and Share. The main workspace is divided into several panes:

- Ribbon pane:** The main menu where you can upload data to manage queries. It is highlighted with a red box and an arrow pointing to it.
- Pages pane:** Allows you to add pages. It is highlighted with a red box and an arrow pointing to it.
- Report pane:** Where visualizations are created and arranged. It features a 'Build visuals with your data' section and a 'Report canvas' area with a dashed border. A red box and arrow highlight the Report canvas.
- Visualization pane:** Allows you to customize with color, filters, etc. It contains sections for Filters, Visualizations, and Fields.
- Filters pane:** Contains sections for 'Filters on this page' and 'Filters on all pages', each with an 'Add data fields here' button.
- Fields pane:** Shows a hierarchical list of dataset fields under sections like Grants, Award Date, Closed, Company, Company A..., Company C..., Deadline, Elapsed days, Funding City, Funding Co..., Funding ID, In Funding, Job Type, Percent A..., Percent Cre..., Program, and Project. A red box and arrow highlight the Fields pane.

Annotations with orange boxes and arrows provide additional context:

- Report pane is where visualizations are created and arranged** (points to the Report canvas)
- Visualization pane allows you to customize with color, filters, etc.** (points to the Visualization pane)
- Fields pane is where elements of your dataset live. They can be dragged to report pane or to filters** (points to the Fields pane)

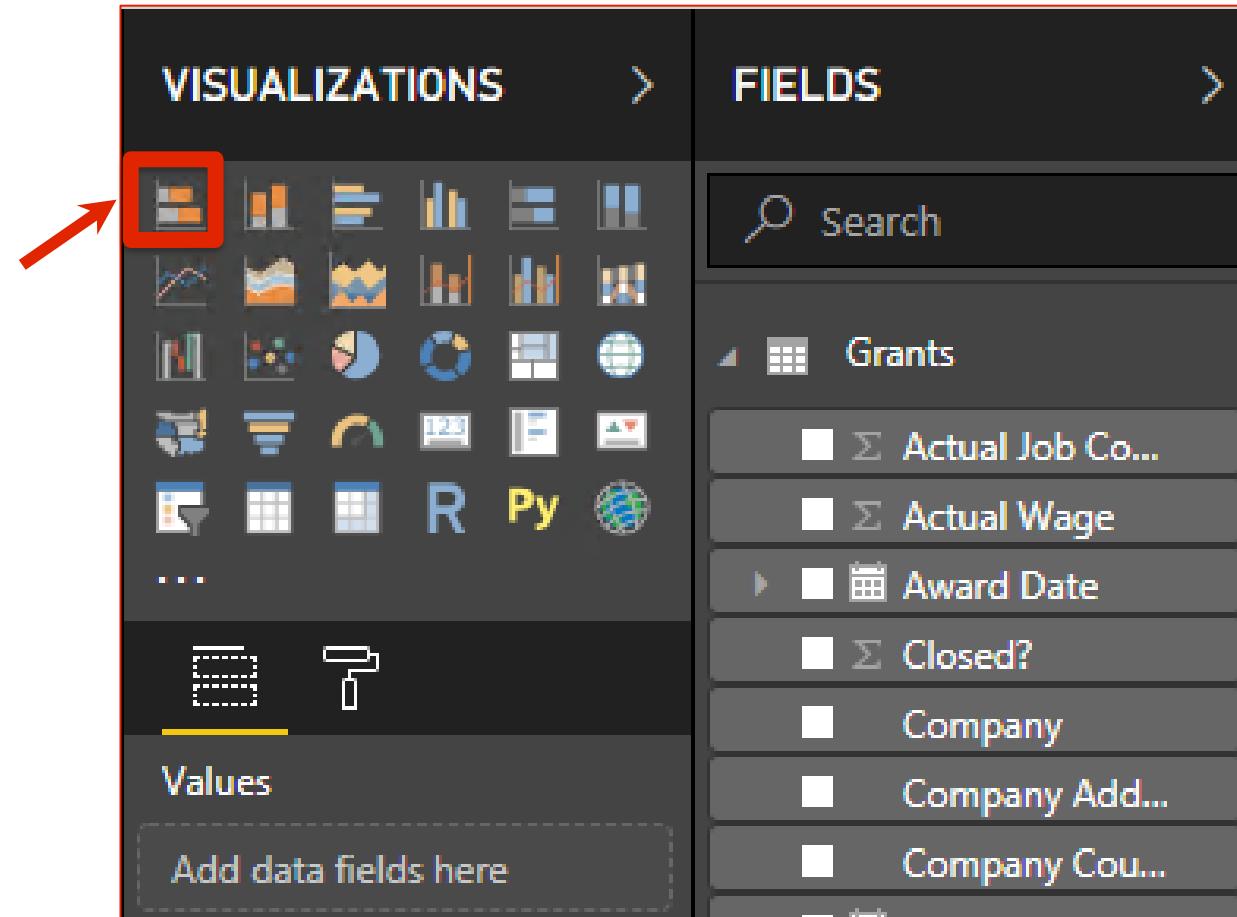
North Carolina (NC) grant usage data

The NC state government gave \$4,000,000 in grant money from 2009 to 2013. The grant manager from the NC office of grants is interested to know how many jobs were created in each funded county from 2009 to 2013. With this information, the grants manager will be able to see where the grant money made the most impact

The grant manager wants to see a Power BI report of the following:

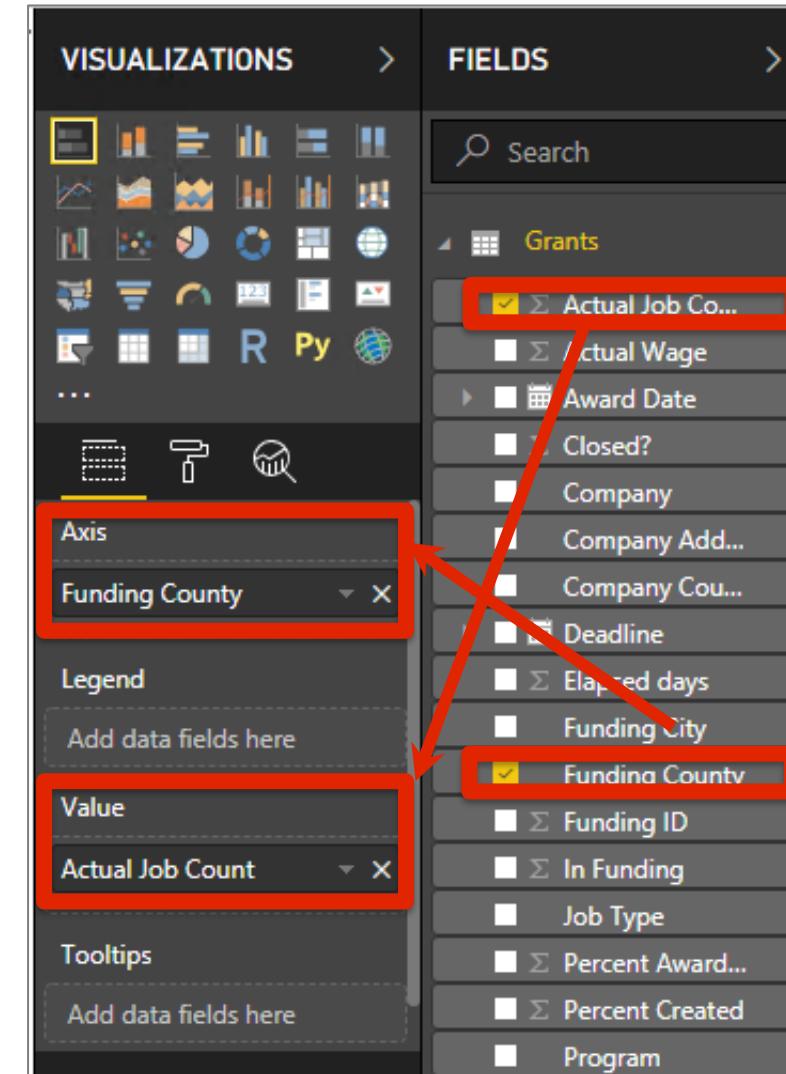
- **Count of Company** by Funding County (bar chart)
- **Funding County** by the count of Company, sorted
- **Award Date** as the slicer to select the needed time period

Creating a bar chart



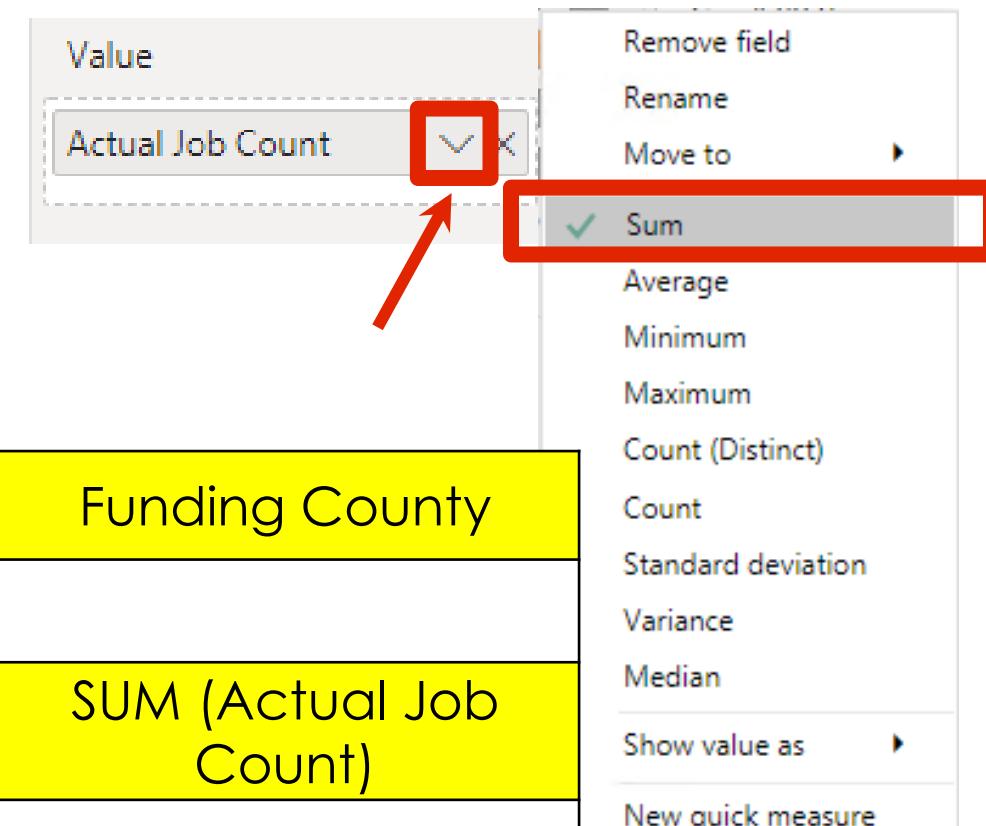
Sorting by 'Actual Job Count'

- Take 'Actual Job Count' from the 'Grants' table in the 'FIELDS' panel on the right. Drag it in the 'Values' section
- Take 'Funding County' from the 'Grants' table in the 'FIELDS' panel. Drag it in the 'Axis' section



Sum of Actual Job Count

- Select SUM(Actual Job Count)
- Click the triangle in under the 'Values' section and choose Sum

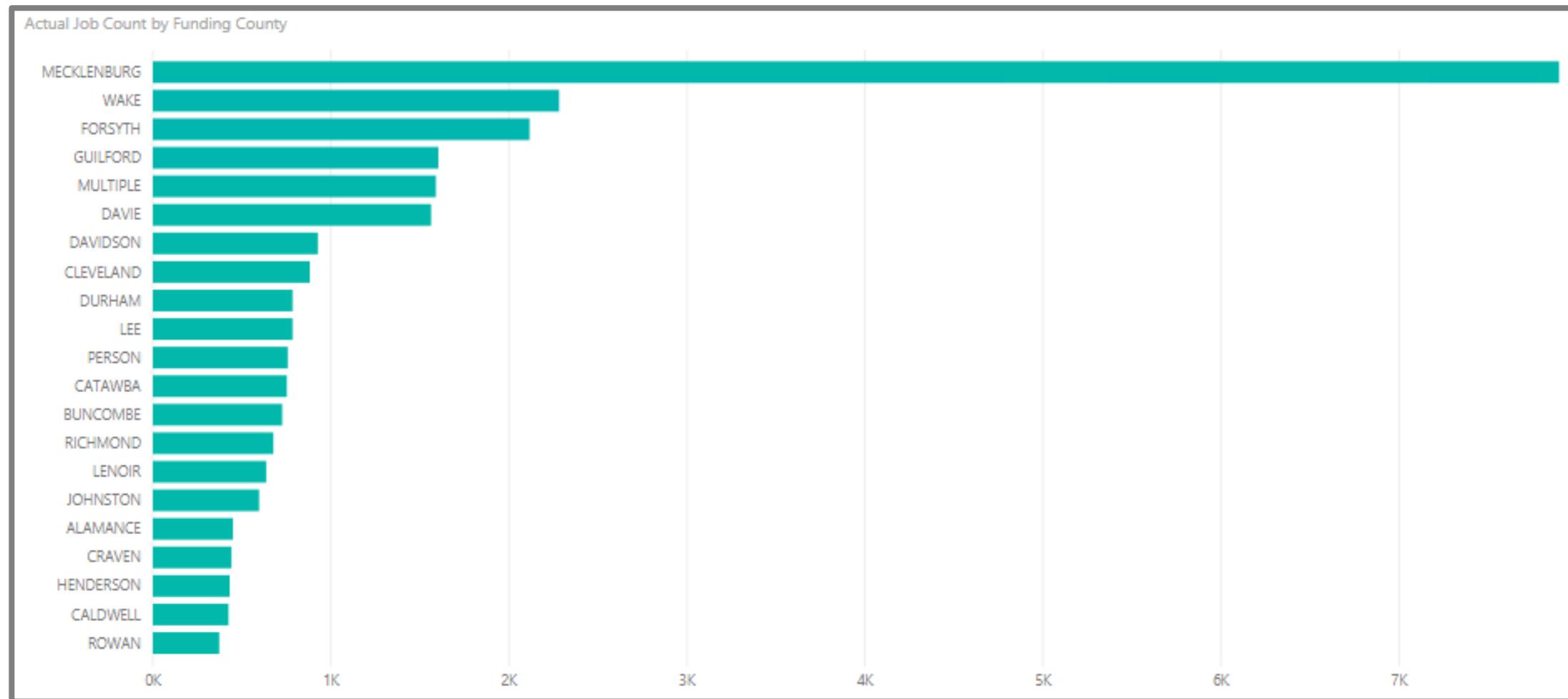


Axis	Funding County
Legend	
Value	SUM (Actual Job Count)
Tooltips	

Sort by Actual Job Count



Actual Job Count by funding county

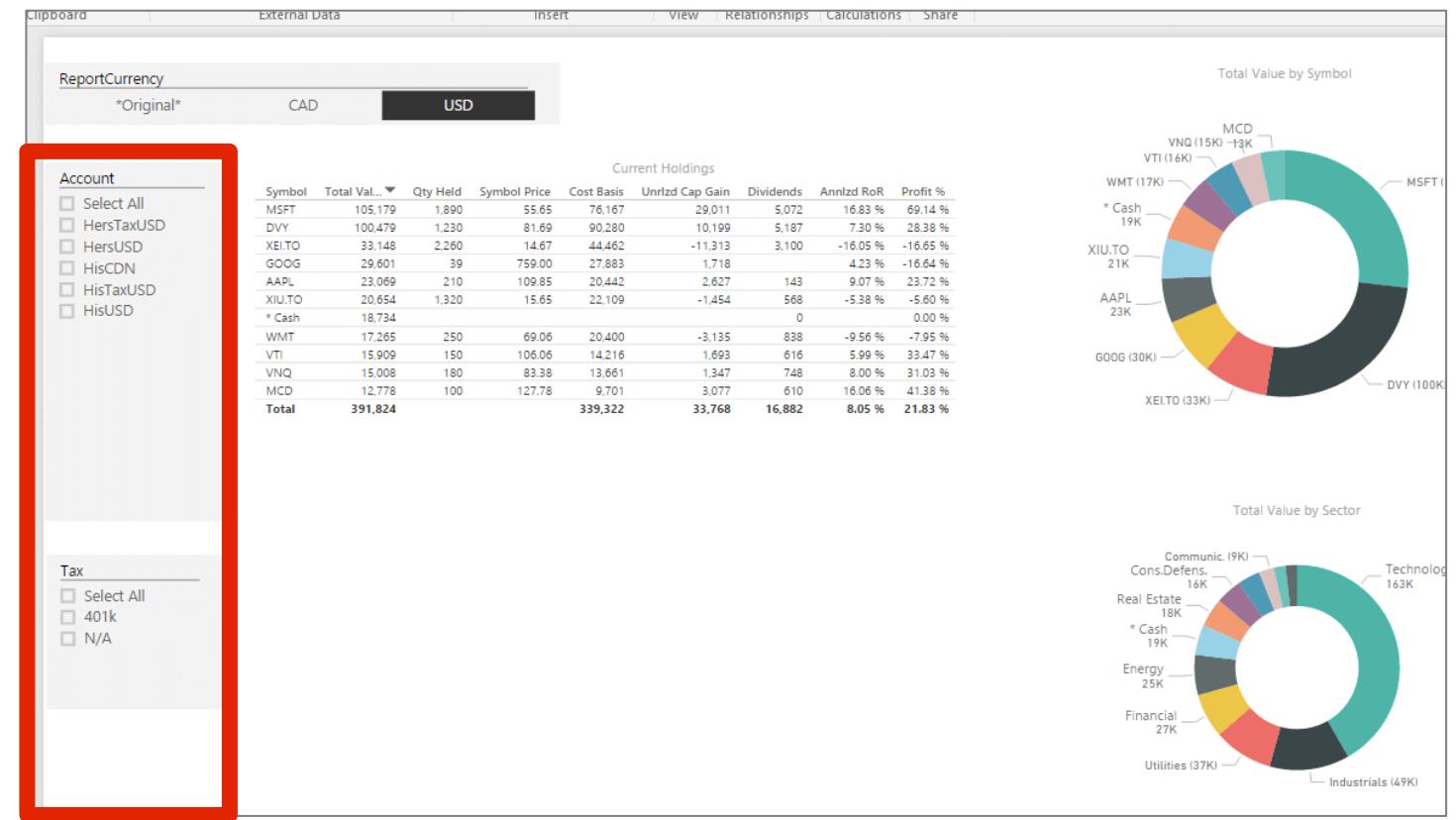


Power BI Slicer

- Power BI **slicer** filters the portion of the dataset shown in the other visualizations in a report

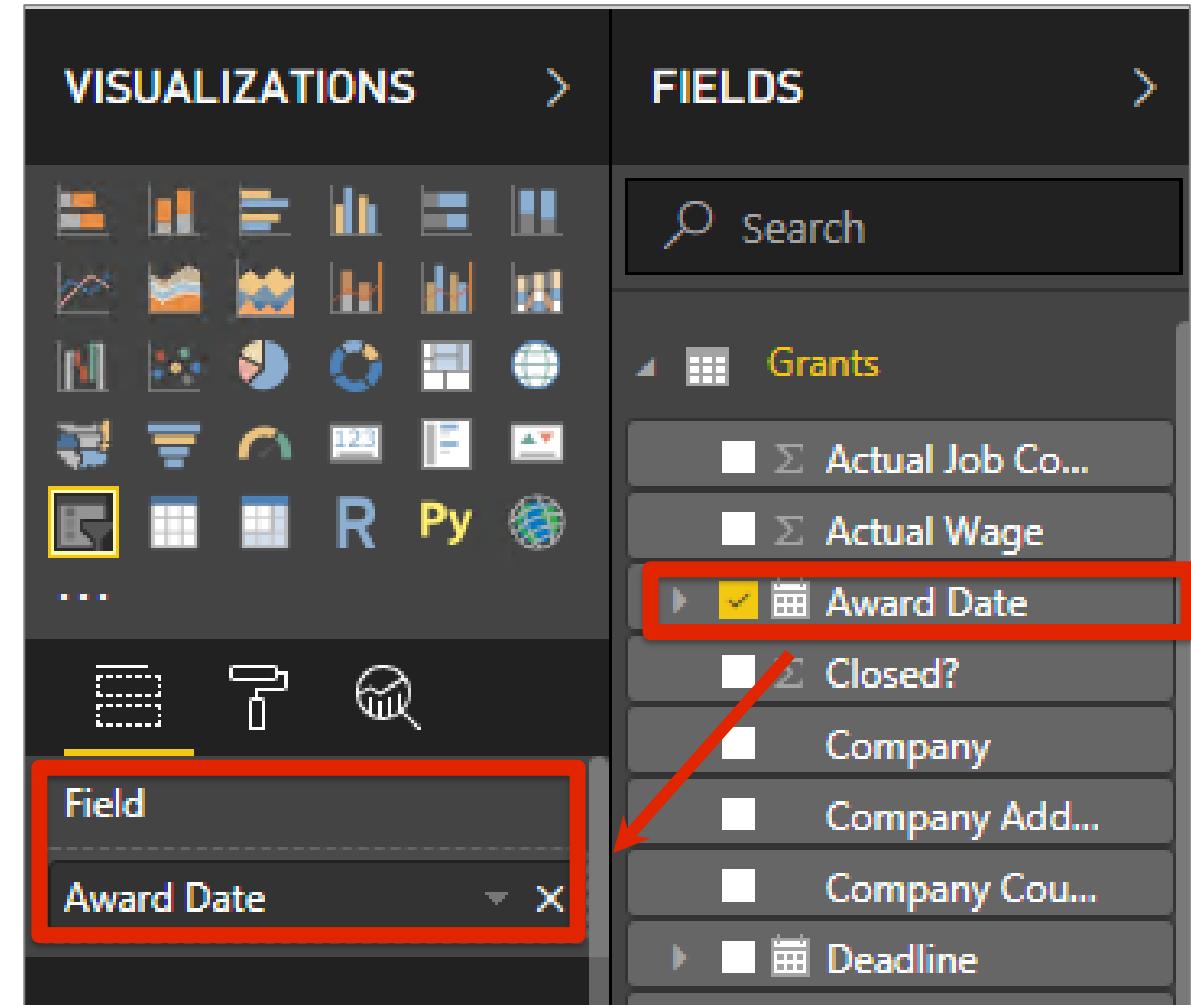
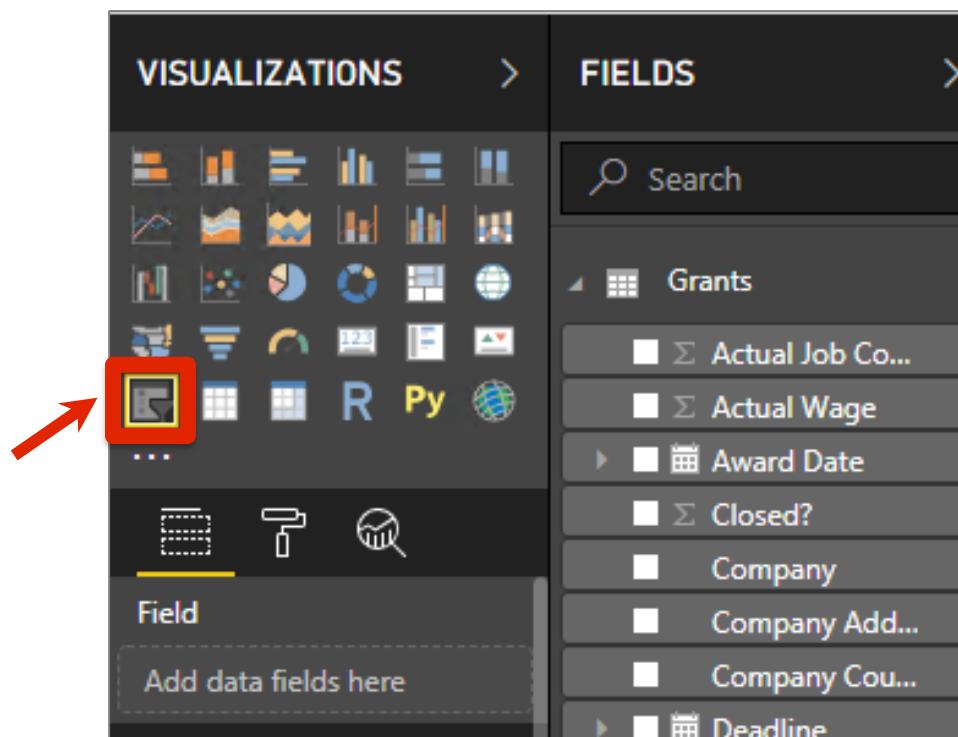
Reasons to use a slicer:

- Makes it easier to see the current filtered state
- Filters by columns that are unneeded and hidden in the data tables
- Creates more focused reports



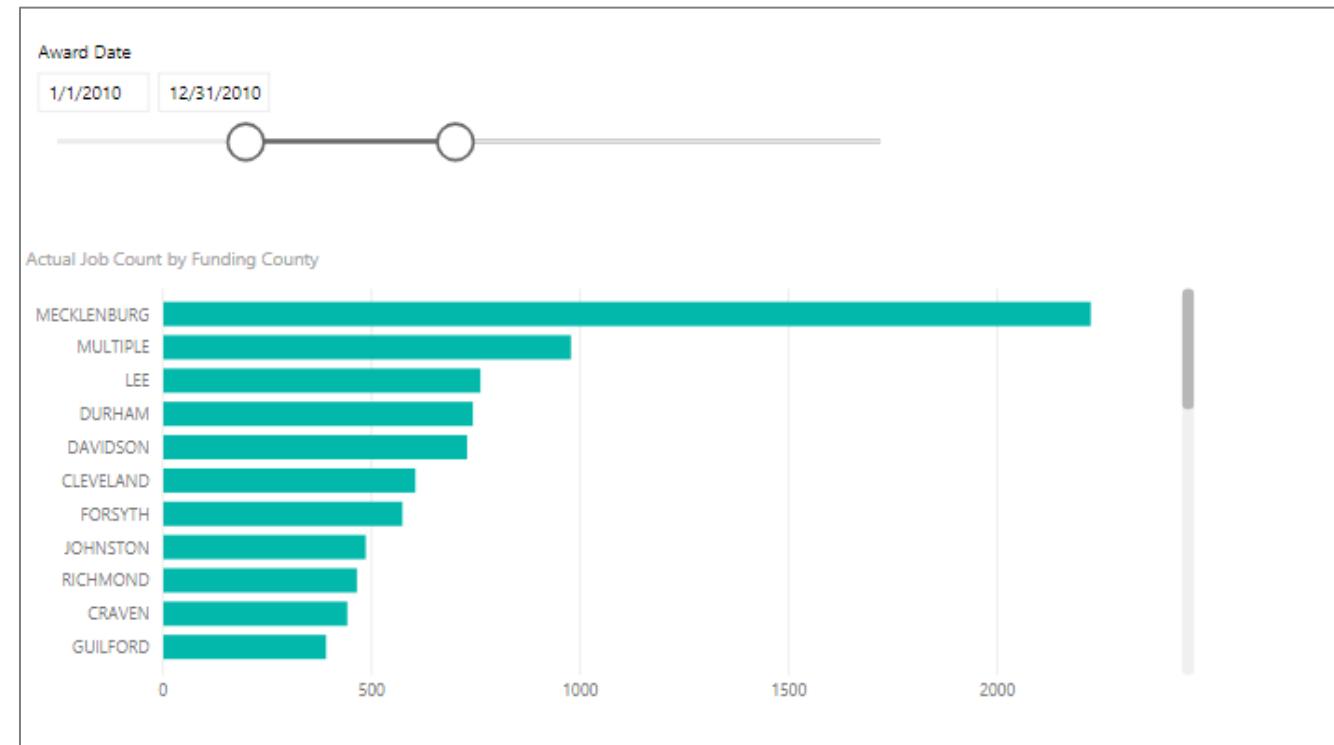
Add Award as Slicer

- Click on the empty space on the Canvas. Make sure the bar chart above is not selected!

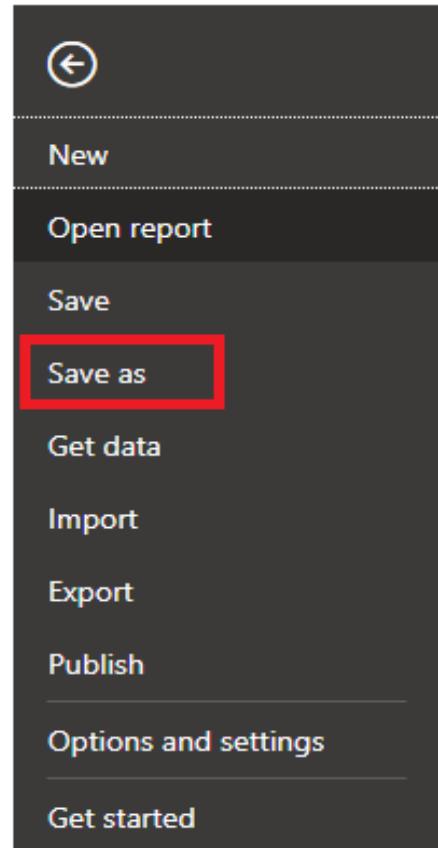


Select the desired time period

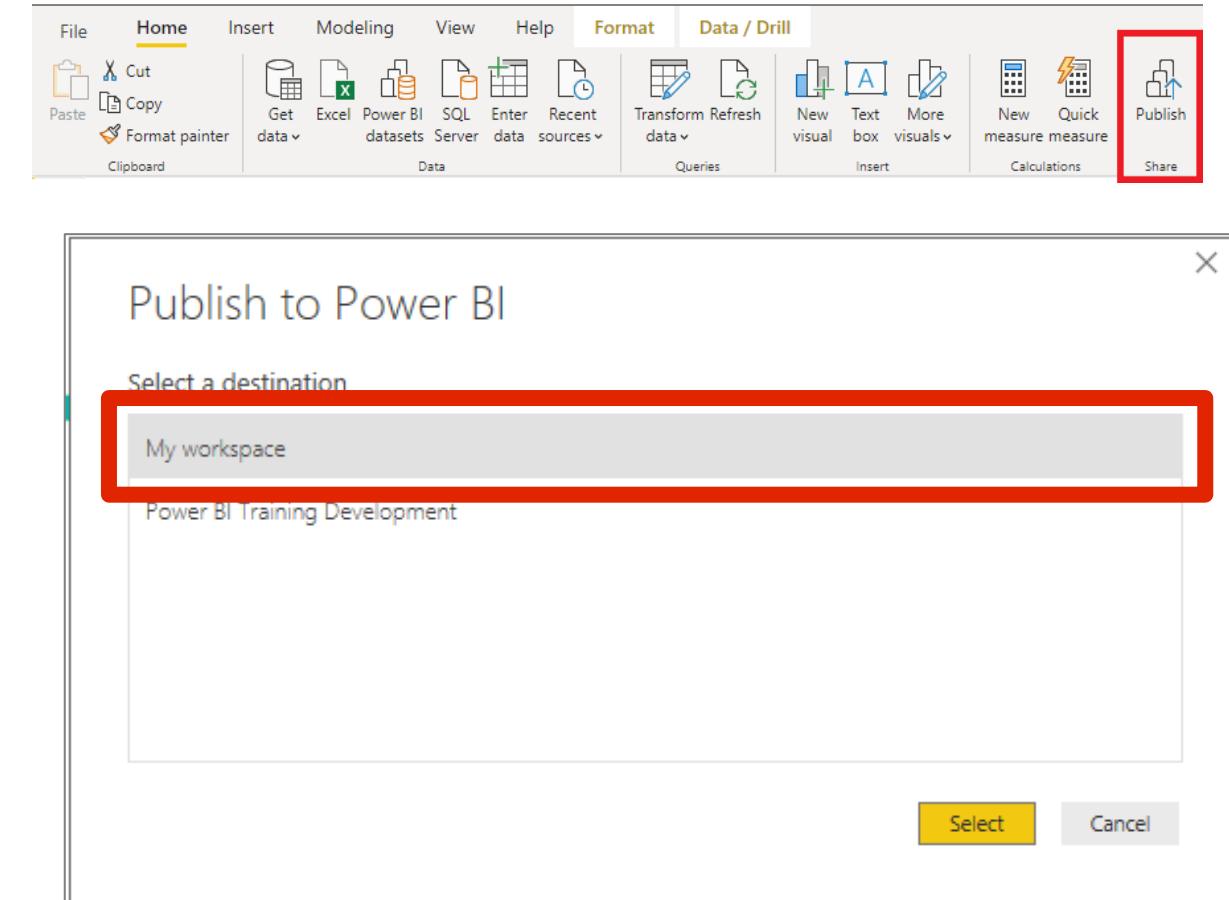
- From 1/1/2010 to 12/31/2010, what were the top 10 counties that created the most jobs?
- What about 2011?
- When you're done exploring, rename the page to 'Lab 1'



Save and publish to Power BI Web service

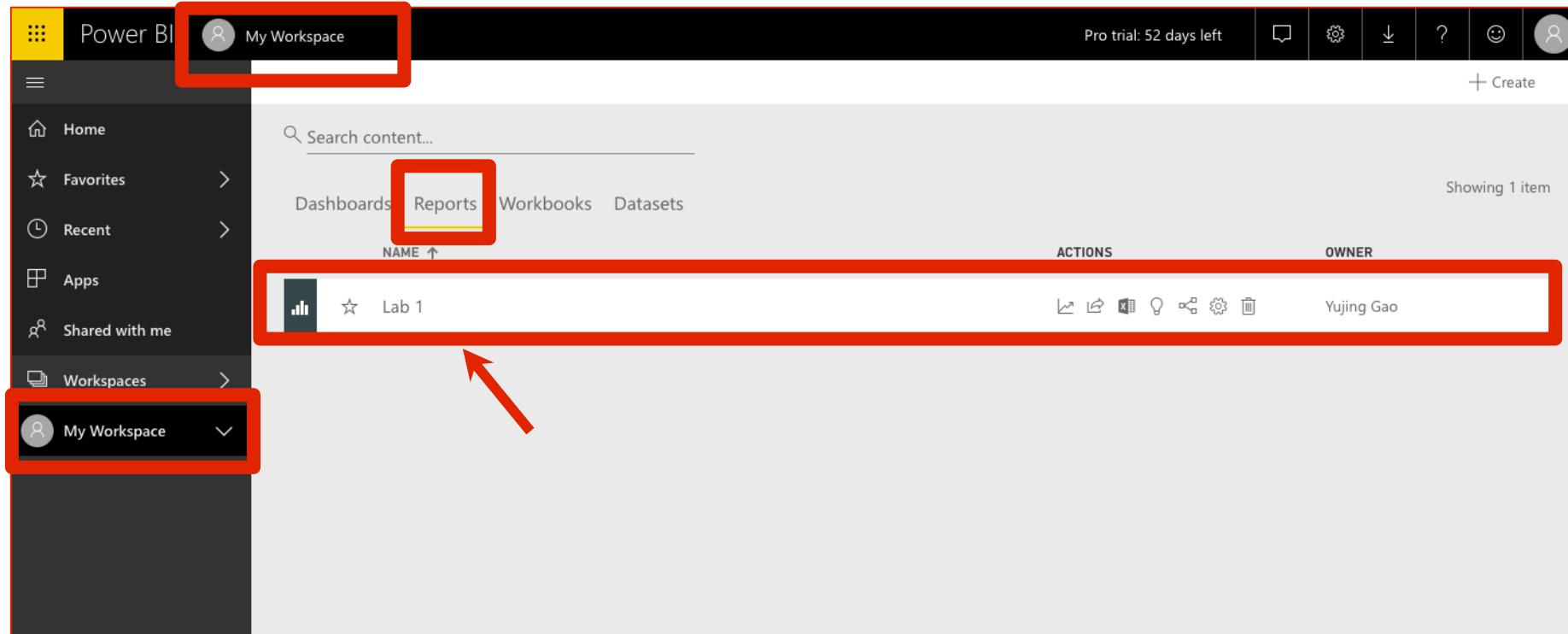


Open report

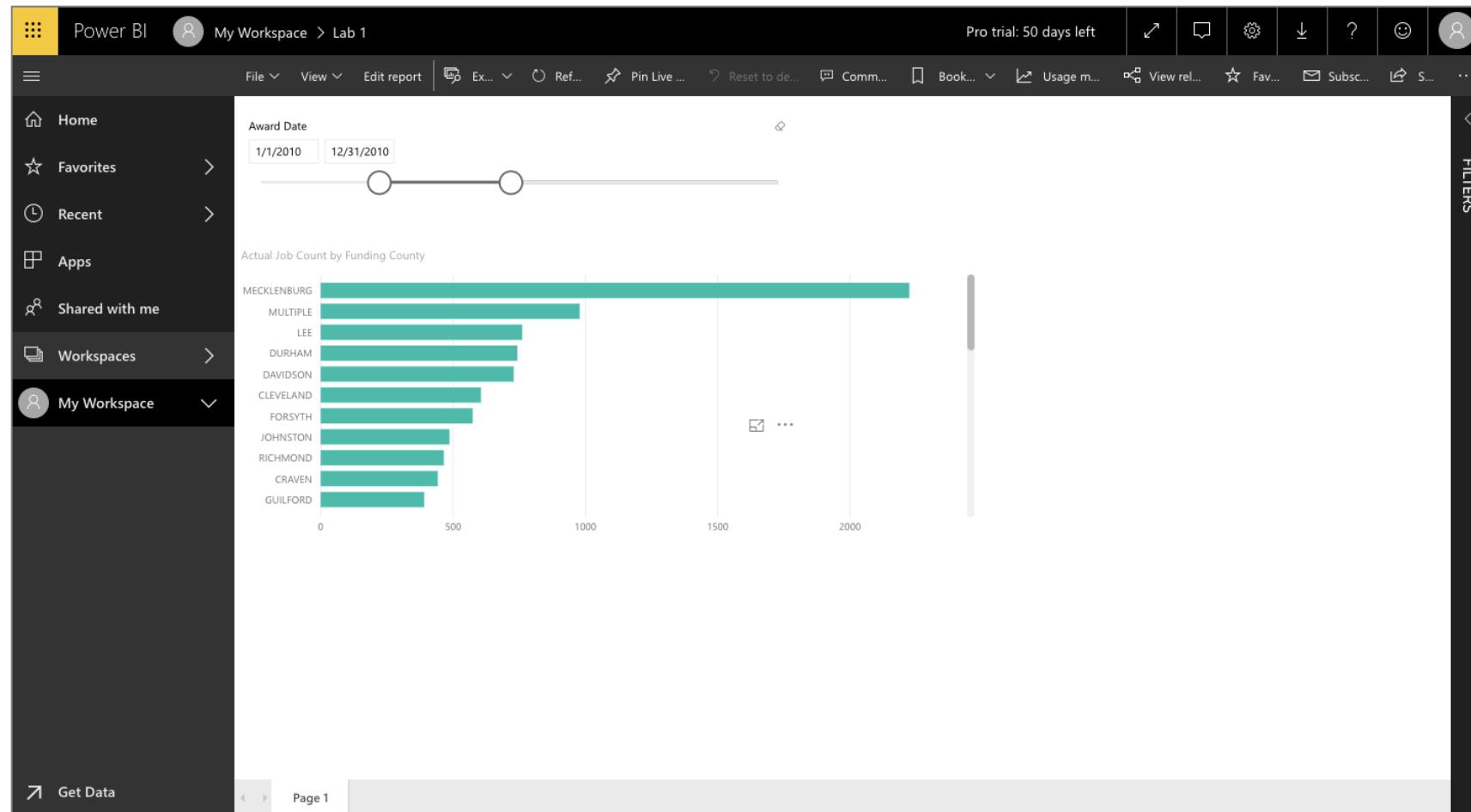


Check your report in PowerBI.com

- Sign in with your account at www.powerbi.com
- Navigate to 'My Workspace', and then click on 'Reports' Tab



View your report



Knowledge Check 2



Lab 1



Exercise 1



Congratulations!

Today you learned about:

1. What is Power BI and business intelligence
2. Four layers of Power BI
3. Creating reports in Power BI

Data Analysis with Excel & PowerBI

DATA
SOCI
ETY:

DATA SOCIETY:

Day 2

“One should look for what is and not what he thinks should be.”

- Albert Einstein



Welcome back!

- In the last class we introduced Power BI and learned how to create dashboards.
- Check out these dashboards created in Power BI: <https://hevodata.com/learn/top-10-best-power-bi-dashboard-examples-in-2021/#top>
 - Did any of these examples stand out to you? Which did you find the most relevant to how you plan to use Power BI? Which did you like the best?

Outline for today

1. Building a BI report with formatting techniques
2. Building a complex BI report with interactive visualizations

North Carolina (NC) grant usage data

The NC state government distributed \$400,000,000 in grants during 2009 – 2013. Now the government report developer wants to look into NC grant distribution during 2009-2013.

The grant manager wants to see a Power BI report of:

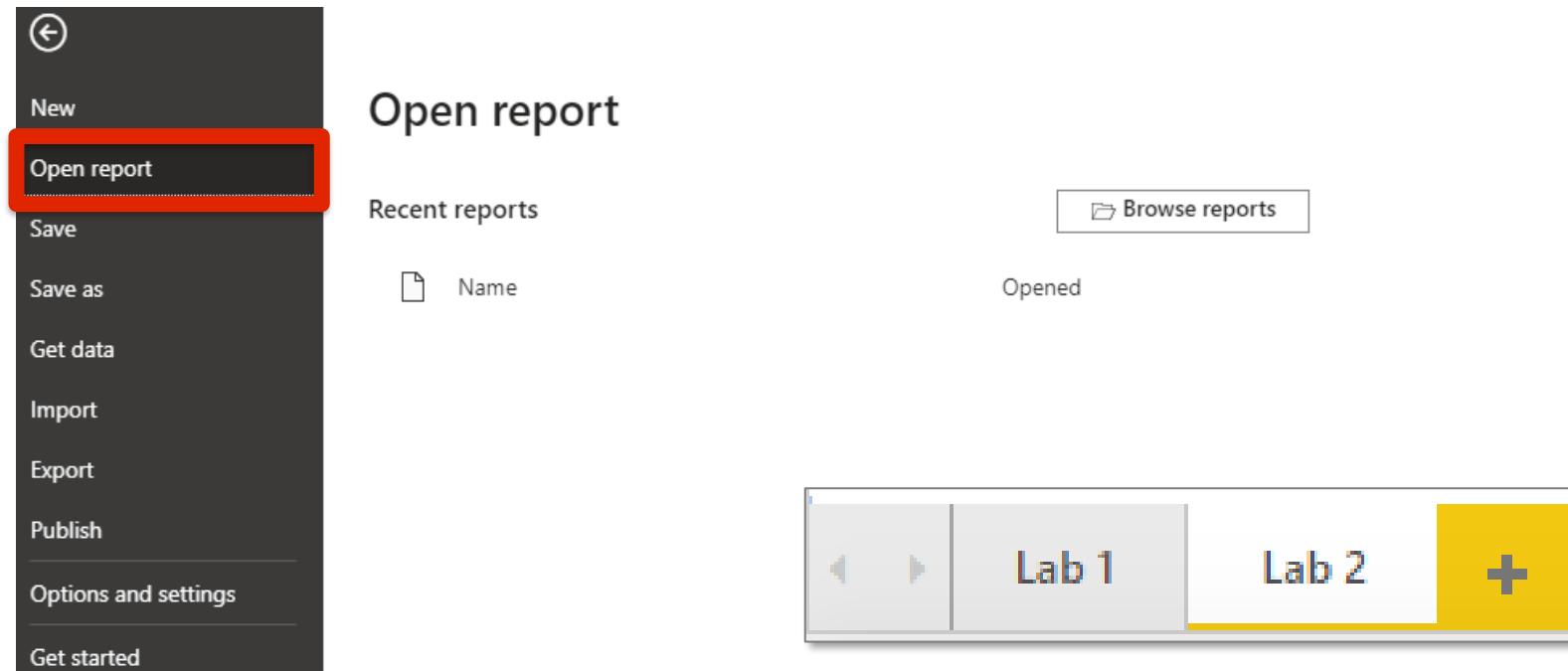
1. Actual Job count by job type and program
2. Program Status
3. Actual wage by job type
4. Funding county

[Here](#) is a flowchart to help you think through which type of chart to use for these reports.

Based on this, which charts would you use to display what the grant manager wants to see?

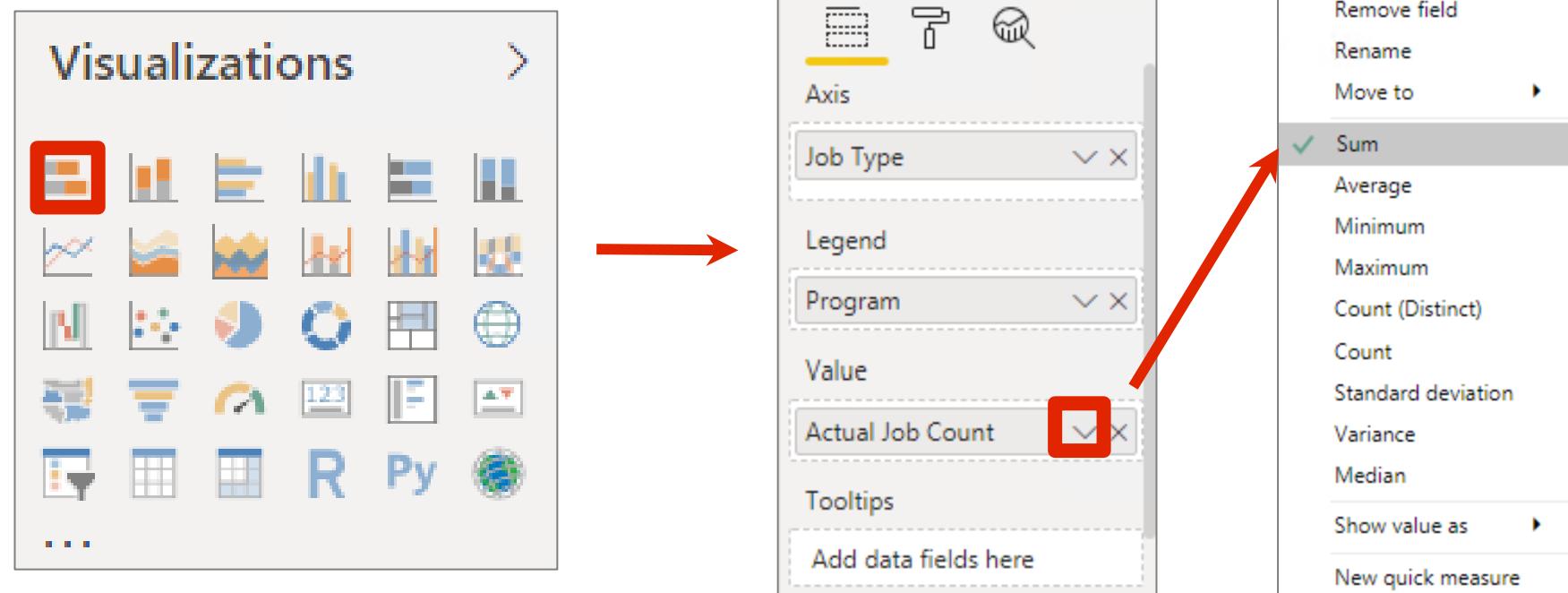
Create a simple chart

- Open the Lab 1 PBIX file from Lab 1, and create another page called “Lab 2”

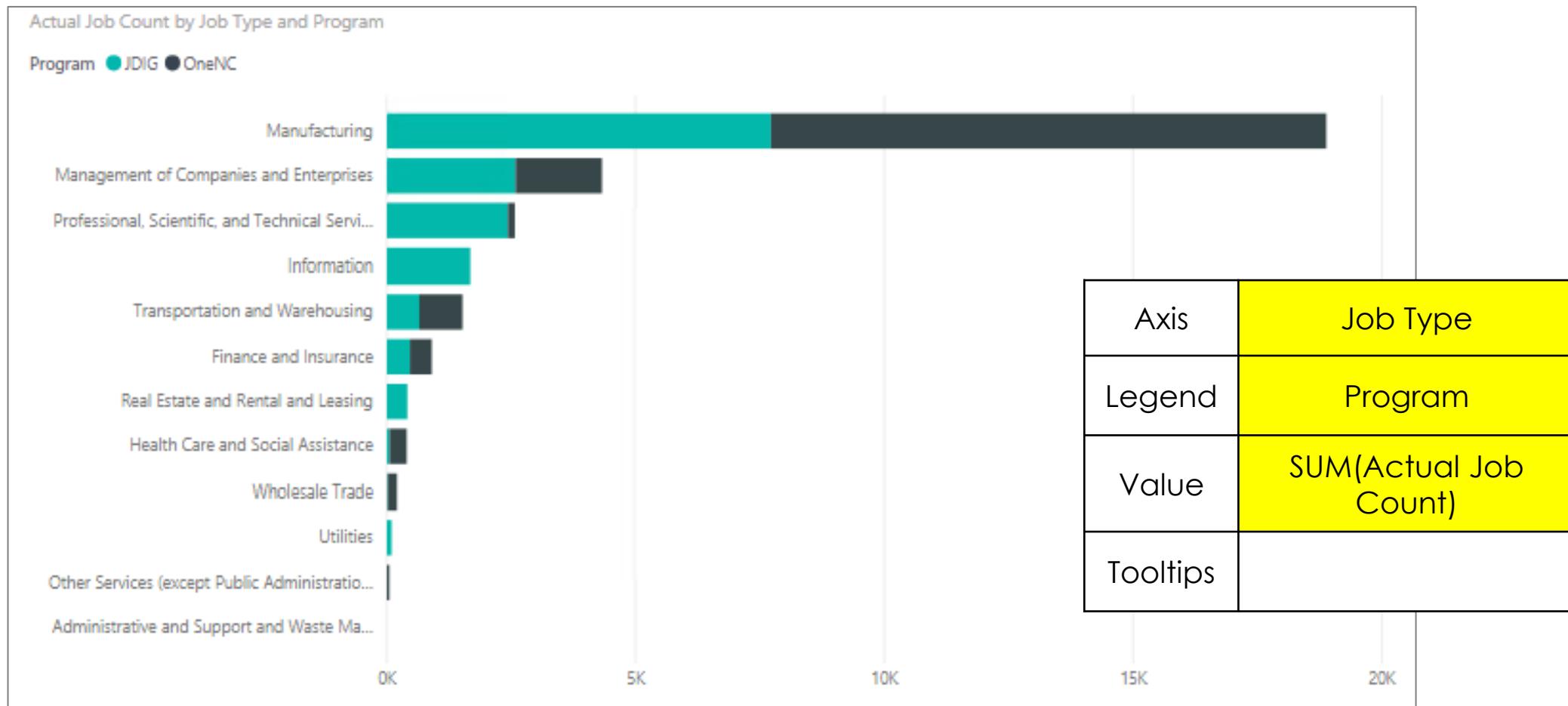


Create a simple chart

- Put 'Actual Job Count' in Value Field and 'Job Type' in Axis, and 'Program' in Legend
- Sum(Actual Job Count) -> click the triangle in under the 'Values' section and choose Sum

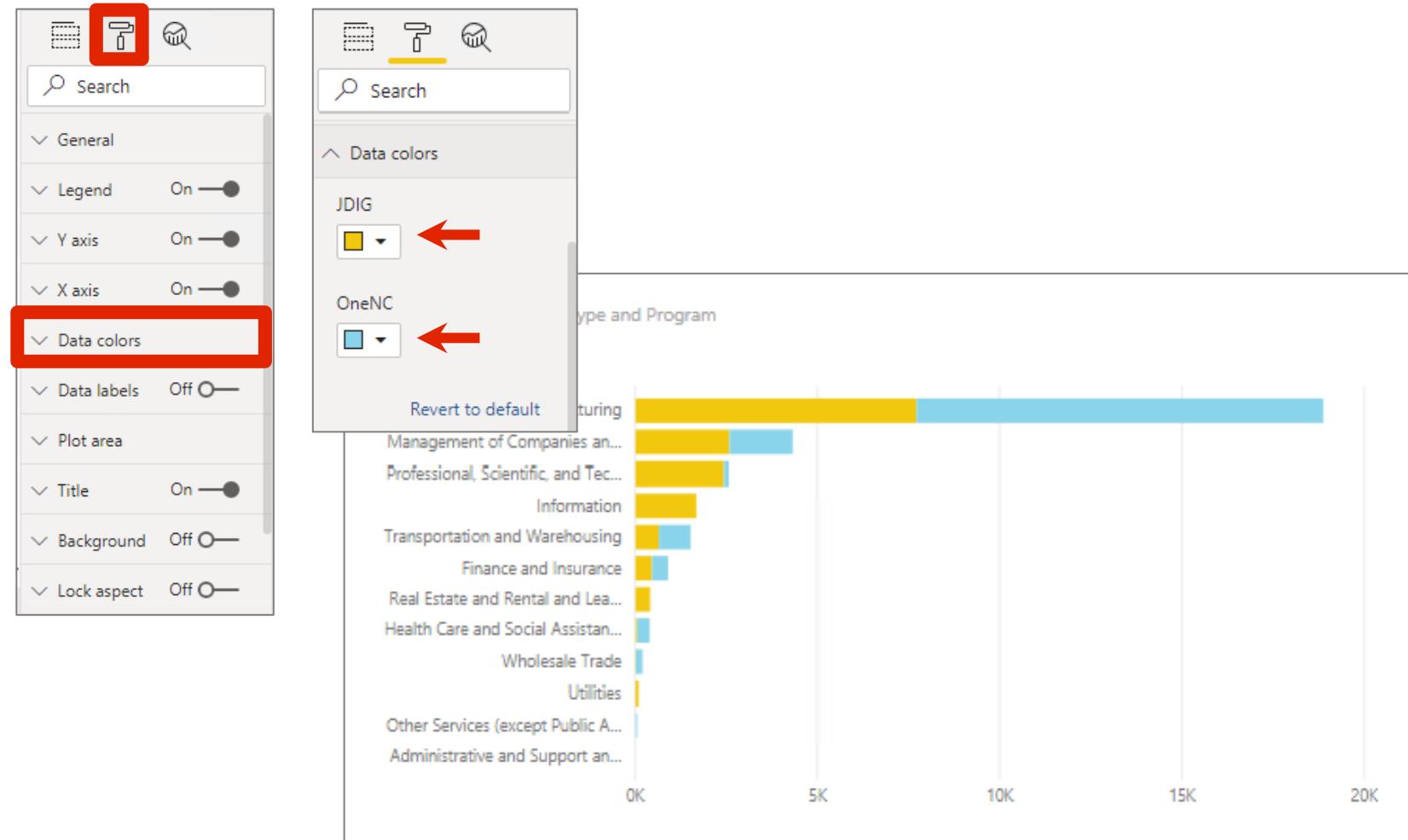


Create a simple chart



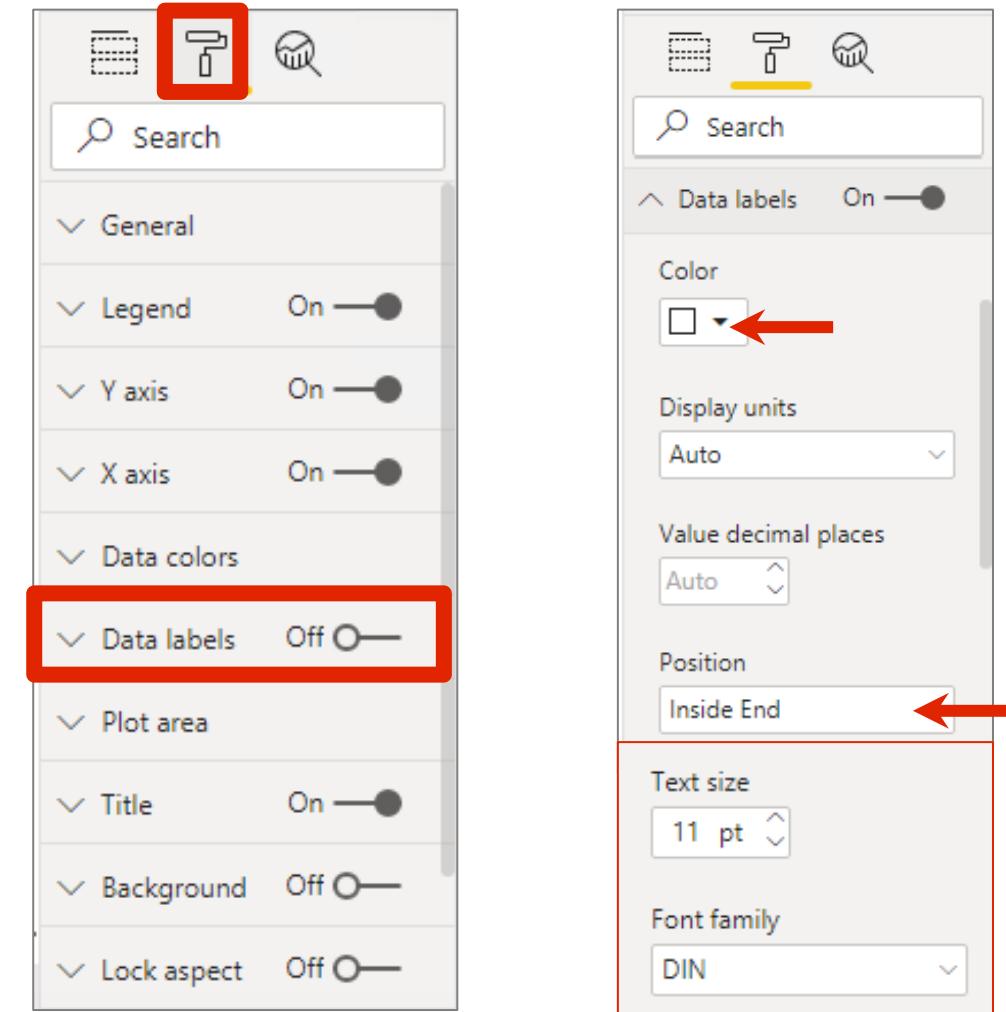
Change your chart color

- Go to Format Tab in Visualizations
- Expand 'Data colors' section
- Make the JDIG Color into yellow, OneNC color into blue

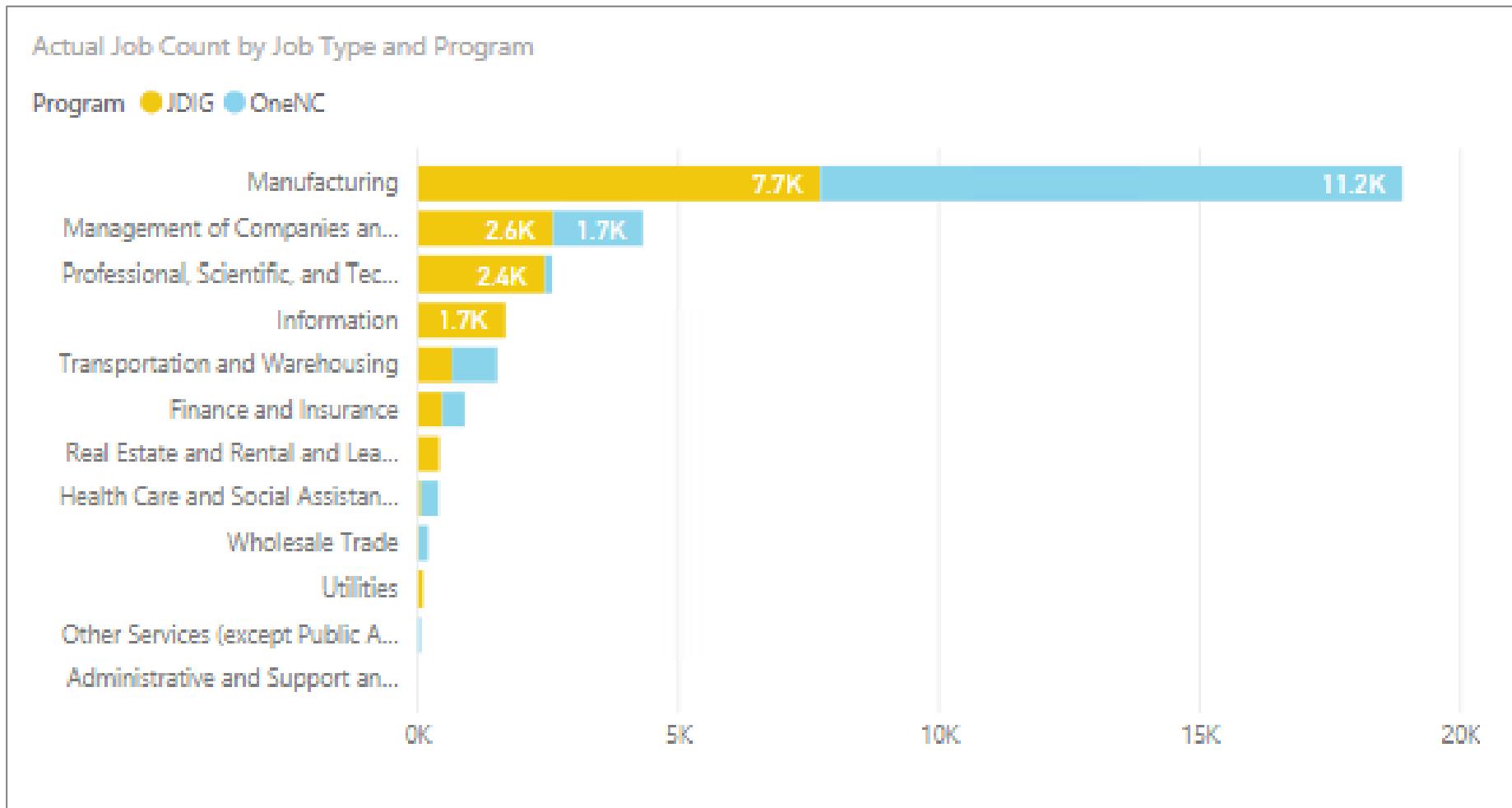


Add data labels

- Go to Format Tab in Visualizations
- Turn the 'Data labels' section on
- Expand 'Data labels' section
- Make the Data label color into white
- 'Position' to be 'Inside End'
- Text Size to be '11'

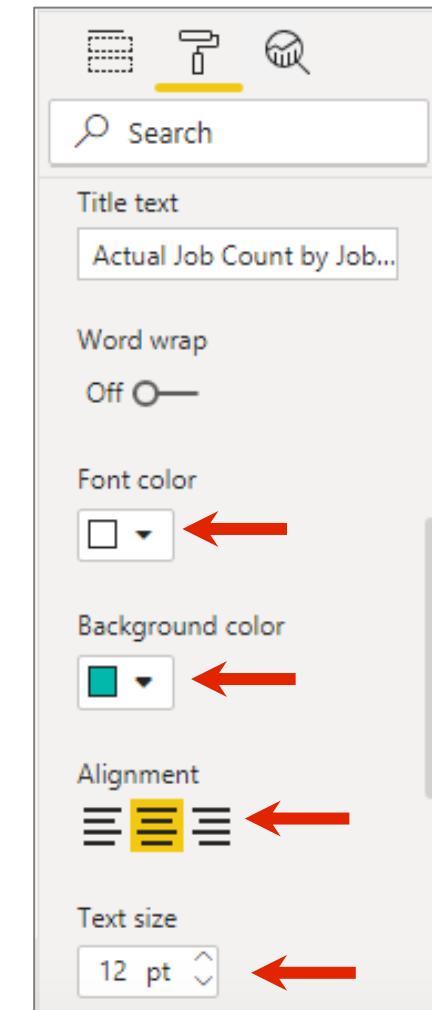
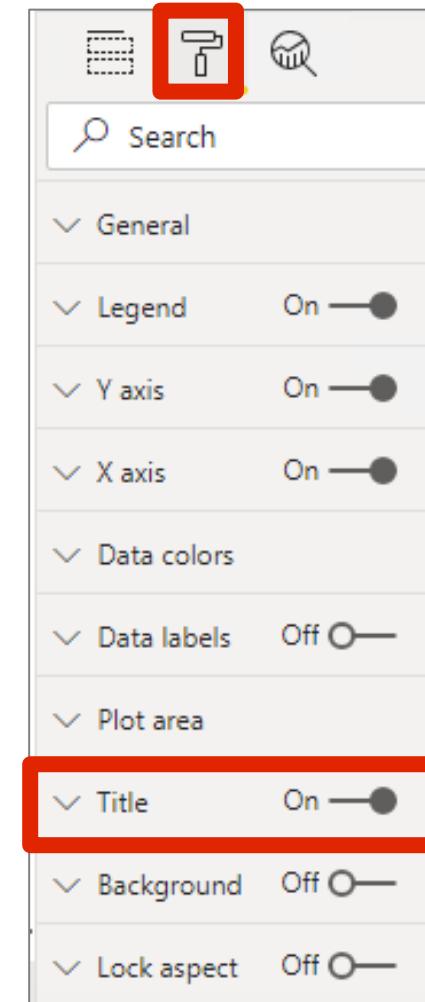


Add data labels

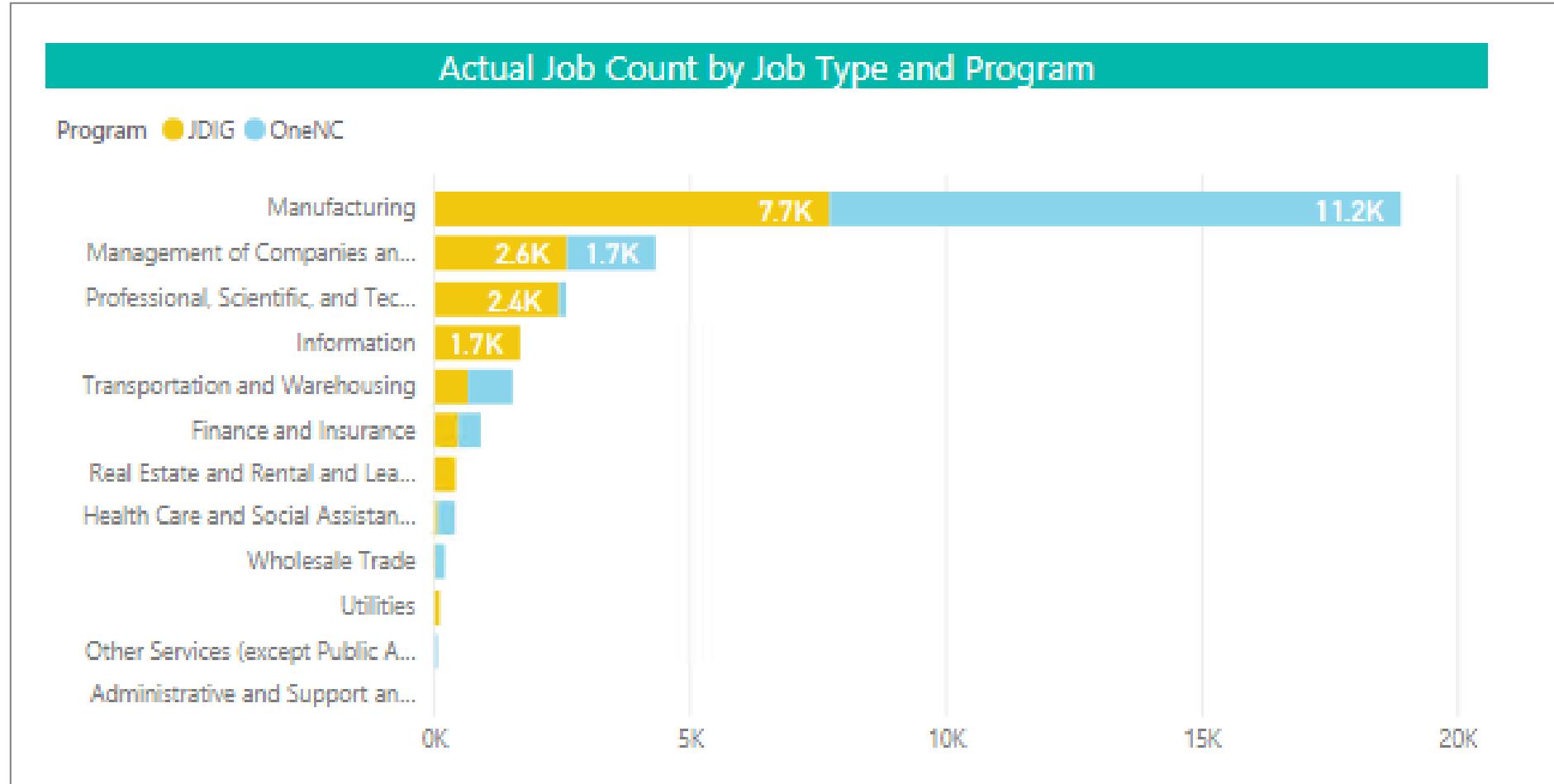


Title formatting

- Go to Format Tab in Visualizations
- Expand 'Title' section
- Make the font color into white, background color into green
- Alignment to be centered
- Text size to be '12' point font

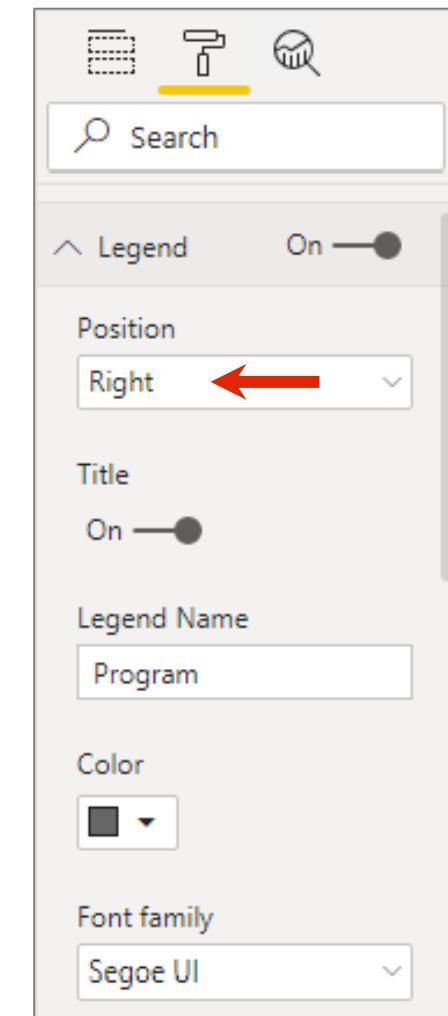
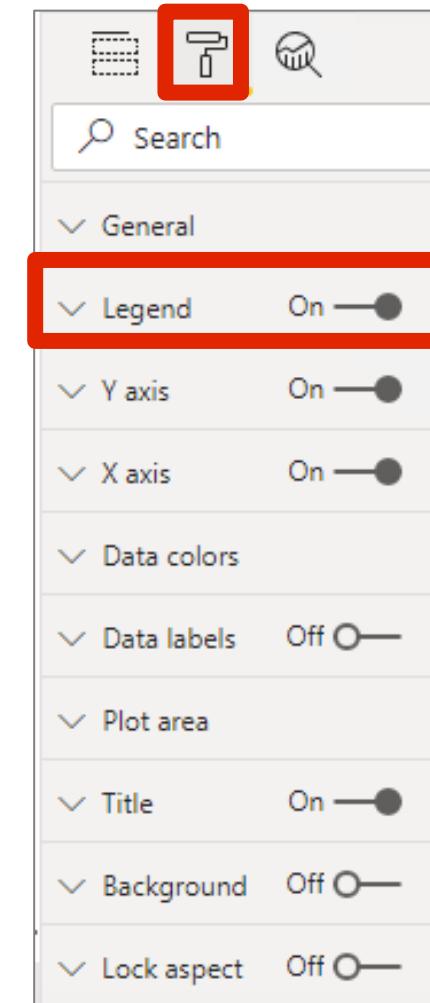


Title formatting

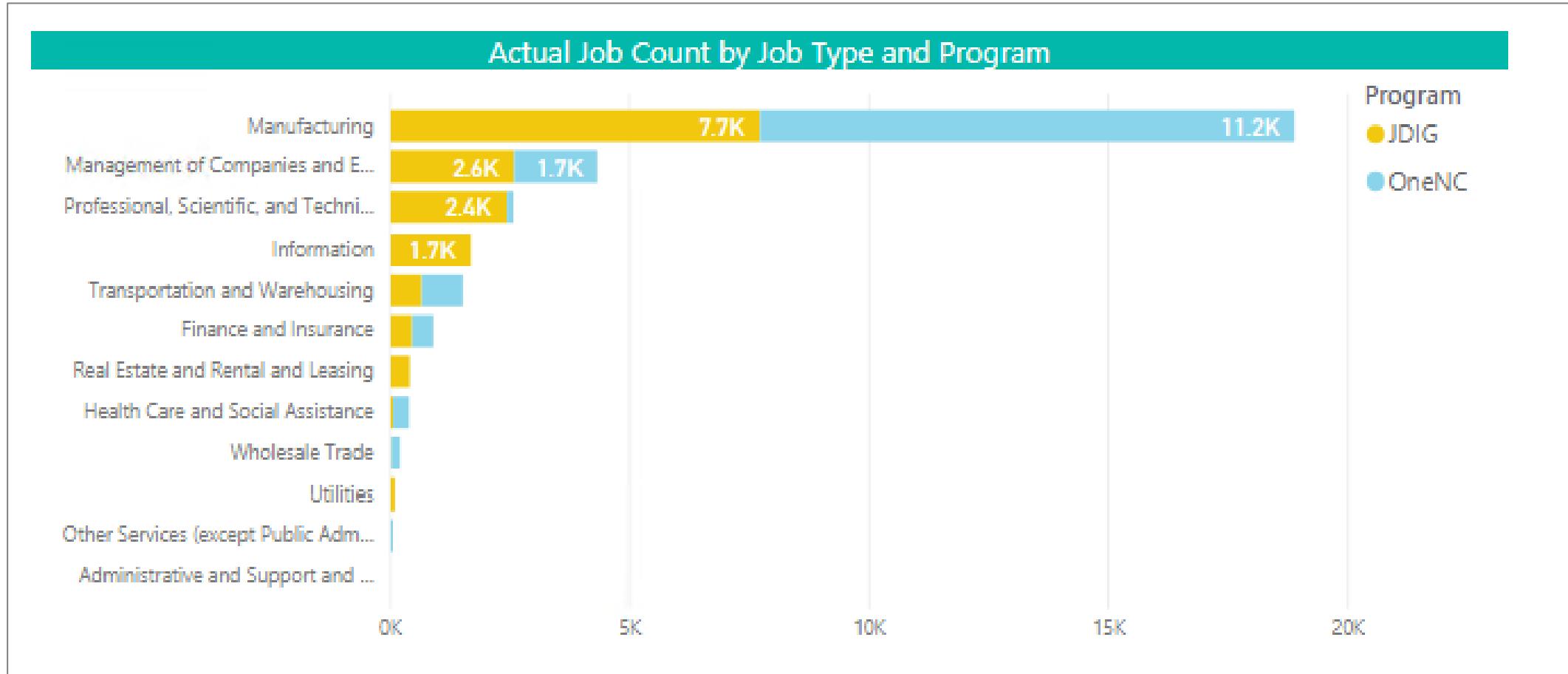


Adjust your legend

- Go to Format Tab in Visualizations
- Expand 'Legend' section
- Position to be 'Right'

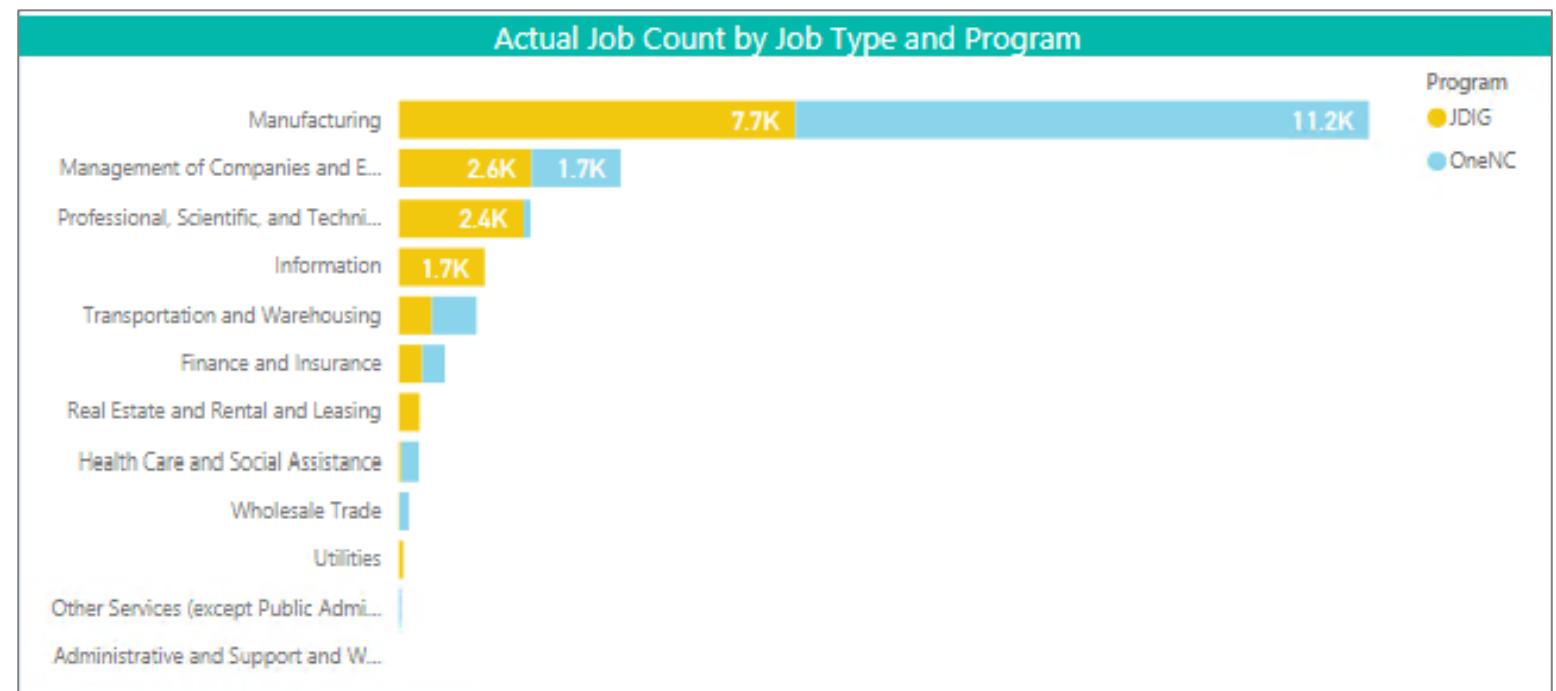
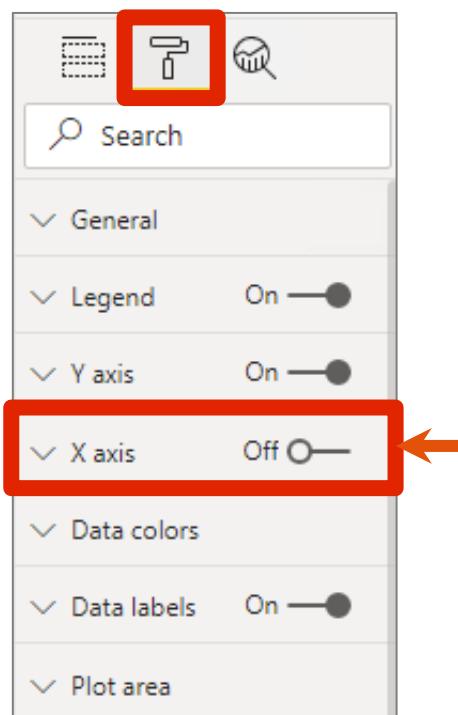


Adjust your legend



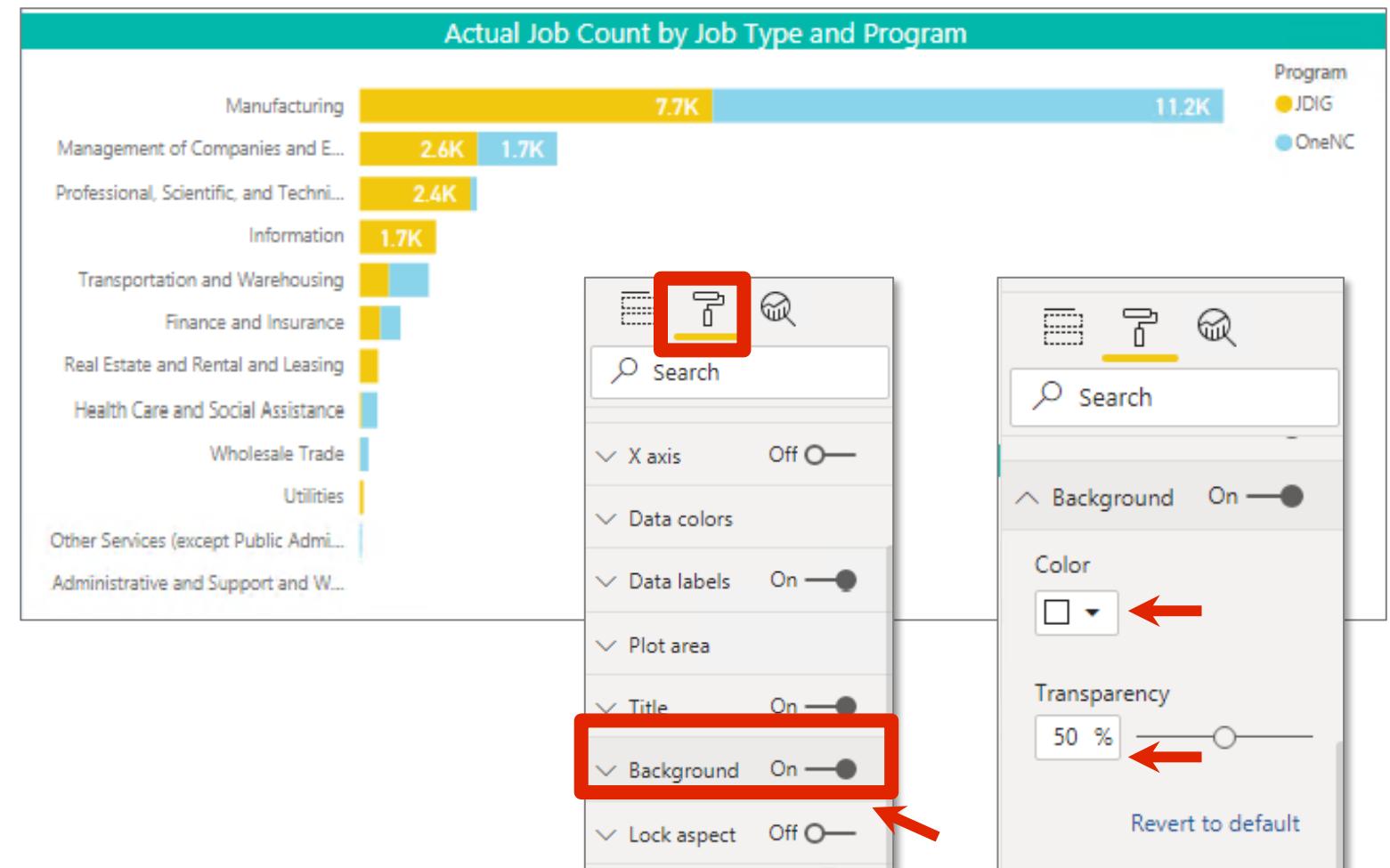
Remove x-axis

- Go to Format Tab in Visualizations, and turn off X axis



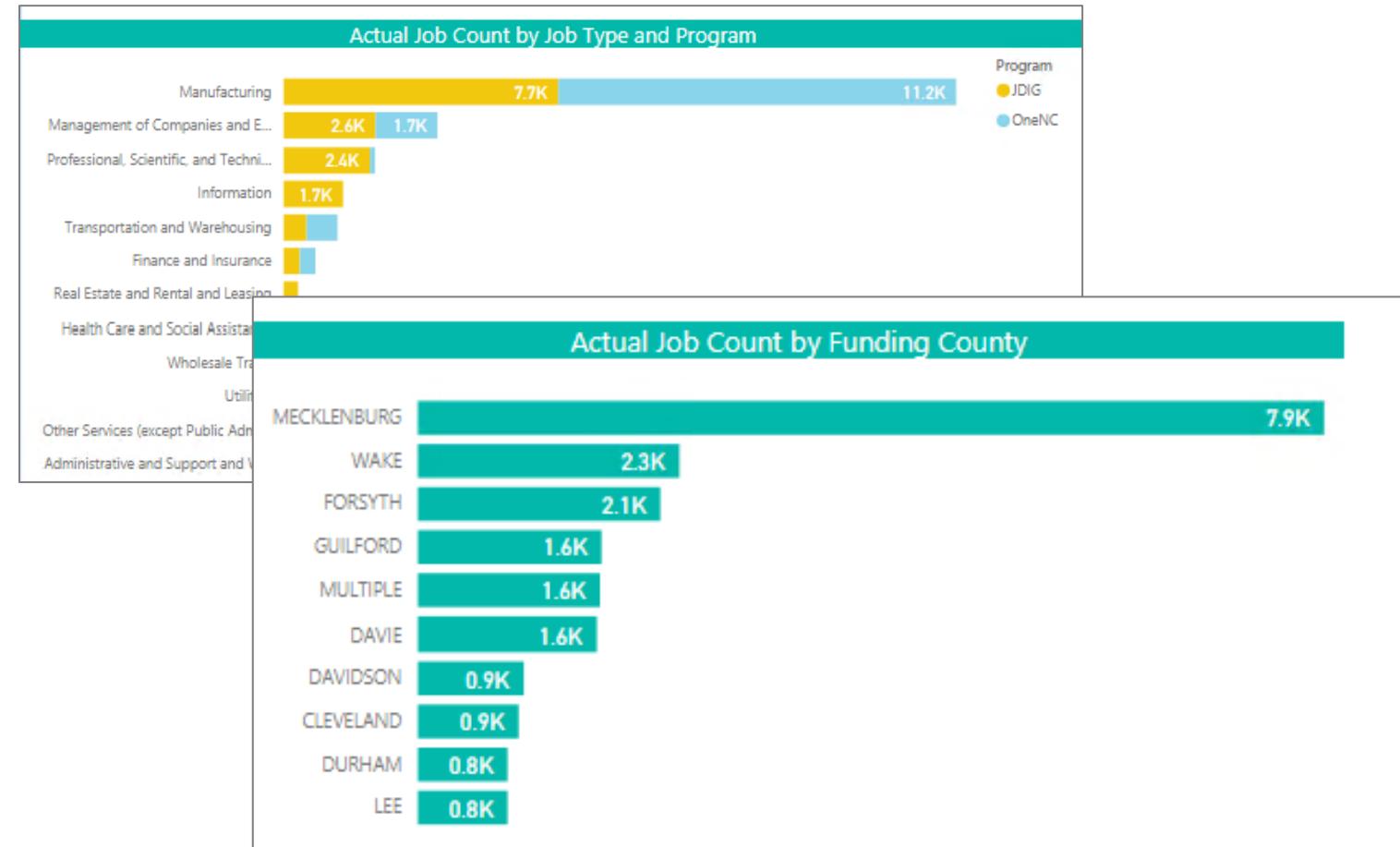
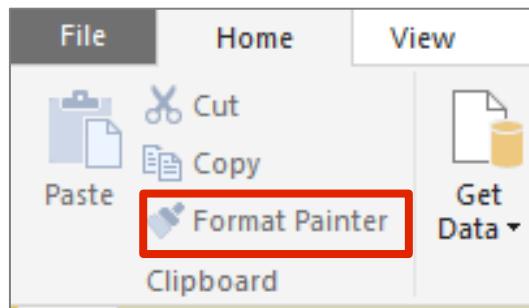
Add visual background

- Go to Format Tab and turn on Background
- Set the color to white, with 50% transparency



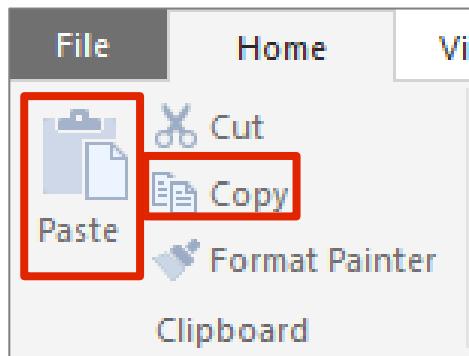
Format Lab 1 title the same way

- Use “Format Painter”

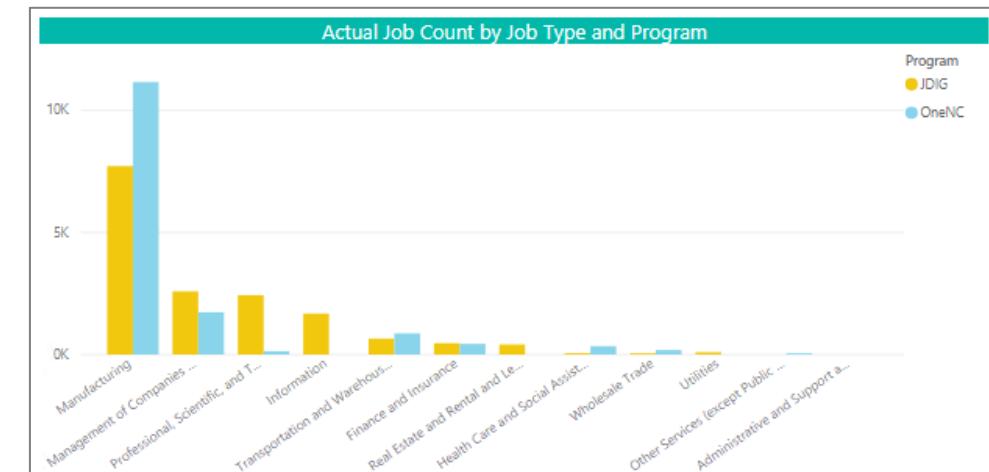
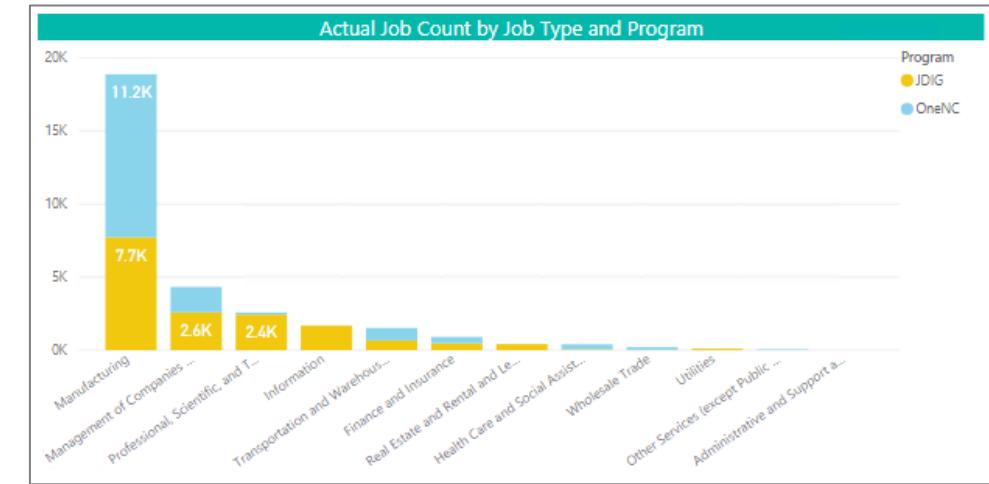
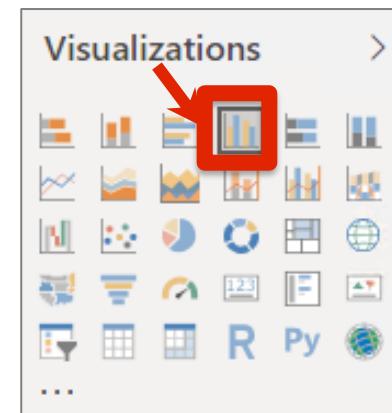
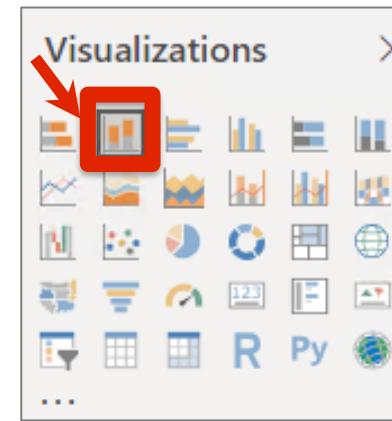


Switching charts

- Copy Paste chart
 - Copy paste the Bar Chart to the other areas of the Canvas

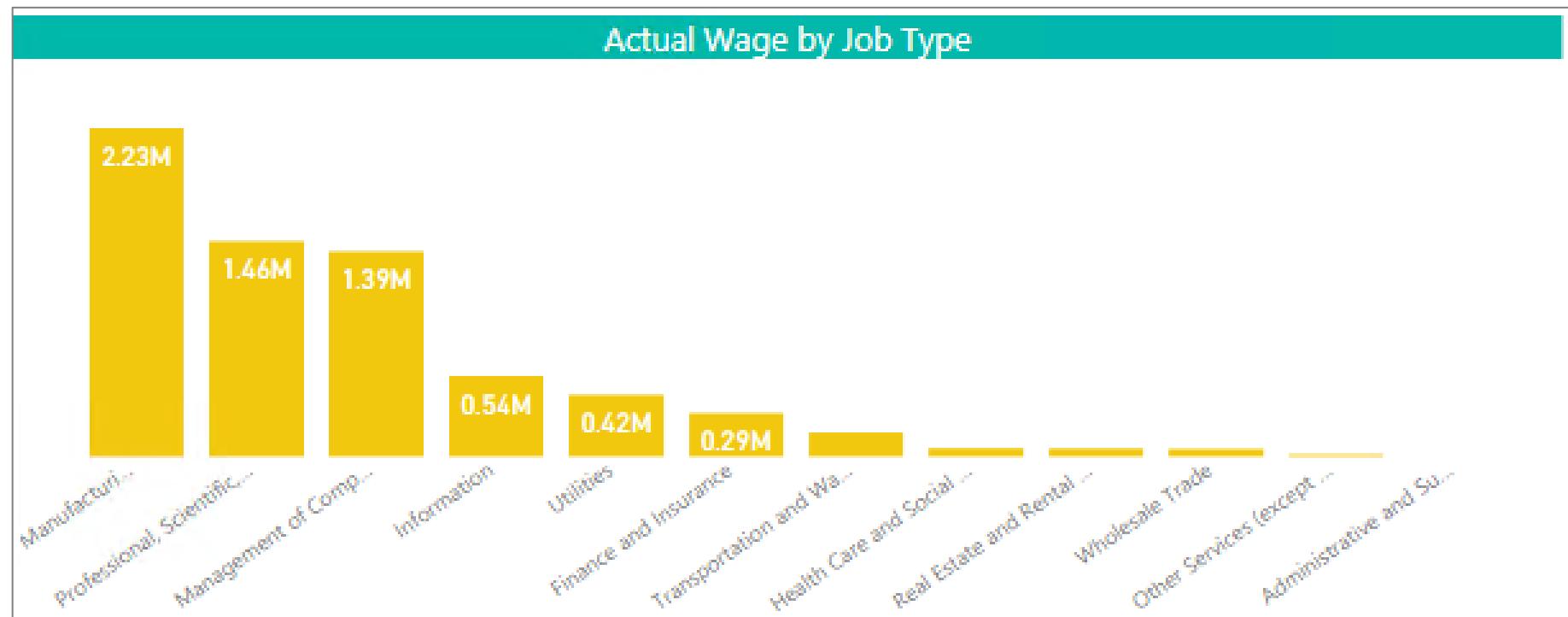


- Replace the visuals to another visual



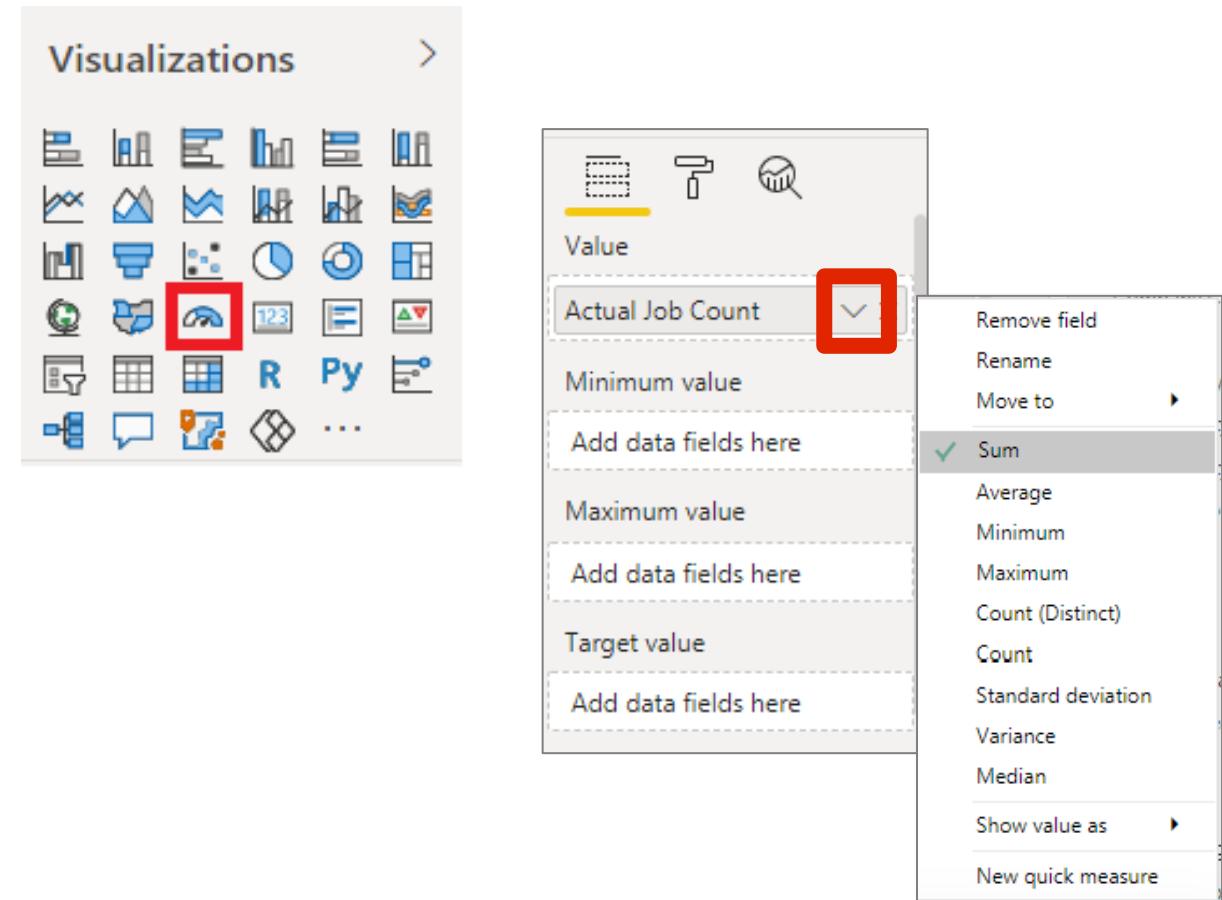
Class practice

- Create a bar chart of Actual Wage by Job type
- Format the chart to be visually appealing – get creative!



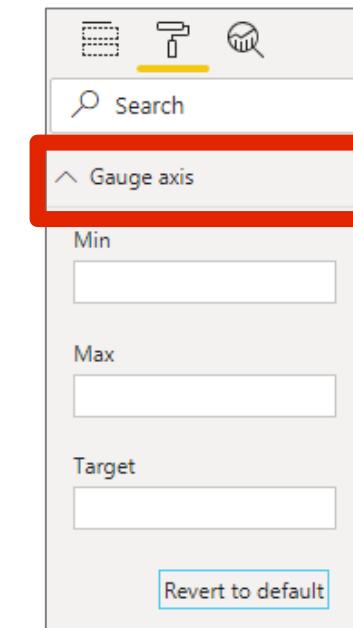
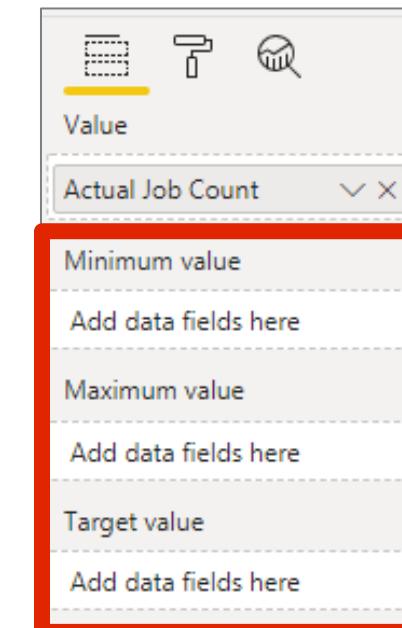
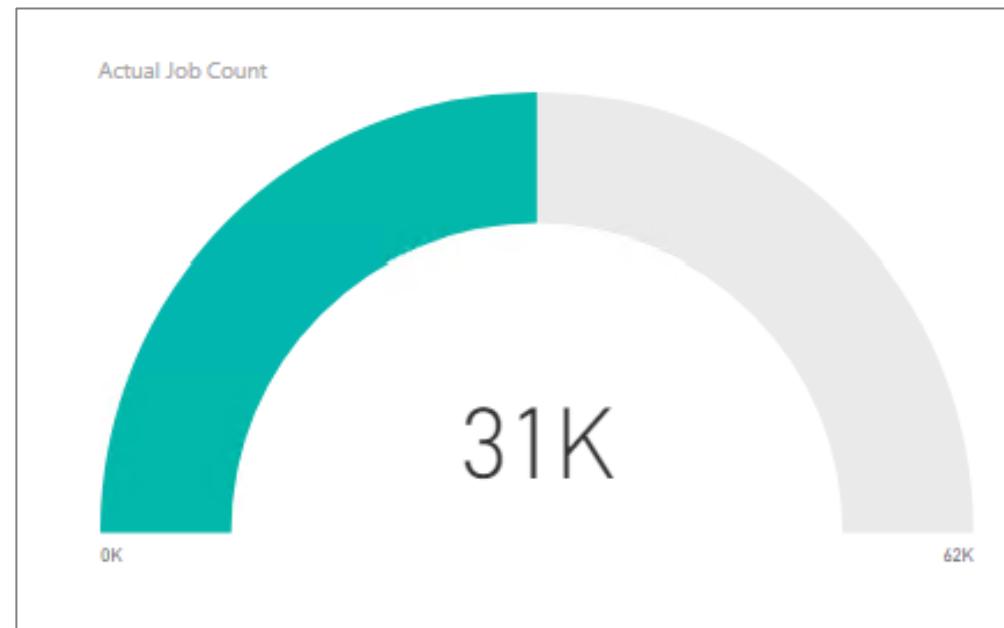
Radial gauge charts

- A radial gauge chart has a circular arc and displays a single value that measure progress towards a goal
- Gauges are a really good choice when you're building reports and want to show progress towards a goal like displaying actual job count



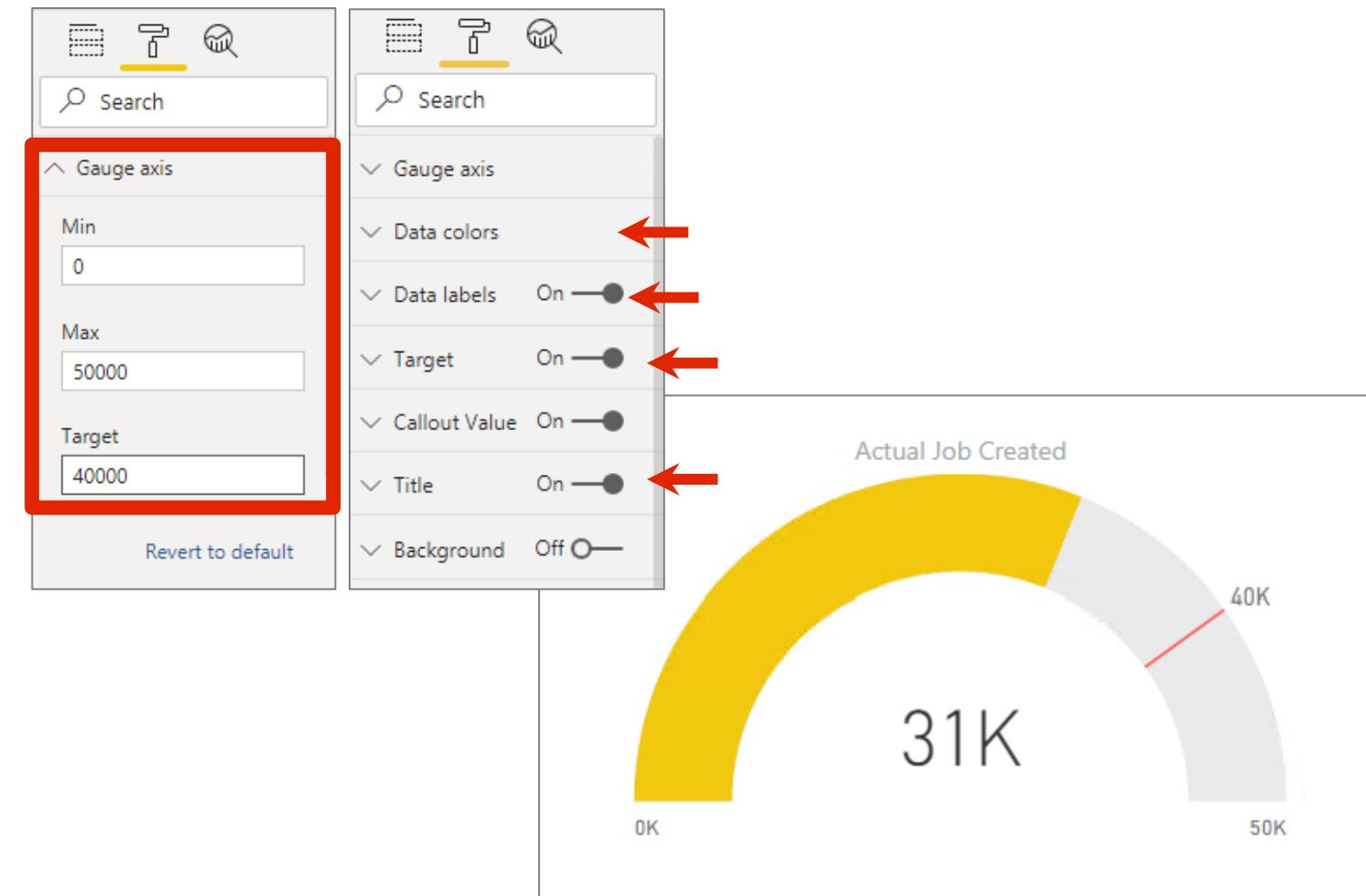
Formatting options for radial gauge

- You can add other fields to determine the maximum, minimum, and target value
- You can also use formatting options to customize these by just setting in a specific value



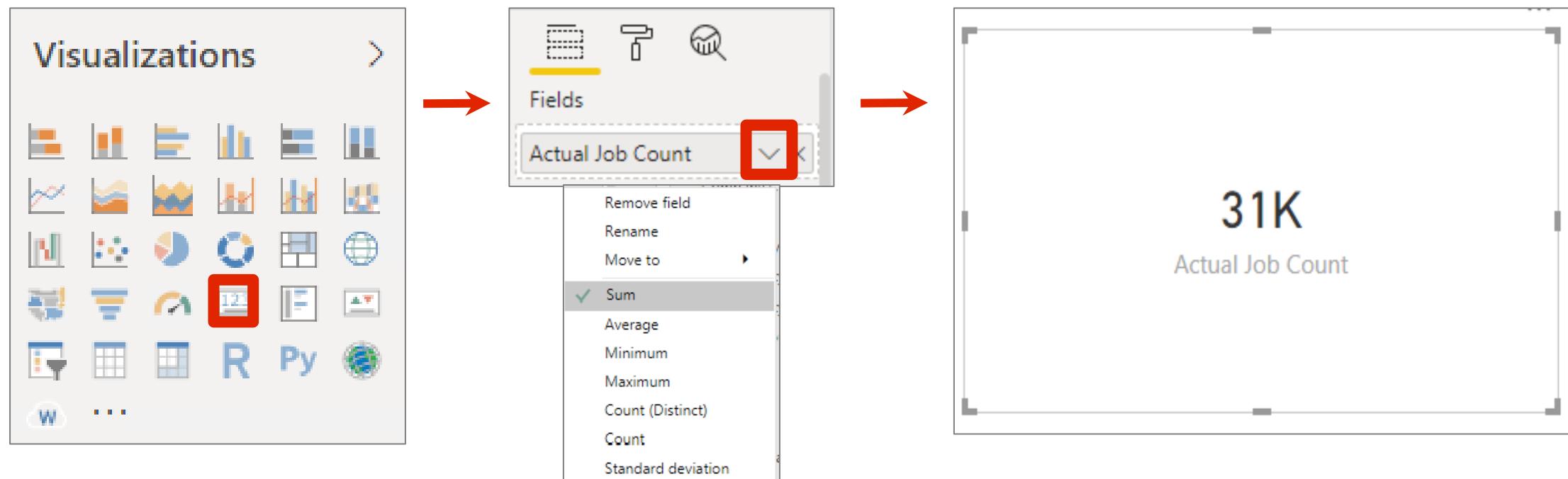
Setting your min, max and target

- Set minimum as 0
- Set maximum as 50,000
- Set target as 40,000

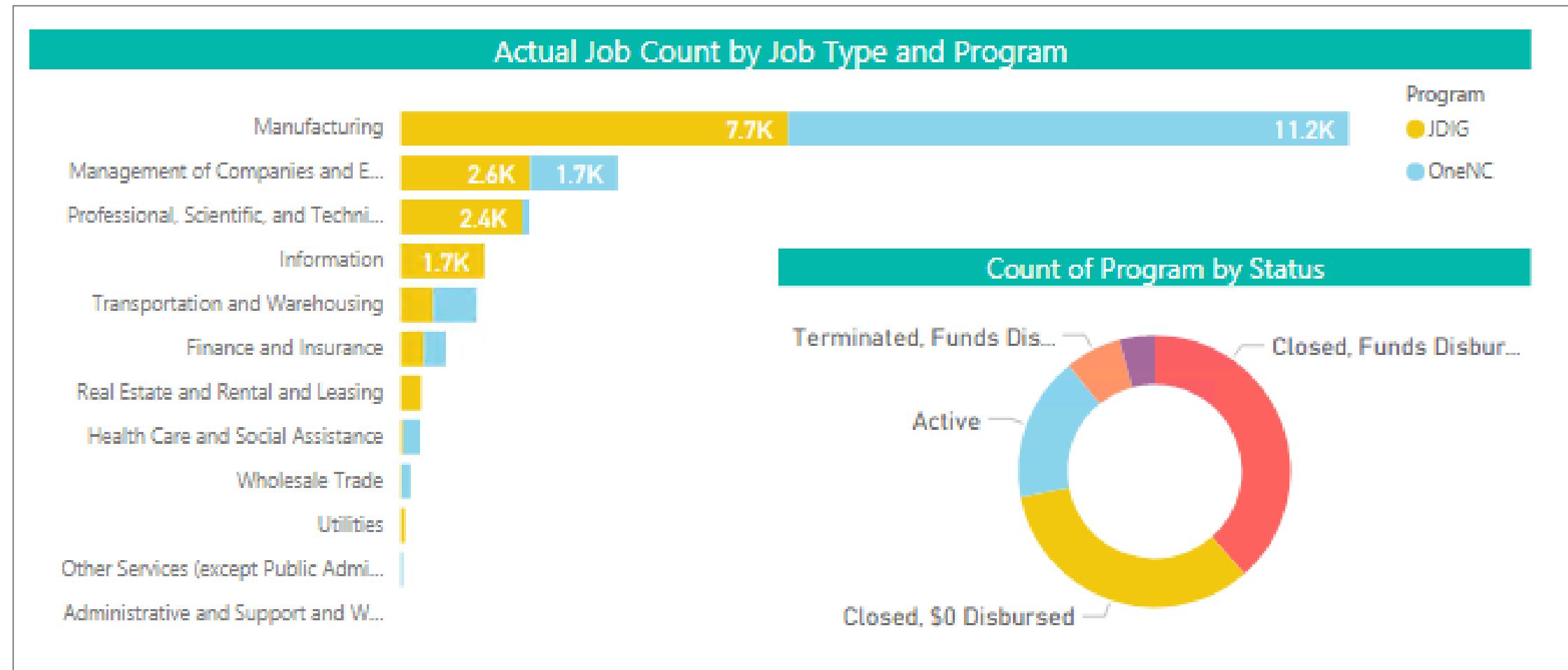


Card visualization

- A card can help you highlight a particular number or metric that you want your audience to see quickly and easily

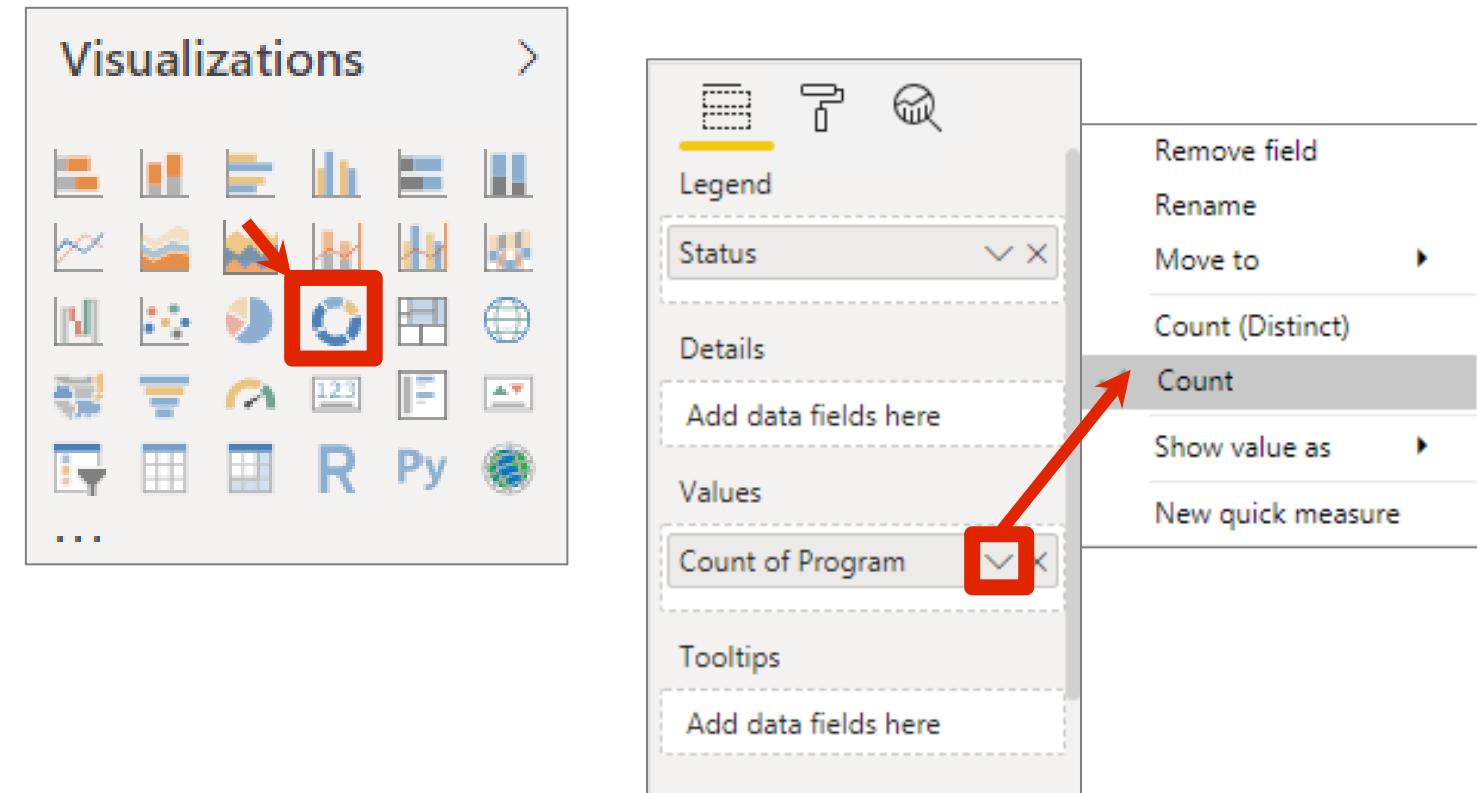


Visual overlay example

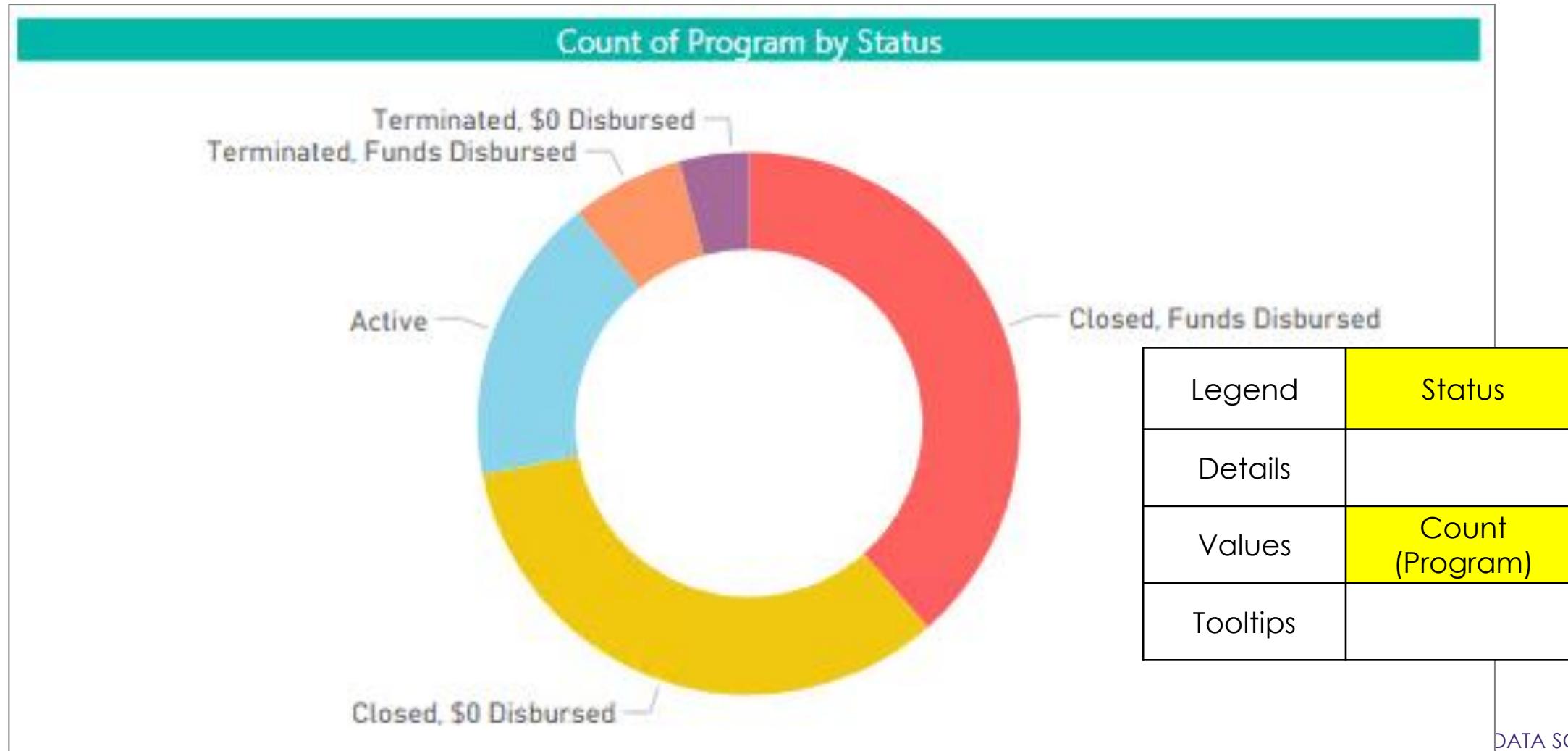


Create a doughnut chart

- A doughnut chart is like a pie chart in that it shows the relationship of parts to a whole
- The only difference is that the center is blank and allows space for a label or icon



Doughnut chart

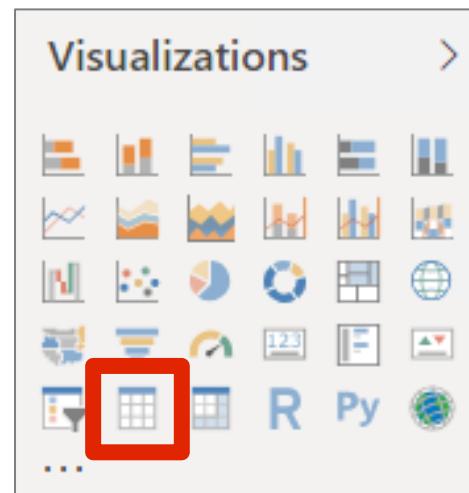


Create a detail table

- Create Another Page called 'Grant Details'



- Click on the blank area of the Canvas and then choose 'Table' Visual



The screenshot shows the 'Values' section of the Power BI Fields pane. A vertical list of fields is shown on the right, each with a yellow background. To the left of the list, the field names are repeated in black text next to a 'Values' label.

Values	Program
Program	Company
Company	Award Date
Award Date	Year
Year	Quarter
Quarter	Month
Month	Day
Day	Funding ID
Funding ID	Status
Status	Actual Job Count
Actual Job Count	Required Job Counts
Required Job Counts	

Detail table

Program	Company	Year	Quarter	Month	Day	Funding ID	Status	Actual Job Count	Required Job Counts
JDIG	A88 Inc.	2010	Qtr 3	September	9	1	Terminated, Funds Disbursed	156	130
JDIG	Ally Financial Inc. (f/k/a GMAC LLC)	2009	Qtr 1	March	20	1	Active	224	180
JDIG	American Roller Bearing Company of North Carolina	2011	Qtr 4	December	8	1	Terminated, Funds Disbursed	0	208
JDIG	AptarGroup, Inc.	2011	Qtr 2	May	16	1	Active	106	135
JDIG	ASCO Power Technologies, LP.	2009	Qtr 1	February	18	1	Terminated, Funds Disbursed	198	295
JDIG	Ashley Furniture Industries, Inc. I	2012	Qtr 2	April	20	1	Active	1229	468
JDIG	Avaya, Inc.	2011	Qtr 4	November	28	1	Terminated, \$0 Disbursed	0	135
JDIG	BAE Systems Shared Services Inc.	2010	Qtr 4	December	16	1	Active	169	158
JDIG	Bayer CropScience LP	2009	Qtr 2	May	6	1	Active	139	128
JDIG	Brunswick Corporation (Hatteras Yachts Division)	2010	Qtr 3	July	20	1	Terminated, Funds Disbursed	221	315
JDIG	Capgemini America, Inc.	2011	Qtr 1	January	13	1	Terminated, Funds Disbursed	255	495
JDIG	Caterpillar Inc. (Bee)	2012	Qtr 1	February	1	1	Terminated, Funds Disbursed	111	169
JDIG	Caterpillar Inc. (Butterfly)	2010	Qtr 3	August	5	1	Active	421	293
JDIG	Caterpillar Inc. (Camo)	2010	Qtr 3	July	30	1	Terminated, Funds Disbursed	269	353
JDIG	Celgard, LLC I	2010	Qtr 1	January	20	1	Terminated, Funds Disbursed	199	260

Format award date

- Click on the triangle icon by the 'Award Date' field under 'Values' of 'Visualization' Panel and change the 'Data Hierarchy' to 'Award Date' itself

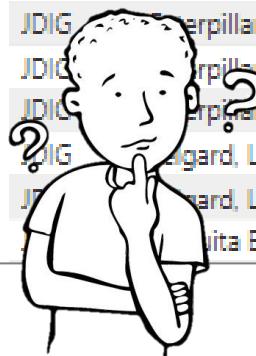
The screenshot shows the 'Award Date' field selected in the 'Values' section of the 'Visualization' panel. A context menu is open, with the 'Award Date' item highlighted and a red box around it. A red arrow points from this highlighted item to a list of dates on the right.

Award Date
Friday, March 20, 2009
Monday, May 16, 2011
Friday, April 20, 2012
Thursday, December 16, 2010
Wednesday, May 6, 2009
Thursday, August 5, 2010
Thursday, June 3, 2010
Thursday, June 7, 2012
Thursday, June 10, 2010
Monday, July 20, 2009
Monday, September 20, 2010
Wednesday, October 26, 2011
Thursday, August 13, 2009
Wednesday, December 16, 2009
Thursday, September 24, 2009
Wednesday, March 30, 2011
Wednesday, December 19, 2012
Friday, June 15, 2012
Wednesday, June 13, 2012

Adjusting data formats

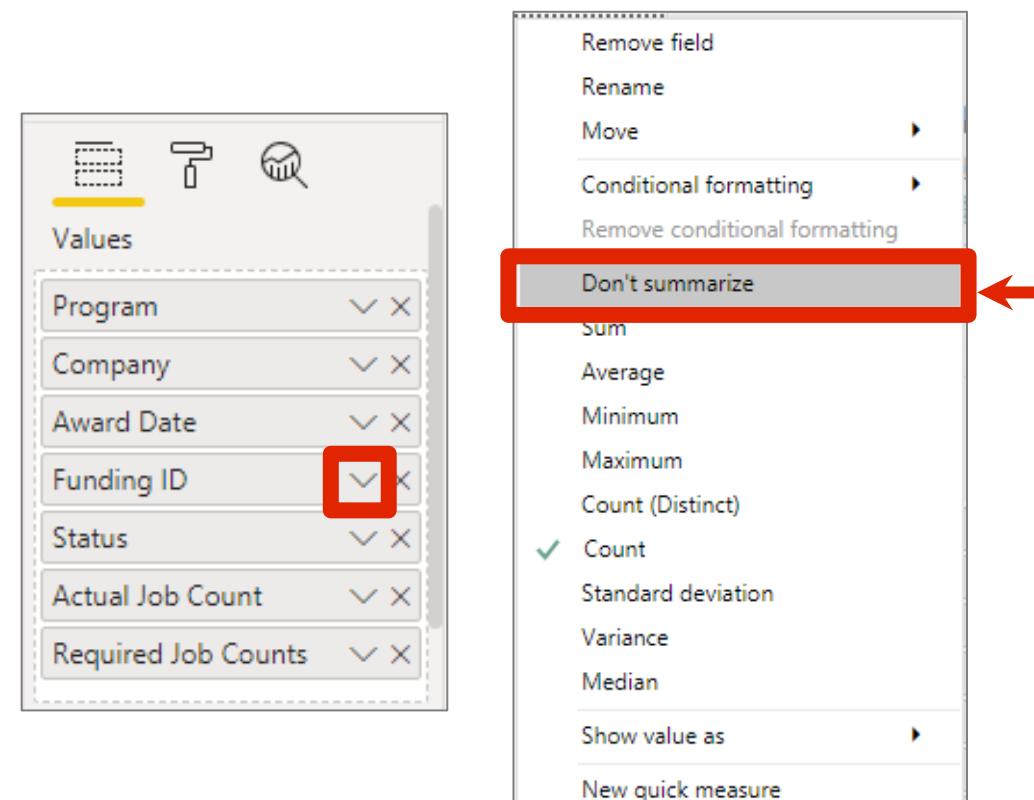
- How can we change the funding ID to a normal format?

Program	Company	Award Date	Funding ID	Status	Actual Job Count	Required Job Counts
JDIG	ABB Inc.	Thursday, September 9, 2010	1	Terminated, Funds Disbursed	156	130
JDIG	Ally Financial Inc. (f/k/a GMAC LLC)	Friday, March 20, 2009	1	Active	224	180
JDIG	American Roller Bearing Company of North Carolina	Thursday, December 8, 2011	1	Terminated, Funds Disbursed	0	208
JDIG	AptarGroup, Inc.	Monday, May 16, 2011	1	Active	106	135
JDIG	ASCO Power Technologies, LP.	Wednesday, February 18, 2009	1	Terminated, Funds Disbursed	198	295
JDIG	Ashley Furniture Industries, Inc. I	Friday, April 20, 2012	1	Active	1229	468
JDIG	Avaya, Inc.	Monday, November 28, 2011	1	Terminated, \$0 Disbursed	0	135
JDIG	BAE Systems Shared Services Inc.	Thursday, December 16, 2010	1	Active	169	158
JDIG	Bayer CropScience LP	Wednesday, May 6, 2009	1	Active	139	128
JDIG	Brunswick Corporation (Hatteras Yachts Division)	Tuesday, July 20, 2010	1	Terminated, Funds Disbursed	221	315
JDIG	Capgemini America, Inc.	Thursday, January 13, 2011	1	Terminated, Funds Disbursed	255	495
JDIG	Caterpillar Inc. (Bee)	Wednesday, February 1, 2012	1	Terminated, Funds Disbursed	111	169
JDIG	Caterpillar Inc. (Butterfly)	Thursday, August 5, 2010	1	Active	421	293
JDIG	Caterpillar Inc. (Camo)	Friday, July 30, 2010	1	Terminated, Funds Disbursed	269	353
JDIG	Cegard, LLC I	Wednesday, January 20, 2010	1	Terminated, Funds Disbursed	199	260
JDIG	Cegard, LLC II	Monday, July 25, 2011	1	Terminated, \$0 Disbursed	0	225
JDIG	Chiquita Brands International, Inc.	Tuesday, November 29, 2011	1	Terminated, Funds Disbursed	281	375



Create a detail table

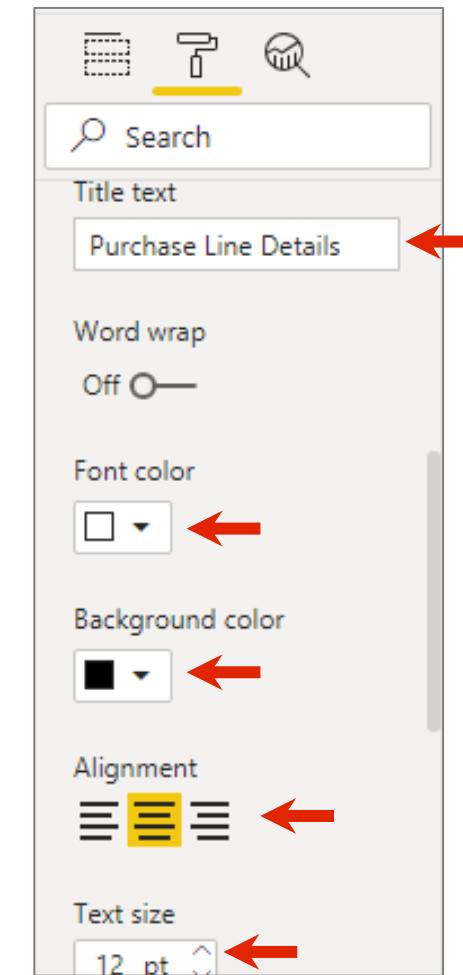
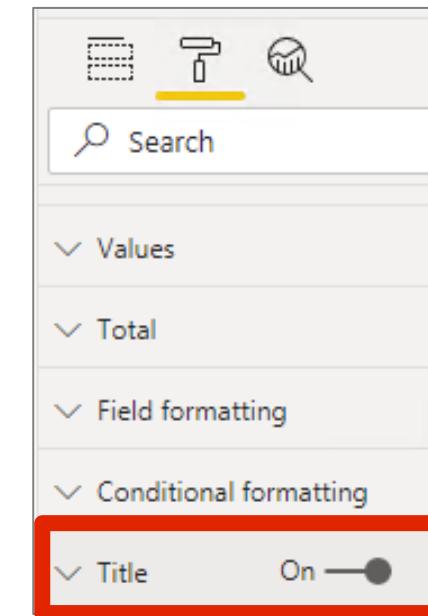
- Click on the triangle icon by the 'Funding ID' field under 'Values' of 'Visualization' Panel and change the calculation method from 'Count' to 'Don't summarize'



Funding ID
146
355
437
306
157
263
247
446
248
173
277
390
174
203
181
335

Add a table title

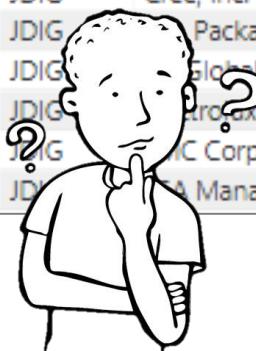
- Go to Format Tab and turn 'Title' on
 - Put 'Purchase Line Details' in Title Text
 - Make the font color into white, background color into black
 - Alignment to be center
 - And text size to be '12'



Conditional formatting

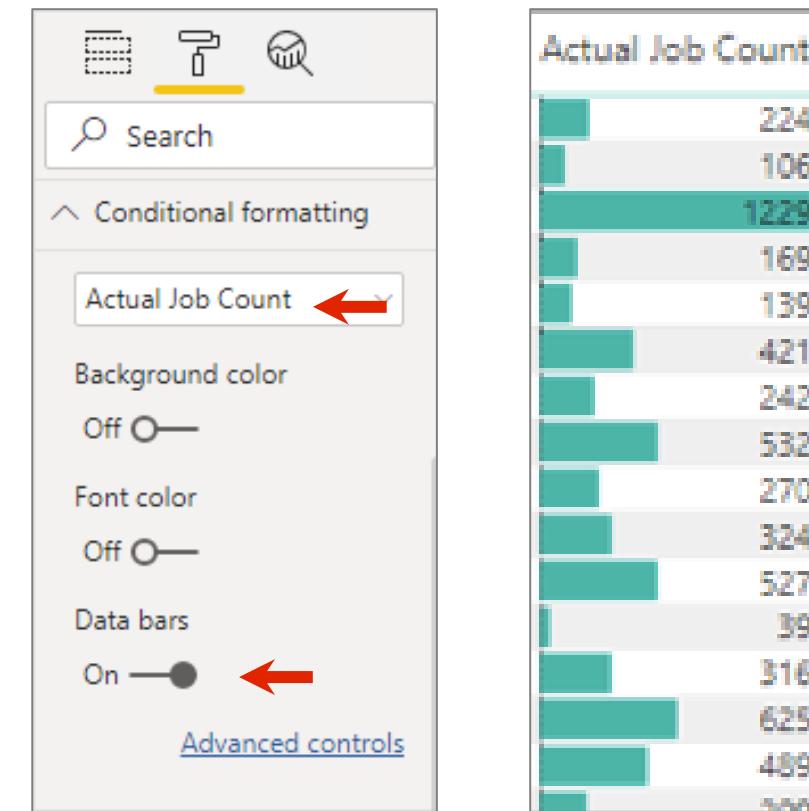
- Can we apply conditional formatting on 'Actual Job Count' column?

Purchase Line Details						
Program	Company	Award Date	Funding ID	Status	Actual Job Count	Required Job Counts
JDIG	Ally Financial Inc. (f/k/a GMAC LLC)	Friday, March 20, 2009	146	Active	224	180
JDIG	AptarGroup, Inc.	Monday, May 16, 2011	355	Active	106	135
JDIG	Ashley Furniture Industries, Inc. I	Friday, April 20, 2012	437	Active	1229	468
JDIG	BAE Systems Shared Services Inc.	Thursday, December 16, 2010	306	Active	169	158
JDIG	Bayer CropScience LP	Wednesday, May 6, 2009	157	Active	139	128
JDIG	Caterpillar Inc. (Butterfly)	Thursday, August 5, 2010	263	Active	421	293
JDIG	Citco Fund Services (USA) Inc.	Thursday, June 3, 2010	247	Active	242	232
JDIG	Citrix Systems, Inc.	Thursday, June 7, 2012	446	Active	532	286
JDIG	Clearwater Paper Corporation I	Thursday, June 10, 2010	248	Active	270	225
JDIG	Continental Automotive Systems, Inc. (Henderson)	Monday, July 20, 2009	173	Active	324	304
JDIG	Cree, Inc. II	Monday, September 20, 2010	277	Active	527	220
JDIG	Packaging USA, Inc.	Wednesday, October 26, 2011	390	Active	39	118
JDIG	Global Technology, Inc. I	Thursday, August 13, 2009	174	Active	316	287
JDIG	Microtex Home Products, Inc. I	Wednesday, December 16, 2009	203	Active	625	590
JDIG	IC Corporation	Thursday, September 24, 2009	181	Active	489	357
JDIG	QA Management, LLC	Wednesday, March 30, 2011	335	Active	209	153



Conditional formatting for 'Actual Job Count'

- In the 'Format' tab, you can also see the 'Conditional Formatting' option showed up
- In the column drop down list, choose 'Actual Job Count'
- Turn on the Data Bars



Formatted 'Actual Job Count'

Purchase Line Details						
Program	Company	Award Date	Funding ID	Status	Actual Job Count	Required Job Counts
JDIG	Ally Financial Inc. (f/k/a GMAC LLC)	Friday, March 20, 2009	146	Active	224	180
JDIG	AptarGroup, Inc.	Monday, May 16, 2011	355	Active	106	135
JDIG	Ashley Furniture Industries, Inc. I	Friday, April 20, 2012	437	Active	1229	468
JDIG	BAE Systems Shared Services Inc.	Thursday, December 16, 2010	306	Active	169	158
JDIG	Bayer CropScience LP	Wednesday, May 6, 2009	157	Active	139	128
JDIG	Caterpillar Inc. (Butterfly)	Thursday, August 5, 2010	263	Active	421	293
JDIG	Citco Fund Services (USA) Inc.	Thursday, June 3, 2010	247	Active	242	232
JDIG	Citrix Systems, Inc.	Thursday, June 7, 2012	446	Active	532	286
JDIG	Clearwater Paper Corporation I	Thursday, June 10, 2010	248	Active	270	225
JDIG	Continental Automotive Systems, Inc. (Henderson)	Monday, July 20, 2009	173	Active	324	304
JDIG	Cree, Inc. II	Monday, September 20, 2010	277	Active	527	220
JDIG	CTL Packaging USA, Inc.	Wednesday, October 26, 2011	390	Active	39	118
JDIG	DB Global Technology, Inc. I	Thursday, August 13, 2009	174	Active	316	287
JDIG	Electrolux Home Products, Inc. I	Wednesday, December 16, 2009	203	Active	625	590
JDIG	EMC Corporation	Thursday, September 24, 2009	181	Active	489	357
JDIG	ESA Management, LLC	Wednesday, March 30, 2011	335	Active	209	153
JDIG	Gildan Yarns, LLC I	Wednesday, December 19, 2012	495	Active	165	153
JDIG	GKN Driveline North America, Inc. I (Roxboro)	Friday, June 15, 2012	452	Active	231	124
JDIG	Hamilton Sundstrand Corporation	Wednesday, June 13, 2012	447	Active	274	293
JDIG	Herbalife International of America, Inc. I	Wednesday, December 19, 2012	496	Active	493	444
JDIG	Hewitt Associates L.L.C. (d/b/a Aon Hewitt)	Wednesday, March 31, 2010	229	Active	431	417
JDIG	Husqvarna Professional Products, Inc.	Thursday, January 7, 2010	209	Active	169	144
JDIG	Inmar, Inc.	Thursday, April 26, 2012	440	Active	114	191
JDIG	Innovative Emergency Management, Inc.	Monday, December 14, 2009	200	Active	42	387
JDIG	JELD-WEN, inc. I	Thursday, December 13, 2012	493	Active	154	135
JDIG	Klausner Lumber Two LLC	Wednesday, December 19, 2012	497	Active	43	315
JDIG	Leviton Manufacturing Co., Inc.	Monday, September 10, 2012	471	Active	205	137
JDIG	Linamar North Carolina, Inc. I	Thursday, June 30, 2011	364	Active	189	327
JDIG	Linamar North Carolina, Inc. II	Thursday, June 21, 2012	456	Active	0	225
Total					31054	46225

Knowledge Check 1



Lab 2 – part 1



Save Lab 2

- Save your report by choose 'File' -> 'Save as' to a new file 'Lab 2'
- Next, we will continue building on the Lab 2 report

Next, we'll learn how to:

1. Create interactive visualizations
2. Build an ETL layer: load data through Power Query

Outline for today

1. Building a BI report with formatting techniques
2. Building a complex BI report with interactive visualizations

Objectives for Lab 2: Continued

- Understanding and utilizing filters to analyze your data
- Learn how to create custom and interactive visuals
- Understand how to use gridlines and phone layout
- Master visual alignment for your report layout

What is a filter?

- The Power BI Report layer allows for the use of filters. Filter are used to filter the charts present in all pages of your report. This is a very helpful tool to narrow down your research interest to analyze a segment of your data
- In this section, we will learn about four types of filters:
 1. Visual Level Filters
 2. Page Level Filter
 3. Report Level Filter
 4. Drill through filter

Different types of filters

- **Visual Level:** filter a specific visual
- **Page Level:** filter an entire page (this is a type of filter which affects the entire visuals in one page)
- **Report Level:** filter an entire report (This is a type of filter which affects the entire visuals in all pages in one report)
- **Drill Through:** create a destination report page that focuses on a specific entity

Recap: North Carolina (NC) grant data

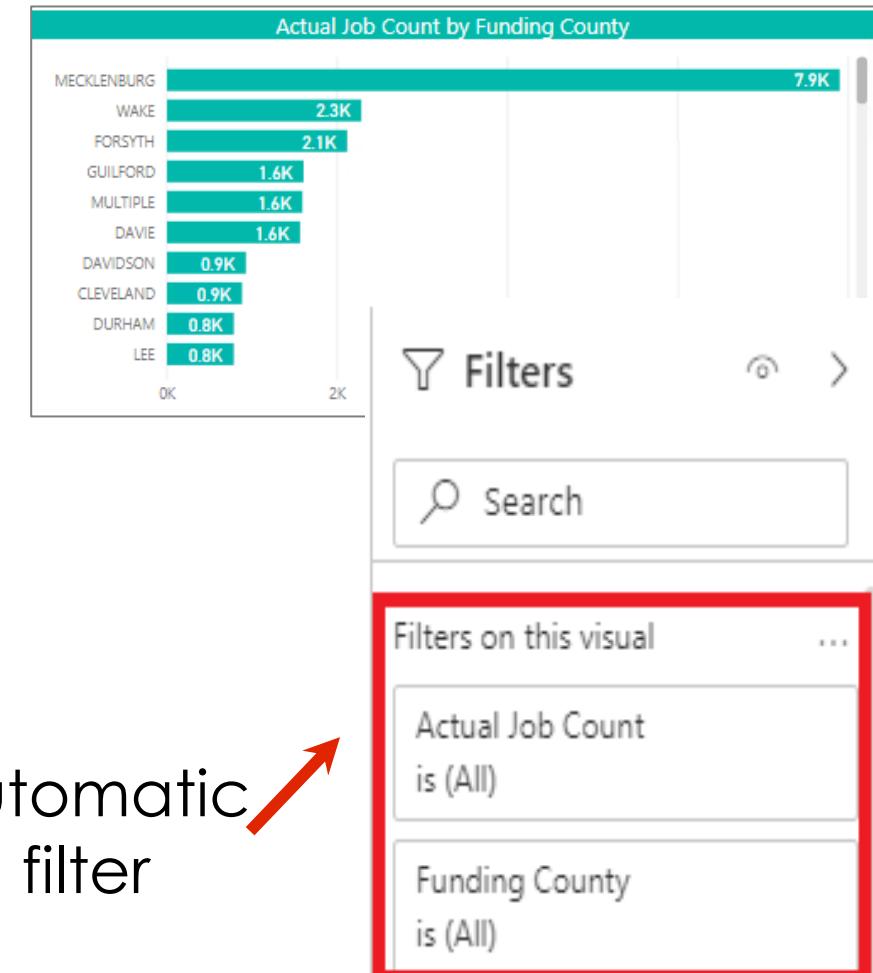
The NC state government gave \$4,000,000 in grant money from 2009 to 2013. The grant manager from the NC office of grants is interested to know how many jobs were created in each funded county from 2009 to 2013. With this information, the grants manager will be able to see where the grant money made the most impact

The grant manager wants to see a Power BI report of the following:

- **Count of Company** by Funding County (bar chart)
- **Funding County** by the count of Company, sorted
- **Award Date** as the slicer to select the needed time period

Using Visual Filter

- **Visual level** filters are the most powerful filters in Power BI, exclusive of custom filter options that can be specified
- Click on the 'Actual Job Count' by 'Funding County' bar chart we have created in lab 1
- Then go to 'Filters' Panel and find 'Filters on this visual' section
- You can see visual level filters have all the fields in the Bar chart and you can change filter setting to them or add new filters from the data model



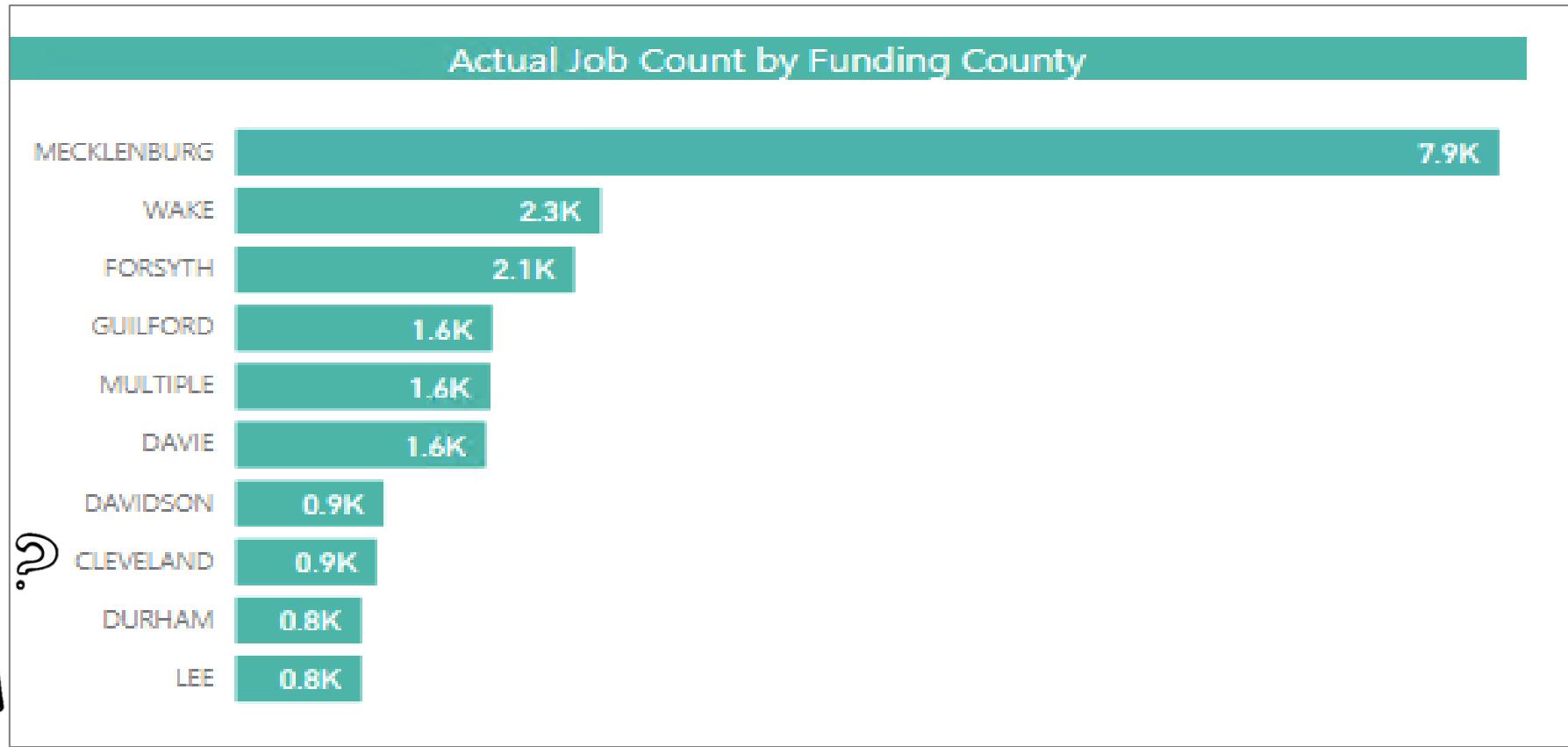
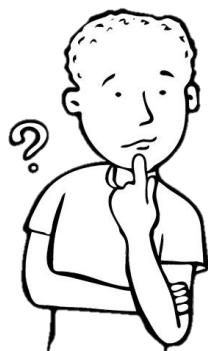
Applying the filter

- Click on the downward facing arrow on the right of 'Funding County' in the Visual Level filters section, Choose 'Top N' under Filter Type
- Then put 10 after 'Show Items:' Top
- Drag 'Actual Job Count' from Fields Panel to 'Under By value' section
- Don't forget to click on 'Apply filter'

The screenshot shows the 'Filters on this visual' pane in Power BI. It includes sections for 'Actual Job Count' (is (All)), 'Funding County' (is (All)), and a dropdown for 'Filter type'. The 'Filter type' dropdown is set to 'Top N', which is highlighted with a red box. Below it, 'Show items:' is set to 'Top' with a value of 10. To the right, a 'By value' section has 'Actual Job Count' selected with a green checkmark, and 'Sum' is chosen from a list of aggregation functions. Other options like 'Average', 'Minimum', 'Maximum', 'Count (Distinct)', 'Count', 'Standard deviation', 'Variance', and 'Median' are also listed.

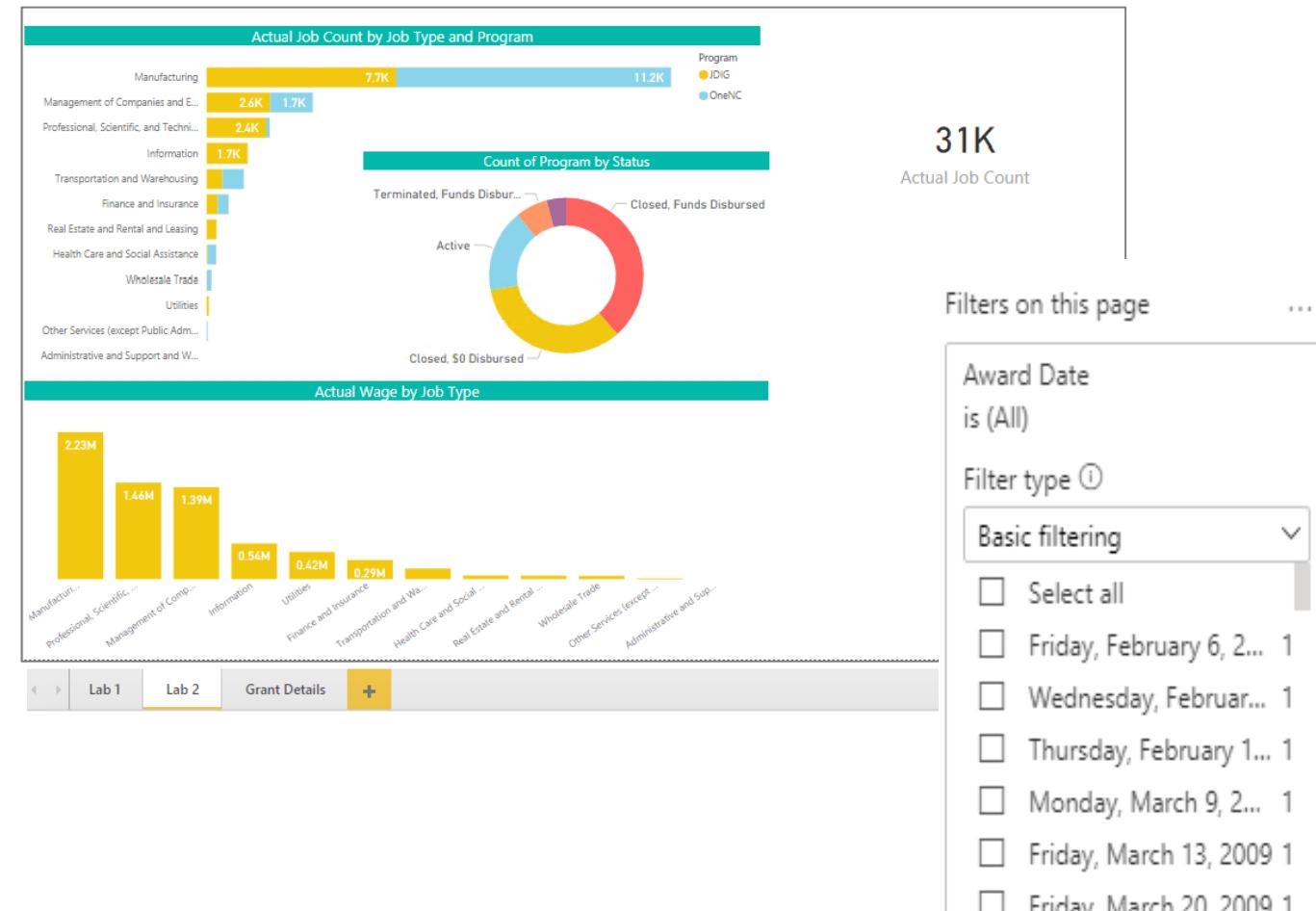
Investigate the data

- Which top 10 counties created the most jobs?



Using a Page Level filter

- Click on the Lab 2 Page we created in the last session
- Then, go to 'Filters' Panel and find 'Filters on this page' section
- Drag 'Award Date' in the 'Filters on this page'



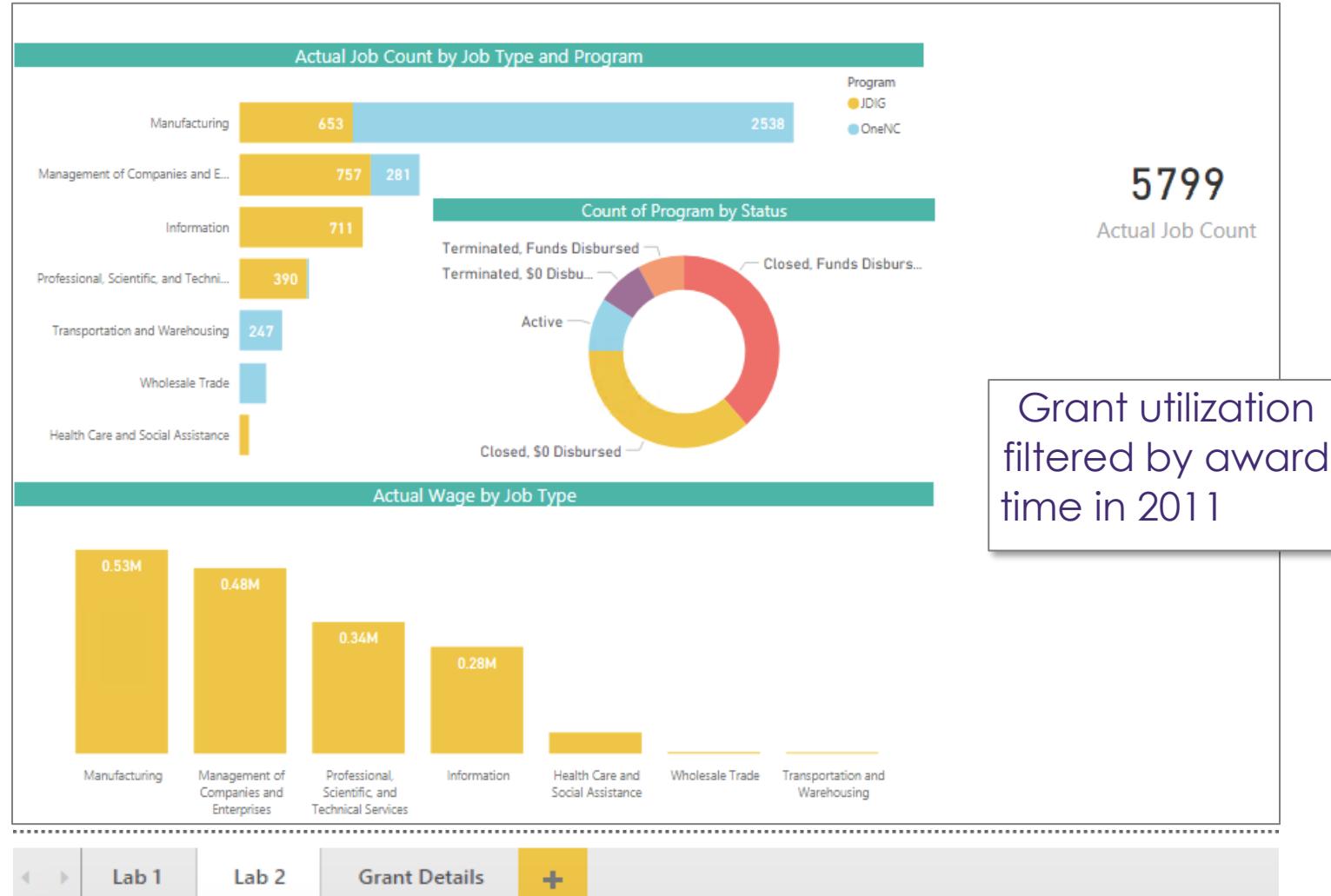
Filter by 'Award Date'

- Choose 'Advanced filtering' under Filter Type
- Put Show items when the value:
Is on or before 12/31/2011
And
Is on or after 1/1/2011

The screenshot illustrates the process of applying advanced filtering in Power BI. It shows three main views of the 'Award Date' filter:

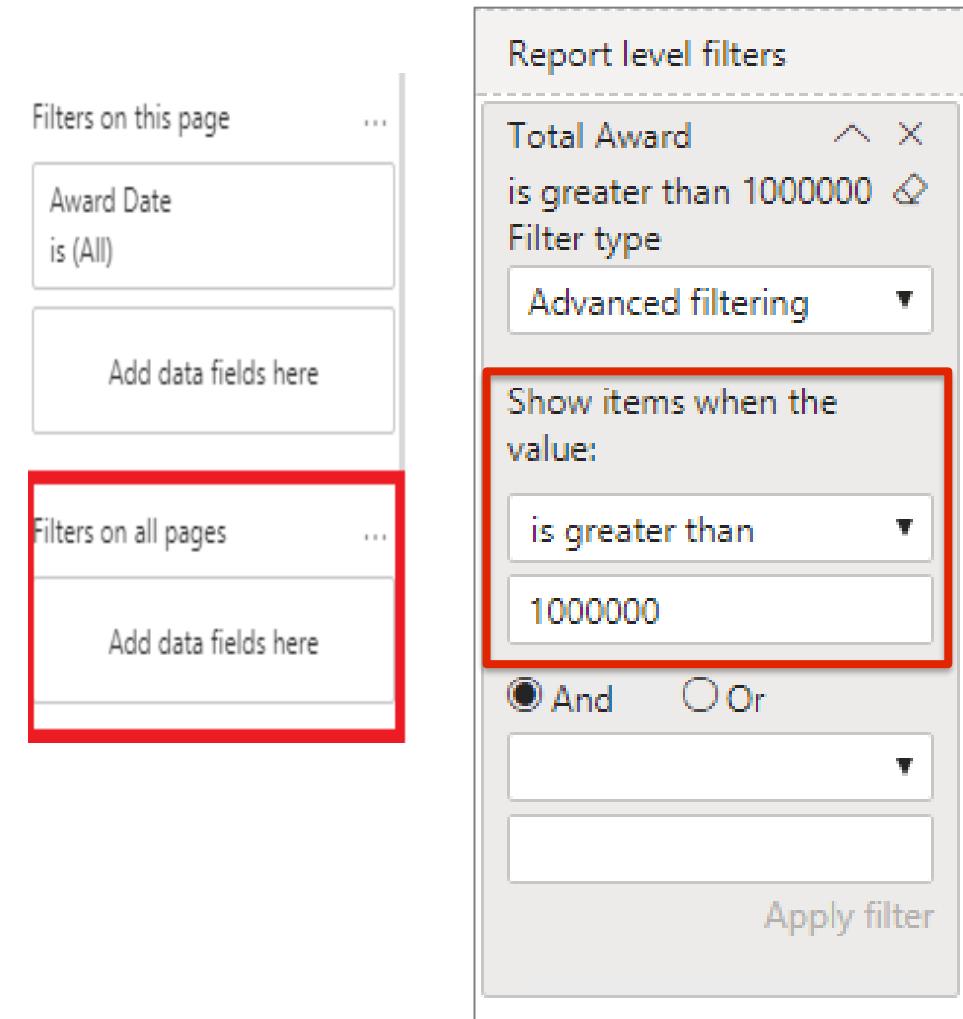
- Left View:** Shows the 'Basic filtering' dropdown open, listing various date options like 'Select all', 'Friday, February 6, 2011', etc.
- Middle View:** Shows the 'Filter type' dropdown open, with 'Advanced filtering' selected (indicated by a blue arrow).
- Right View:** Shows the 'Show items when the value' dropdown open, with two conditions set:
 - 'is on or before' set to 12/31/2011 at 12:00 AM.
 - 'is on or after' set to 1/1/2011 at 12:00 AM.

Filtered by 'Award Date'

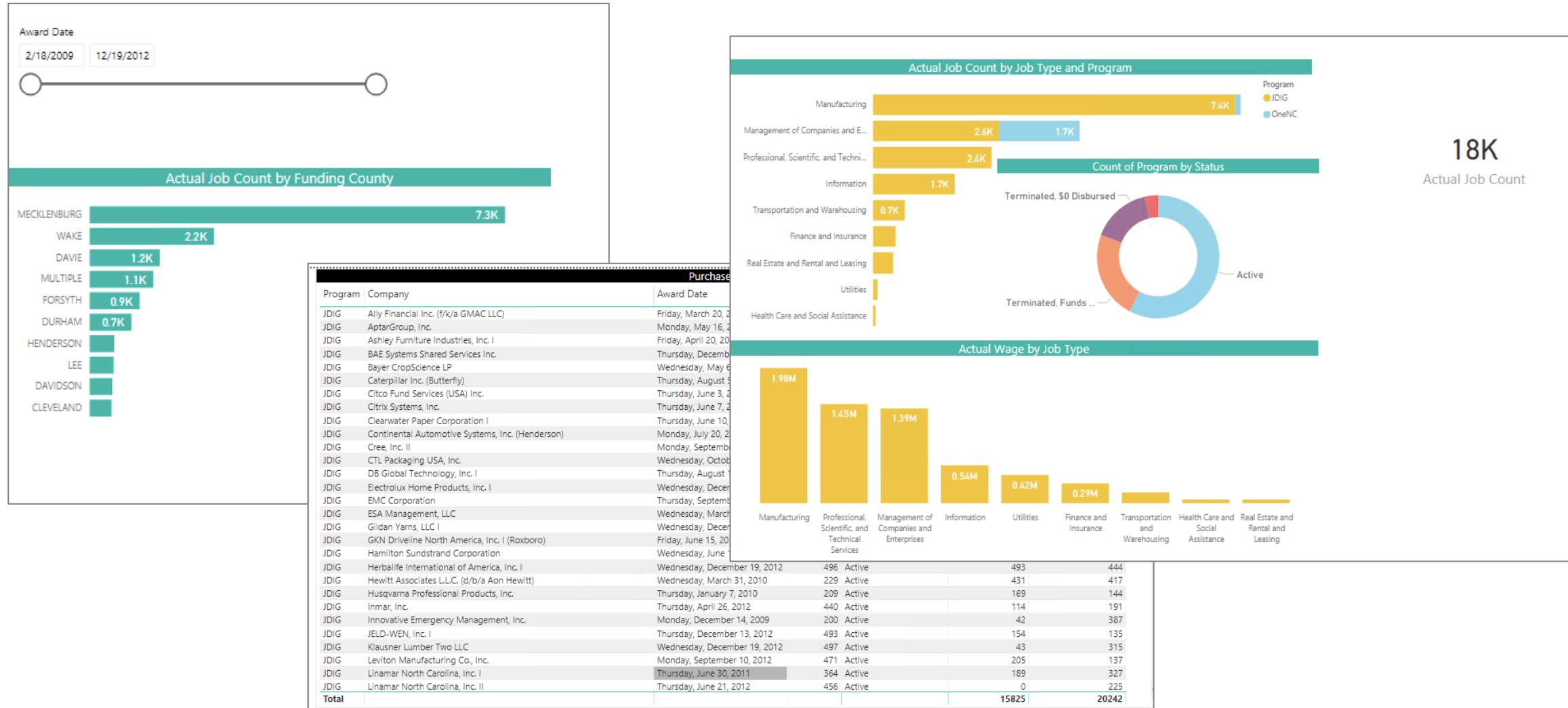


Using a Report Level filter

- Click on the Lab 2 Page
- Then go to 'Filter' panel and find 'Filter on all pages' section
- Drag 'Total Award' in the 'Filter on all pages'
- Now we can filter for items that are greater than \$1,000,000

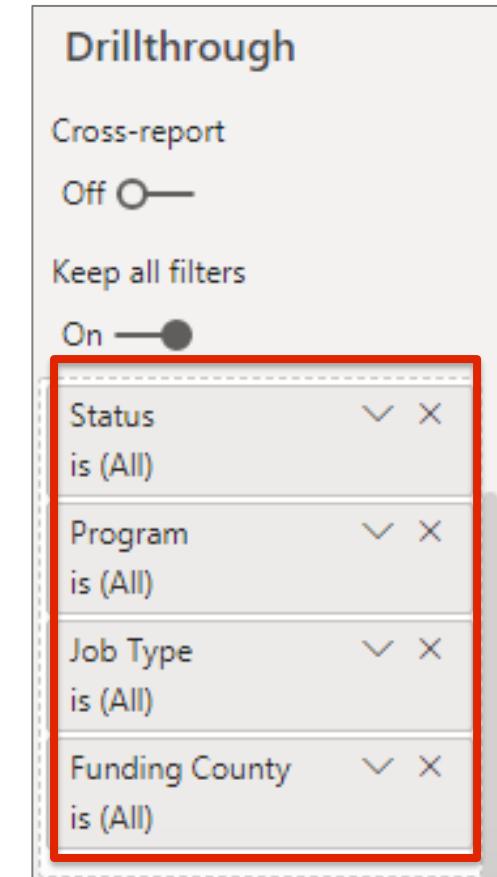
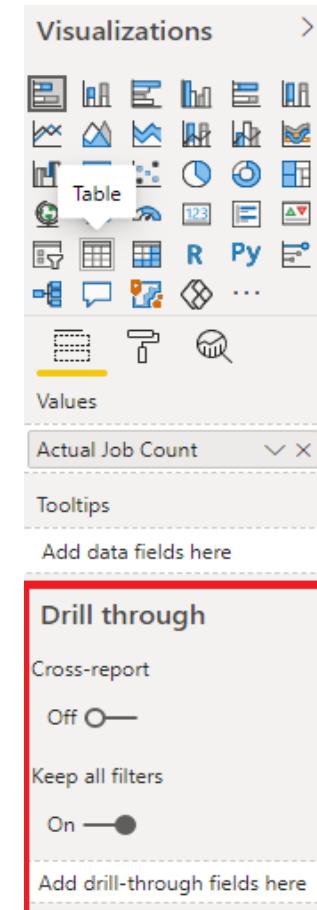


Filtered by 'Total Award Amount'



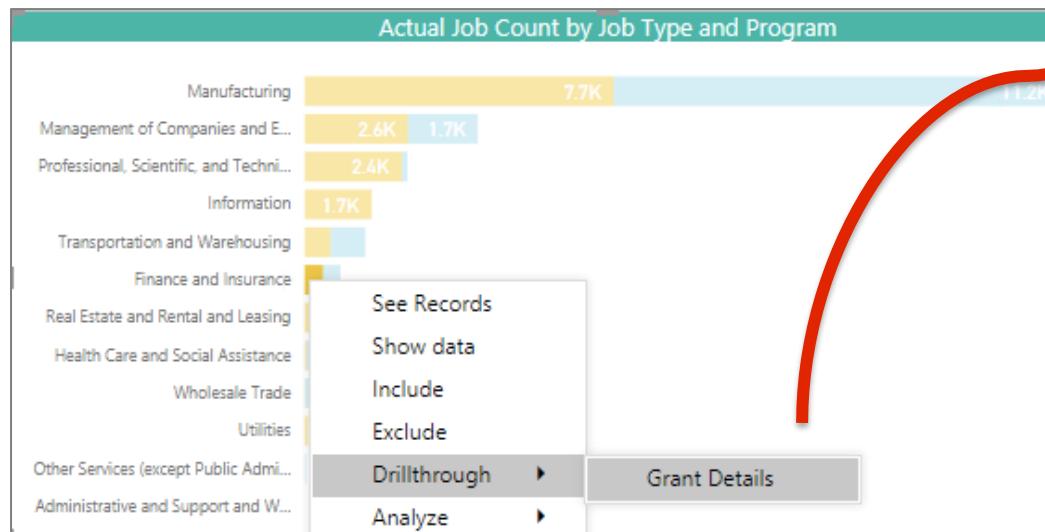
Using the Drillthrough filter

- Add Drillthrough filters to 'Grant Details' table Visual in the 'Grant Details' page
- Drillthrough filter is under the the 'Visualization' panel. You can drag fields to this section just like other type of filter
- Drag 'Status', 'Program', 'Job Type' and 'Funding Count' under the DRILLTHROUGH filter section of the 'Grant Details' Table. So that the same fields in the 'Main Page' can control filtering the detail table



Diving into data with Drillthrough

- Click on the 'Actual Job Count by Job Type and Program' bar chart
- When you right click, you can see the 'Drillthrough' capability



Purchase Line Details						
Program	Company	Award Date	Funding ID	Status	Actual Job Count	Required Job Counts
JDIG	Ally Financial Inc. (f/k/a GMAC LLC)	Friday, March 20, 2009	146	Active	224	180
JDIG	Citco Fund Services (USA) Inc.	Thursday, June 3, 2010	247	Active	242	232
Total					466	412

Drillthrough

Cross-report

Off

Keep all filters

On

Funding County
 is (All)

Job Type
 is Finance and Insuran...

Program
 is JDIG

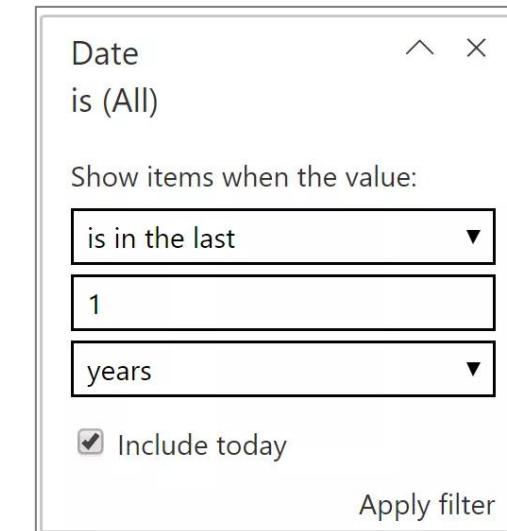
Status
 is (All)

Reintroducing the slicer

- Power BI **slicer** allows users to narrow the portion of the dataset shown in the other visualizations in a report
- Slicer = the visualization of a filter
- Reasons to use a slicer:
 - Makes it easier to see the current filtered state
 - Filters by columns that are unneeded and hidden in the data tables
 - Creates more focused reports

Facts to remember about slicers

- By default, slicers on pages affect all the other visualizations on that page
- As you choose values in the list and date sliders you just created, note the effects on the other visualizations. The filtered data is an intersection of the values selected in both slicers
- You can use **visual interactions** to exclude some page visualizations from being affected by others



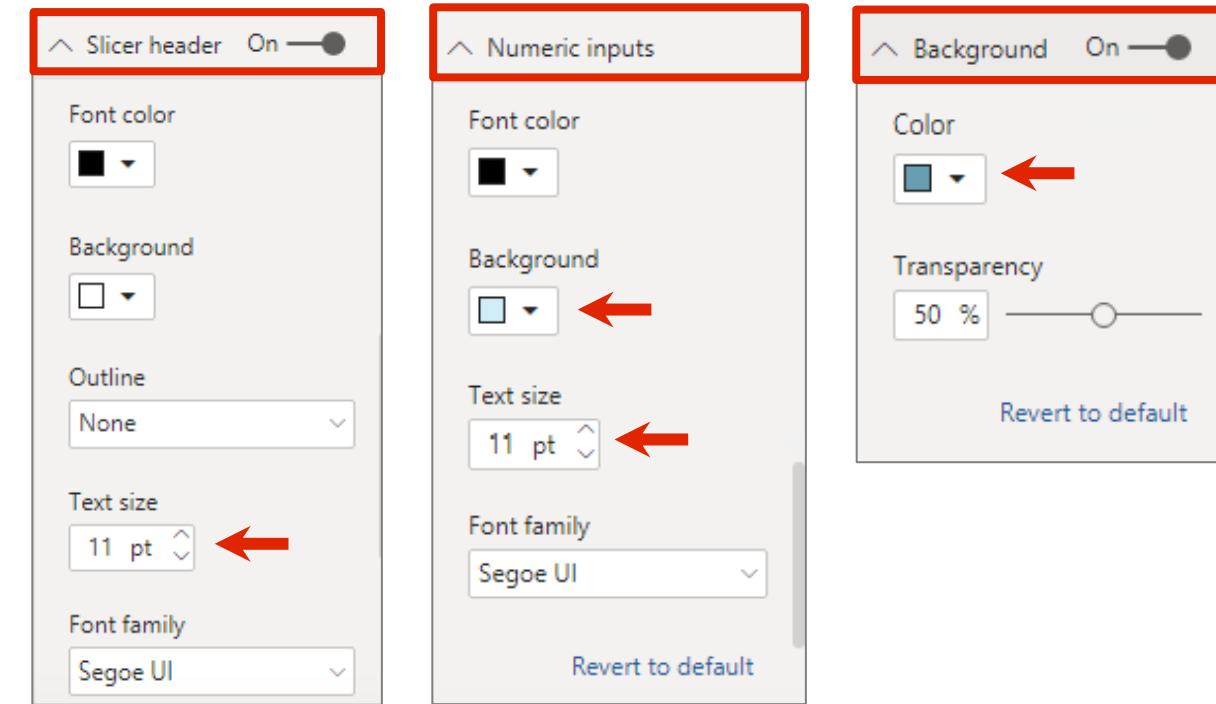
Using slicers

- Copy paste the date slicer we created in Lab 1 to Lab 2
- You can see a downward facing arrow on the top right corner of the slicer visual. Click on it
- You can then change the date slicer type to 'Relative' data range



Formatting the visual with Slicer

- Format the visual by changing the background setting under format tab of the visualization panel
- In the 'Format' tab, change Slicer header/ numeric inputs/ background



Knowledge Check 2



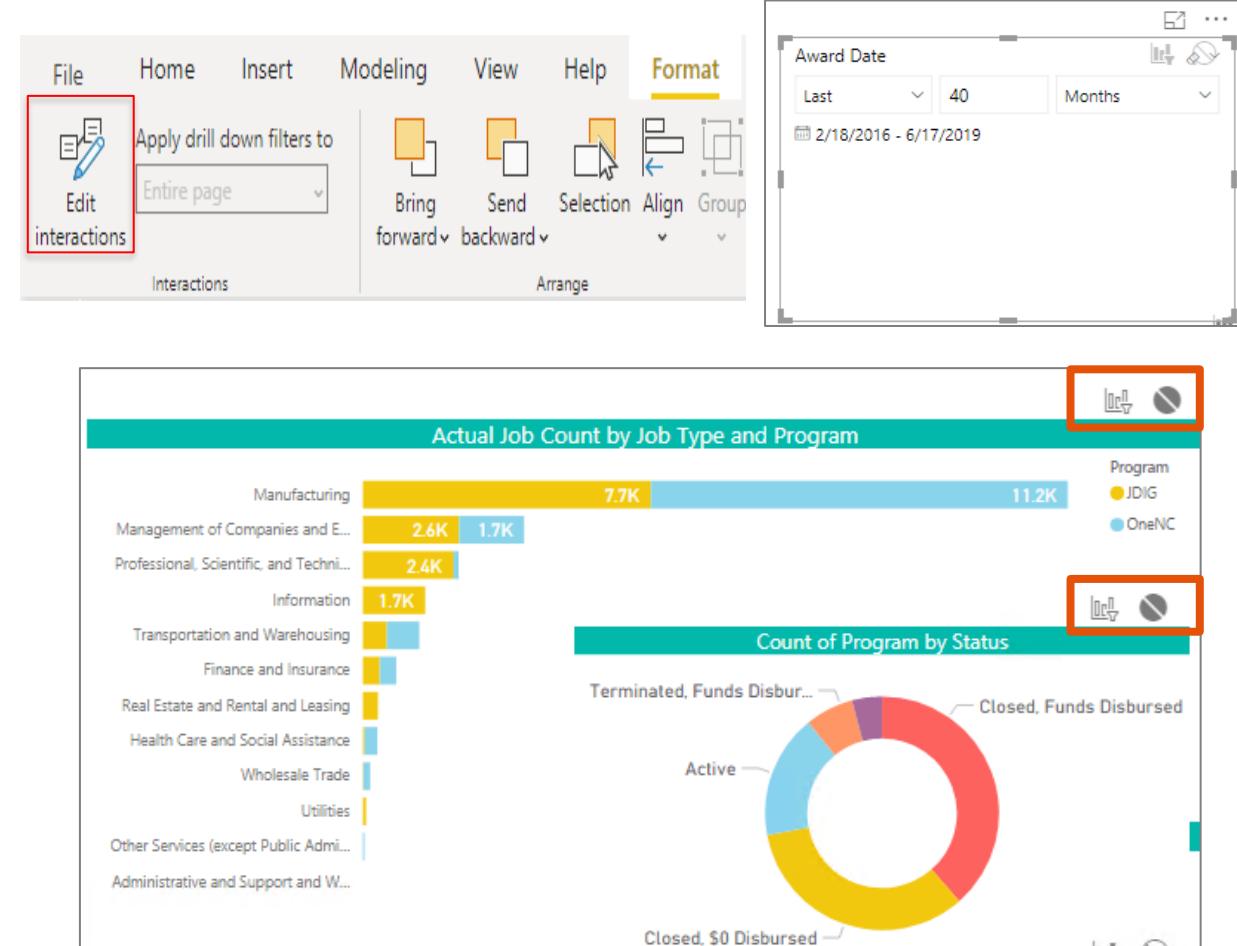
Objectives for Lab 2: Continued

- Understanding and utilizing filters to analyze your data
- Learn how to create custom and interactive visuals
- Understand how to use gridlines and phone layout
- Master visual alignment for your report layout

Using interactive visuals

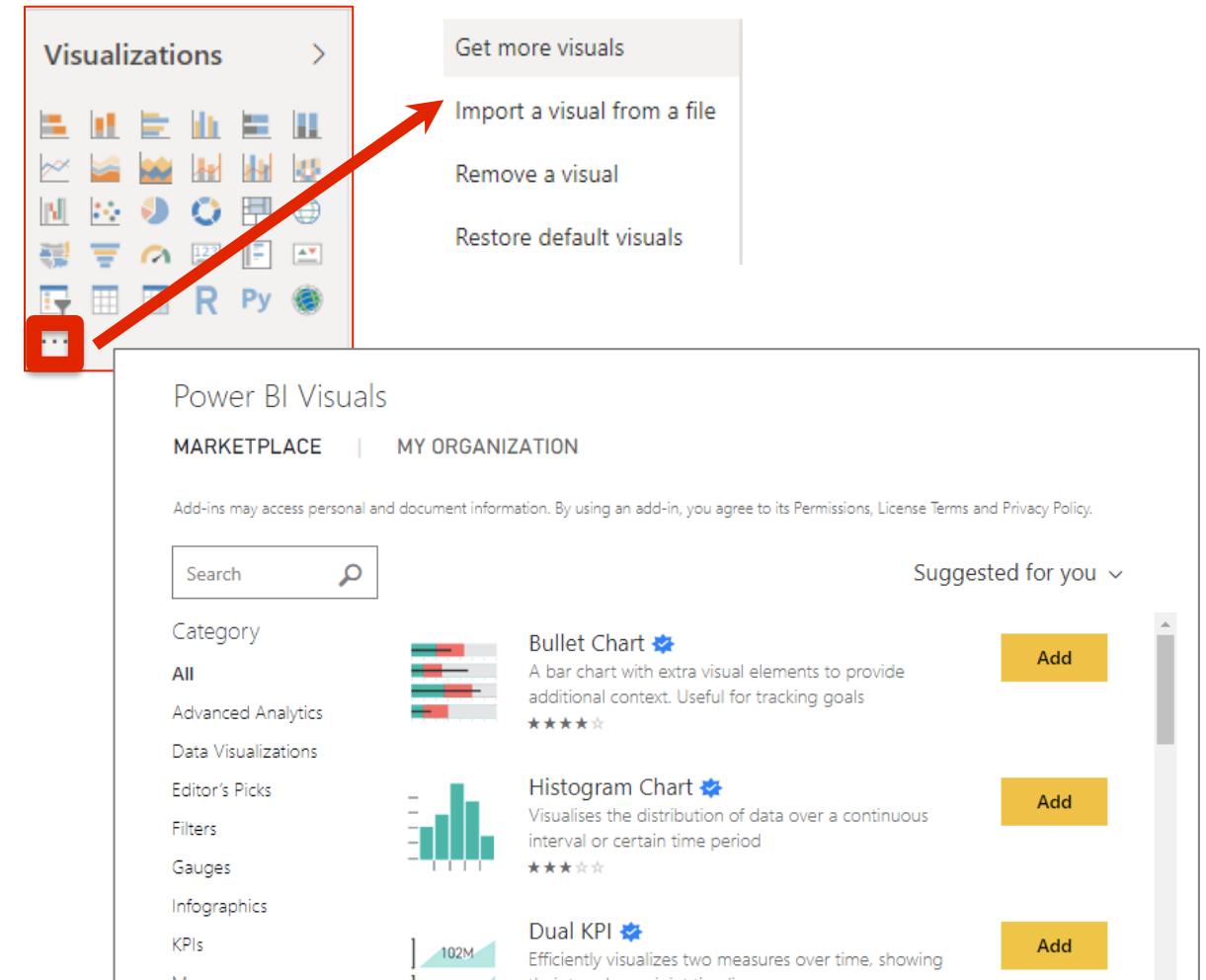
Interactive visuals give your audience an opportunity to explore and dig into your data

- You can turn interactive filtering on and off between visuals by enabling 'Edit Interactions' under Filter Tools
- If it should cross-filter the visualization, select the filter icon 
- If it should have no impact, select the no impact icon 



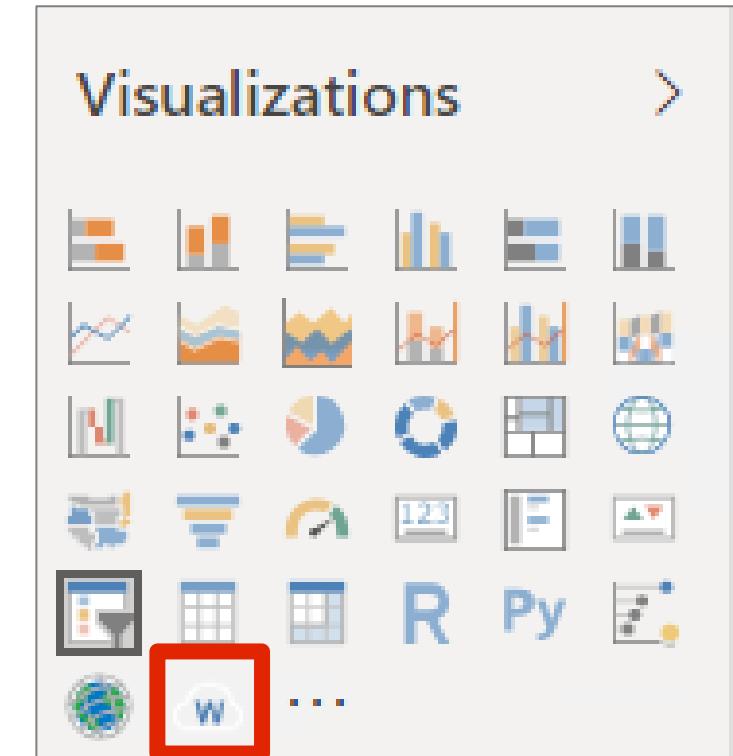
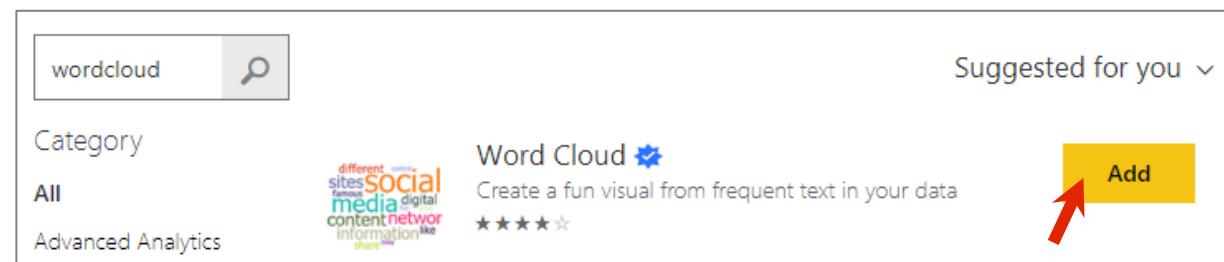
Add new visuals from marketplace

- You can add new visualizations by selecting the '...' from **Visualizations** panel.
- Select '**Get more visuals**'
- Many of the visualizations from the Marketplace are free!



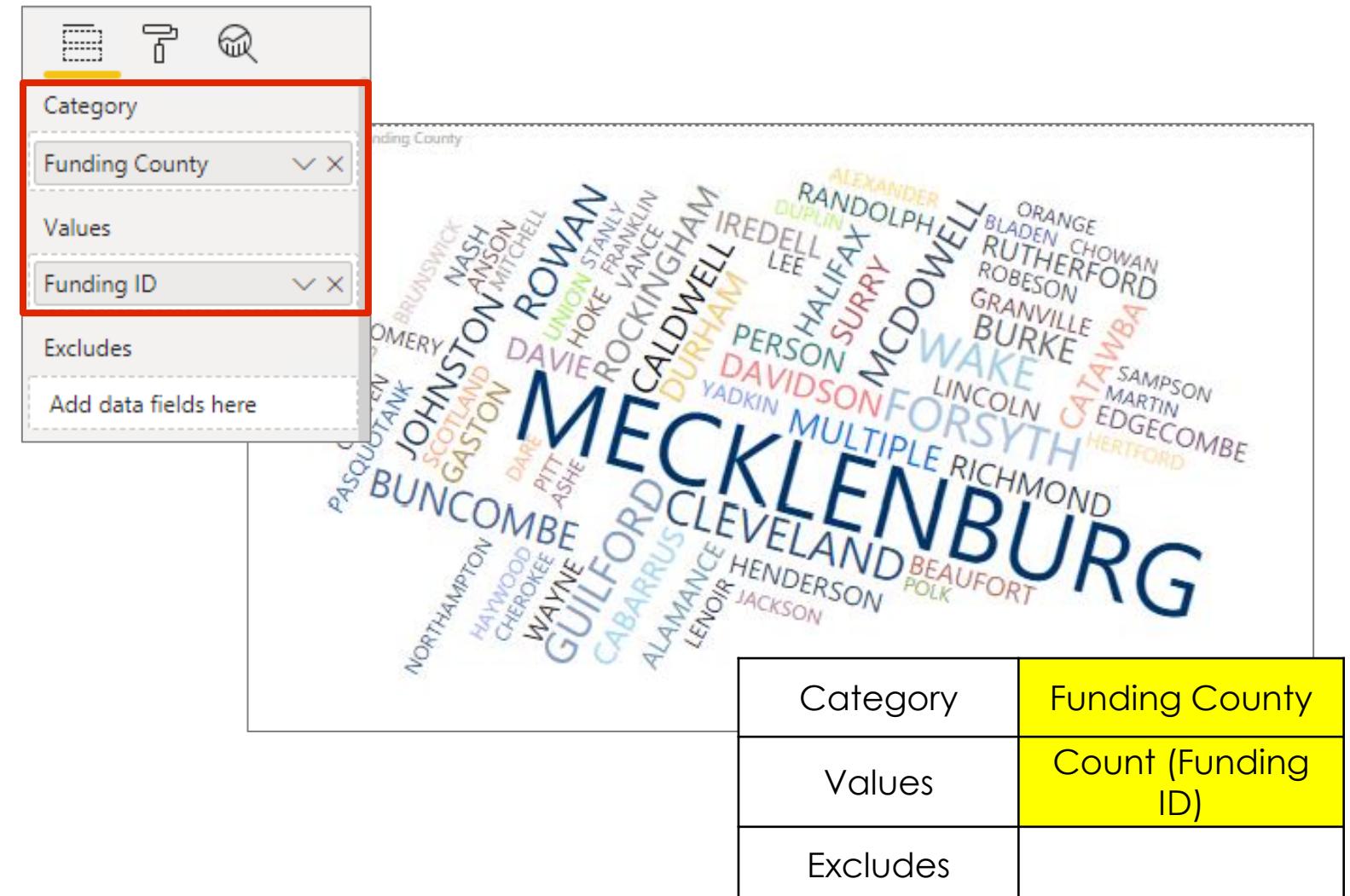
Import new visual

- Let's import 'Word Cloud' visual by clicking on 'Add' button



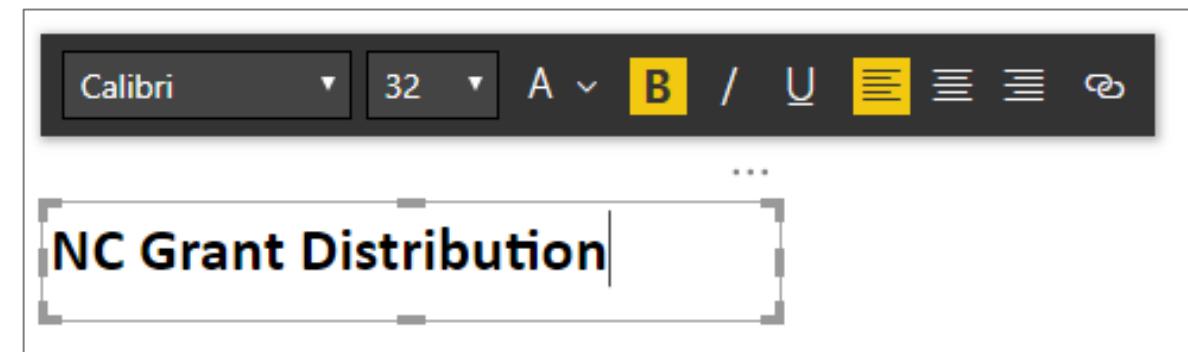
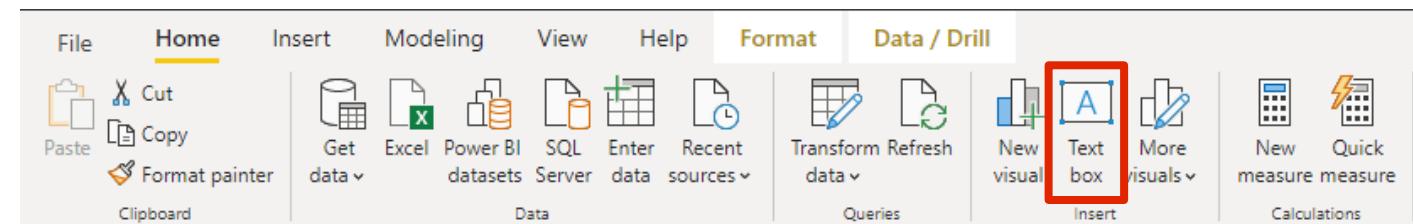
Add new visual to your report

- Create a new visual by choosing this newly added ‘Word Cloud’ visual
 - Put ‘Funding County’ to the category field
 - Put Count(Funding ID) to the value field

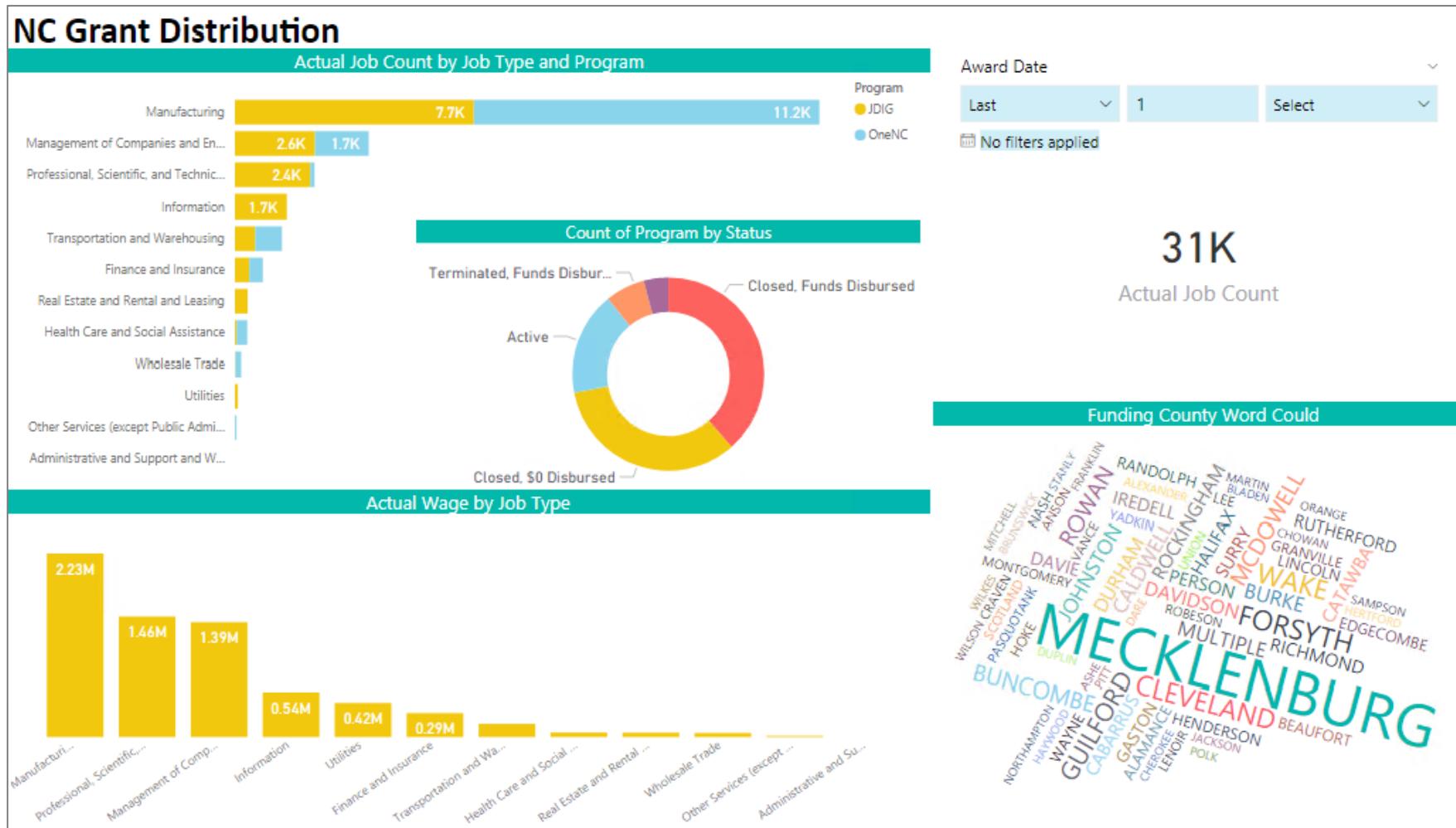


Add page title

- By clicking on the 'Home' table on the top tool bar and you can find 'Text box'. Select it to insert a 'Text box' as your title
- Drag the text box to the top left of the main canvas, and type in your title

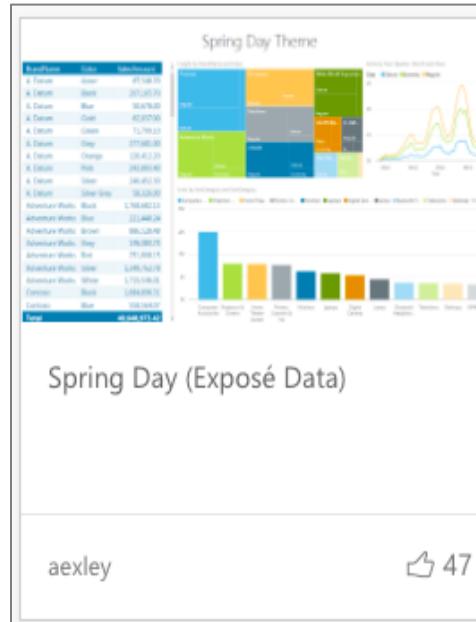


Almost done!



Power BI report themes

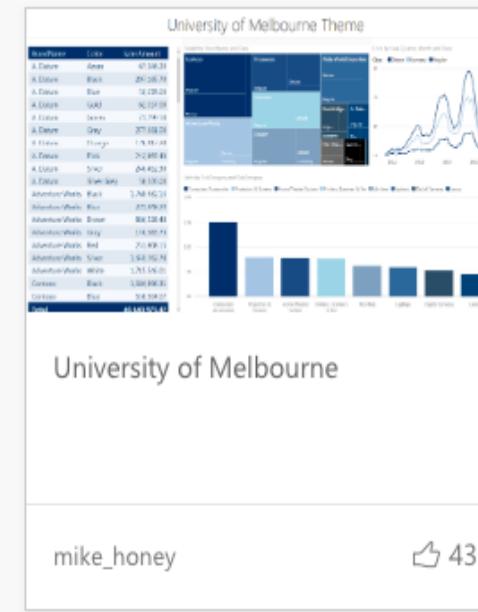
- You can apply a color theme to your entire **report** with **report themes**
- When you apply a report theme, all visuals in your report use the colors from your selected theme



Spring Day (Exposé Data)

aexley

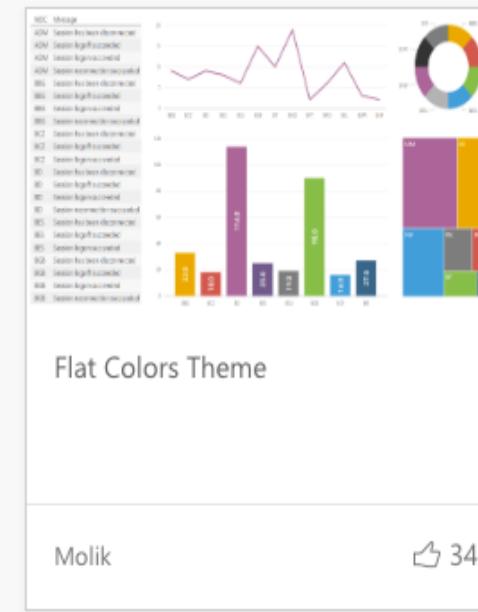
47



University of Melbourne

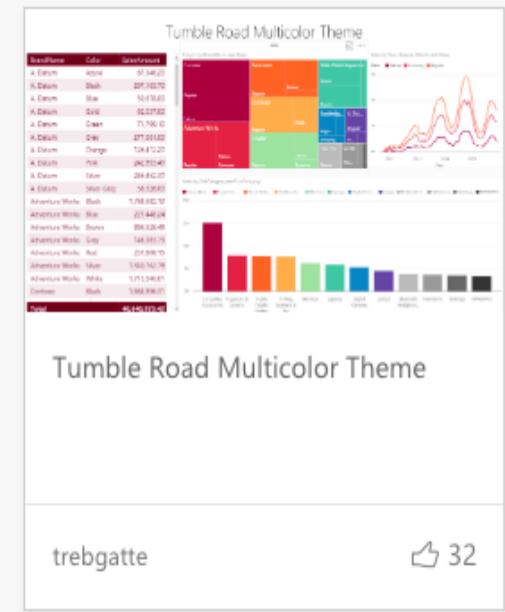
mike_honey

43



Molik

34

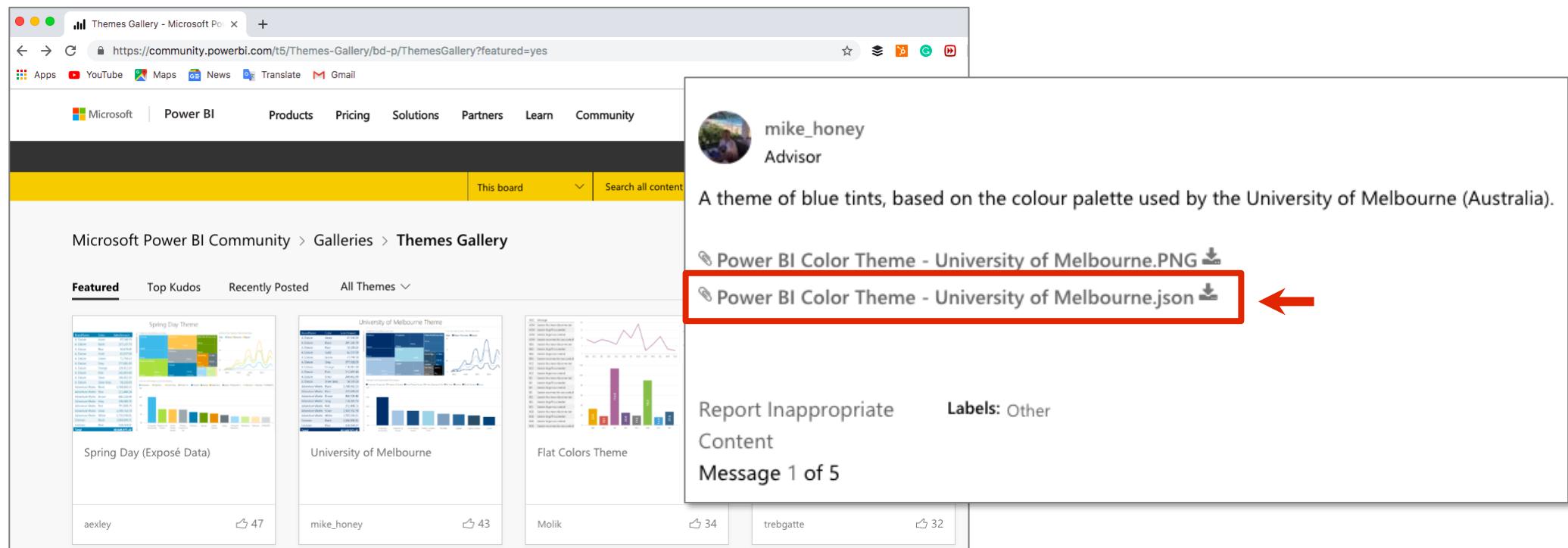


trebgalette

32

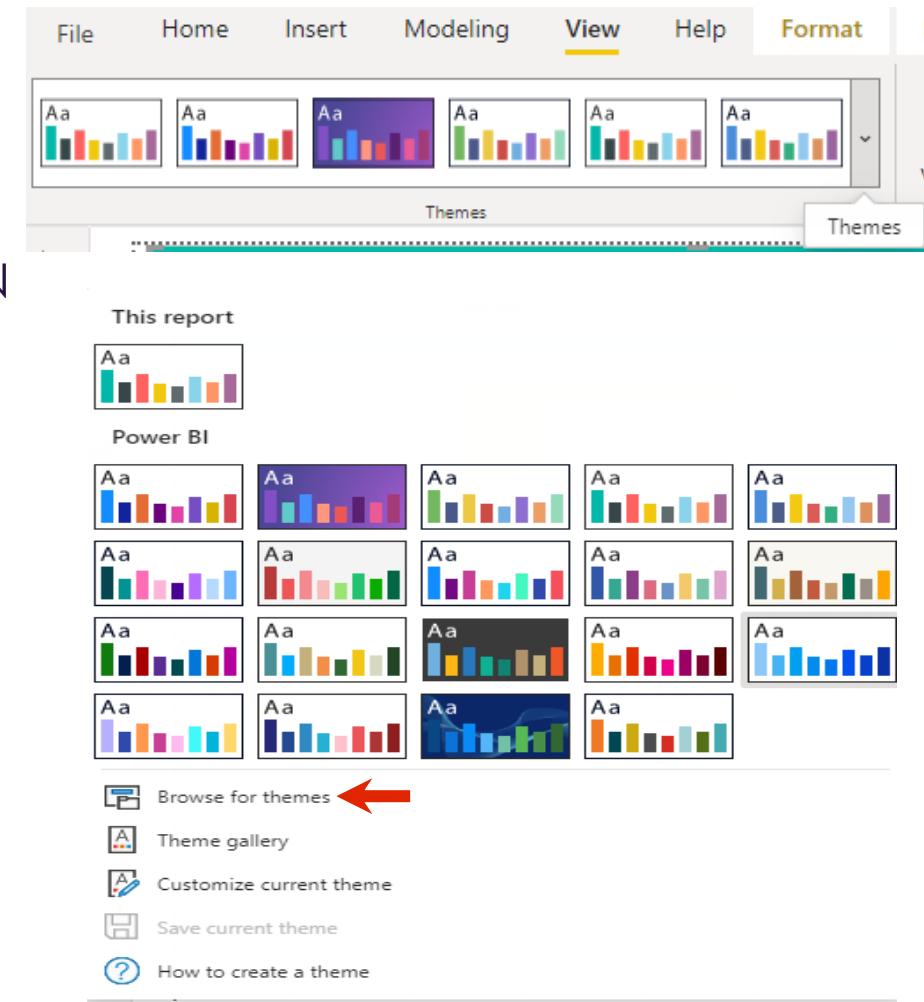
Change your report theme

- Choose a theme you like from <https://community.powerbi.com/t5/Themes-Gallery/bd-p/ThemesGallery>
- Download the .Json file from the theme you choose

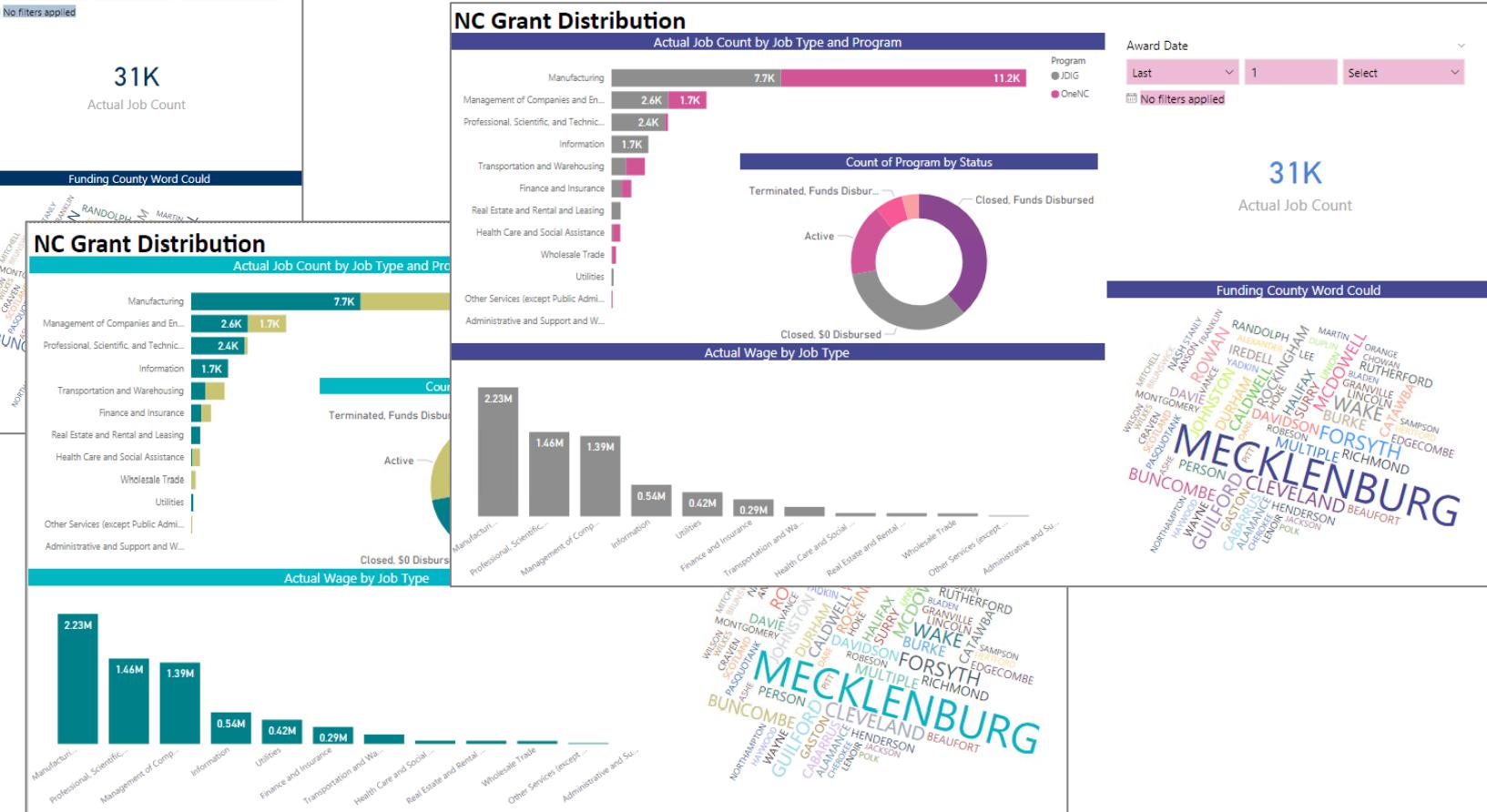
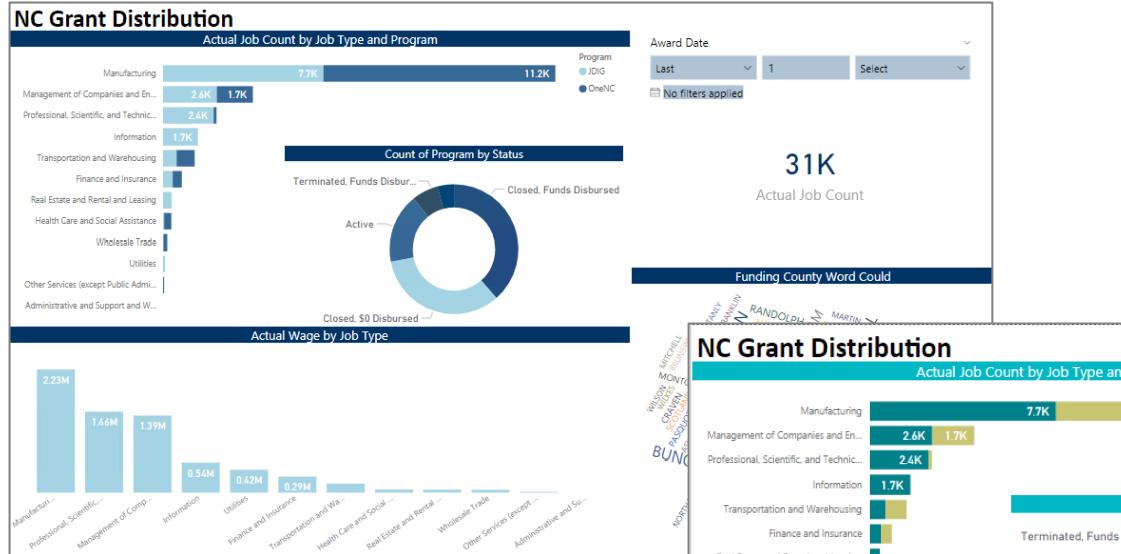


Importing your theme

- In Power BI desktop, under View tool bar, click on down arrow under the themes section
- Then choose 'Browse for themes' and find the JSON file you downloaded

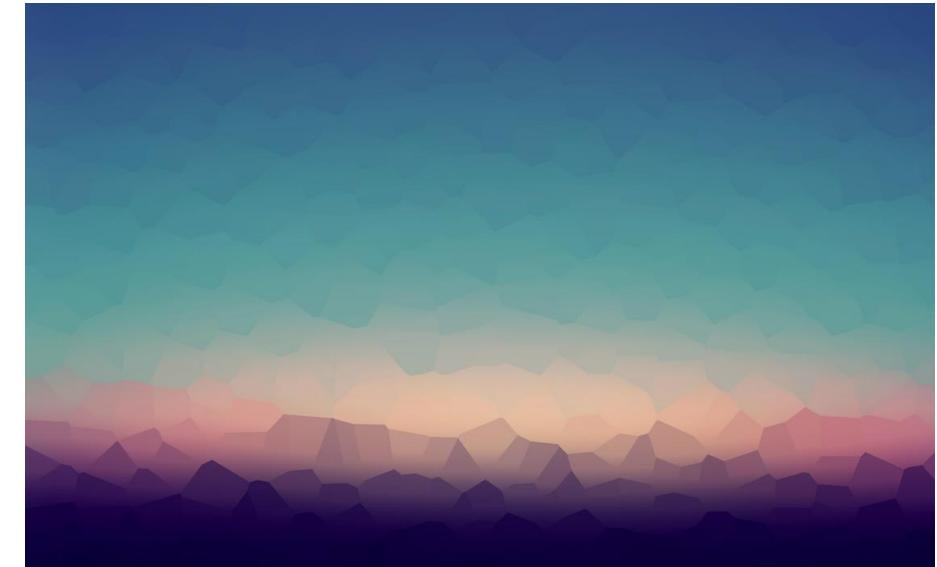
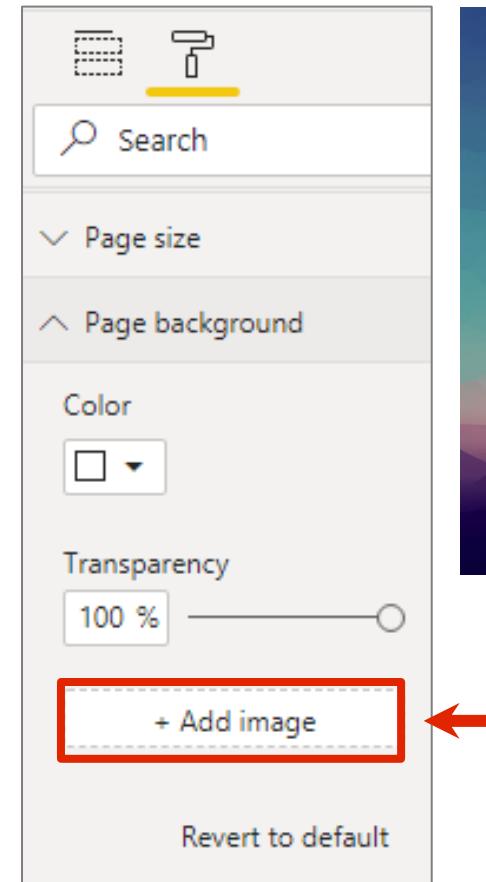


Different theme examples

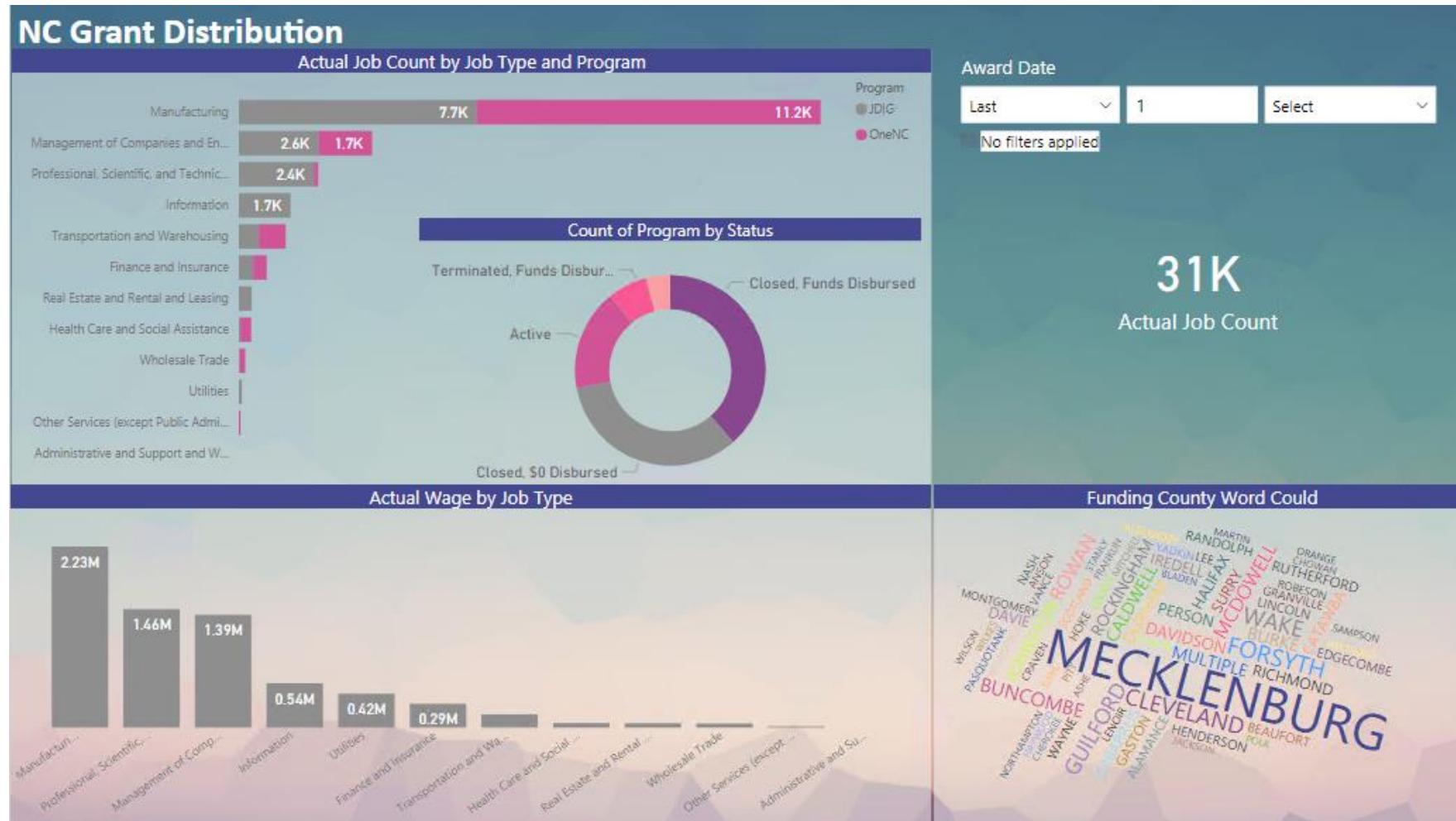


Adding a page background

- Click on any white space of your report and go to visualization panel and click on the format tab
- Upload the image



Report with added background

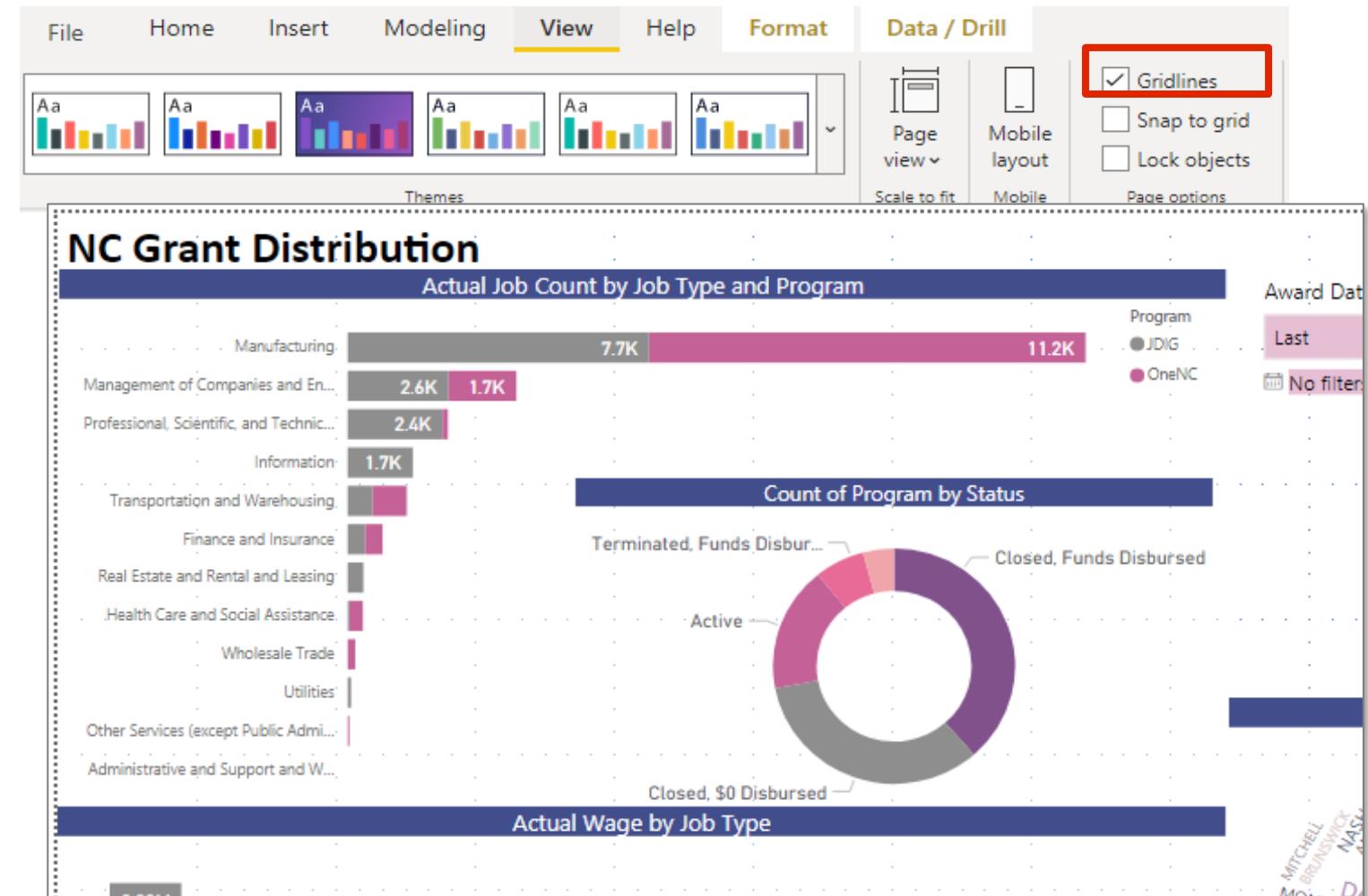


Objectives for Lab 2: Continued

- Understanding and utilizing filters to analyze your data
- Learn how to create custom and interactive visuals
- Understand how to use gridlines and phone layout
- Master visual alignment for your report layout

Turning your gridlines on / off

- **Gridlines** allow you to neatly align your visuals on the report page
- It uses snap-to-grid functionality so the visuals on your report look clean, aligned, and evenly spaced
- You can turn on and turn off '**Gridlines**' checkbox under View table



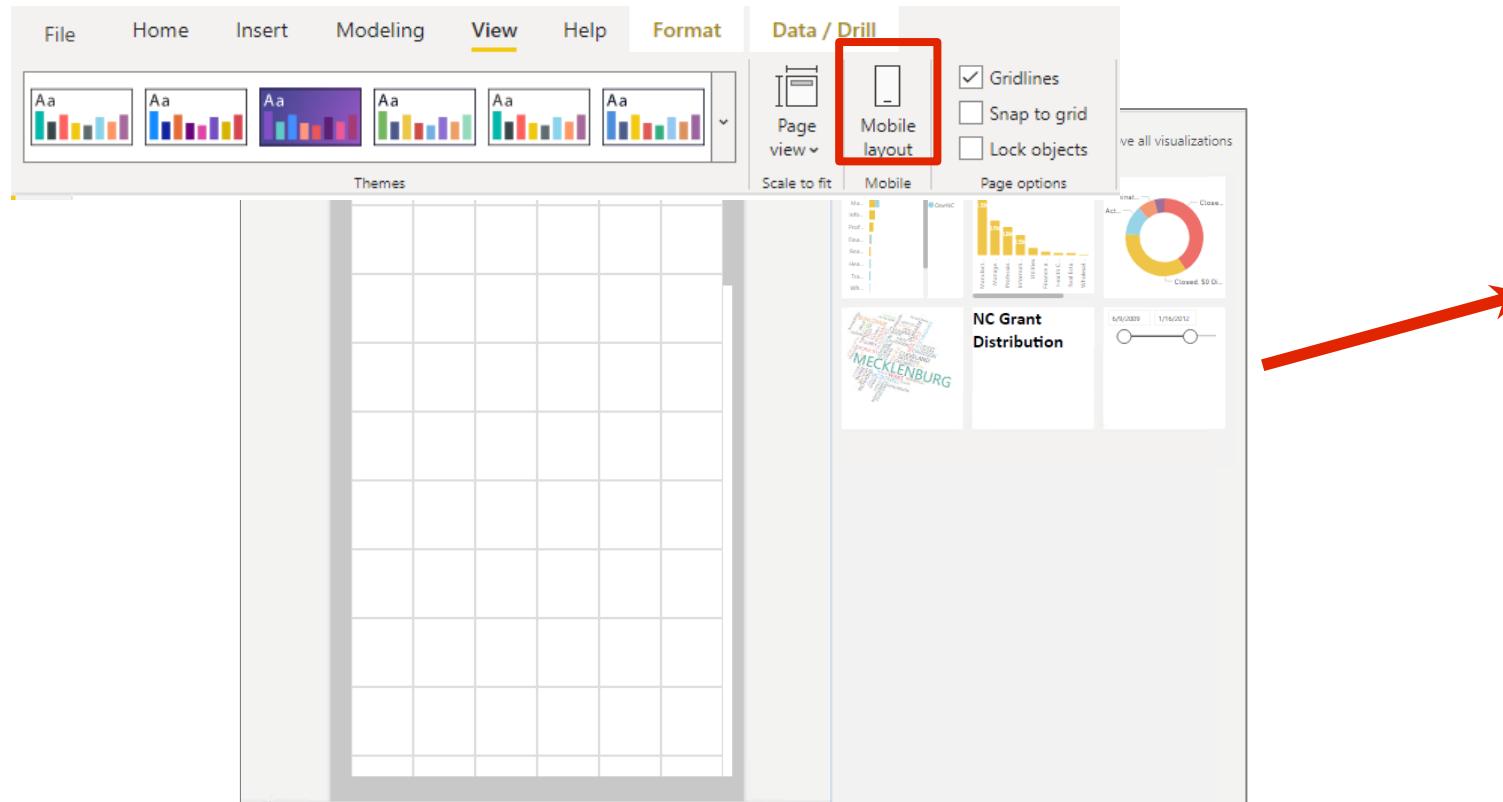
Design mobile layout



Now we have a nice desktop layout. Can we have a mobile design?

Setting up the mobile layout

- Click on mobile layout under View table, and design mobile layout by drag and drop



Objectives for Lab 2: Continued

- Understanding and utilizing filters to analyze your data
- Learn how to create custom and interactive visuals
- Understand how to use gridlines and phone layout
- Master visual alignment for your report layout

Using bookmarks

- Can I present the visuals in my report in a PowerPoint style?



The screenshot shows a Power BI report with three visualizations: a bar chart titled 'Overall rank by State', a map titled 'Overall rank by State', and a stacked bar chart titled 'Weather by State' and 'Cost of living by State'. The 'BOOKMARKS' pane on the right contains several bookmarked items, including 'Overview', 'Top ten rankings', 'Weather comparisons', 'Cost of living comparison', 'Ten most challenging', 'Ten worst-weather states', and 'Summary findings'. The 'Values' and 'FILTERS' sections are also visible.

1

2

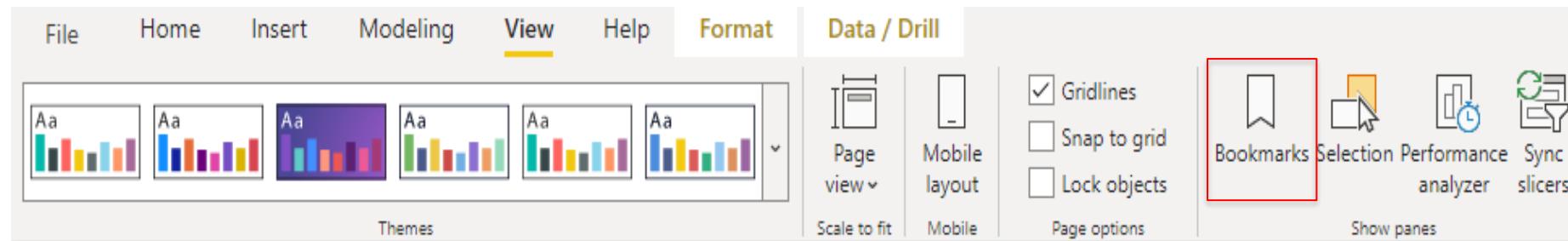
3

Learn how to create and edit bookmarks

Yes, by using bookmarks!

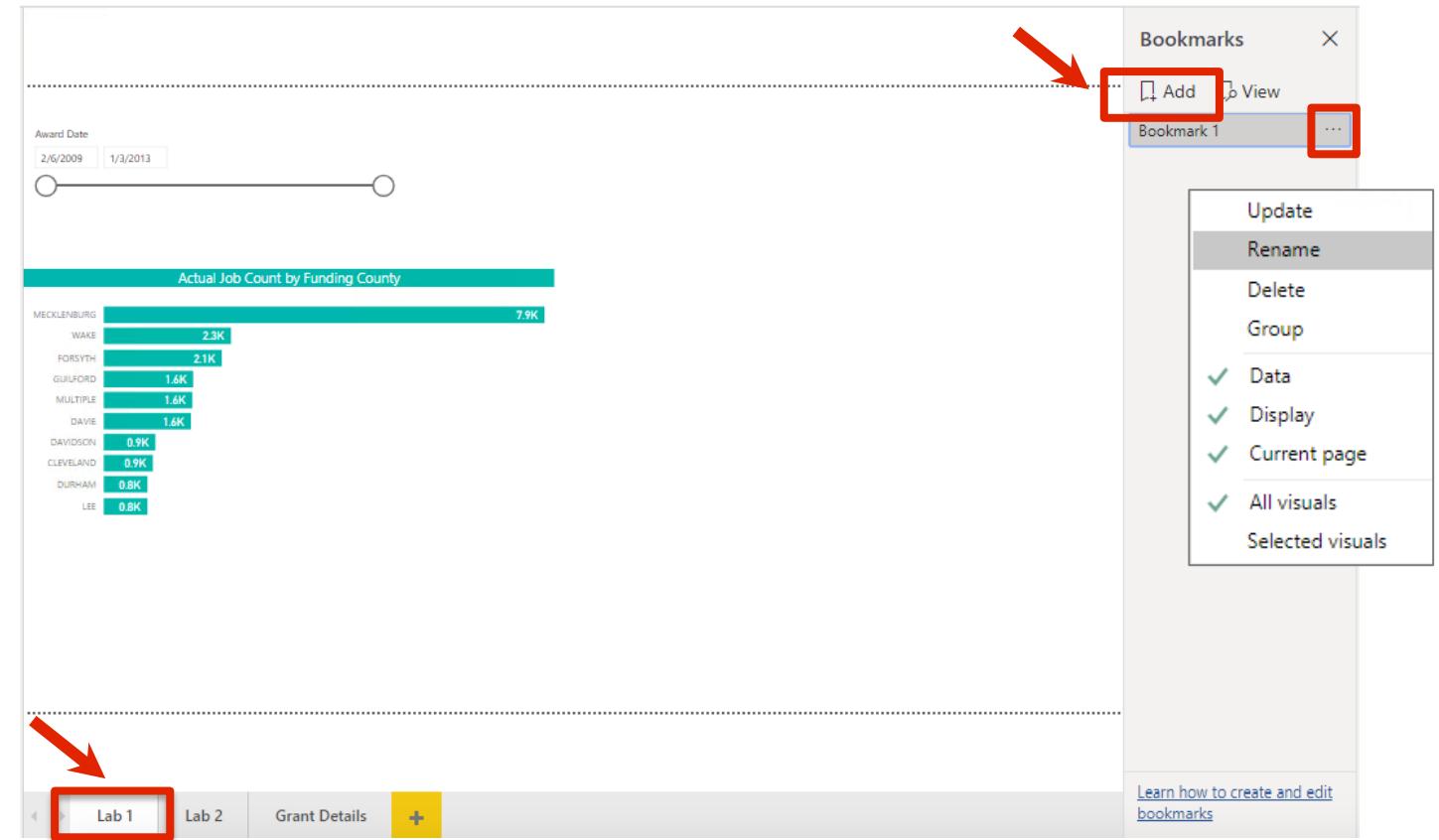
Using bookmarks for presentation

- **Bookmarks** helps you capture the currently configured view of a report page, including filtering, so you can share it with others
- You can create a collection of bookmarks and arrange them in your desired order to highlight insights or the story you want to tell with your visuals
- Select the 'View' ribbon, then select the box for 'Bookmarks Pane'



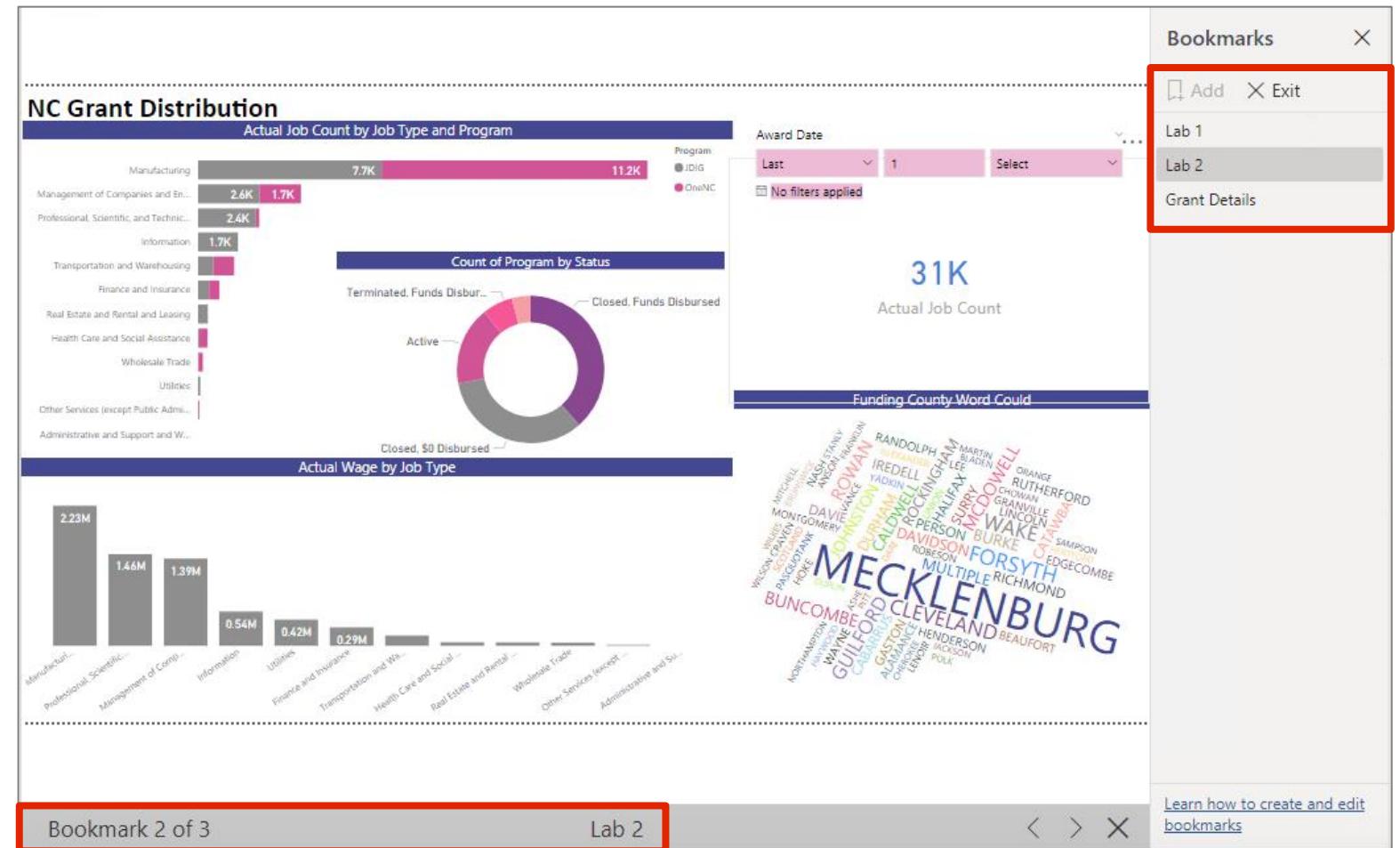
Using bookmarks for presentation

- Click on the Lab 1 page, select 'Add from the Bookmarks' pane to add a bookmark
- Select the ellipses next to the bookmark's name, rename the bookmark as Lab 1



Add Lab 2 to bookmarks

- Repeat the process for Lab 2
- Select 'Add' from the Bookmarks pane to add a bookmark, and then rename as Lab 2
- Click on the 'Grant Details' page, select 'Add' from the Bookmarks pane, and then rename as Grant Details
- Click on 'View' to view the report with bookmarks

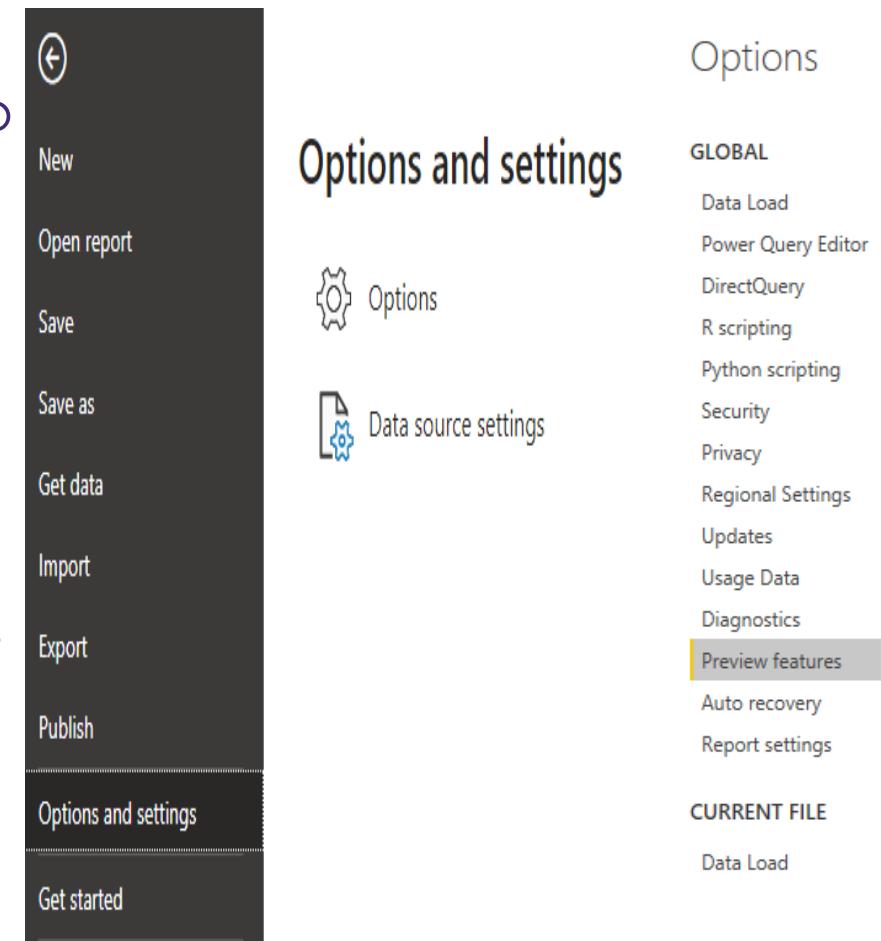


Save Lab 2 as final report

- Save your report by choose 'File' -> 'Save as' to a new file 'Lab 2'
- Publish to the reporting server

Options for advanced features

- To get options for advanced features, go to **File > Options and Settings > Options**
- You can adjust your settings and even choose some Preview Features which are not enabled



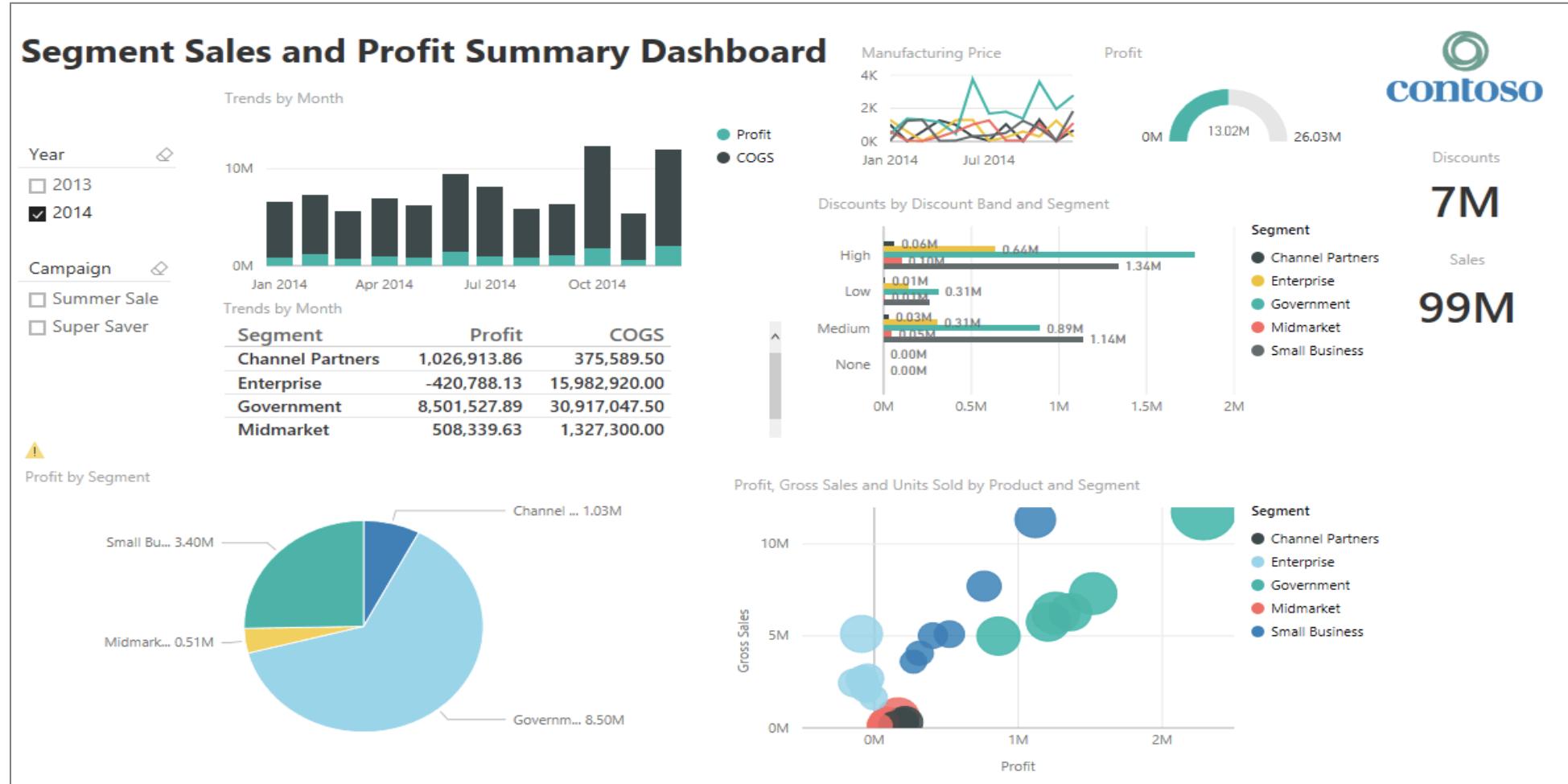
Preview features

The following features are available for you to try in this release. Preview features might change or be removed in future releases.

- Shape map visual [Learn more](#)
- Spanish language support for Q&A [Learn more](#)
- Json Table Inference [Learn more](#)
- New web table inference [Learn more](#)
- Import text using examples [Learn more](#)
- Excel table inference [Learn more](#)
- Q&A for live connected Analysis Services databases [Learn more](#)
- Azure map visual [Learn more](#)
- Data point rectangle select [Learn more](#)
- Smart narrative visual [Learn more](#)
- Dynamic M Query Parameters [Learn more](#)
- Anomaly detection [Learn more](#)
- New field list [Learn more](#)

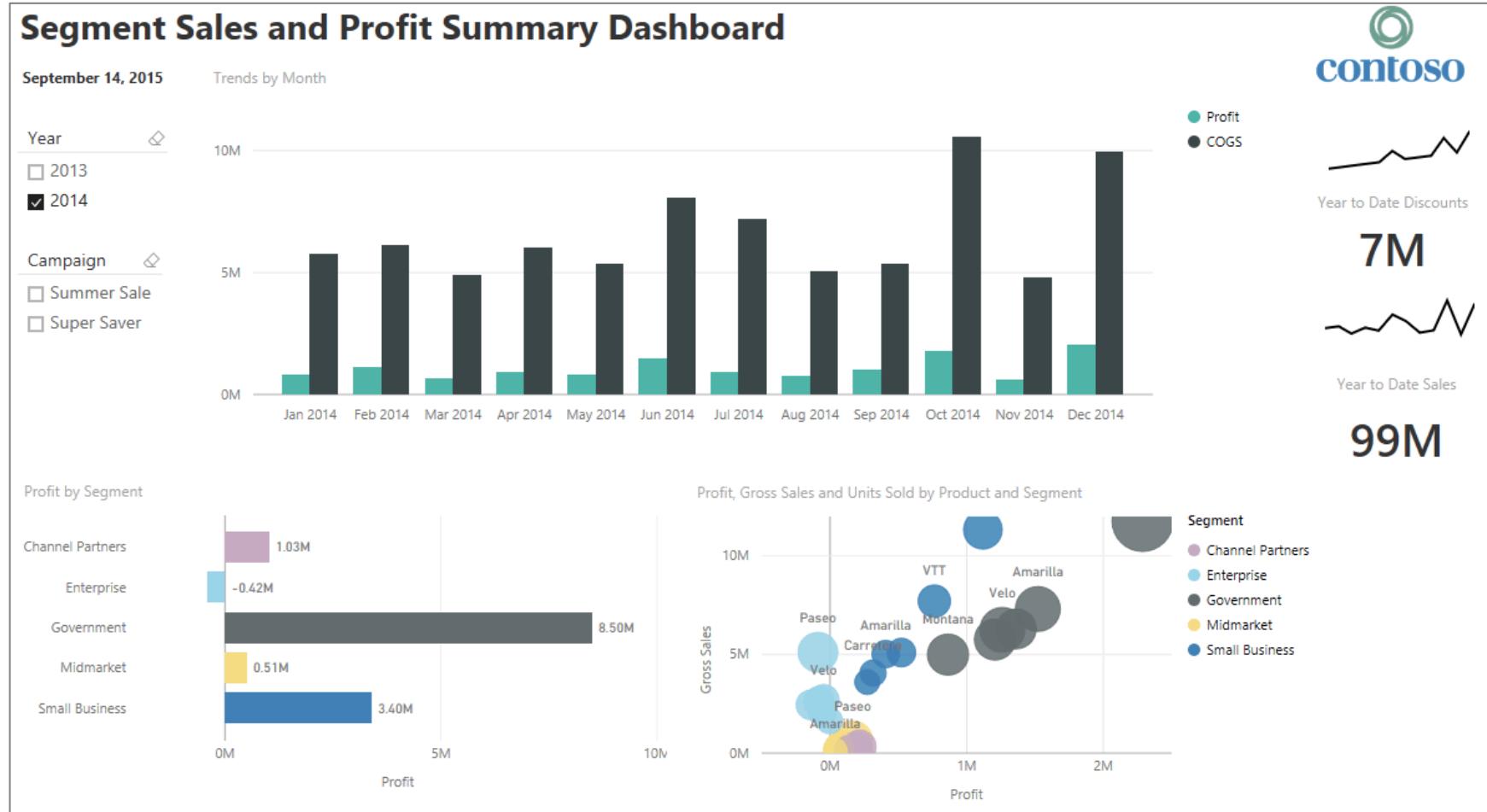
Which dashboard is better?

Dashboard 1



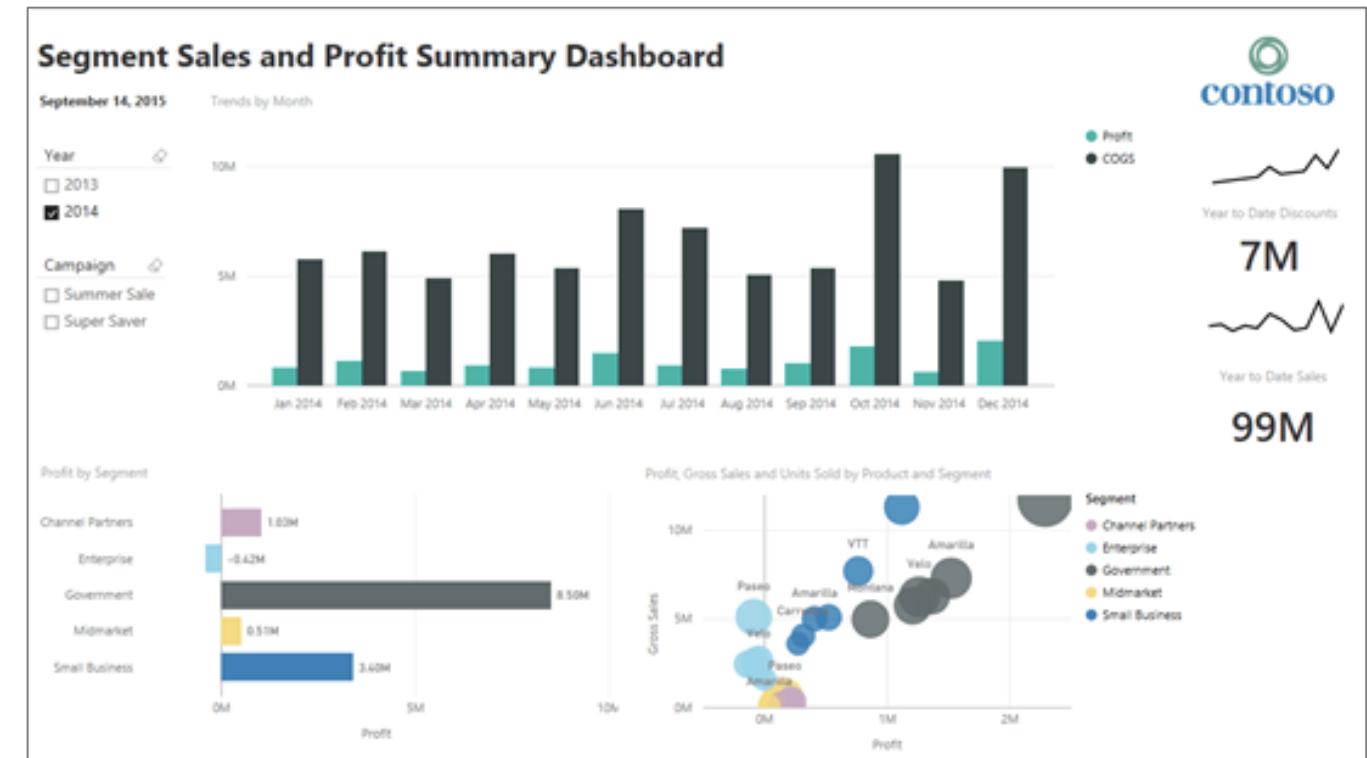
Which dashboard is better?

Dashboard 2



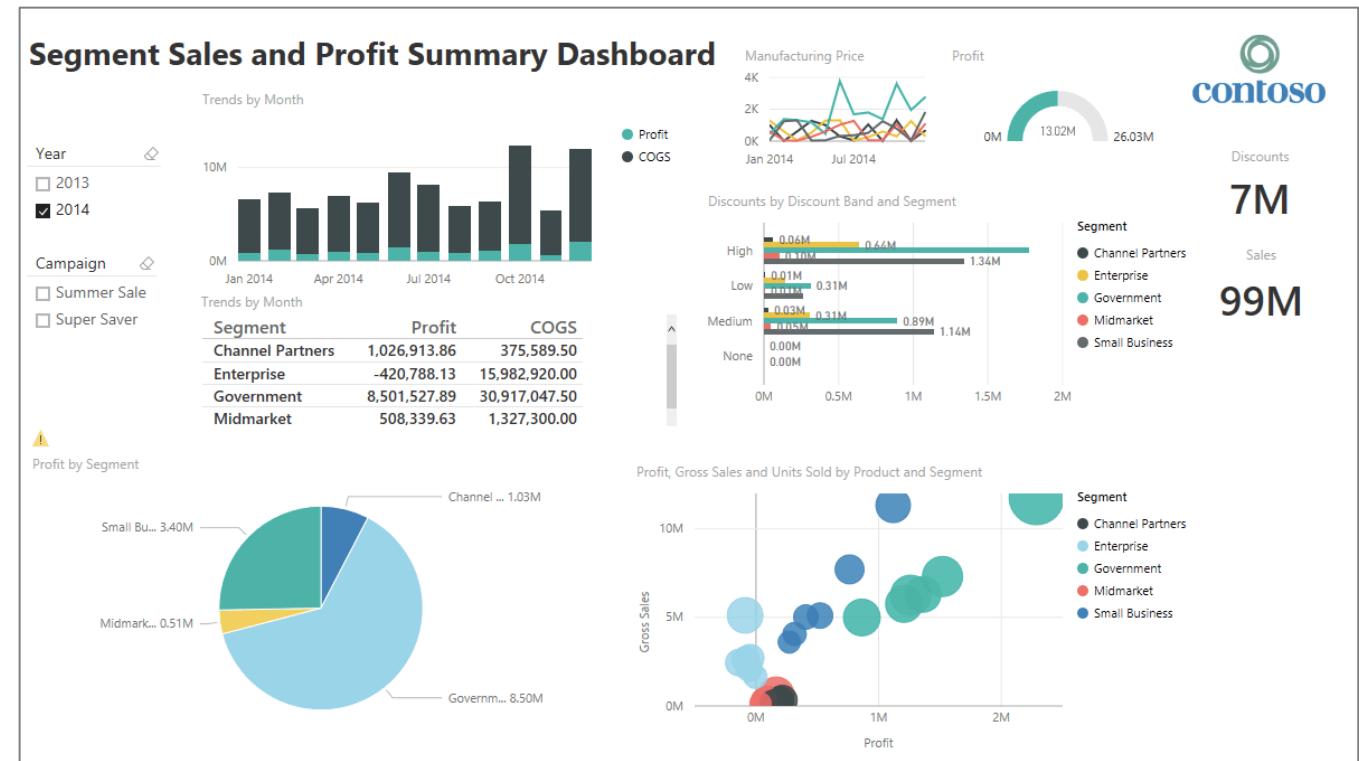
Dashboard 2!

- Reduced information overload
- All information nicely fits within the screen without scrolling
- Segment colors are consistent
- The '**Profit by Segment**' bar chart clearly shows the negative Enterprise results now
- The scatter chart adds perspective at a glance with regards to the product performance within a segment



Why isn't Dashboard 1 as effective?

- Too much information and inconsistent segment colors
- The pie chart fails to communicate the negative Enterprise results
- The '**Manufacturing Price**' line **chart** is way too small and has no legend
- The '**Discount Bands bar chart**' has unnecessary labels
- The table with the scroll bar in the middle of the screen does not add any value



Lab 2 – part 2



Exercise 2



Congratulations!

Today you learned how to:

1. Build BI reports with formatting techniques
2. Build complex BI reports with interactive visualizations

Data Analysis with PowerBI

DATA
SOCI
ETY:

DATA SOCIETY:

Day 3

“One should look for what is and not what he thinks should be.”
- Albert Einstein



Outline for today

1. Sneak peek on ETL layer: load data through Power Query
2. Implement data storytelling frameworks and techniques

Power Query

Power Query

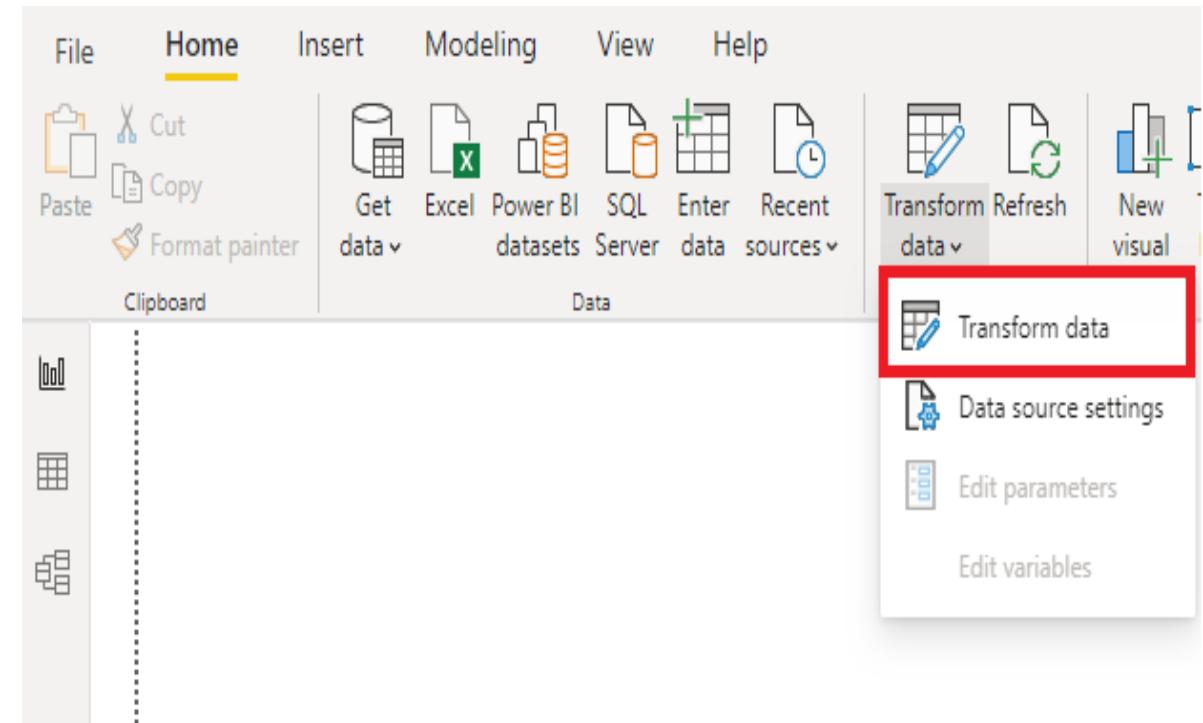
- The Microsoft Data Connectivity and Data Preparation technology
- Enables business users to seamlessly access data stored in hundreds of data sources
- Reshape it to fit their needs, with an easy to use, engaging and no-code user experience

Power Query Editor

- The primary data preparation experience
- Allowing users to apply over 300 different data transformations by previewing data and selecting transformations in the user experience
- These data transformation capabilities are common across all data sources, regardless of the underlying data source limitations

Launching ‘Power Query Editor’

- **ETL** > Extract, transform and load
- **Power Query** is made available in **Power BI Desktop** through **Power Query Editor**.
- To launch Power Query Editor, select **Transform data** from the **Home** tab of Power BI Desktop.



ETL layer of Power BI

The screenshot shows the Power Query Editor interface with several annotations:

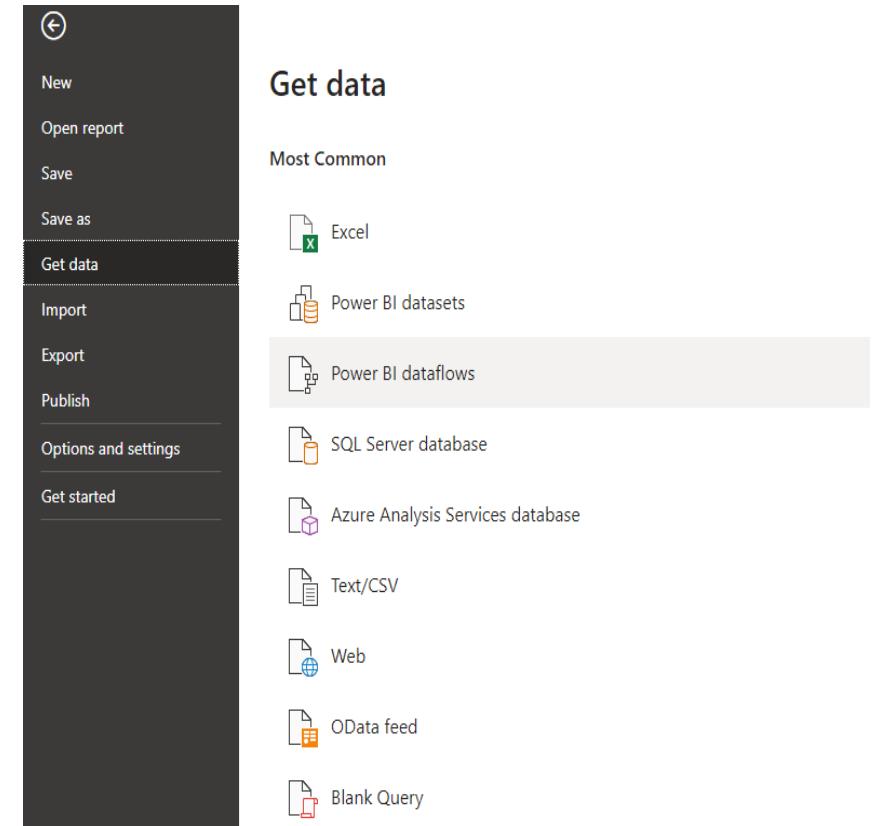
- Queries [1]**: A list of available queries, with "Grants" selected. An annotation states: "Queries are listed and available for selection, viewing, and shaping".
- Center Pane**: Displays the data from the selected query ("Grants"). An annotation states: "In the center pane, data from the selected query is displayed and available for shaping".
- Ribbon Buttons**: Buttons in the ribbon are highlighted with red boxes. An annotation states: "In the ribbon, buttons are active to interact with the data in the query".
- Query Settings Window**: A window titled "QUERY SETTINGS" lists "Properties" (Name: Grants) and "Applied Steps" (Source, Navigation, Changed Type). An annotation states: "The Query Settings window appears, listing the query's properties and applied steps".

Sample data from the "Grants" query:

ID	Category	Grantor	Date	Recipient
1	OneNC	Plasticard Locktech International, LLP	5/17/2012	
2	OneNC	United Furniture Industries NC, LLC	4/15/2010	
3	OneNC	Global Textile Alliance, Inc.	9/21/2012	
4	OneNC	SANS Technical Fibers, LLC	12/1/2009	
5	JDIG	Ashley Furniture Industries, Inc. I	4/20/2012	
6	JDIG	Cree, Inc. II	9/20/2010	
7	JDIG	Novo Nordisk Pharmaceutical Industries, Inc. II	10/4/2010	
8	OneNC	Bakers Waste Equipment, Inc.	10/1/2012	
9	OneNC	The Roberts Company Fabrication Services, Inc.	5/2/2011	
10	OneNC	Cooper Standard Automotive, Inc.	9/23/2011	
11	OneNC	FCC (North Carolina), LLC	8/3/2012	
12	OneNC	Michelin North America, Inc.	4/9/2010	
13	OneNC			
14	OneNC			
15	OneNC			
16	OneNC			
17	JDIG			
18	OneNC			
19	OneNC			
20	OneNC			
21	OneNC			
22	OneNC			

Data source types in Power BI

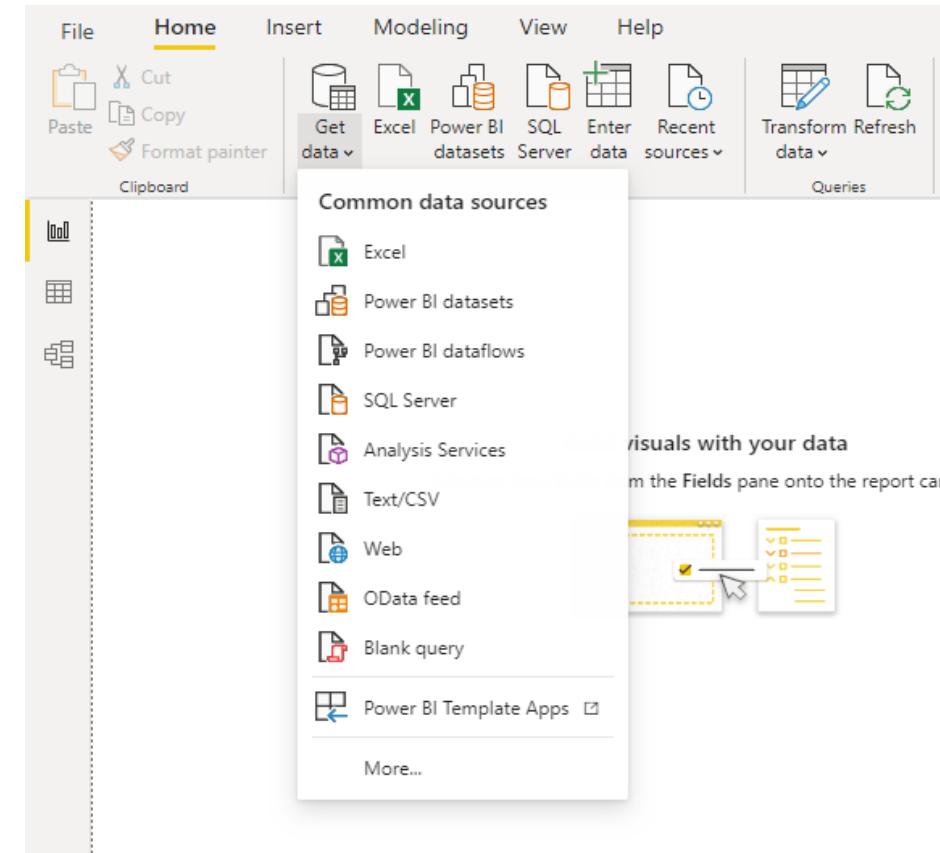
- With Power BI Desktop, you can connect to data from many different sources
- The File > Get Data provides the following data connections:
 - Excel
 - Text/CSV
 - XML
 - JSON
 - Folder
 - PDF
 - SharePoint Folder



Data source options

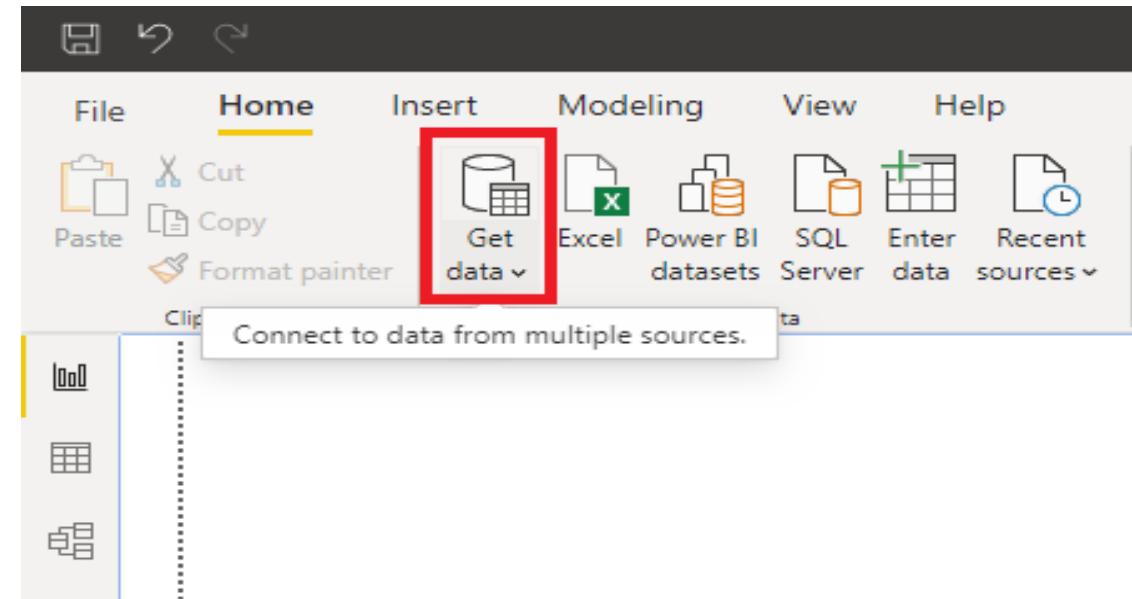
- Power BI can connect to many different data sources
- By clicking on **Get Data**, you can see a list of the **Most Common** data sources
- In addition to those, you can also connect to Hadoop, Azure, R and Python, many others!

Take 5 minutes to explore the different data sources – which ones are you most likely to use?



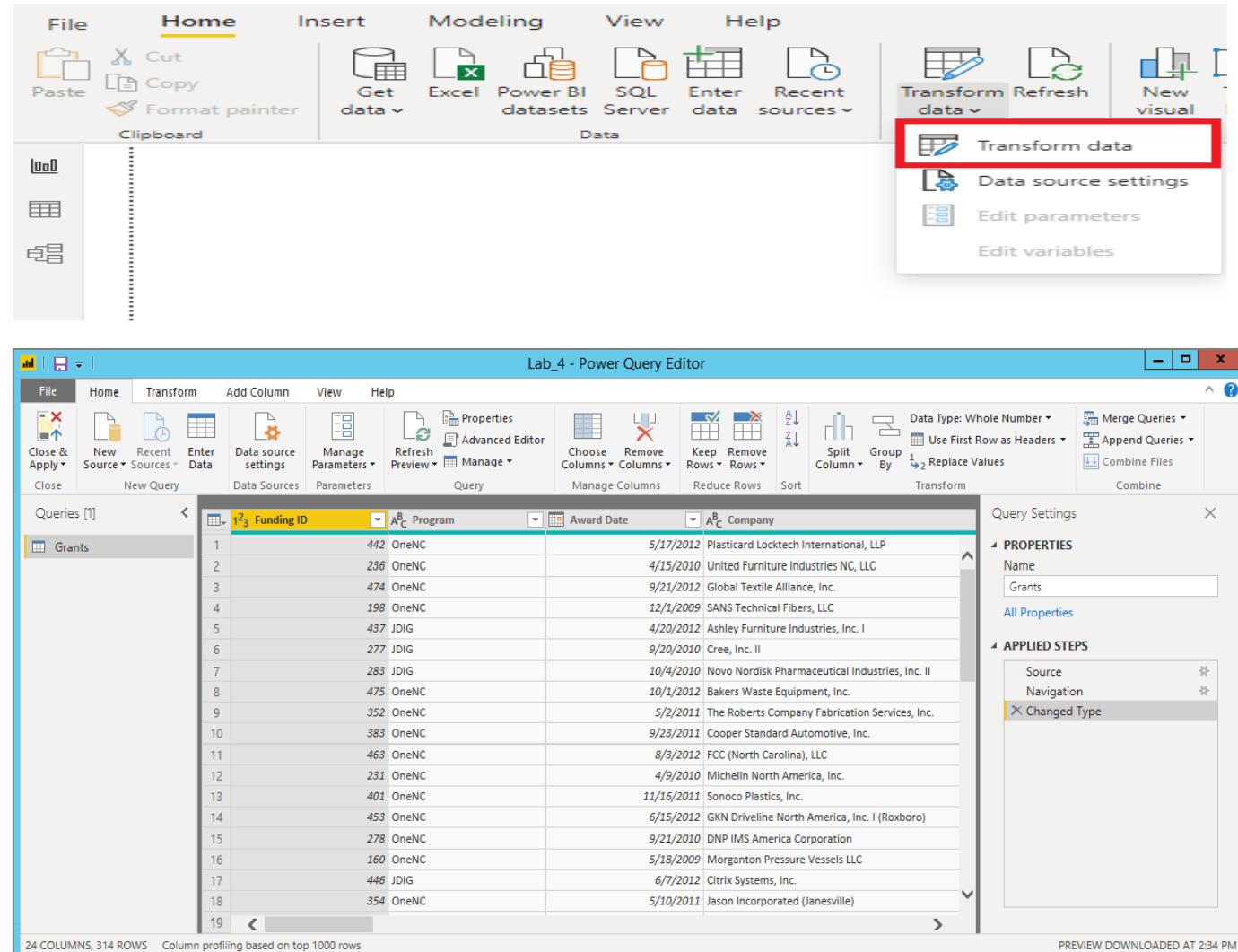
Get data from Excel

- Start a **new** Power BI file
- Choose **get data** from the top right of the Tool Bar
- Choose '**Excel**' then click 'Connect'
- Navigate to your '**Grants**' file in lab 4 folder and click on Open



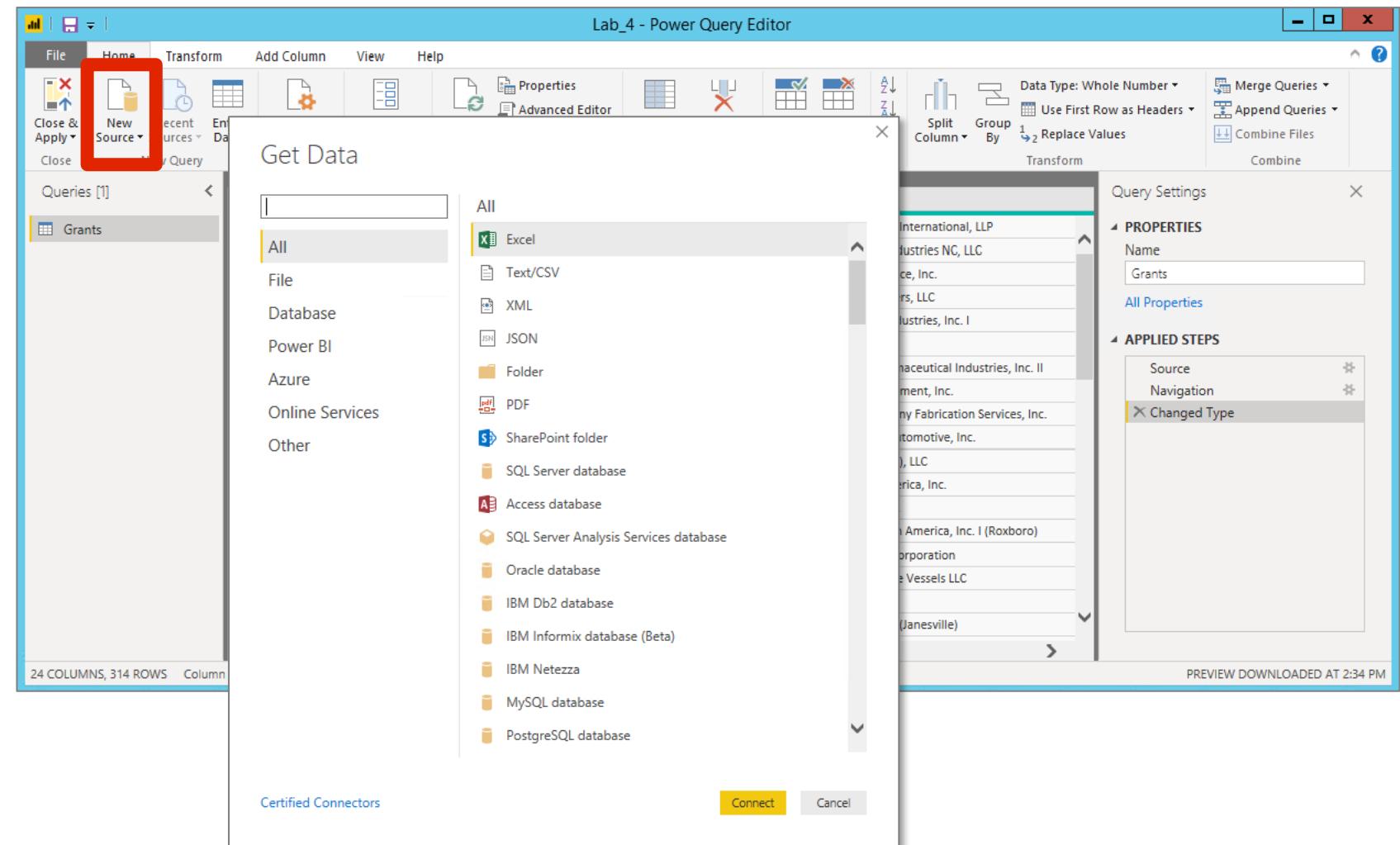
Edit queries

- Click on the '**Transform data**' on the tool bar under Home
- Then the **Power Query Editor** window will pop up



'New Source' to upload data

- Click on 'New Source' under Home tab. Then choose Excel
- Find the **Lab 2 Data.xlsx** file under lab 2 folder



Open the data

- Click on Open, then choose '**Sheet 1**' then 'OK'

Sheet1
Preview downloaded on Wednesday, December 9, 2020

Funding ID	Program	Award Date	Company
442	OneNC	5/17/2012	Plasticard Locktech International, LLP
236	OneNC	4/15/2010	United Furniture Industries NC, LLC
474	OneNC	9/21/2012	Global Textile Alliance, Inc.
198	OneNC	12/1/2009	SANS Technical Fibers, LLC
437	JDIG	4/20/2012	Ashley Furniture Industries, Inc. I
277	JDIG	9/20/2010	Cree, Inc. II
283	JDIG	10/4/2010	Novo Nordisk Pharmaceutical Industries, Inc.
475	OneNC	10/1/2012	Bakers Waste Equipment, Inc.
352	OneNC	5/2/2011	The Roberts Company Fabrication Services,
383	OneNC	9/23/2011	Cooper Standard Automotive, Inc.
463	OneNC	8/3/2012	FCC (North Carolina), LLC
231	OneNC	4/9/2010	Michelin North America, Inc.
401	OneNC	11/16/2011	Sonoco Plastics, Inc.
453	OneNC	6/15/2012	GKN Driveline North America, Inc. I (Roxboro)
278	OneNC	9/21/2010	DNP IMS America Corporation
160	OneNC	5/18/2009	Morganton Pressure Vessels LLC
446	JDIG	6/7/2012	Citrix Systems, Inc.
354	OneNC	5/10/2011	Jason Incorporated (Janesville)
300	OneNC	11/18/2010	FAS Controls Inc.
505	OneNC	1/3/2013	Exela Pharma Sciences, LLC

i The data in the preview has been truncated due to size limits.

OK Cancel

	Funding ID	Program	Award Date	Company
1	442	OneNC	5/17/2012	Plasticard Locktech International, LLP
2	236	OneNC	4/15/2010	United Furniture Industries NC, LLC
3	474	OneNC	9/21/2012	Global Textile Alliance, Inc.
4	198	OneNC	12/1/2009	SANS Technical Fibers, LLC
5	437	JDIG	4/20/2012	Ashley Furniture Industries, Inc. I
6	277	JDIG	9/20/2010	Cree, Inc. II
7	283	JDIG	10/4/2010	Novo Nordisk Pharmaceutical Industries, Inc. II
8	475	OneNC	10/1/2012	Bakers Waste Equipment, Inc.
9	352	OneNC	5/2/2011	The Roberts Company Fabrication Services, Inc.
10	383	OneNC	9/23/2011	Cooper Standard Automotive, Inc.

Perform data transformation

- We will only keep columns '**Company**', '**Company County**', '**Company Address**', '**Website**' and '**elapsed days**' in our data

- Click on '**Choose Columns**' and select those 3 columns and click OK
- Then the table has the other columns removed

The screenshot shows the Microsoft Power Query Editor interface with the title bar "Lab_4 - Power Query Editor". The ribbon menu is visible with options like File, Home, Transform, Add Column, View, and Help. In the Home tab, the "Manage Columns" button is highlighted with a red box. A modal dialog box titled "Choose Columns" is open on the right, prompting the user to "Choose the columns to keep". It includes a "Search Columns" input field and a list of columns with checkboxes. Several columns are checked: "Company", "Company County", "Company Address", and "Website". Other columns like "Funding ID", "Program", and "Award Date" are unchecked. At the bottom of the dialog are "OK" and "Cancel" buttons, and a status message "Changed Type" and "Removed Other Columns". The main query grid below shows a table with columns "Company", "Company County", and "Company Address", corresponding to the selected rows in the list.

Company	Company County	Company Address
Plasticard Locktech International, LLP	Buncombe	605 Sweeten Creek Industrial Park, Asheville, NC
United Furniture Industries NC, LLC	Davidson	12 Hackney Street, Lexington, NC
Global Textile Alliance, Inc.	Rockingham	2361 Holiday Loop Road, Reidsville, NC
SANS Technical Fibers, LLC	Rockingham	4721 NC Highway 770, Stoneville, NC
Ashley Furniture Industries, Inc. I	Davie	221 Ashley Furniture Way, Advance, NC 27006
Cree, Inc. II	Durham	4600 Silicon Drive, Durham, NC 27703-8475; 3026 E Corr
Novo Nordisk Pharmaceutical Industries, Inc. II	Johnston	3612 Powhatan Road, Clayton, NC 27527-9217
Bakers Waste Equipment, Inc.	Caldwell	1808 Norwood St. SW, Lenoir, NC
The Roberts Company Fabrication Services, Inc.	Sampson	133 Forlives Road, Winterville, NC
Cooper Standard Automotive, Inc.	Wayne	308 Fedelon Trail, Goldsboro, NC
FCC (North Carolina), LLC	Scotland	16700 Airport Rd., Maxton, NC
Michelin North America, Inc.	Stanly	South Stanly School Road, Norwood NC
Sonoco Plastics, Inc.	Haywood	288 Howell Mill Road, Waynesville, NC
GKN Driveline North America, Inc. I (Roxboro)	Person	6400 Durham Road, Timberlake, NC
DNP IMS America Corporation	Cabarrus	4524 Enterprise Drive NW, Concord, NC

Change query name

- You can change the name of your query by changing the name on the Query Settings panel
- Here we **rename** the query as '**NC Company Data**'

The screenshot shows the Power BI Query Editor interface. On the left is a table with three columns: 'Company', 'Company County', and 'Company Address'. The table contains 16 rows of company information from North Carolina. On the right is the 'Query Settings' pane, which includes sections for 'PROPERTIES' (Name set to 'NC Company Data') and 'APPLIED STEPS' (listing 'Source', 'Navigation', 'Promoted Headers', 'Changed Type', and 'Removed Other Columns').

#	A ^B Company	A ^B Company County	A ^B Company Address
1	Plasticard Locktech International, LLP	Buncombe	605 Sweeten Creek Industrial Park, Asheville, NC
2	United Furniture Industries NC, LLC	Davidson	12 Hackney Street, Lexington, NC
3	Global Textile Alliance, Inc.	Rockingham	2361 Holiday Loop Road, Reidsville, NC
4	SANS Technical Fibers, LLC	Rockingham	4721 NC Highway 770 , Stoneville, NC
5	Ashley Furniture Industries, Inc. I	Davie	221 Ashley Furniture Way, Advance, NC 27006
6	Cree, Inc. II	Durham	4600 Silicon Drive, Durham, NC 27703-8475; 3026 E Cornwallis Rd, Res...
7	Novo Nordisk Pharmaceutical Industries, Inc. II	Johnston	3612 Powhatan Road, Clayton, NC 27527-9217
8	Bakers Waste Equipment, Inc.	Caldwell	1808 Norwood St. SW, Lenoir, NC
9	The Roberts Company Fabrication Services, Inc.	Sampson	133 Forlives Road, Winterville, NC
10	Cooper Standard Automotive, Inc.	Wayne	308 Fedelon Trail, Goldsboro, NC
11	FCC (North Carolina), LLC	Scotland	16700 Airport Rd., Maxton, NC
12	Michelin North America, Inc.	Stanly	South Stanly School Road, Norwood NC
13	Sonoco Plastics, Inc.	Haywood	288 Howell Mill Road, Waynesville, NC
14	GKN Driveline North America, Inc. I (Roxboro)	Person	6400 Durham Road, Timberlake, NC
15	DNP IMS America Corporation	Cabarrus	4524 Enterprise Drive NW, Concord, NC
16	Morganton Pressure Vessels LLC	McDowell	1 Alfredo Baglioni Drive, Marian, NC

Remove nulls

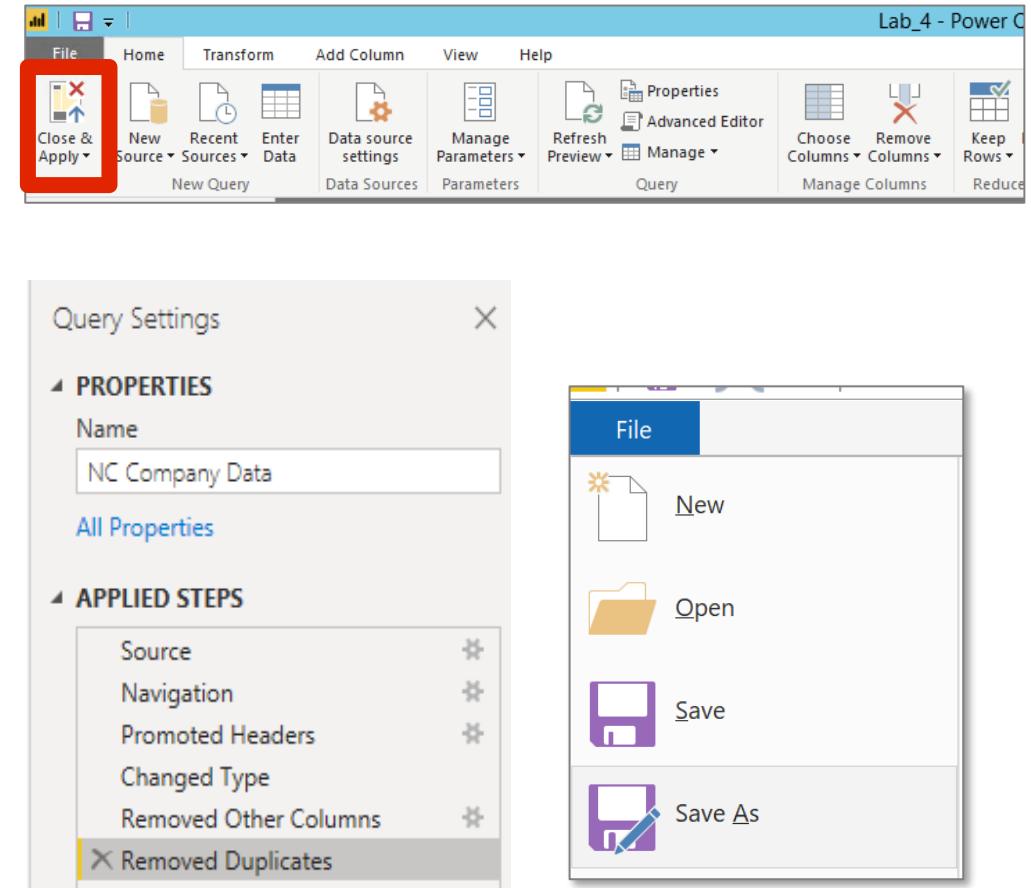
- You can see that in the table, we still have a lot of duplicate records
- Click on the '**Remove Rows**' button in the header, then choose '**Remove Duplicates**'

The screenshot shows the Power BI desktop interface. The ribbon is at the top with the 'Home' tab selected. In the 'Transform' section of the ribbon, the 'Remove Rows' button is highlighted with a red box. Below the ribbon, there's a table titled 'NC Company Data'. A context menu is open over the table, with the 'Remove Duplicates' option highlighted. To the right of the table, there are 'Query Settings', 'PROPERTIES' (Name: NC Company Data), and 'APPLIED STEPS' sections. The 'APPLIED STEPS' section shows a step named 'Removed Duplicates'.

Rank	Company Name	Address
1	Plasticard Locktech International, LLP	Mountain Creek Industrial Park, Asheville, NC
2	United Furniture Industries NC, LLC	Kney Street, Lexington, NC
3	Global Textile Alliance, Inc.	Holiday Loop Road, Reidsville, NC
4	SANS Technical Fibers, LLC	Highway 770, Stoneville, NC
5	Ashley Furniture Industries, Inc. I	Davie
6	Cree, Inc. II	Durham
7	Novo Nordisk Pharmaceutical Industries, Inc. II	Johnston
8	Bakers Waste Equipment, Inc.	Caldwell
9	The Roberts Company Fabrication Services, Inc.	Sampson
10	Cooper Standard Automotive, Inc.	Wayne
11	FCC (North Carolina), LLC	Scotland
12	Michelin North America, Inc.	Stanly
13	Sonoco Plastics, Inc.	Haywood

Apply changes and save dataset

- In the **Query Settings**, you can easily 'Navigate' to the previous steps and reverse the steps sequence
- After all the data source changes are done, you can click on '**Close & Apply**' to apply the changes to the original dataset
- Make sure to save the current file by choosing '**File**' -> '**Save As**' and save the file as '**NC Company Data**'



Knowledge Check 1



Outline for today

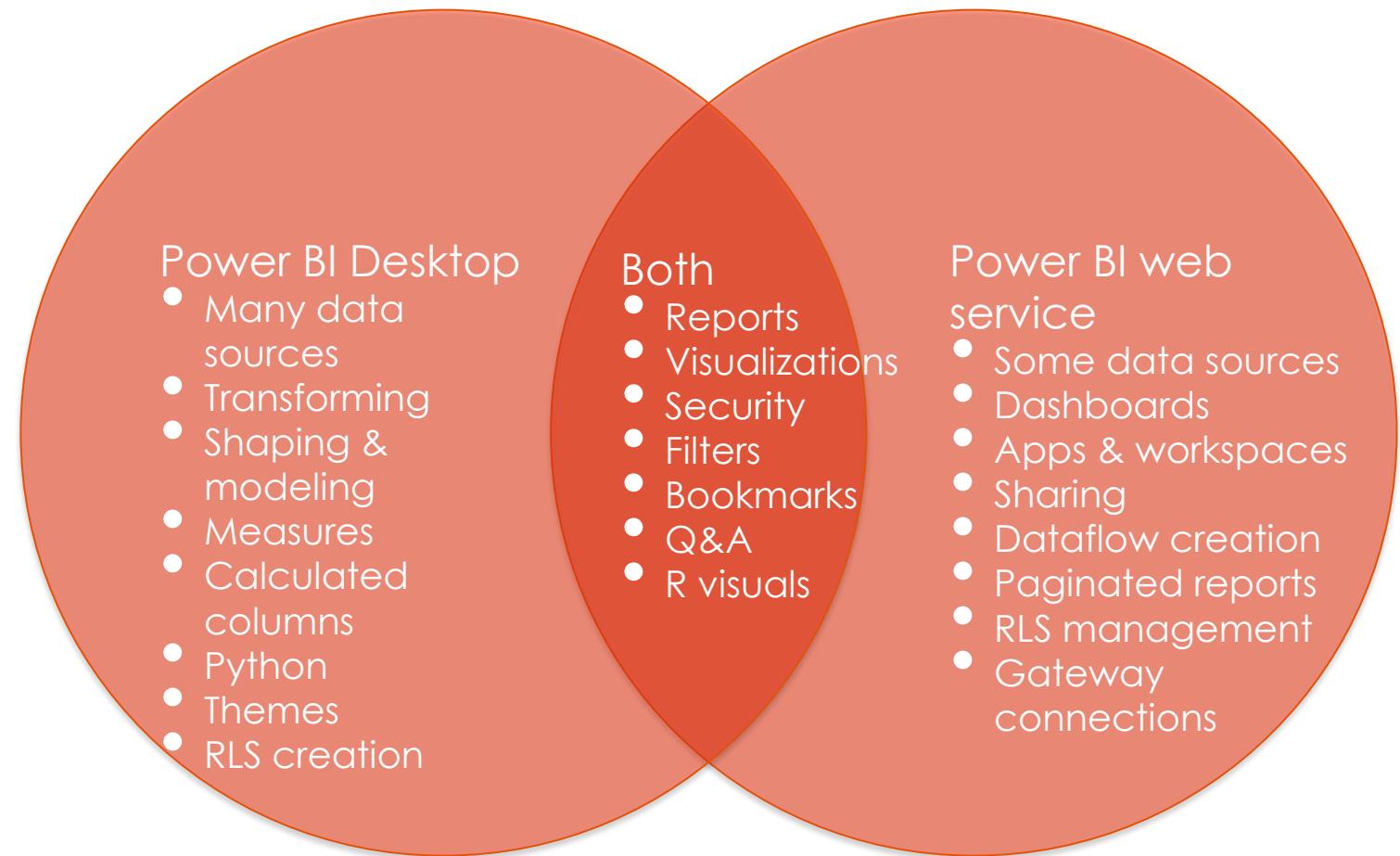
1. Sneak peek on ETL layer: load data through Power Query
2. Explain the additional functions of Power BI web service

Objectives for Lab 3

- Navigate through the Portal
- Uploading and downloading reports
- Utilize schedule refresh to ensure up-to-date visuals
- Adding reports to your favorites
- Uploading datasets
- Build your report online
- Build your dashboard

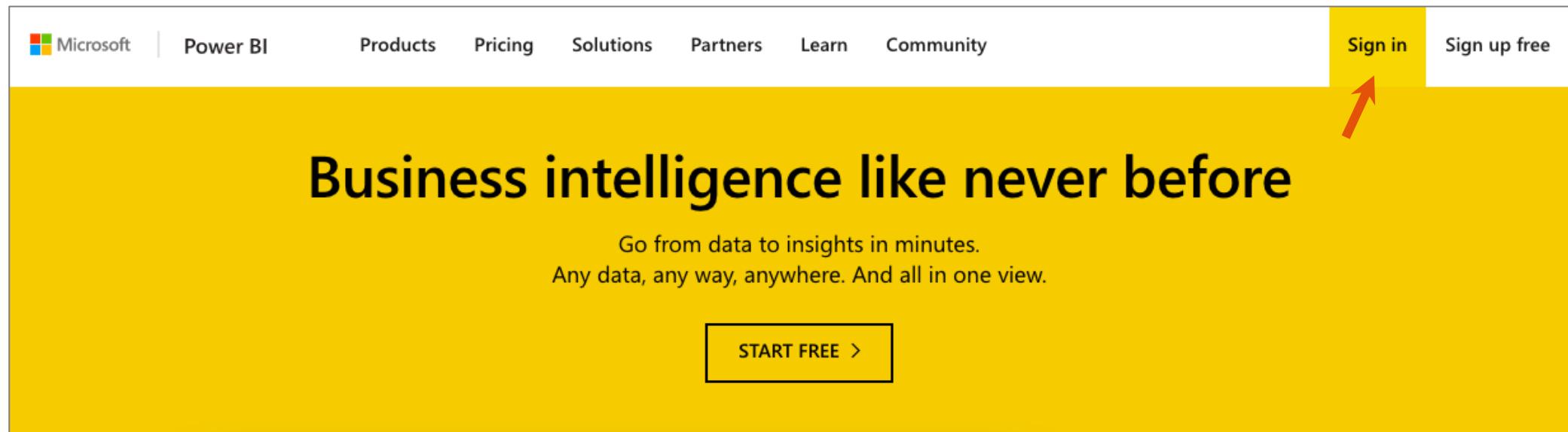
Comparing Power BI desktop & Power BI service

- Power BI Desktop is a complete data analysis and report creation tool
- The Power BI web service is a cloud-based, online service for **light report editing and collaboration for teams and corporations**



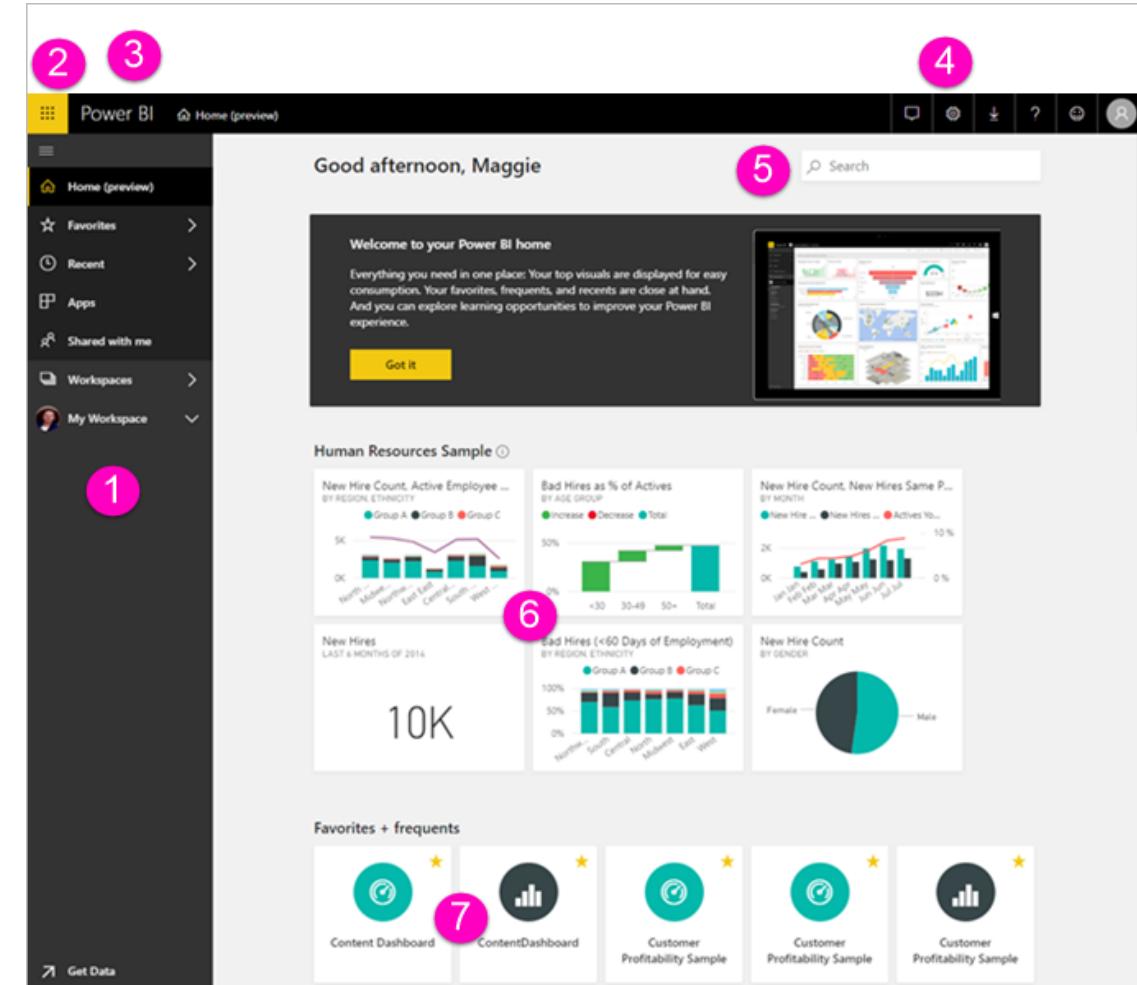
Sign in to Power BI Service

- Go to: <https://powerbi.microsoft.com/en-us/>
- Choose 'Sign In' in the top right corner
- Login with your account credentials



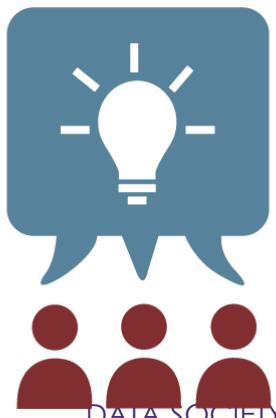
Familiarizing yourself with Power BI Service view

- When you open the Power BI service in a browser, you start at your Home screen. Here are the elements you may see:
 - Navigation pane (left pane)
 - Office 365 app launcher
 - Power BI home button
 - Icon buttons, including settings, help, and feedback
 - Search box
 - Tiles from a favorite dashboard
 - Favorite and frequent dashboards and reports



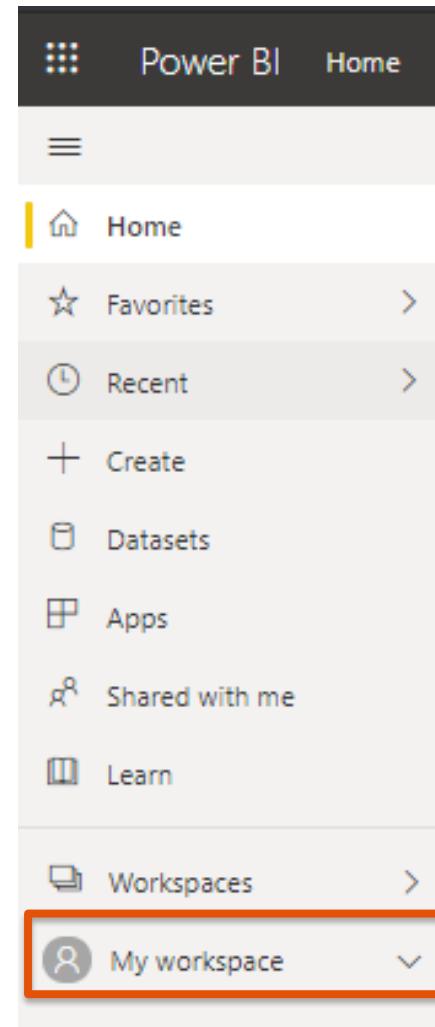
Power BI's workspace built for collaboration

- Great place to collaborate with your colleagues on dashboards, reports, and datasets to create apps
- After you finish collaborating on your dashboards and reports with colleagues, then you package it as an app and distribute it
- By default, everyone will have 'My Workspace' to work with, you can also see all the workspaces shared with you



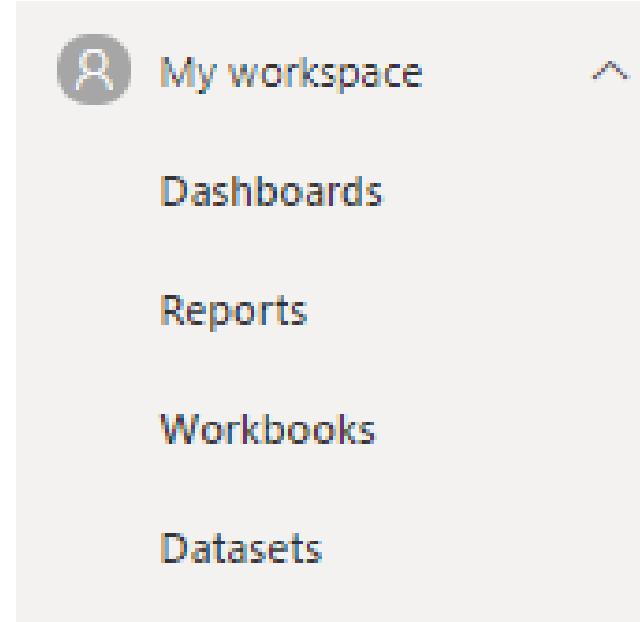
Navigate to workspaces

- After logging in to Power BI, you can find workspaces in the left panel
- Let's choose the default “My Workspace” to start



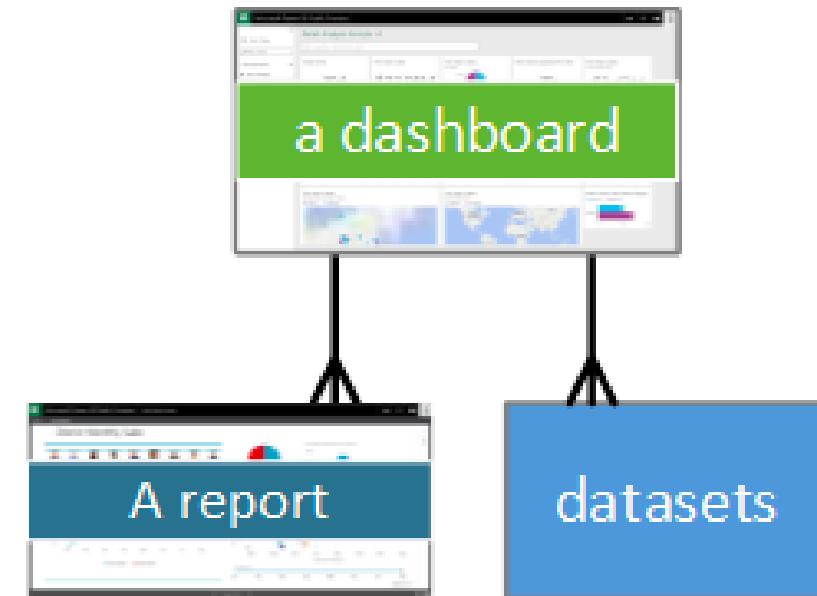
Navigate to workspaces

- You can see each workspace has 4 areas. They are Dashboard, Reports, Workbooks, Datasets



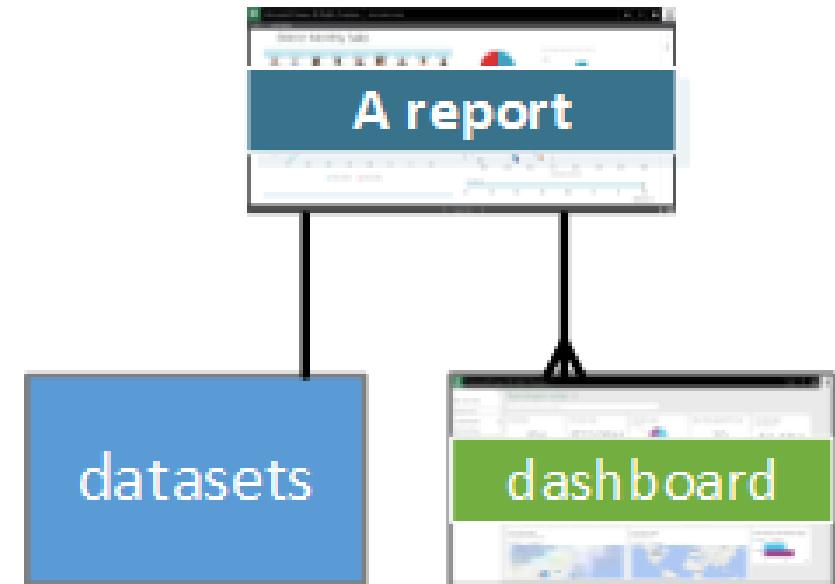
Understanding your dashboard

- **Dashboard:** a Power BI dashboard is a single page, often called a canvas, that uses visualizations to tell a story. The visualizations you see on the dashboard are called **tiles** and are pinned to the dashboard by report designers
- ONE dashboard...
 - is associated with a single workspace
 - can display visualizations from many different datasets
 - can display visualizations from many different reports
 - can display visualizations pinned from other tools (for example, Excel)



Understanding your report

- **Reports:** a Power BI report is a multi-perspective view into a dataset, with visuals that represent different findings and insights from that dataset
- **ONE report...**
 - is contained in a single workspace
 - can be associated with multiple dashboards within that workspace
 - can be created using data from one dataset. Power BI Desktop can combine more than one data source into a single dataset in a report, and that report can be imported into Power BI

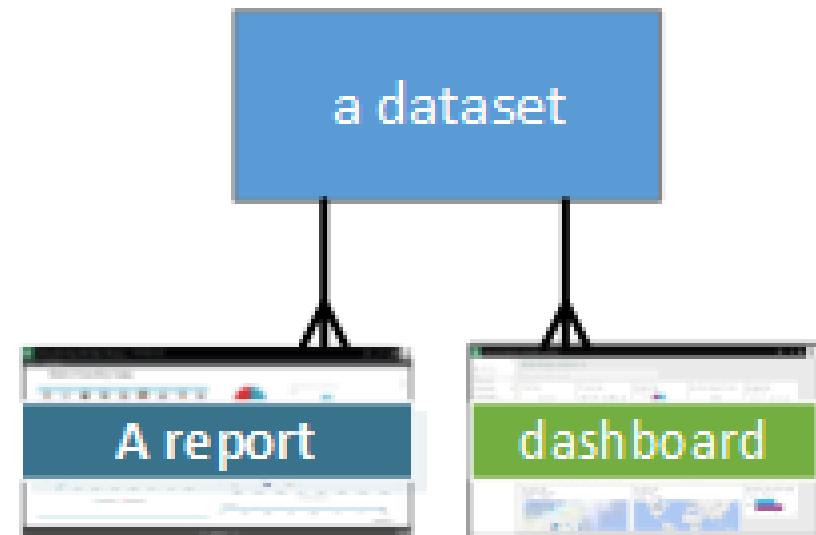


Understanding your workbook

- **Workbooks** are Excel files associated with this workspace. When you use 'Get data' with Excel files, you have the option to Import or Connect to the file
- When you choose connect, your workbook will appear in Power BI just like it would in Excel Online

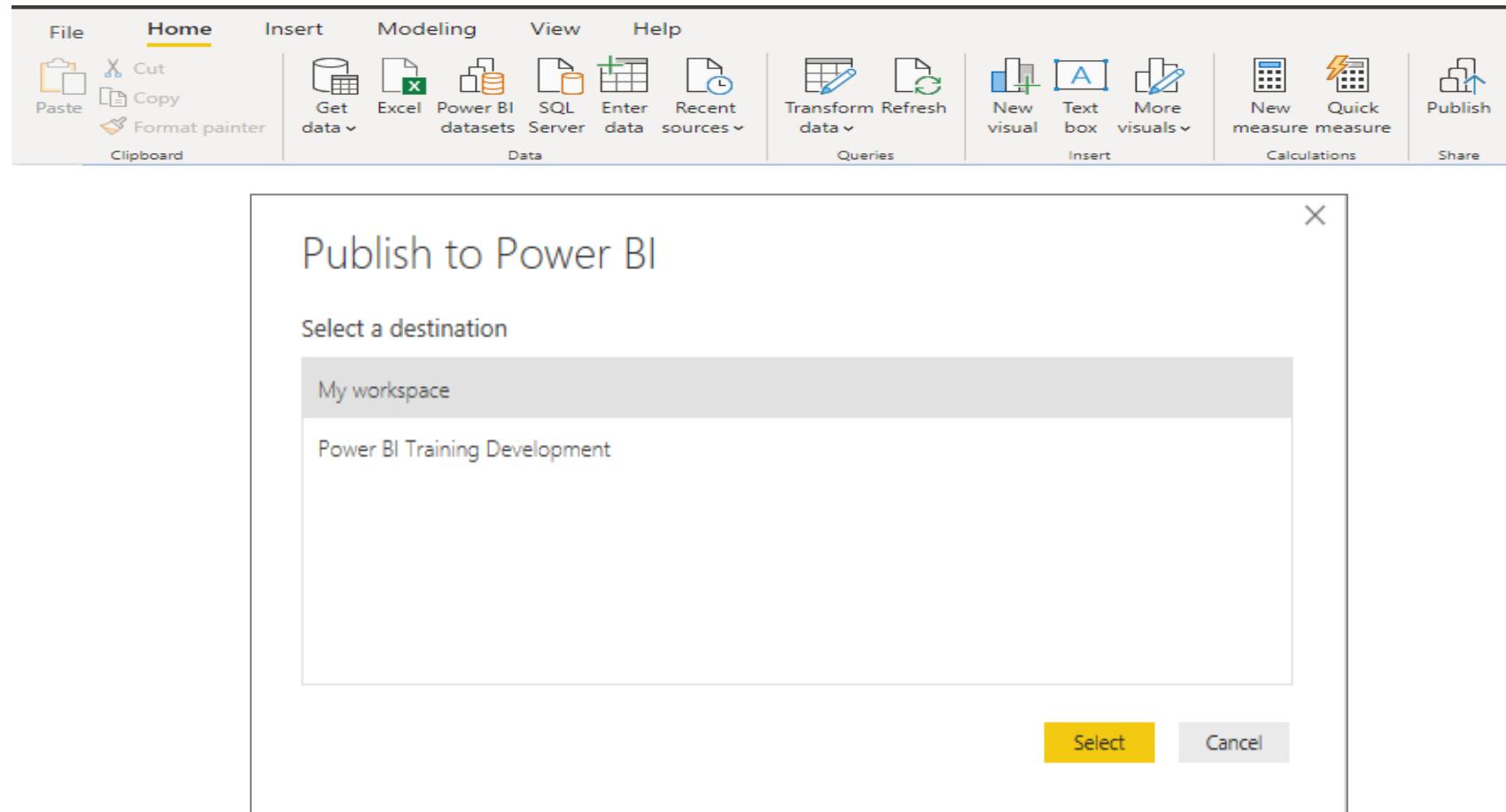
Understanding your dataset

- **Dataset:** datasets are associated with workspaces and a single dataset can be part of many workspaces. When you open a workspace, the associated datasets are listed under the Datasets tab
- ONE dataset...
 - can be used over and over in one or in many workspaces
 - can be used in many different reports
 - visualizations from that one dataset can display on many different dashboards



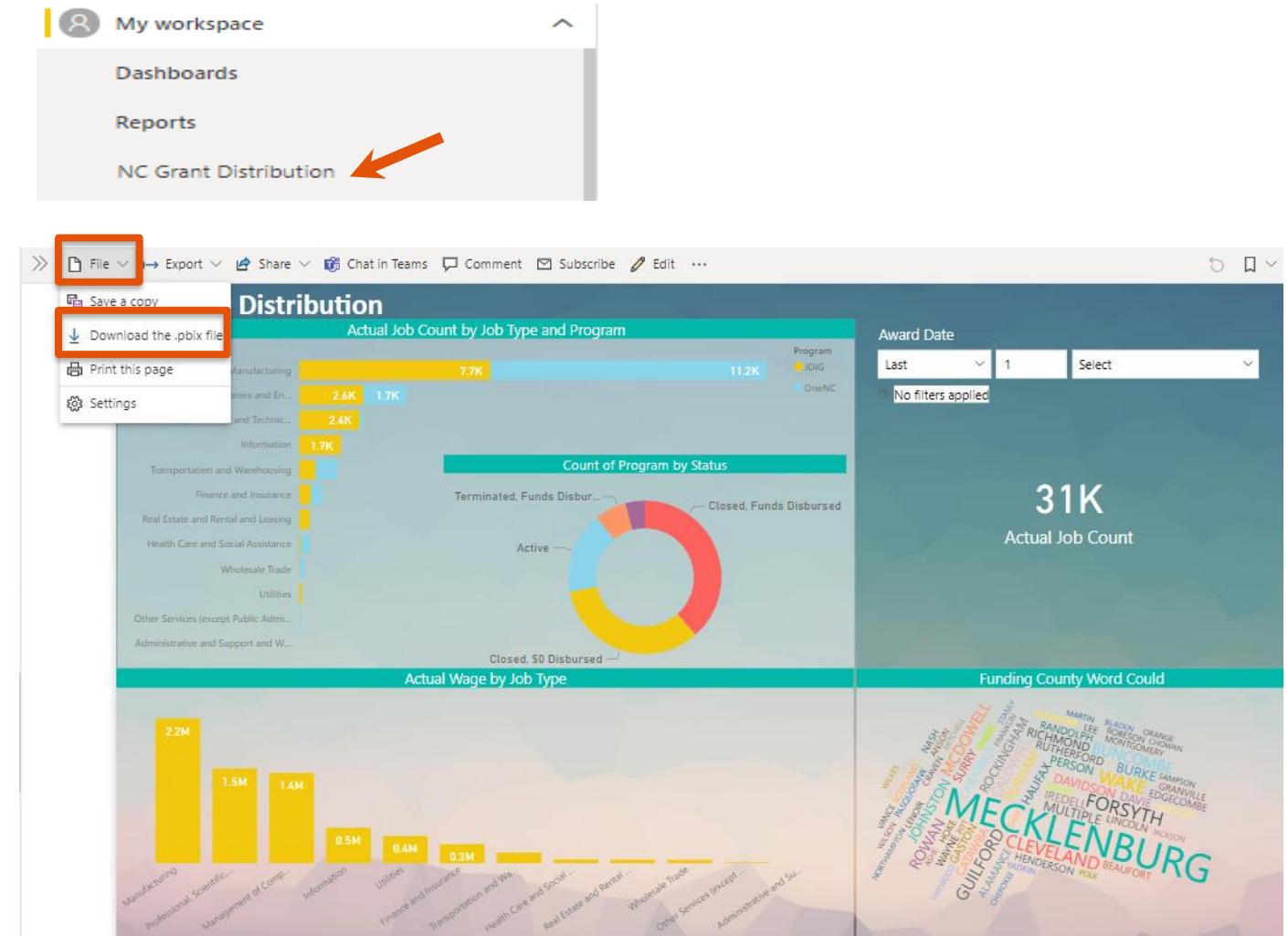
Uploading reports

- You will need to use Power BI Desktop to upload Power BI report



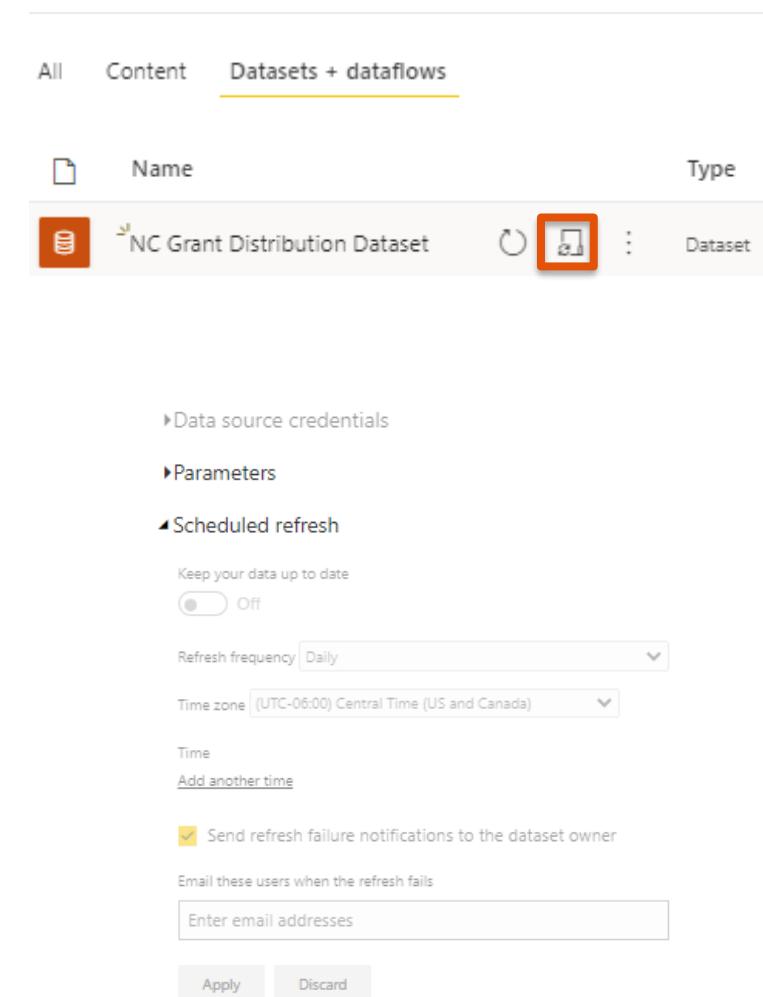
Downloading reports

- Click into the report you want to download on PowerBI.com workspace
- You can find the 'File' Drop Down on the Top right corner of the main area
- There you can Download Report (Preview)



Schedule refresh on datasets

- Knowing how to refresh your dataset is critical in delivering the most accurate results
- Go to the 'Datasets' tab of the workspace and click on the 'Schedule Refresh' button
- From here, you can set the Gateway connection (connector to the underlining data source). If your data is locally in your server, then gateway is where Power BI cloud service can connect to your on-premise local data
- If your data is online or is in the cloud, the gateway is not needed



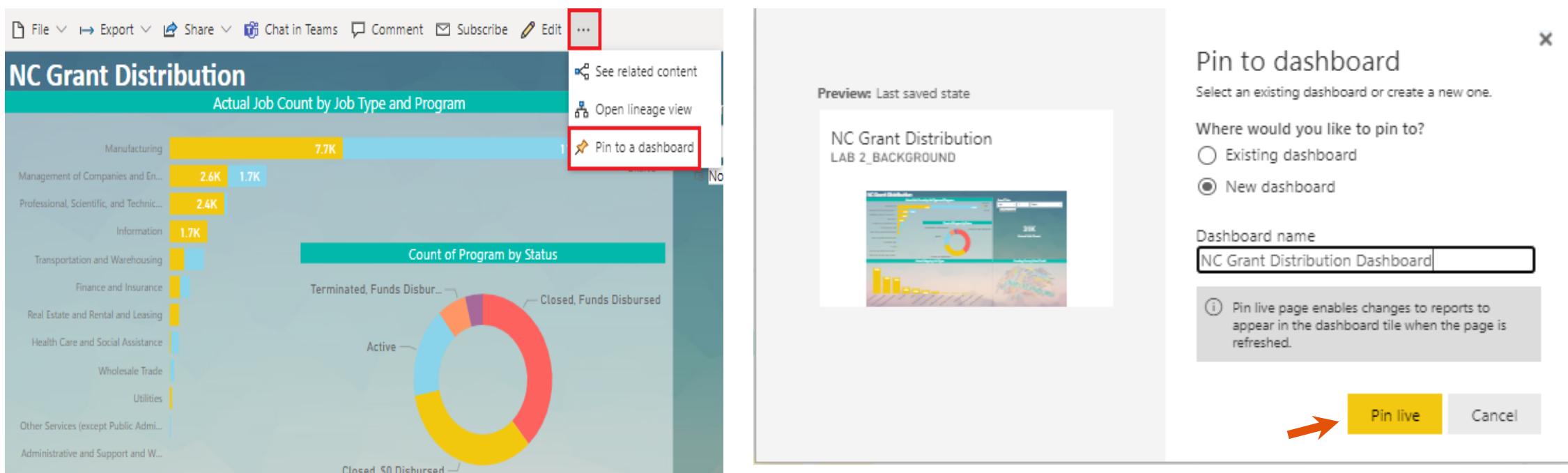
Building your online report

- You can create a report online from an existing dataset by choosing 'Create Report' button on the Datasets tab options
- Then, the report development environment will show up in the browser

The screenshot shows the Power BI service interface. At the top, there are tabs: All, Content, and Datasets + dataflows, with Datasets + dataflows being the active tab. Below the tabs, a list of datasets is shown, with the 'NC Grant Distribution Dataset' selected. A red box highlights the three-dot menu icon next to the dataset name, and a red arrow points to the 'Create report' option in the dropdown menu, which is also highlighted with a red box. The main workspace area displays a 'Build visuals with your data' section with a placeholder message: 'Select or drag fields from the Fields pane onto the report canvas.' To the right, the Fields pane is open, showing a hierarchical list of fields from the selected dataset. The 'Values' section is expanded, showing various numerical and categorical fields like 'Actual Job...', 'Actual Wage', 'Award Date', etc.

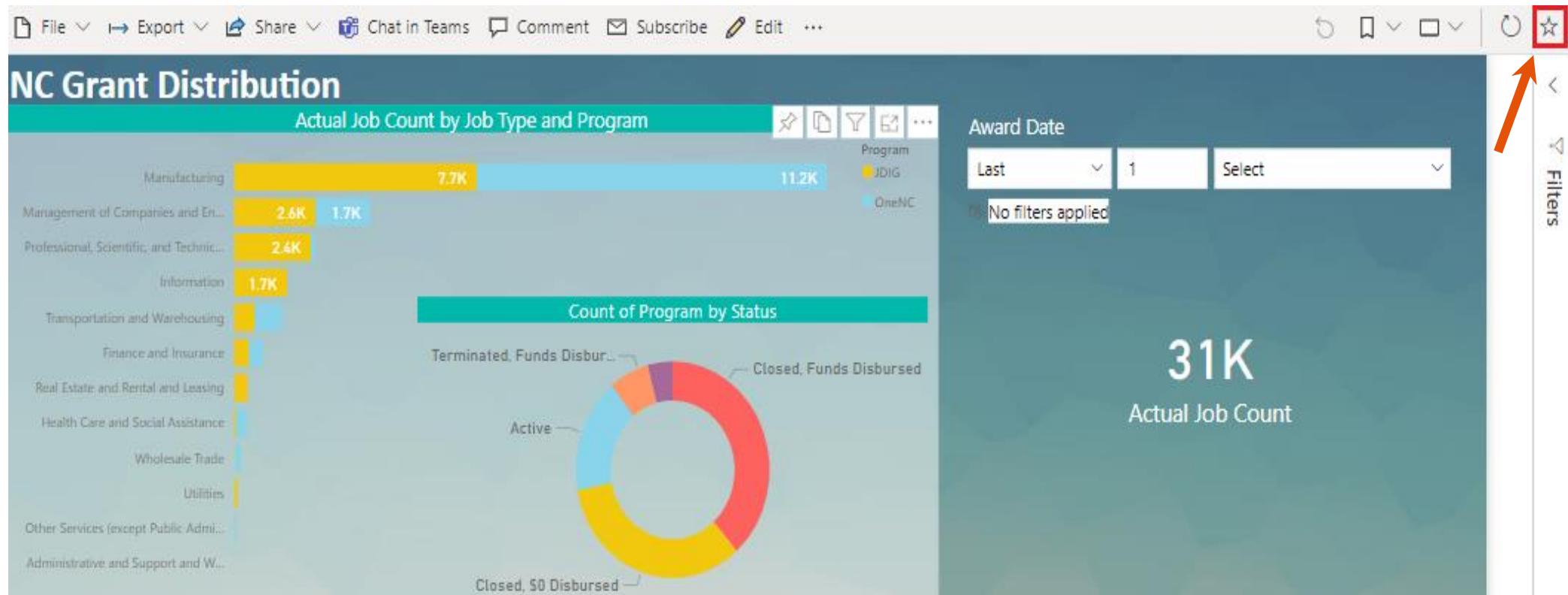
Pinning your dashboards

- You can create Dashboard from existing Reports in the same workspace
- Go to a report on your Workspace, and then find the Pin Visual
- Then you can pin your visual to an existing dashboard or a new dashboard



Add to your favorites

- You can add any dashboard or report to your Favorites

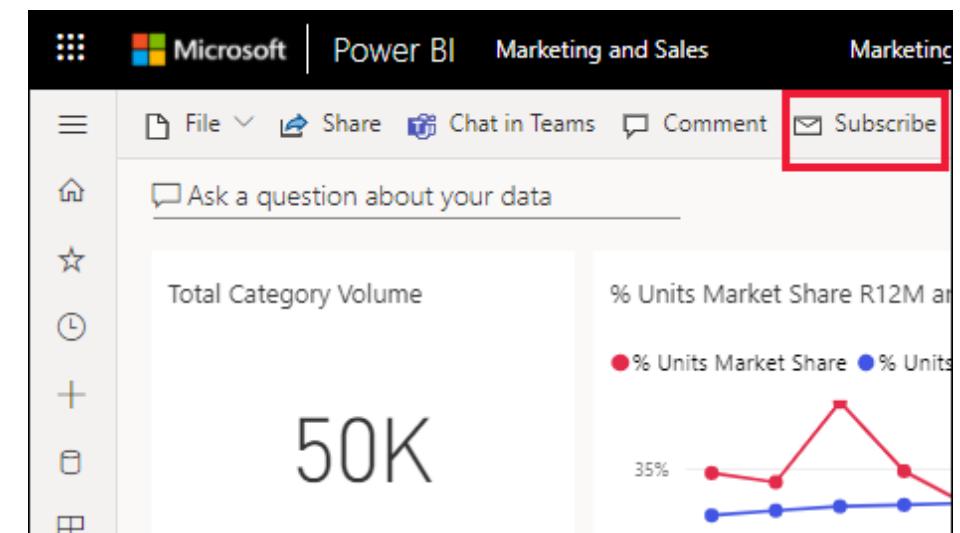


Data Alerts

- You can set alerts to notify you when data in your dashboards changes beyond limits you set
- There are some restrictions to when Alerts can be set:
 - Alerts can only be set on tiles pinned from report visuals, and only on gauges, KPIs, and cards
 - Alerts only work on data that is refreshed.
 - Alerts can be created on dashboards:
 - that you have created and saved in My workspace
 - that have been shared with you in a Premium capacity
 - in any workspace you can access, if you have a Power BI Pro license
- Since our data is static, we can follow [Microsoft's tutorial](#) to set alerts on a sample dashboard

Subscriptions

- Subscriptions help keep track of dashboards
- Power BI will email a snapshot to specified email addresses
- Subscriptions require a Power BI Pro or Premium License



Subscriptions

- Frequency can be customized: daily, weekly, or when the data refreshes

Subscribe

Enter email addresses

(Specify at least one email address)

Subject

Subject

Include an optional message...

Frequency

Daily

Sun Mon Tue Wed Thu Fri Sat

Scheduled Time

3 00 PM (UTC-05:00) Eastern Time (US & Canada)

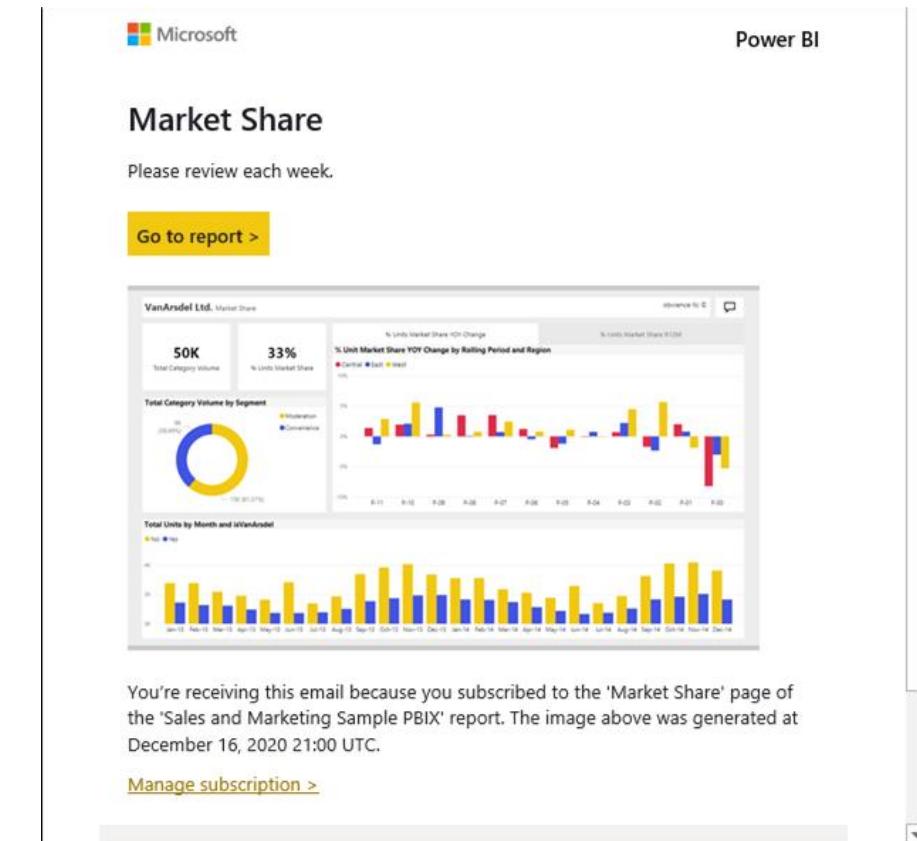
Start date End date

Also Include

Access to this dashboard

Link to dashboard in Power BI

[Manage all subscriptions](#)



Knowledge Check 2



Lab 3

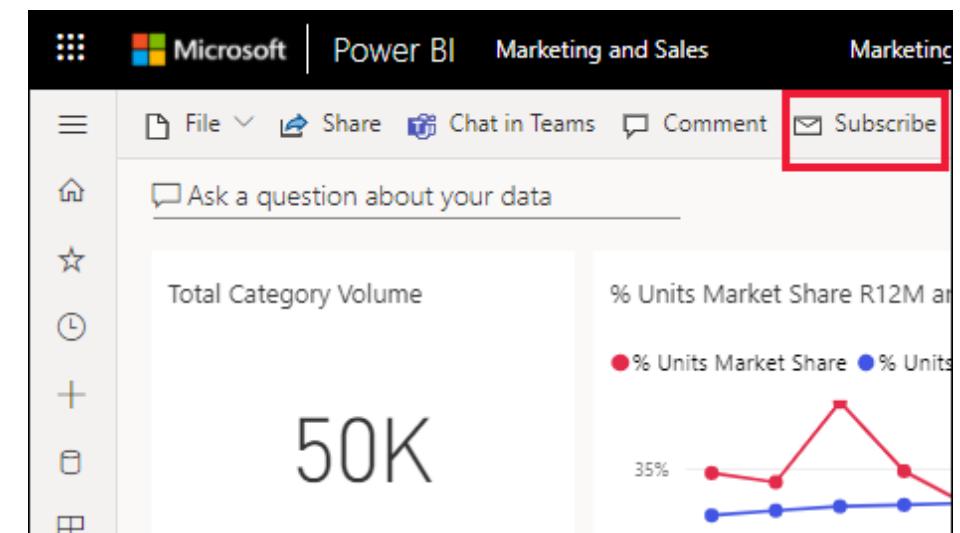


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Subscriptions

- Frequency can be customized: daily, weekly, or when the data refreshes

Subscribe

Enter email addresses

(Specify at least one email address)

Subject

Subject

Include an optional message...

Frequency

Daily

Sun Mon Tue Wed Thu Fri Sat

Scheduled Time

3 00 PM (UTC-05:00) Eastern Time (US & Canada)

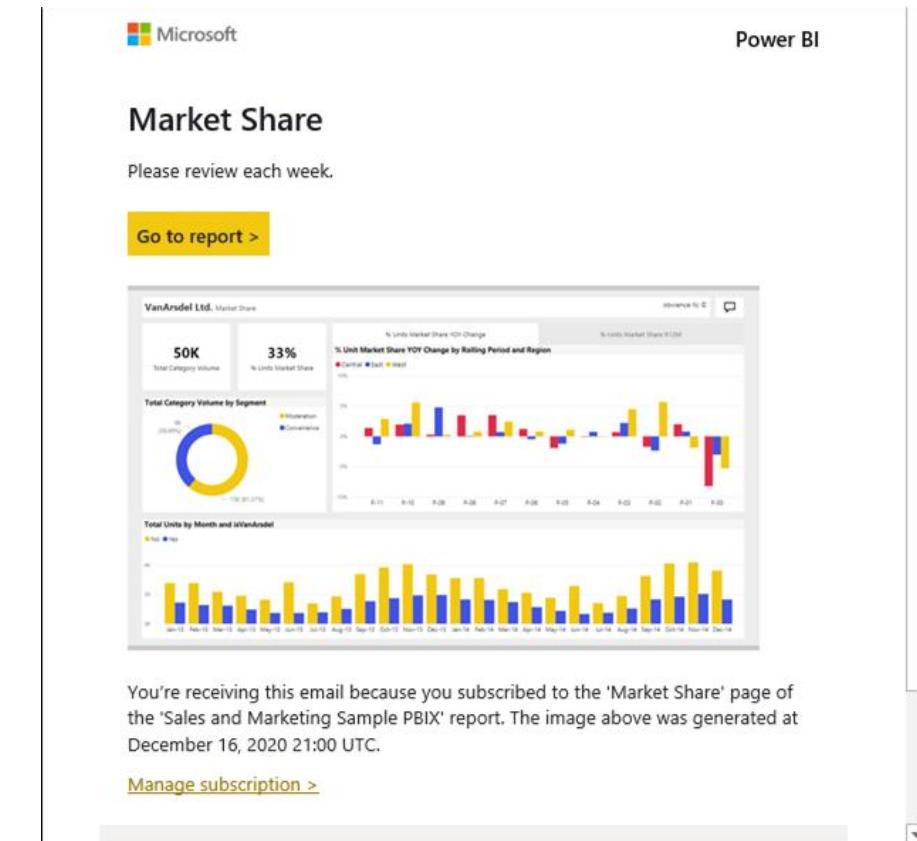
Start date End date

Also Include

Access to this dashboard

Link to dashboard in Power BI

[Manage all subscriptions](#)



Congratulations!

Today you learned how to:

1. Load data through Power Query
2. Use Power BI web service

Data Analysis with PowerBI

DATA
SOCI
ETY:

DATA SOCIETY:

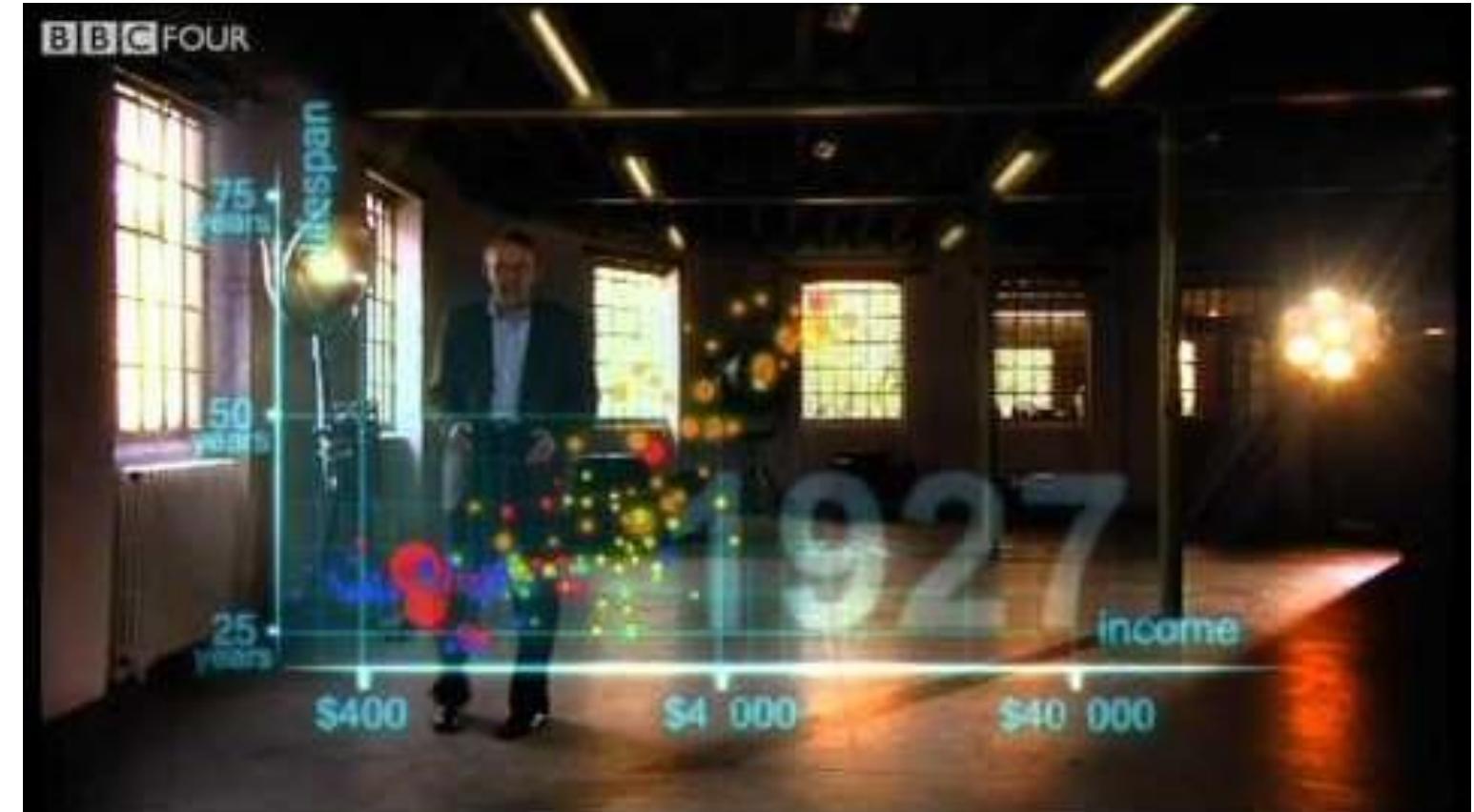
Day 4

“One should look for what is and not what he thinks should be.”
- Albert Einstein



Warm up: Hans Rosling visualization video

- 200 Countries, 200 Years, 4 Minutes - The Joy of Stats - BBC Four (narrative framework)
- <https://www.youtube.com/watch?v=jbkSRLYSojq>



Outline for today

1. Implement data storytelling frameworks and techniques
2. Program in Power BI using DAX language to manipulate data

Why is visualization important?

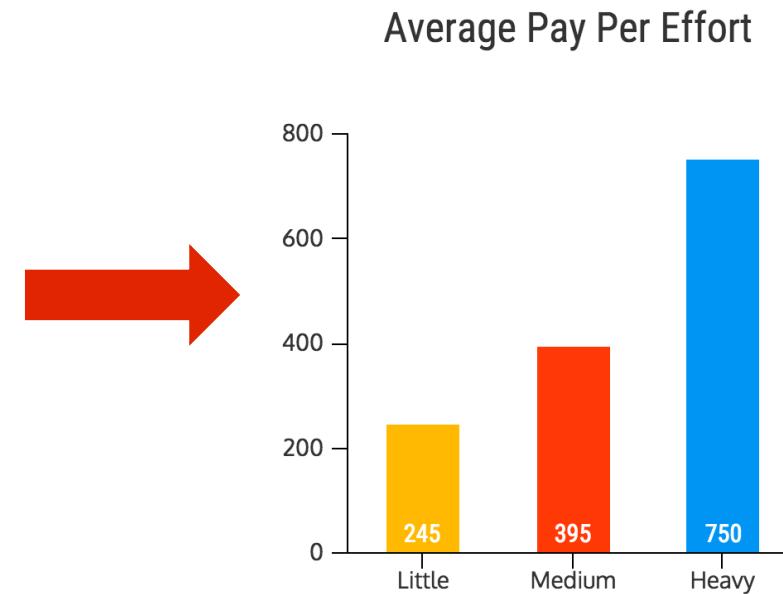
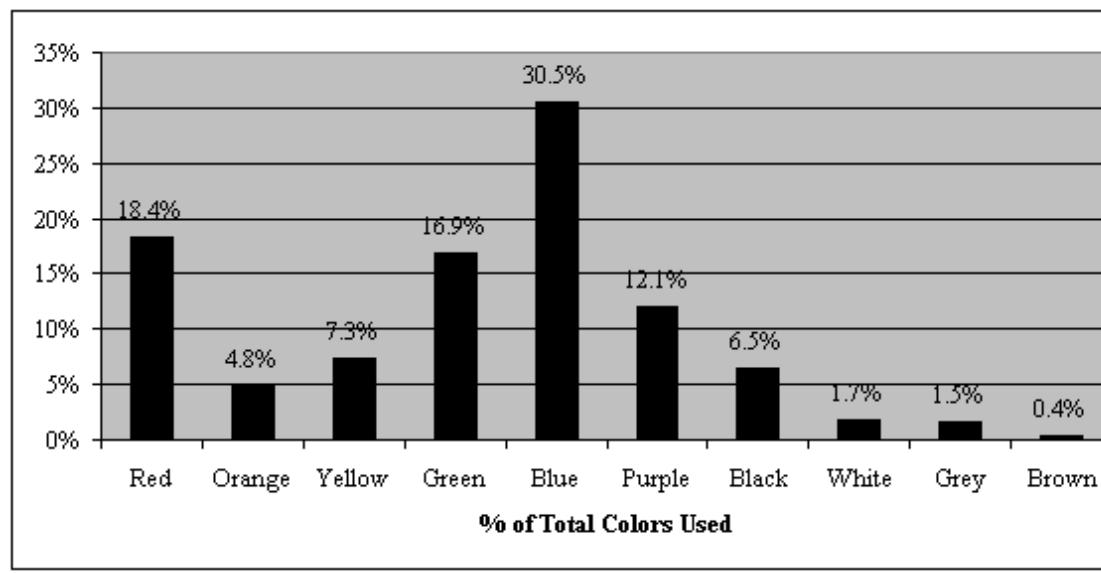
1. To provide valuable insights, visualization must be interpretable and relevant
2. To give a visual or graphical representation of data/concepts
3. To communicate ideas. We are visual by nature and visualizations are a form of communication
4. Provide an accessible way to see and understand trends, outliers, and patterns in data
5. Confirm a hypothesis about the data

Visualizing data: design principles

- What are the design standards to create interpretable and readable data graphics?
- In the following slides, we will go into the key design principles for data visualization

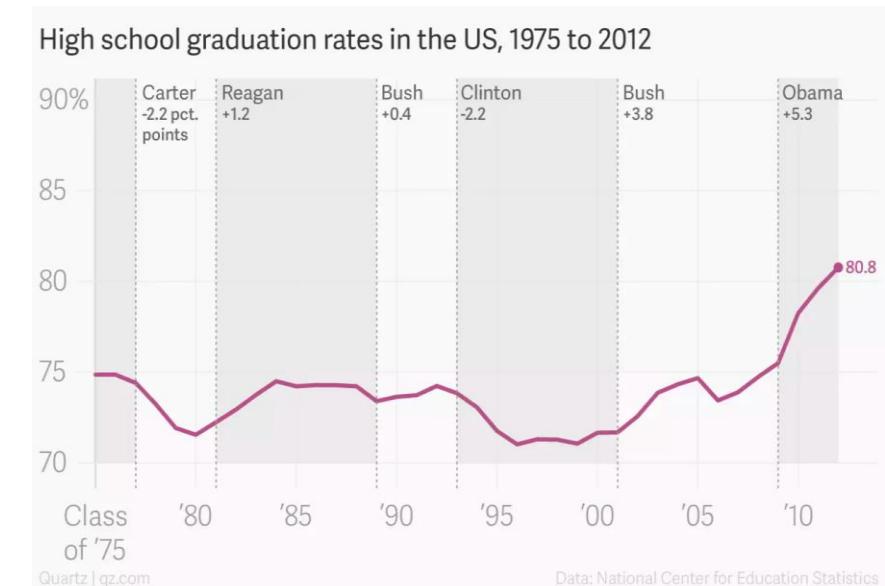
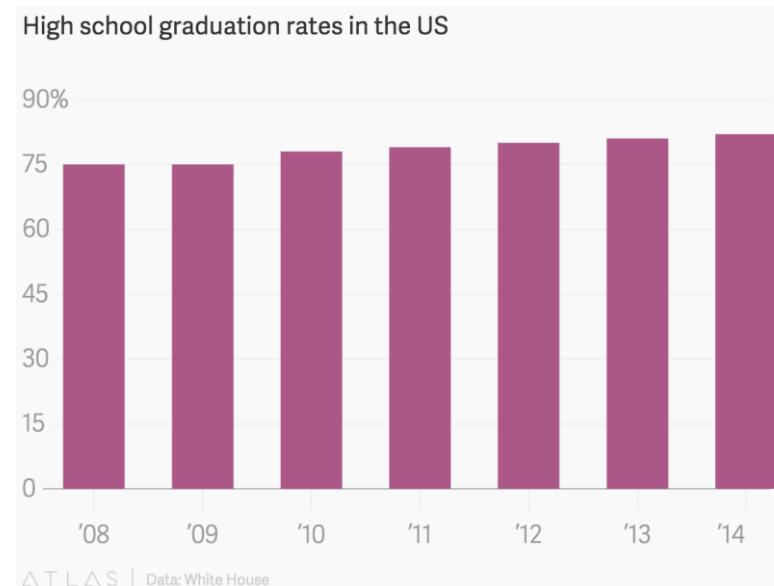
Color

- Use color only when it related to differences in the data. Ensure high contrast values to be mindful of color-blindness and other visual sensitivities



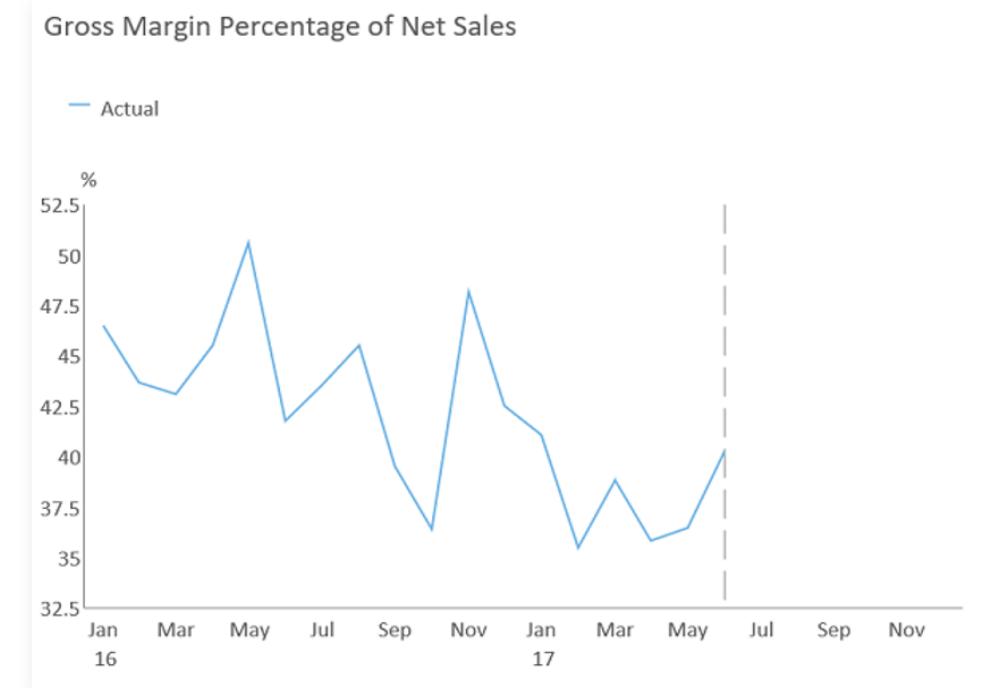
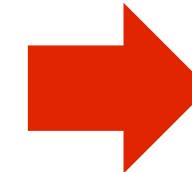
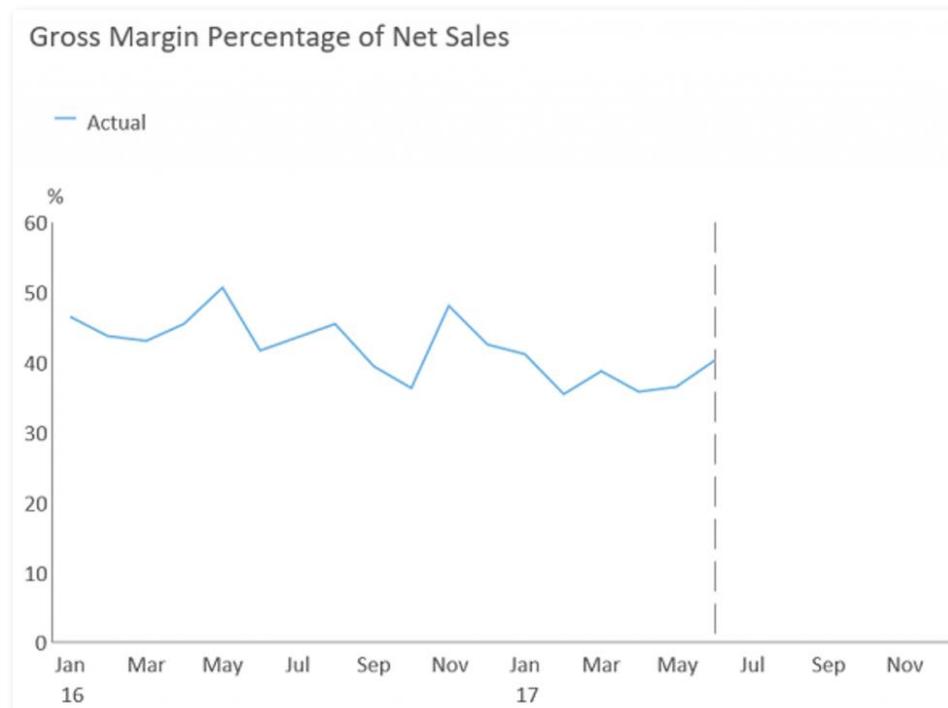
Text and tables

- Descriptions can guide your readers and communicate key insights. Use legends when necessary, make sure to label axes and include a heading



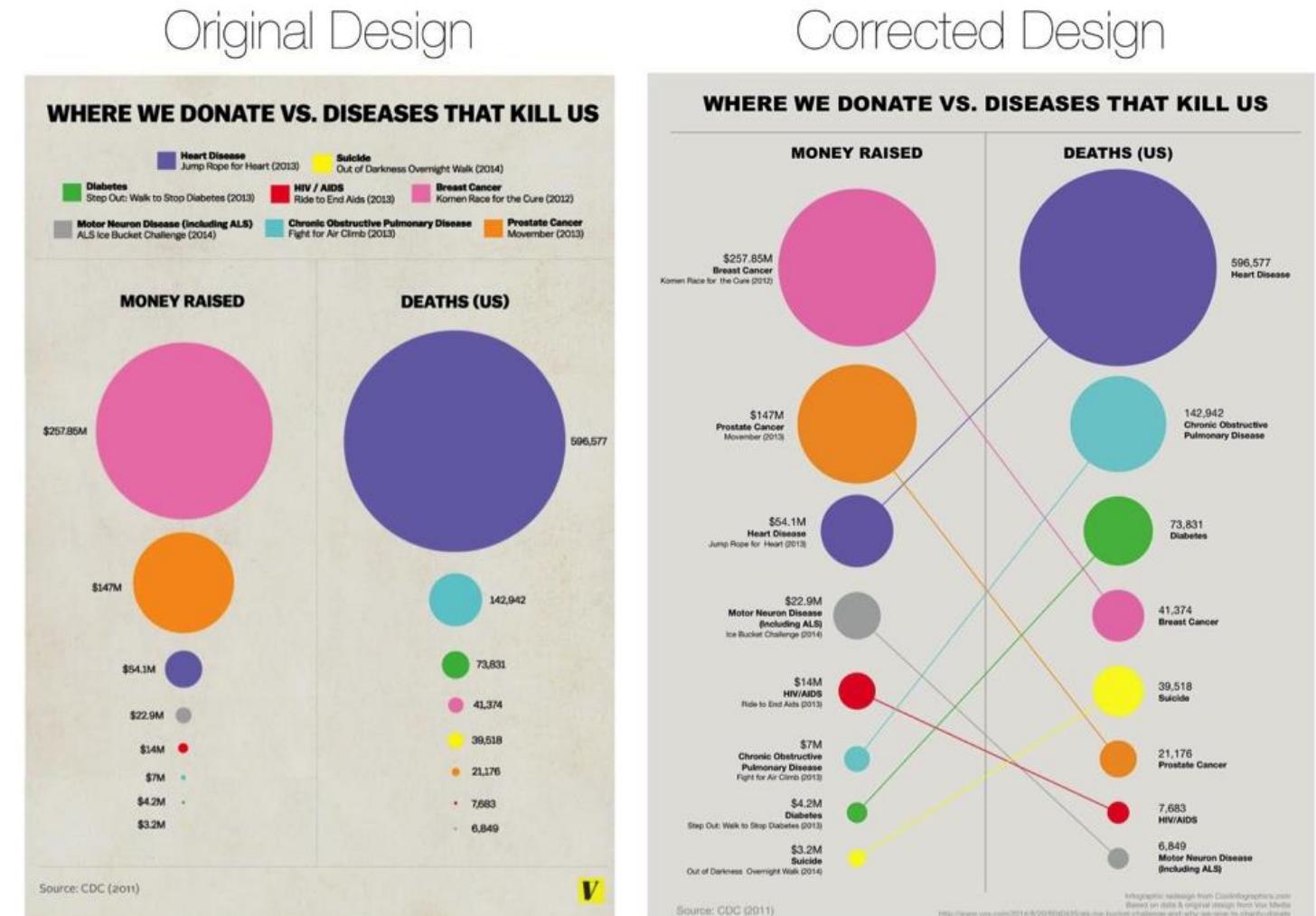
Scales

- Use natural increments on your axes (1, 2, 3; 0, 100, 200, 300); make sure that the scales are proportionate and intuitive



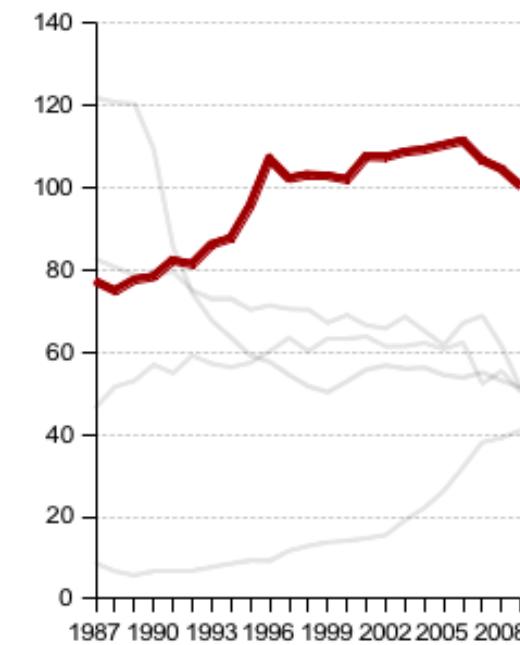
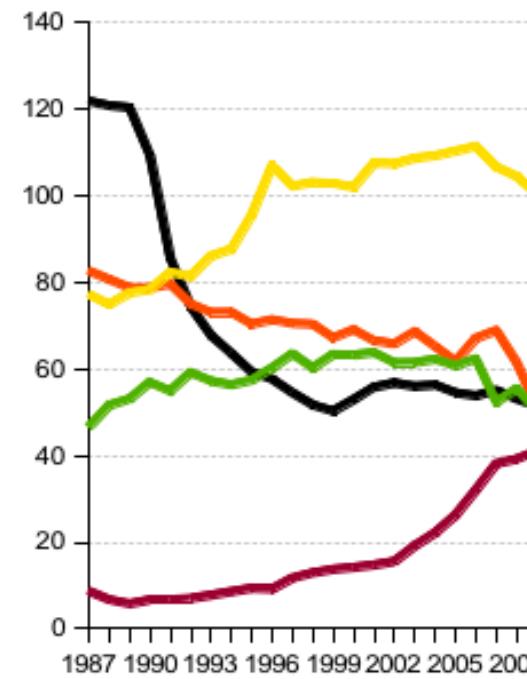
Data Integrity

- Keep comparative data truthful
- Be mindful of "lying with stats"



Data density

- Don't present too much data on a single chart / graph



Data richness/Attribution

- Is your data high-quality from reliable sources and accurate?
(Always Include Citations)
- Turns out Colgate cherry-picked the information from a general health study—ALL market toothpastes were recommended equally

Whatever happened to this statistic?



Design principles checklist

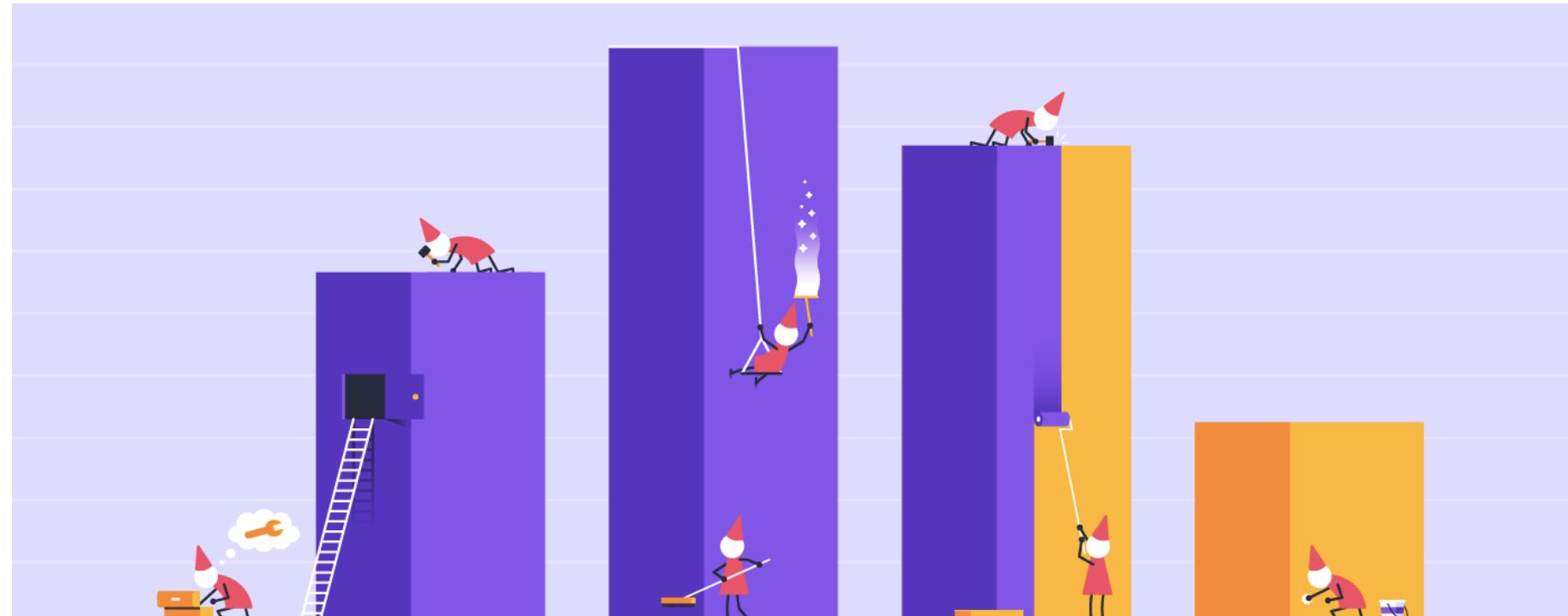
- Think through these principles as you're building your visualization!

1. Use color to highlight differences
2. Make text and tables legible
3. Use appropriate scales
4. Ensure shapes / visuals are comparative
5. Highlight only the data you want to display
6. Make sure data quality is accurate (with attribution)



Data storytelling

- Translate data into actions or business outcomes while engaging your audience
- How can data visualizations be used to tell a story?



Why is storytelling important?

- Regardless of your role, **you are a communicator first and foremost**. Data is worthless if you don't communicate it properly. Great analysis must also have great storytelling
- Never assume that the results will speak for themselves. Stories always trump statistics alone, and communicating insights from data clearly, requires a structured approach
- Let's look at two frameworks you can use

Data storytelling - George Roumeliotis

- Current Airbnb data science manager and was head of a data science group at Intuit
- For projects, he developed a business story framework for communicating about each analysis:
 1. My understanding of the business problem
 2. How will I measure the business impact?
 3. What data is available?
 4. The initial solution hypothesis
 5. The solution
 6. The business impact of the solution



Knowledge Check 1



Outline for today

1. Implement data storytelling frameworks and techniques
2. Program in Power BI using DAX language to manipulate data

Objectives for Lab 4

- Navigate through the 3 Power BI data modeling components in Power BI Desktop
- Introduction to Power BI Formulas (DAX)
- Introduction to Measures
- Introduction Calculated Columns
- Understanding Relationships between tables
- Relationship types
- Active VS Inactive relationships
- Relationship Direction

Understanding Data Tab

- **Data Tab** has all the tables in detailed data view (as opposed to Power Query in Edit Queries, Window which only provides data preview and does not store actual data)

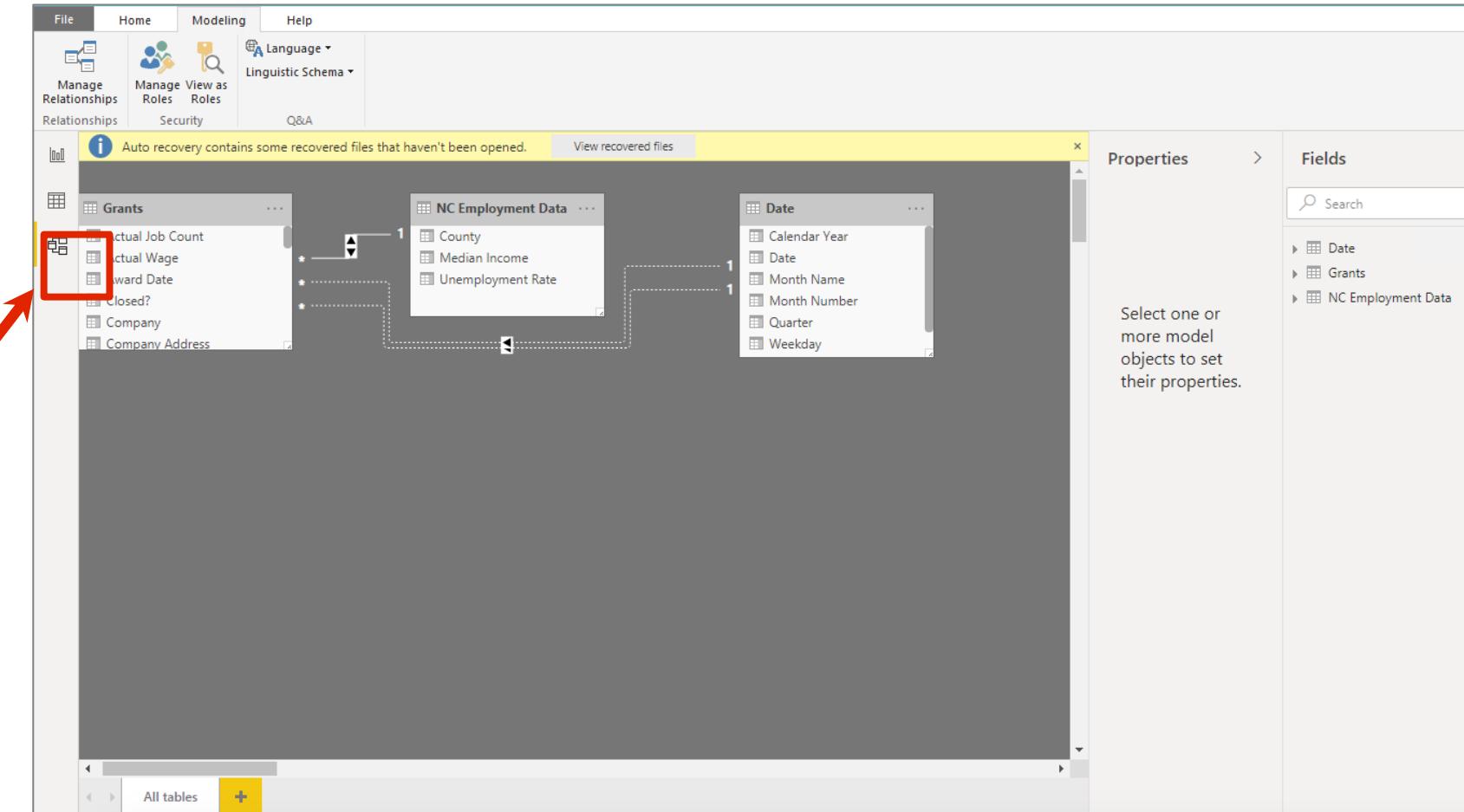
The screenshot shows the Microsoft Power BI desktop interface. The ribbon at the top includes tabs for File, Home, Modeling, and Help. Below the ribbon, there are several icons for managing relationships, calculations, and data types. The main workspace displays a table named 'Grants' with 314 rows. The table has columns for Funding ID, Program, Award Date, Company, Company County, Company Address, Website, Job Type, and Request. A red arrow points to the 'New Table' icon in the ribbon. To the right of the table, a 'Fields' pane is open, showing a hierarchical list of fields from the table, such as Date, Grants, Actual Job Count, Actual Wage, Average Project Wa..., Award Date, Closed?, Company, Company Address, Company County, Deadline, Elapsed days, Funding City, Funding County, Funding ID, In Funding, Job Type, Percent Awarded, Percent Awarded..., Percent Created, and Program.

Funding ID	Program	Award Date	Company	Company County	Company Address	Website	Job Type	Request
139	OneNC	Friday, February 6, 2009	Piedmont Aviation Component Services, LLC	Forsyth	1031 East Mountain St, Building 320, Kernersville NC	www.piedmontaviation.com	Manufacturing	
143	OneNC	Thursday, February 19, 2009	Sioux Tools Incorporated	Cherokee	250 Snap-on Drive, Murphy, NC	www.snapon.com	Manufacturing	
145	OneNC	Friday, March 13, 2009	FASTA of North Carolina Inc.	Halifax	231 Hwy 158, Littleton, NC	www.fasta.us	Manufacturing	
148	OneNC	Wednesday, April 1, 2009	Stonewall Packaging, LLC	Jackson	52 W. Main Street, Sylva, NC	Not Available	Manufacturing	
149	OneNC	Tuesday, April 7, 2009	Nature's Earth Pellets NC, LLC	Scotland	16900 Aberdeen Road, Laurinburg, NC	www.naturesearch.com	Manufacturing	
151	OneNC	Monday, April 20, 2009	MITek Industries, Inc.	Chowan	818 Soundside Road, Edenton, NC	www.mii.com	Manufacturing	
175	OneNC	Wednesday, August 19, 2009	E. I. Du Pont De Nemours and Company	Bladen	22828 NC Highway 87 West, Fayetteville, NC	www.dupont.com	Manufacturing	
178	OneNC	Wednesday, September 9, 2009	Caye Home Furnishings, LLC	Alexander	Former Broyhill Furniture Facility,Taylorsville, NC	caynefurniture.com	Manufacturing	
182	OneNC	Thursday, September 24, 2009	Townsend's, Inc.	Davie	251 Eaton Road, Mocksville, NC	www.townsend.com	Manufacturing	
186	OneNC	Monday, October 5, 2009	North American Aerodynamics, Inc.	Person	110 Carver Drive, Roxboro, NC	www.naaero.com	Manufacturing	
196	OneNC	Tuesday, November 17, 2009	North Cove Springs Bottling and Beverage, Inc.	McDowell	13195 Hwy 221N, Marion NC	www.ncsprings.com	Manufacturing	
199	OneNC	Monday, December 7, 2009	Marves Industries, LLC	Burke	205 Cline Clark Drive, Hidebran, NC	www.marves.com	Manufacturing	
202	OneNC	Monday, December 14, 2009	ThermoFisher Scientific Corp	Buncombe	275 Aiken Road, Asheville, NC	www.thermofisher.com	Manufacturing	
205	OneNC	Thursday, December 17, 2009	Talon Systems America, Inc.	Iredell	607 Meacham Road, Statesville, NC	Not Available	Manufacturing	
208	OneNC	Tuesday, January 5, 2010	Wilbert, Inc.	Gaston	100 Oaks Parkway, Belmont, NC	wilbertplasticservices.com	Manufacturing	
215	OneNC	Thursday, January 28, 2010	ACW Technology Inc.	Durham	2500 S. Tricenter Boulevard, Durham, NC	www.acw.co.uk	Manufacturing	
217	OneNC	Wednesday, February 3, 2010	Commonwealth Brands, Inc.	Rockingham	301 North Scales Street, Reidsville, NC	www.commonwealthbrands.com	Manufacturing	
222	OneNC	Thursday, March 4, 2010	Pierre Foods, Inc.	Catawba	3437 E Main Street, Claremont, NC	www.pierrefoods.com	Manufacturing	
227	OneNC	Thursday, March 25, 2010	Harvest Time Bread of North Carolina, LLC	Surry	501 Mountain View Lane, Mt. Airy, NC	www.harvesttimebread.com	Manufacturing	
230	OneNC	Monday, April 5, 2010	Clariant Corporation	Mecklenburg	4000 Monroe Road, Charlotte, NC	www.clariant.com	Manufacturing	
234	OneNC	Tuesday, April 13, 2010	Albaad USA, Inc.	Rockingham	129 Technology Drive South, Reidsville, NC	www.albaad.com	Manufacturing	
235	OneNC	Wednesday, April 14, 2010	Mountaire Farms, Inc.	Robeson	17269 NC Hwy 71 North, Lumber Bridge, NC	www.mountaire.com	Manufacturing	
237	OneNC	Tuesday, April 20, 2010	Greiner Bio-One North America, Inc.	Union	4238 Capital Drive, Monroe, NC	www.gbo.com	Manufacturing	
239	OneNC	Friday, April 23, 2010	Spectrum Mills, LLC (McDowell County)	McDowell	253 Barnes Road, Marion, NC	Not Available	Manufacturing	
243	OneNC	Tuesday, May 11, 2010	VSA LLC	Burke	1000 Chain Drive, Morganton, NC	vsaic.com	Manufacturing	
244	OneNC	Tuesday, May 18, 2010	Advanced Textile Solutions, Inc. (ATS)	Caldwell	2000 Baker Circle, Granite, NC	Not Available	Manufacturing	

TABLE: Grants (314 rows)

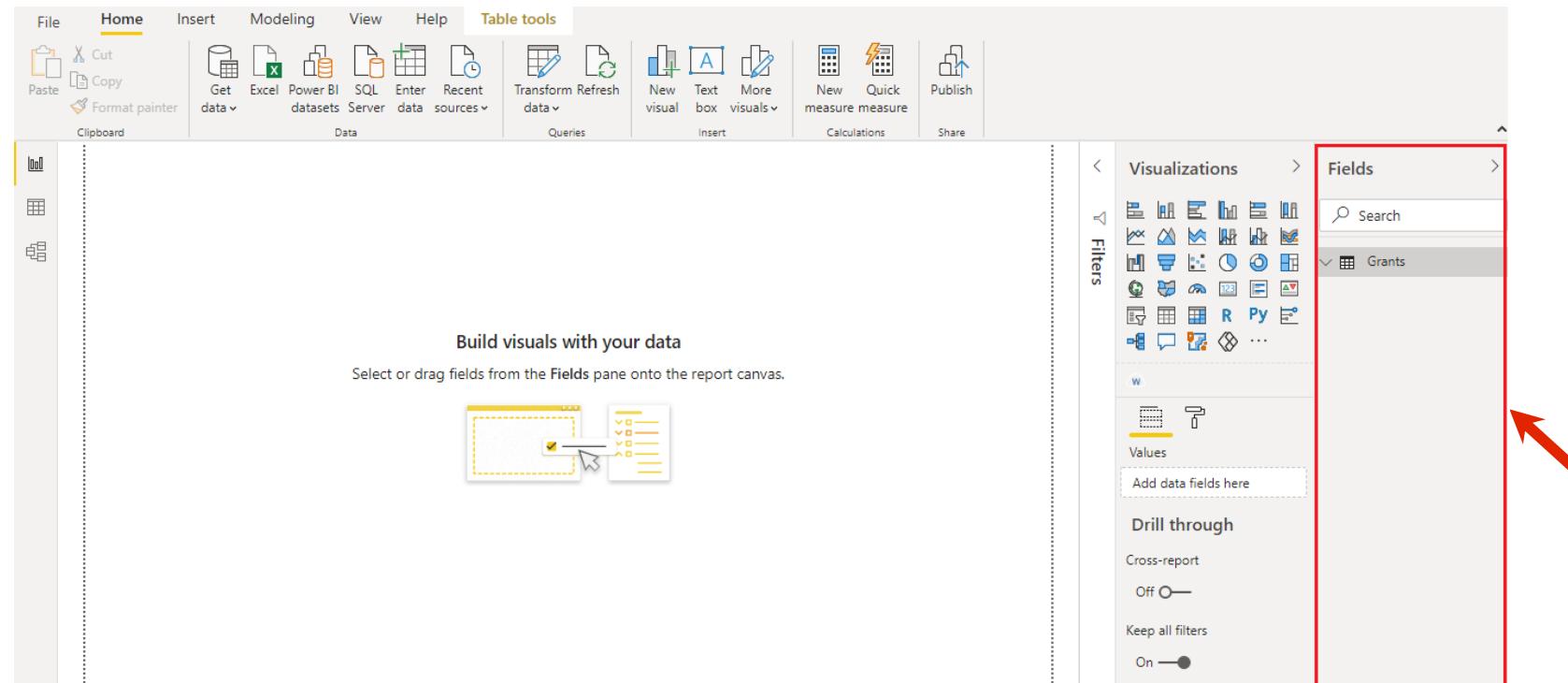
Understanding Relationship Tab

- **Relationship Tab** displays relationships between tables



Fields pane

- **Fields** on the left is where you locate all the data fields. You can add measures (calculations) here



Introduction to Power BI Formulas (DAX)

- Data Analysis Expressions (DAX) is a formula language that works with relational data in Power BI Desktop
- DAX has a library of over 200 functions, operators, and constructs, providing immense flexibility in creating formulas to calculate results for just about any data analysis need
- There are 3 places you can use DAX:
 - Calculated columns
 - Calculated table
 - Measures

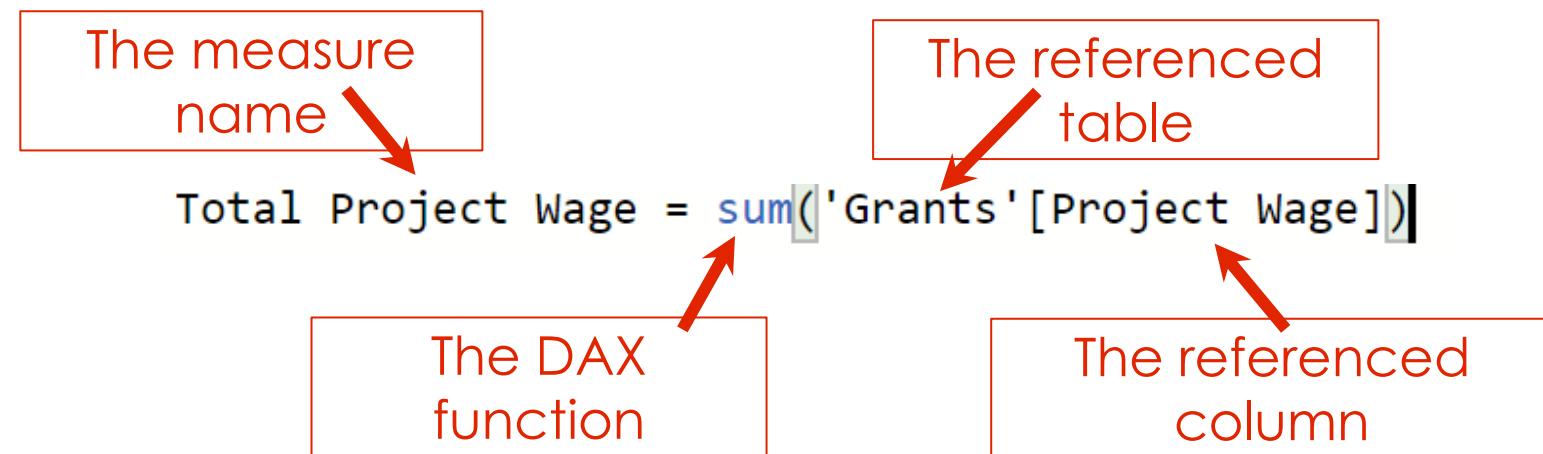
Calculate ‘total project wage’

- The grant officer wants to know the total project wage
- The total project wage is the average wage announced in each press release
- This is important insight for him to know, as it affects budgeting within the state government. Based on these numbers, the grant officer can allocate money accordingly to different sectors of his office



DAX Formula Syntax

- For example, let's look at a simple DAX formula for a measure > Adds up all of the numbers in the 'Grants' [Project Wage] column
- Parentheses () surround an expression containing one or more arguments.

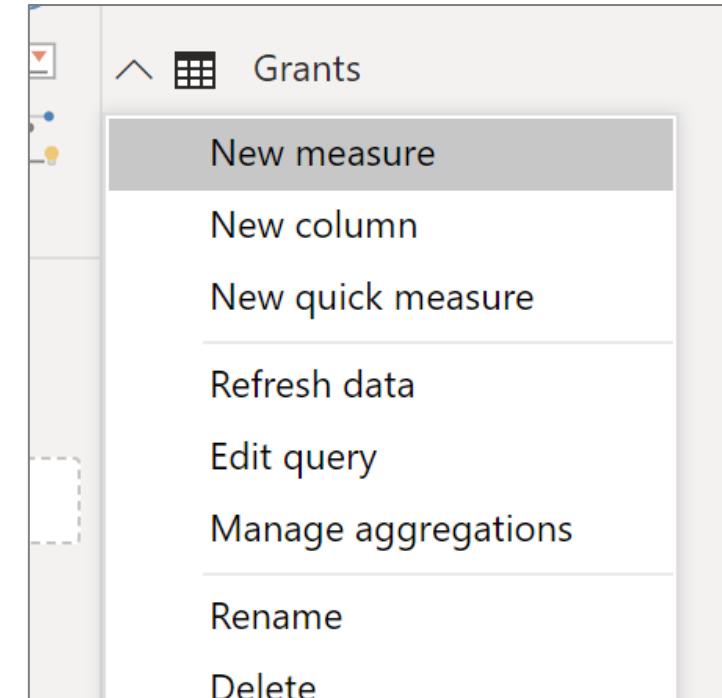


Introduction to measures

- The calculated results of measures are always changing in response to your interaction with your reports, allowing for fast and dynamic ad-hoc data exploration
- It does not host physical data, instead it **hosts the logic definition of how you want to calculate the result**
- For example, you can define a measure using Sum function against a data field and then use the measure in any visual which will dynamically change the result based on what filtering scenario the measure is situated at

Create your first measure formula

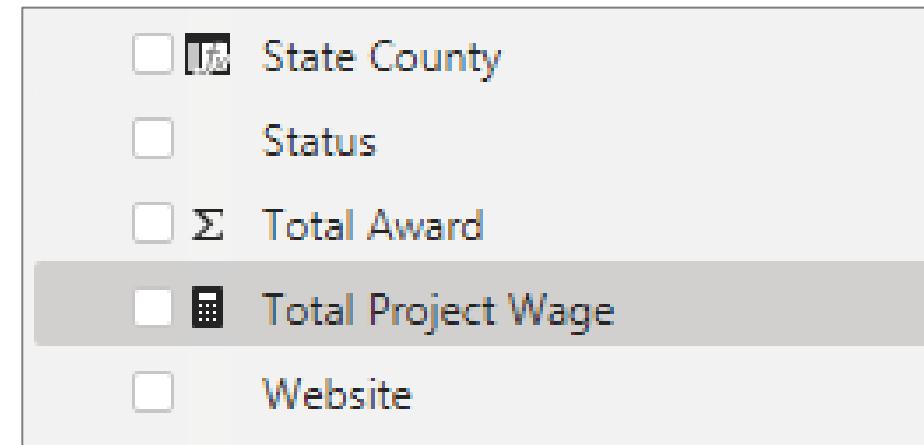
- Open ‘Lab 4 Data’ .xlsx file in the Lab folder
- In Report view, in the field list, right-click on the Grants table, and then click New Measure
- In the formula bar, replace Measure by typing a new measure name, Total Project Wage
- After the equals sign, type sum(Grants[Project Wage])



X ✓ 1 Total Project Wage = sum('Grants'[Project Wage])

Measure added

- On the 'Fields' panel, you should see the new measure added under 'Grants' table



Calculate ‘closed project wage’

Isn't this measure doing the same thing as if I were to just add the Project Wage field to my report?

Yes but, there's a good reason to create our own measure that sums up values from the Project Wage field: we can use it as an argument in other formulas!

Now, we are going to create a new measure to calculate **the total project wage for the closed grants**



How would you write the formula?

Using the CALCULATE function

- **CALCULATE** = Evaluates an expression in a context that is modified by the specified filters
- **CALCULATE(<expression>, <filter1>, <filter2>...)**
- You'll use the CALCULATE function to filter the amounts we want to sum by an argument we pass to the CALCULATE function.

Parameters	
Term	Definition
expression	The expression to be evaluated.
filter1, filter2, ...	(optional) A comma separated list of Boolean expression or a table expression that defines a filter.

Closed project wage formula

- In the formula bar, replace Measure by typing a new measure name, **Closed Project Wage**
- Then, type **CALCULATE([Total Project Wage], FILTER(Grants, Grants[Closed]=1))**
- Click the checkmark in the formula bar or press Enter to validate the formula and add it to the model
- Your formula should now look like this:

```
1 Closed Project Wage = CALCULATE([Total Project Wage], FILTER(Grants, Grants[Closed]=1))
```

Tip: Type the first few letters and the rest will show up automatically

Measure created with DAX

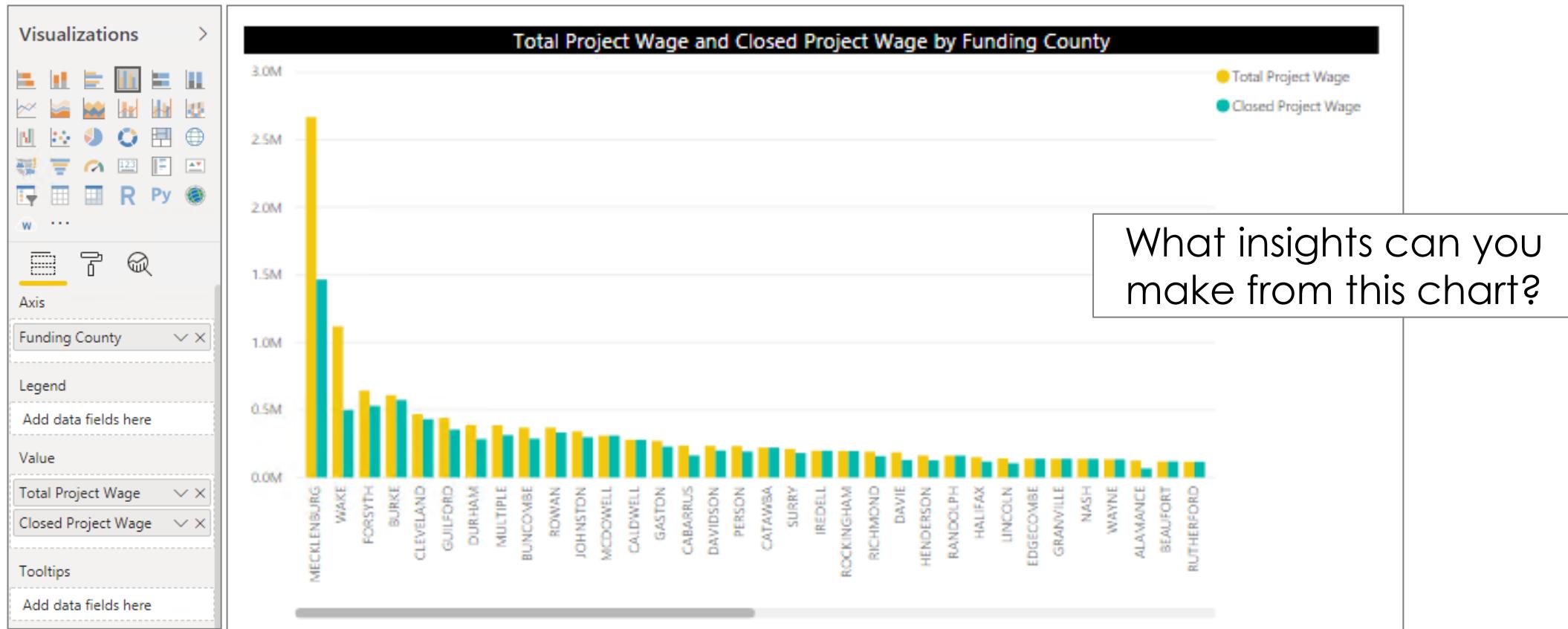
- You did it! You just created a measure using DAX, and not an easy one at that
- What this formula will do is calculate the total project wage for the closed grants, depending on the filters applied in a report

```
1 Closed Project Wage = CALCULATE([Total Project Wage], FILTER(Grants, Grants[Closed]=1))
```

Filters narrow down what will be calculated. In this case, you selected one filter as an argument, which is the result of another function.

Calculate closed project wage

- Let's put [Total Project Wage] and our [Closed Project Wage] measure in a clustered column chart, and then added Program field in Grants table as Axis



Lab 4



Exercise: calculate 'Average Project Wage'

- Exercise : Calculate Average Project Wage and create visualization
- Hint: DAX function > AVERAGE

AVERAGE

12/09/2018 • 2 minutes to read • Contributors

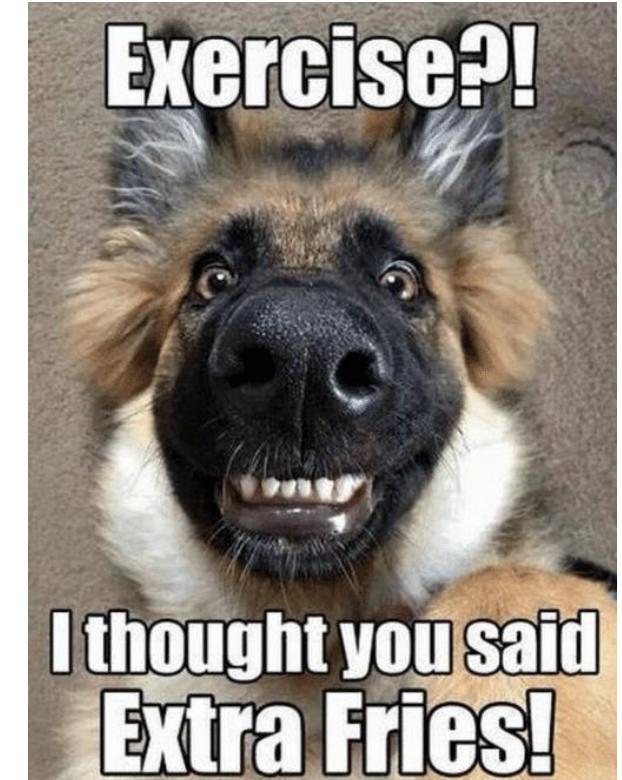
Returns the average (arithmetic mean) of all the numbers in a column.

Syntax

```
DAX
AVERAGE(<column>)
Copy
```

Parameters

Term	Definition
column	The column that contains the numbers for which you want the average.



Step 1: calculate ‘Average Project Wage’

- AVERAGE > Returns the average (arithmetic mean) of all the numbers in a column
- AVERAGE(<column>)

Parameters	
Term	Definition
column	The column that contains the numbers for which you want the average.

Step 2: calculate 'Average Project Wage'

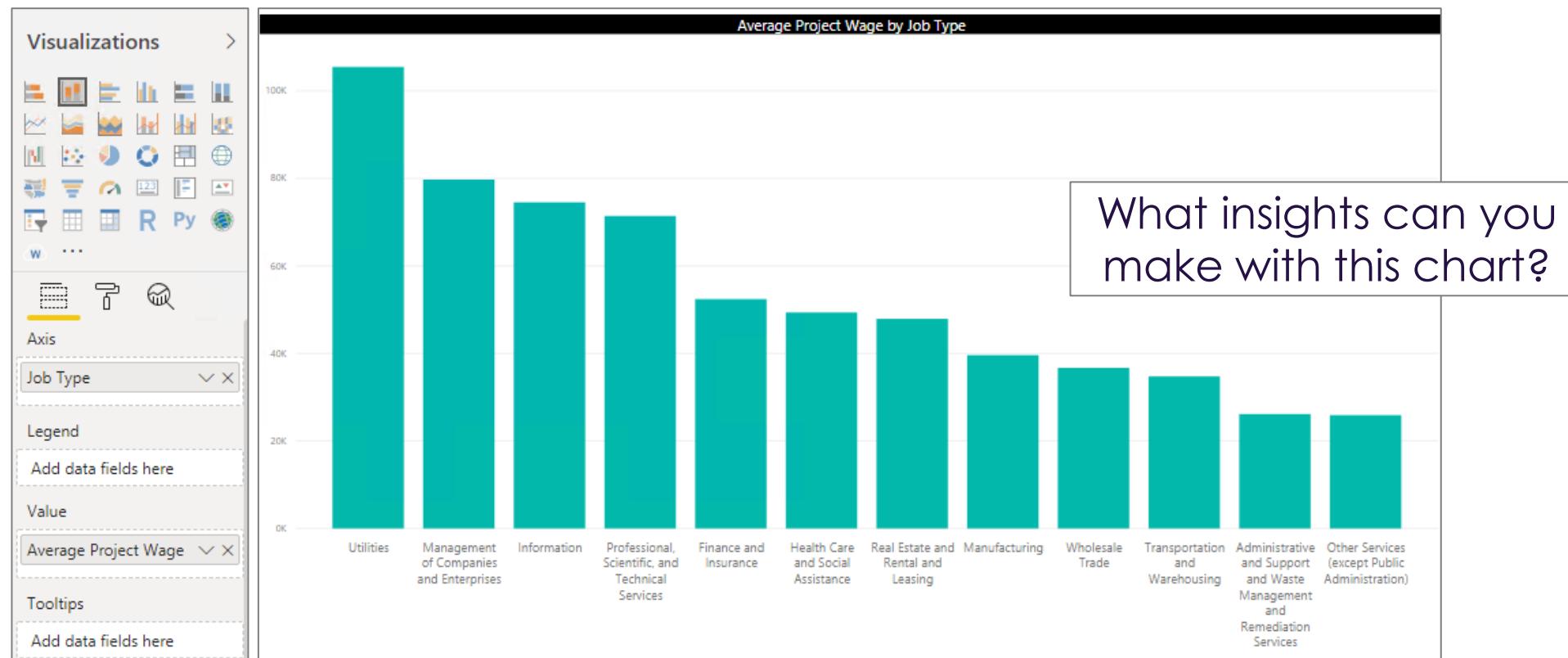
- Right click on 'Grants' table and add a New measure
- Average Project Wage = AVERAGE(Grants[Project Wage])
- Under the 'Grants' table, a new field 'Average Actual Wage' showed up.

The screenshot shows the Power BI Fields pane. At the top left, there are two icons: a red X and a green checkmark. To the right of these is a text input field containing the formula: "1 Average Project Wage = AVERAGE(Grants[Project Wage])". Below this, the Fields pane lists the "Grants" table with three measures: "Actual Job Count", "Actual Wage", and "Average Project Wage". The "Average Project Wage" measure is highlighted with a gray background, indicating it is currently selected or being edited.

Fields
Search
Date
Grants
Actual Job Count
Actual Wage
Average Project Wage

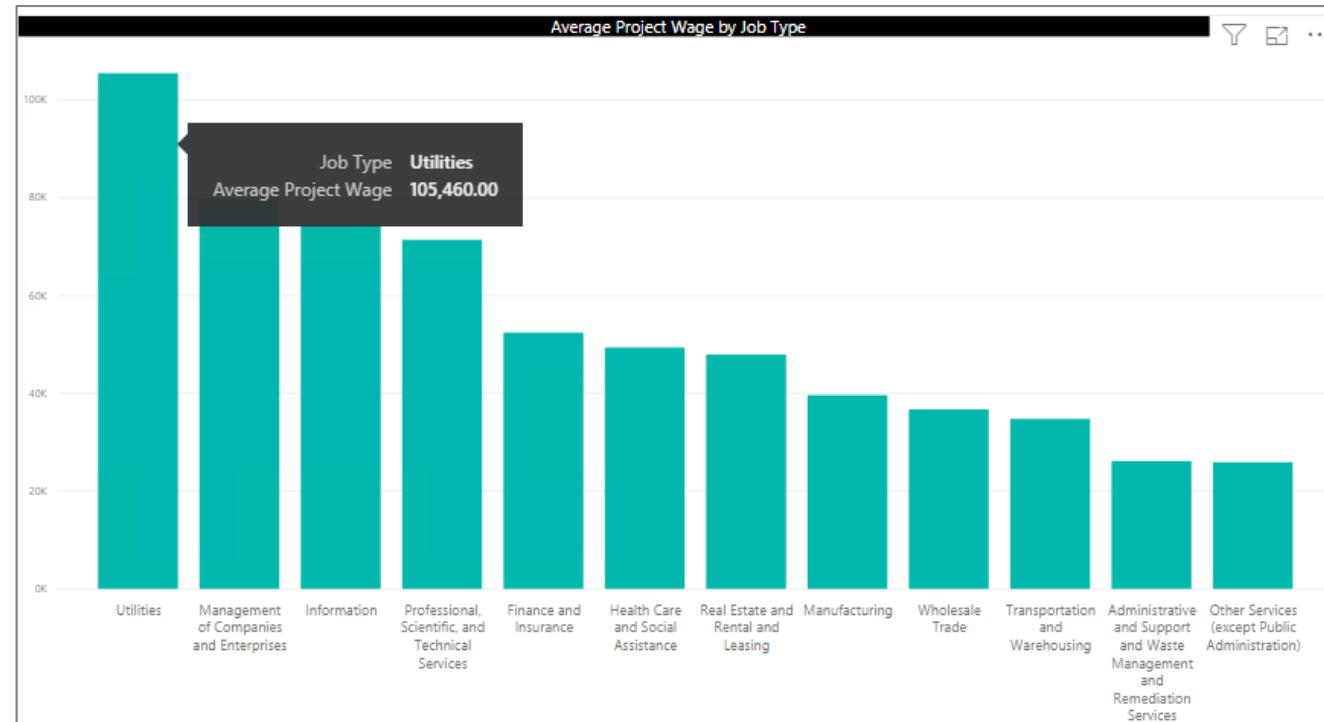
Step 3: visualize in 'Reports' pane

- Let's put [Average Project Wage] measure in a column chart, and then added [Job Type] field in Grants table as Axis, we'd get something like this:



Formatting your measure

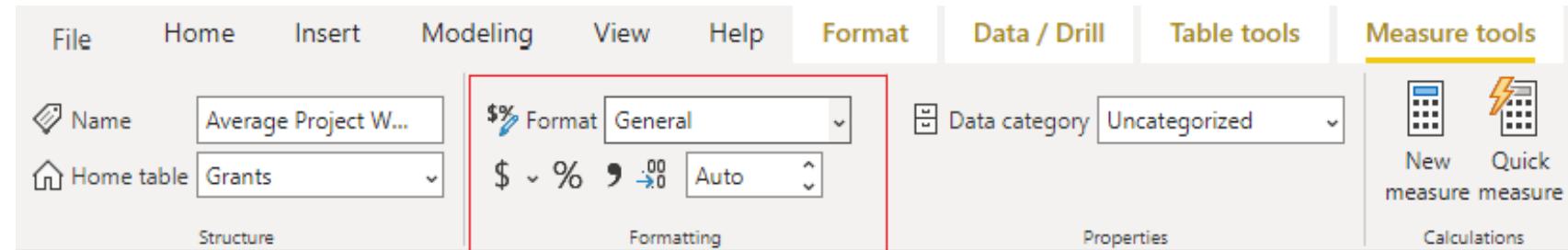
- Hover on the column chart, you can see the 'Average Project Wage' for the 'Job Type' you choose. You will find the value of Average Project Wage is in decimal



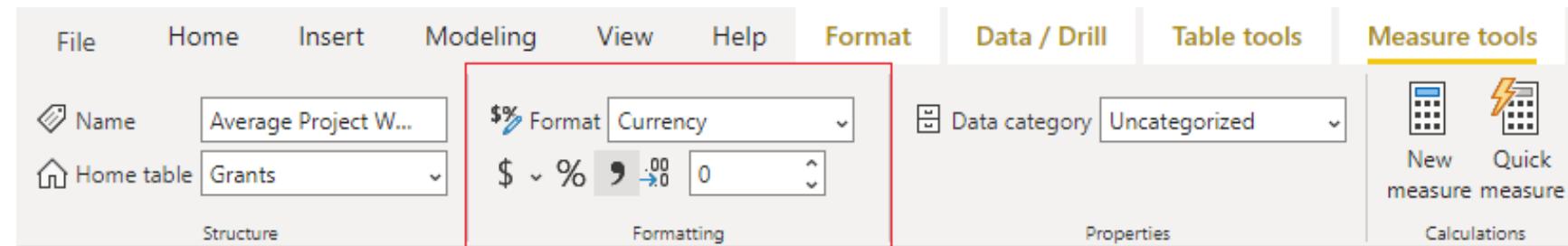
How can we change the decimal value into currency?

Measure formatting

- Click on the Average Project Wage measure on the ‘Fields’ panel and then click ‘Measure Tools’ tab on the Top tool bar area. You will see the Formatting section there

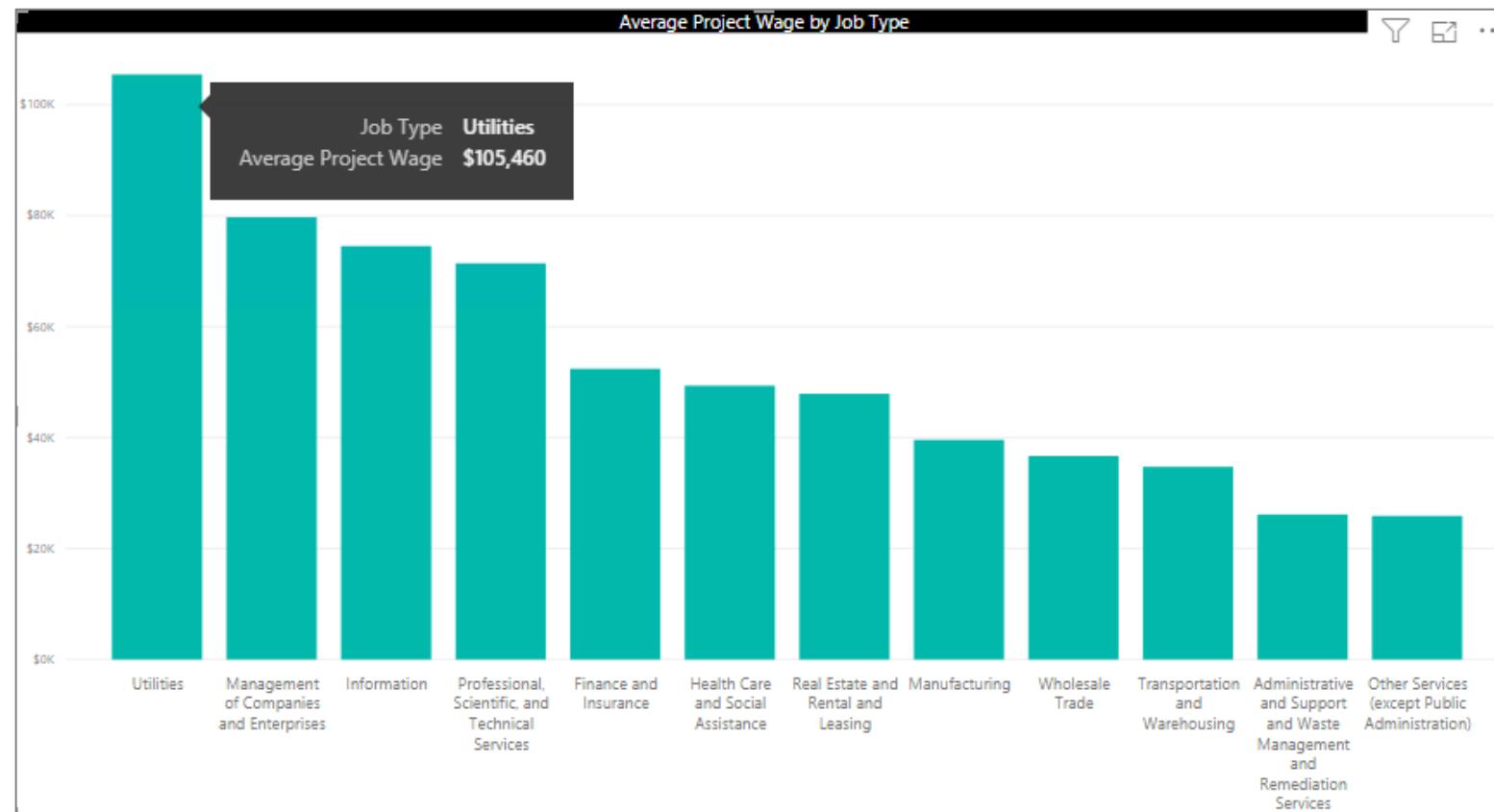


- Click on Format > ‘Currency’
- Type 0 on the decimal field



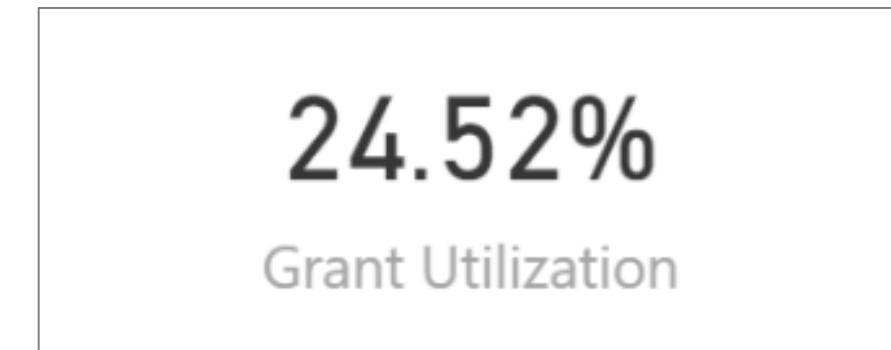
Changed to currency

- Hover back to the column chart, you will find the value format changed to currency without decimal points



Calculate grant utilization

- Let's calculate grant utilization rate to see how efficient our grants are
- Grant utilization = Actual Used Awards / Total Awards
- How can we calculate Grant utilization rate?



Calculate actual used awards

- How can we calculate **Actual Used Awards**?

Measure Formula	Format
Total Grant Amount = sum(Grants[Total Award])	Currency

- Actual Used Awards = (Total Award * Percent Awarded) + (Total Award 2 * Percent Awarded 2) + ... To the last row

Column Name	Type	Description
Total Award	Integer	Total amount available to the company
Percent Awarded	Decimal	Percent of money awarded to the company

Using SUMX()

SUMX()

- **SUMX()** > returns the sum of an expression evaluated for each row in a table
- The SUMX() Function Syntax: = SUMX(<Table>, <expression>)
- SUMX() will iterate through a table specified in the first parameter, one row at a time, and complete a calculation specified in the second parameter

In summary:

- SUM() operates over a single column
- SUMX() can operate on multiple columns in a table

Calculate actual used awards

Measure Formula	Format
Actual Used Awards = SUMX (Grants, Grants[Total Award]*Grants[Percent Awarded])	Currency

Once it has done this for every row in the Grants table, it then adds up the total of all the row by row calculations to get the total

Calculate Total Award * Percent Awarded for each row in Grants Table



Calculate grant utilization

Measure Formula	Format
Way 1: Grant Utilization = [Actual Used Awards]/[Total Grant Amount]	Percentage
Way 2: Grant Utilization = DIVIDE([Actual used awards \$],[Total Awards \$],0)	Percentage

Visualize grant utilization

- Go to the “Reports” pane and visualize data

The image shows the Power BI interface. On the left, the "Visualizations" pane is open, displaying a grid of icons for various chart types like bar charts, line graphs, and pie charts. Below the grid are three icons: a table, a funnel, and a magnifying glass. Underneath these is a section labeled "Fields" with a dropdown menu containing the text "Grant Utilization". To the right of the visualization pane is a report card with a white background. It features a large blue percentage value "24.52%" and the text "Grant Utilization" below it.

Exercise 3



Exercise: Calculate job fulfillment

- Calculate **Job Fulfillment** and create a **card visualization**
 - Hint: Job Fulfillment = Sum of Actual Job Count / Sum of Required Job Count

Measure Formula	Format
Required Jobs =	
Actual Jobs =	
Job Fulfillment =	

Step 1: calculate job fulfillment

Measure Formula	Format
Required Jobs = sum(Grants[Required Job Counts])	Whole number
Actual Jobs = sum(Grants[Actual Job Count])	Whole number
Way 1: Job Fulfillment = [Actual Jobs] / [Required Jobs]	Percentage
Way 2: Job Fulfillment = divide([Actual Jobs],[Required Jobs],0)	Percentage

Step 2: visualize job fulfillment

- Go to the “Reports” pane and visualize data

The image shows the Power BI interface. On the left, the "Visualizations" pane is open, displaying a grid of icons for various chart types like bar charts, line graphs, and pie charts. Below the grid are three small icons: a table, a funnel, and a magnifying glass. Underneath these is a section labeled "Fields" with a dropdown menu containing the text "Job Fulfilment". To the right of the pane is a large, empty rectangular area representing the "Report" pane.

67.18%

Job Fulfilment

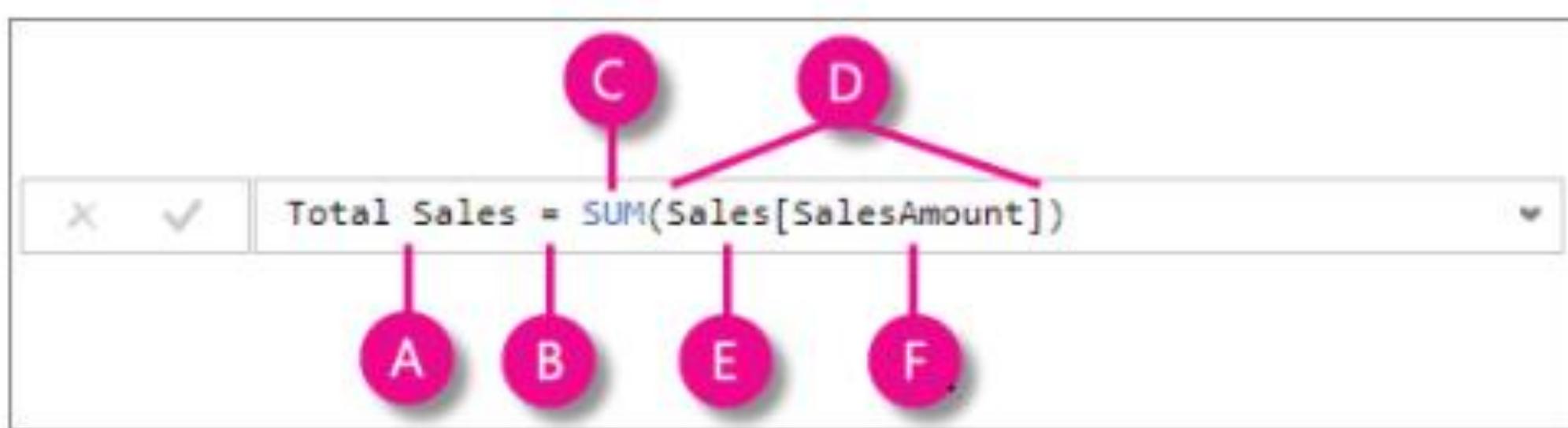
Exercise 4



Knowledge Check 2



- In the poll, choose the correct interpretation for each letter



Power BI Community and helpful links

- <https://community.powerbi.com/> ask questions
- <https://ideas.powerbi.com/forums/265200-power-bi-ideas> create and vote ideas
- <https://www.youtube.com/channel/UCy2rBqj4M1tzK-urTZ28zcA> beginner to intermediate
Youtube
- <https://powerpivotpro.com/> beginner to intermediate
- <https://SQLBI.com/> intermediate to advanced
- <https://www.gapminder.org/fw/world-health-chart/> interactive video for visualization

DATA SOCIETY:

Congratulations!



Appendix for help with Storytelling



Data visualization prep and analysis

- Before you can start analysis and making visualizations, you should start with a clear problem statement
- Once you have a clear problem statement, you can follow the process below for data analysis and prep, and then explore data visually

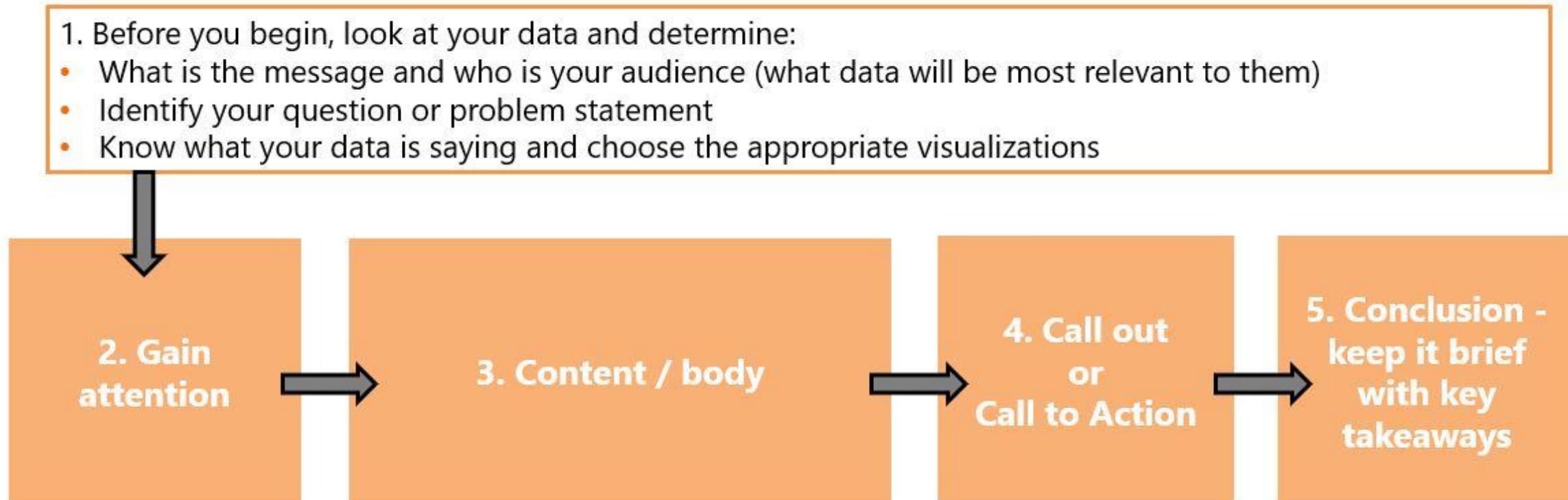


5 tips for your data presentation

1. Explain what the data axes mean (this is a part of orienting your audience)
2. Explain what the value of the data points mean
3. Explain the level of detail presented
4. Explain what data points they should be focusing on
5. As noted in the previous graphic organizer, always end with a key takeaway based on the visualization(s)

Step 1: Preparing key metrics

- Narrative framework graphic organizer



Step 2: Gain attention

- Headline/heading
- Pose a problem or ask a question
- Tell a story within your story



Step 3: Use relevant content knowledge

- Stimulate prior knowledge
- Present content and appropriate data visuals
- Have planned questions and key points
- Compare, contrast and connect
- Add supporting evidences



Step 4: Call to action

- Propose a solution
- Describe benefits of your solution

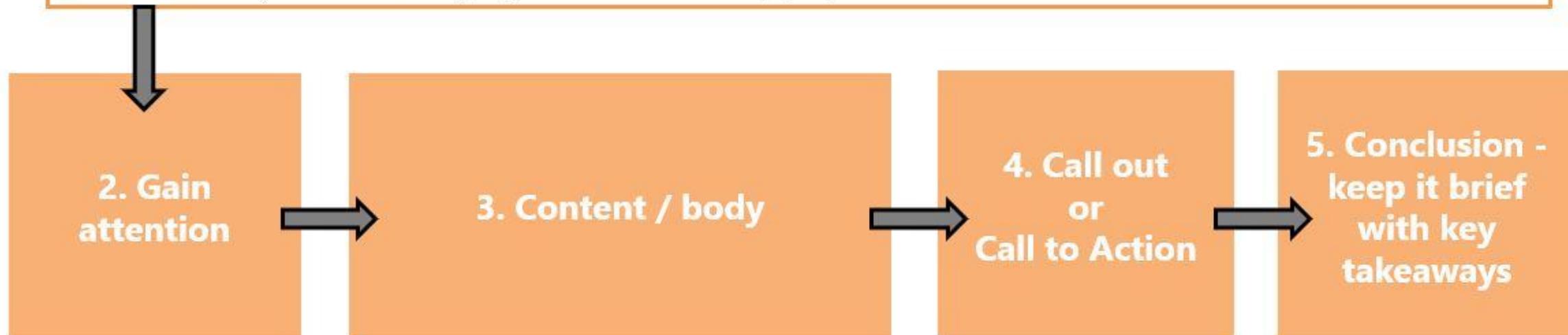


Step 5: Conclusion

- Keep it brief and make it actionable!

1. Before you begin, look at your data and determine:

- What is the message and who is your audience (what data will be most relevant to them)
- Identify your question or problem statement
- Know what your data is saying and choose the appropriate visualizations



Final note on 508 compliance

- **Section 508**, an amendment to the United States Workforce Rehabilitation Act of 1973, is a **federal law mandating that all electronic and information technology developed, procured, maintained, or used by the federal government be accessible to people with disabilities.**
- Internally: Power BI has Tab menu, keyboard shortcuts and audio accessibility
- Any outward facing data sharing or visualizations shared from the agency must follow 508 Compliance requirements:
 - Don't rely on color as a differentiating factor
 - Use contextual and descriptive text for links and buttons (variables, relationships, axes and CODE)
 - Use text, not images, in titles and navigational elements



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Thank you!

