DATASOCIETY:

Data Analysis with Excel & PowerBI

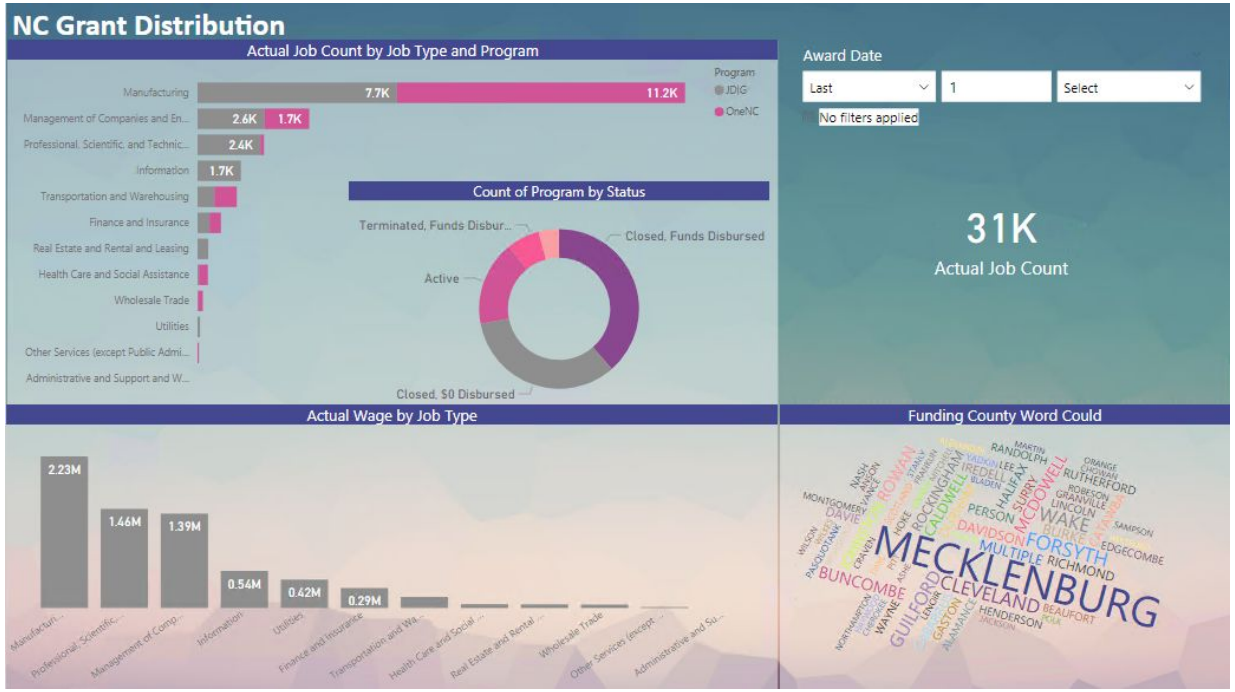
Day 3

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

- Albert Einstein

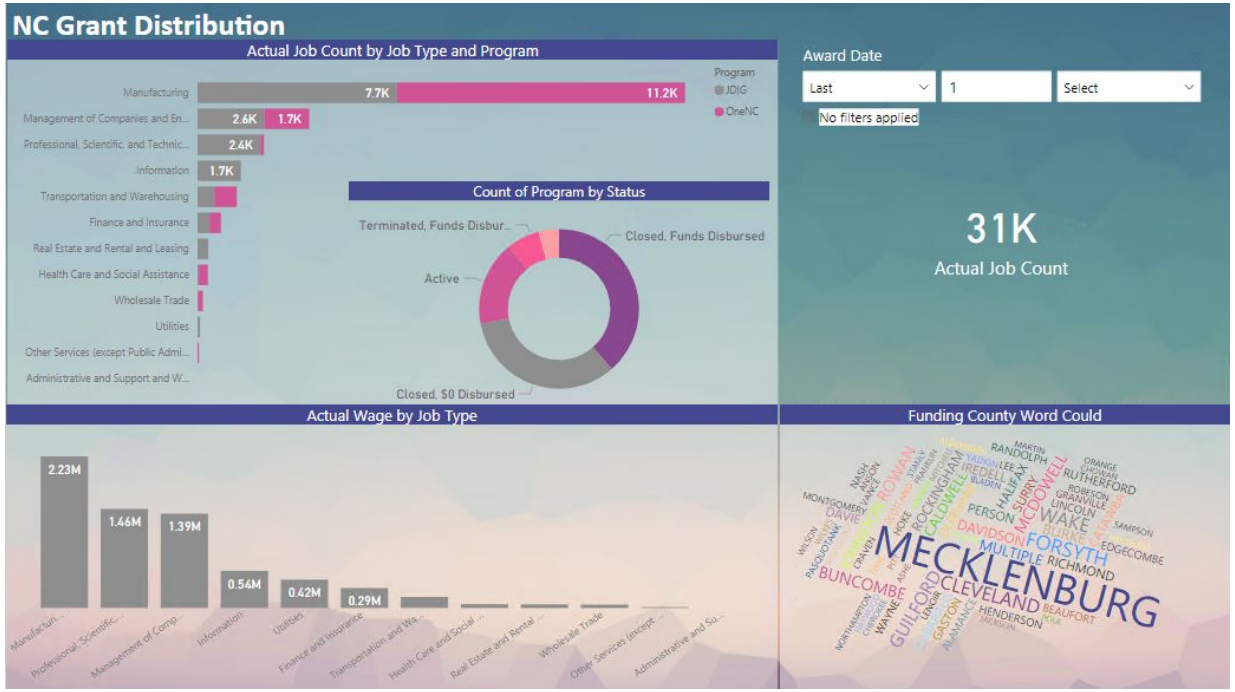
Welcome: Activation activity

- Do you remember the dashboard you created and the key points you sketched out yesterday ?
- Now, open your dashboard and we will spend 15 minutes taking turns presenting your story to your small group



Return to Class: Activation Debrief

- Did anyone notice that their dashboard required extra explanation? (how do you plan to mitigate this?)
- Would anyone like to share any insights about color or graph choice that came up? (did anyone offer improvements on color/placement choices?)



Outline for today

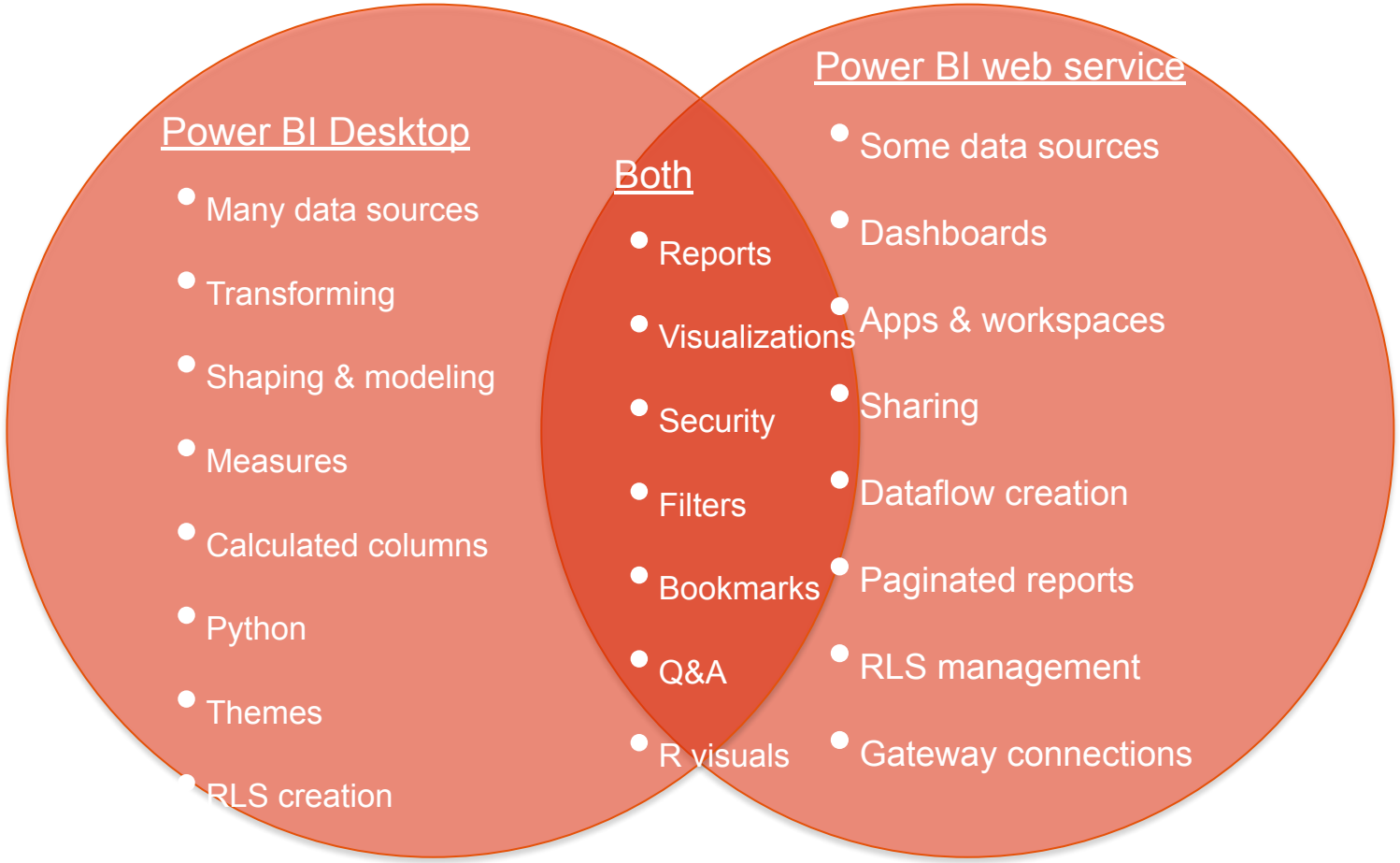
- 1. Explain the additional functions of Power BI web service
- 2. Program in Power BI using DAX language to manipulate data
- 3. Create a map visual
- 4. Workshop: practice your skills

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

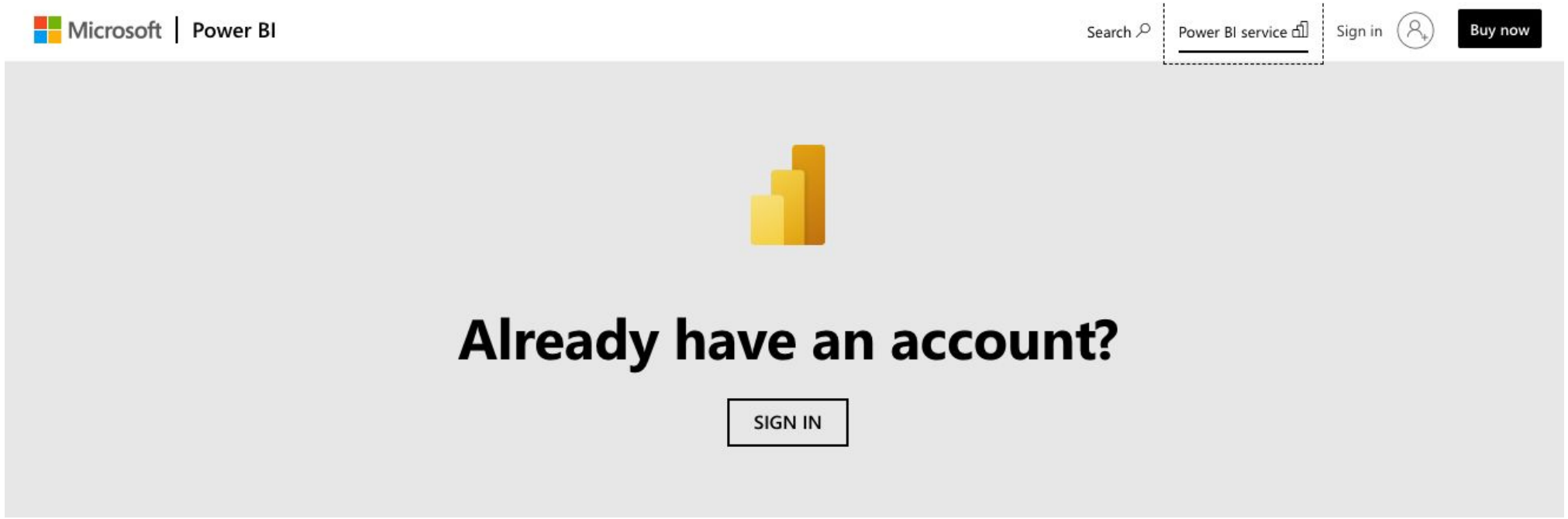
Comparing Power BI desktop & Power BI service

- 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



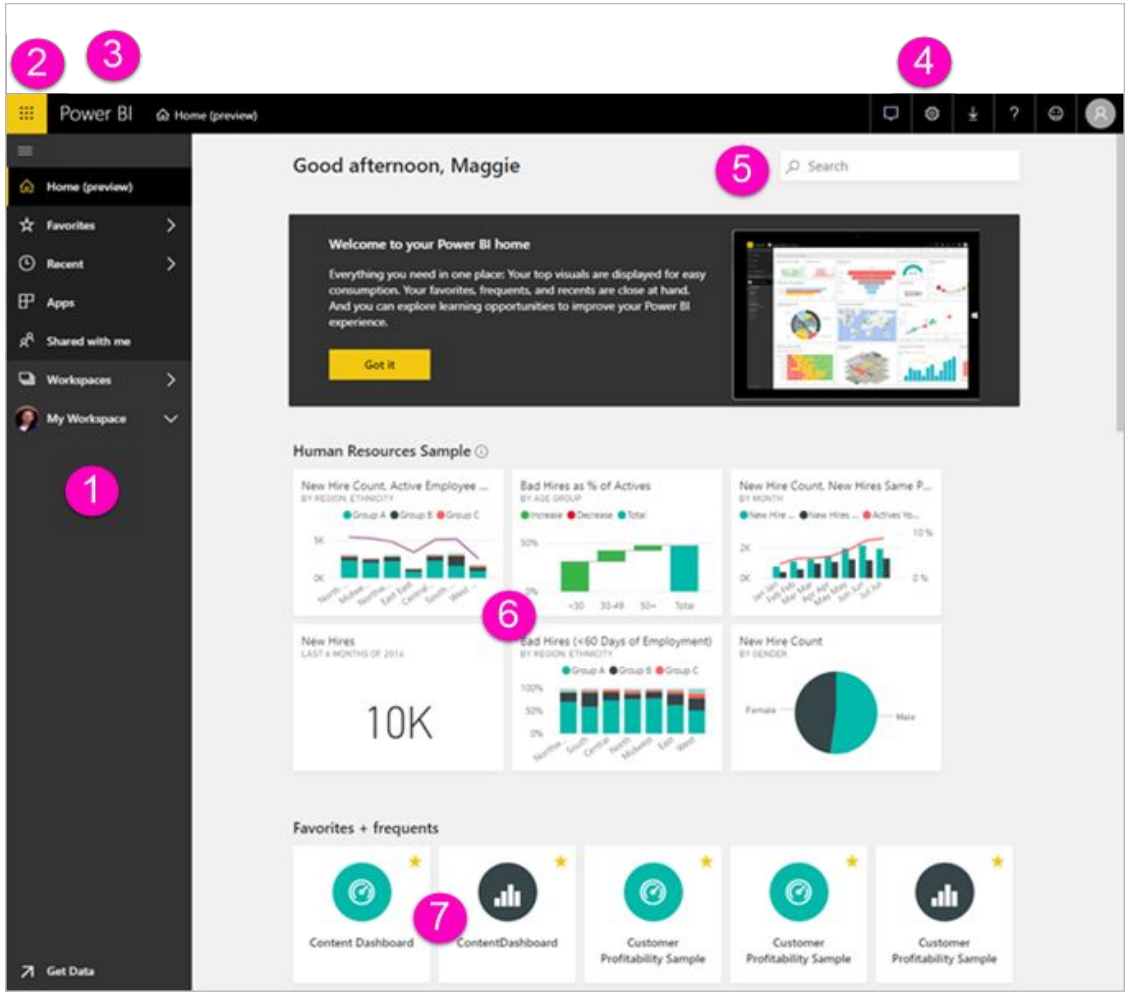
Sign in to Power BI Service

- Go to: https://powerbi.microsoft.com/en-us/landing/signin/
- Choose 'Power BI service' in the top right corner
- Login with your account credentials



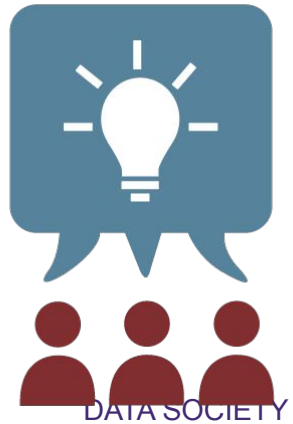
Familiarizing yourself with Power BI Service view

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



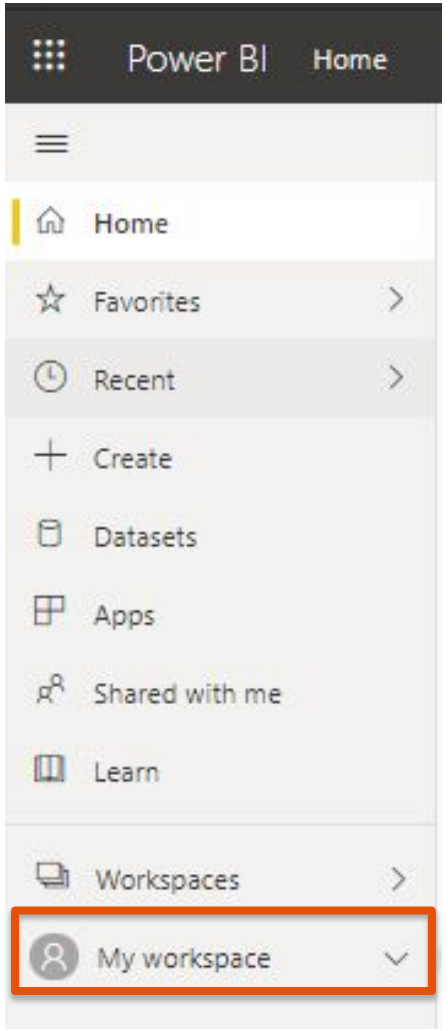
Power BI's workspace built for collaboration

- 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



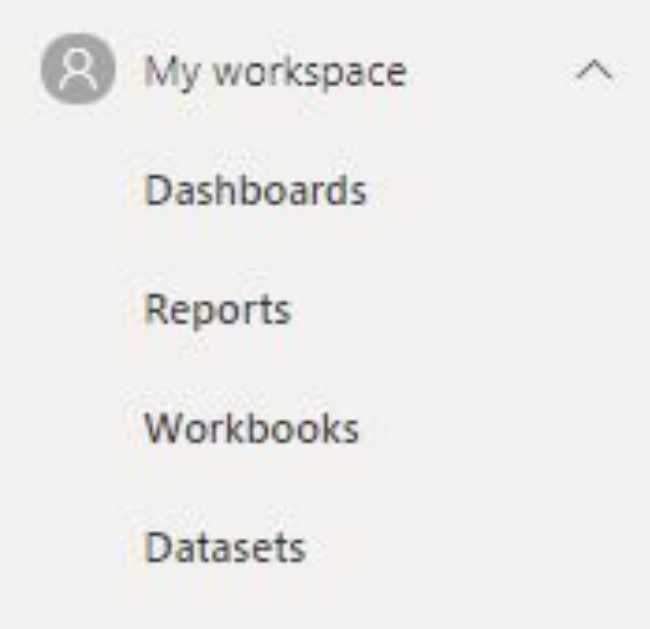
Navigate to workspaces

- 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

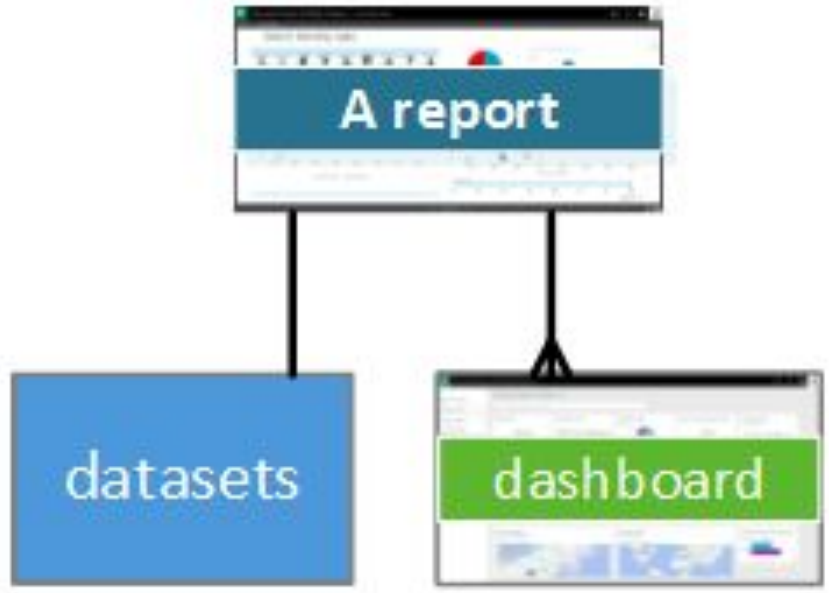


Understanding your dashboard

- 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

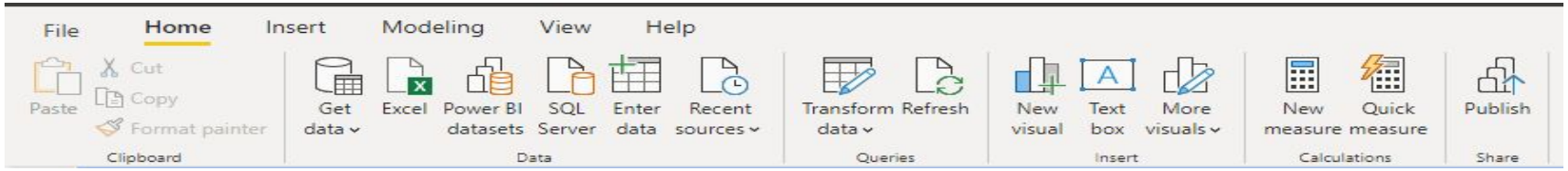
- When you choose connect, your workbook will appear in Power BI just like it would in Excel Online

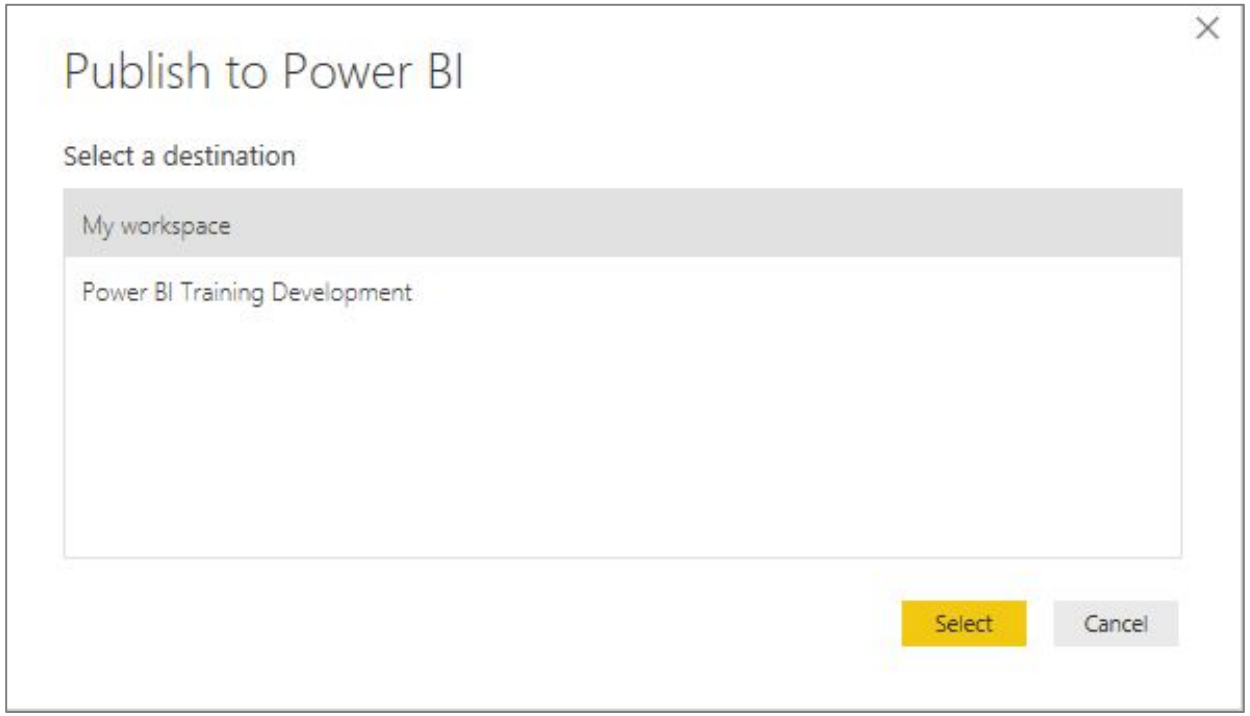
Understanding your dataset

- 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

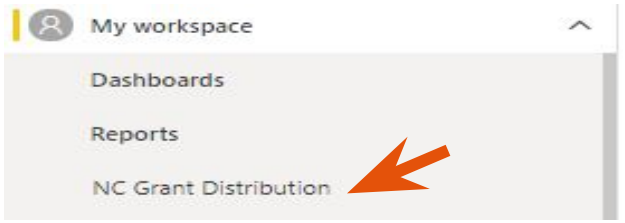
- You will need to use Power BI Desktop to upload Power BI report

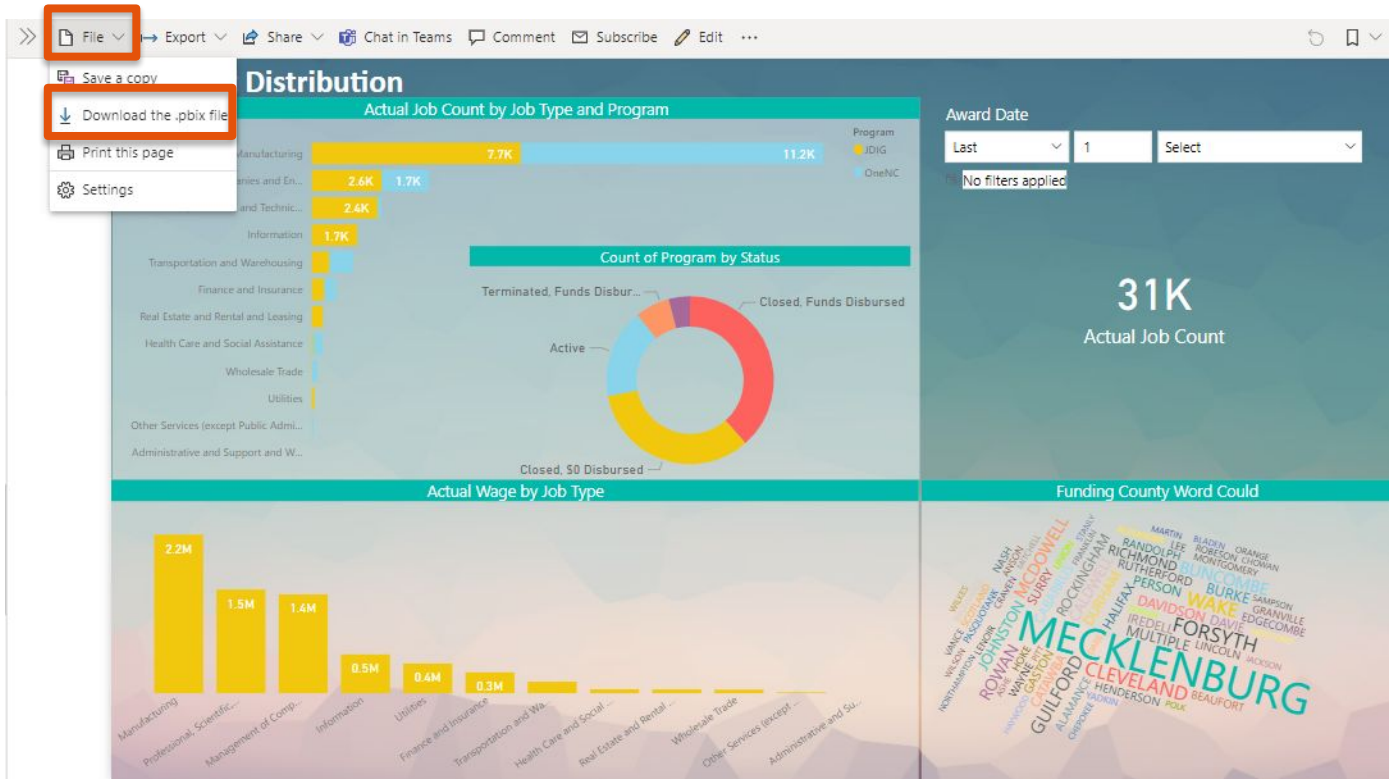




Downloading reports

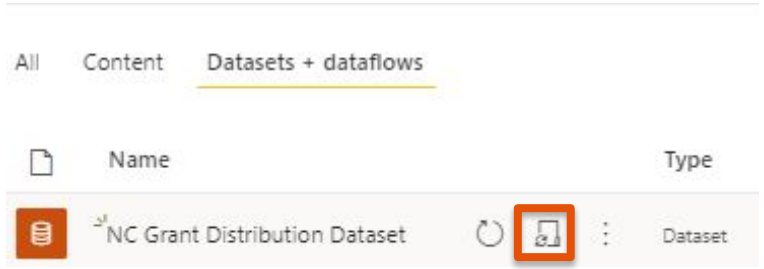
- Click into the report you want to download on PowerBI.com workspace
- You can find the 'File' Drop Down on the Top right corner of the main area
- There you can Download Report (Preview)

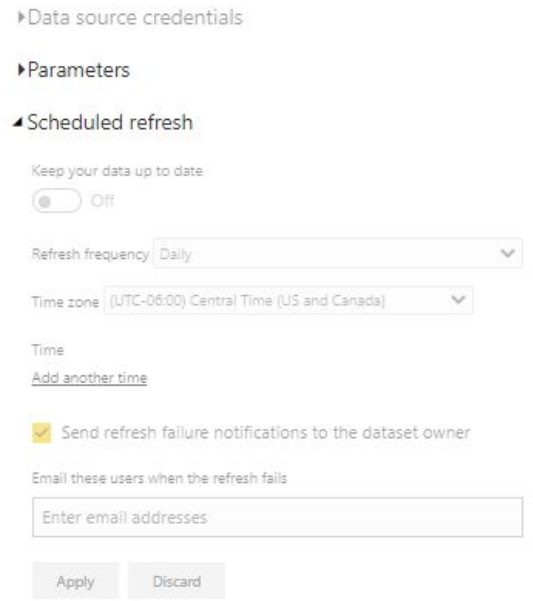




Schedule refresh on datasets

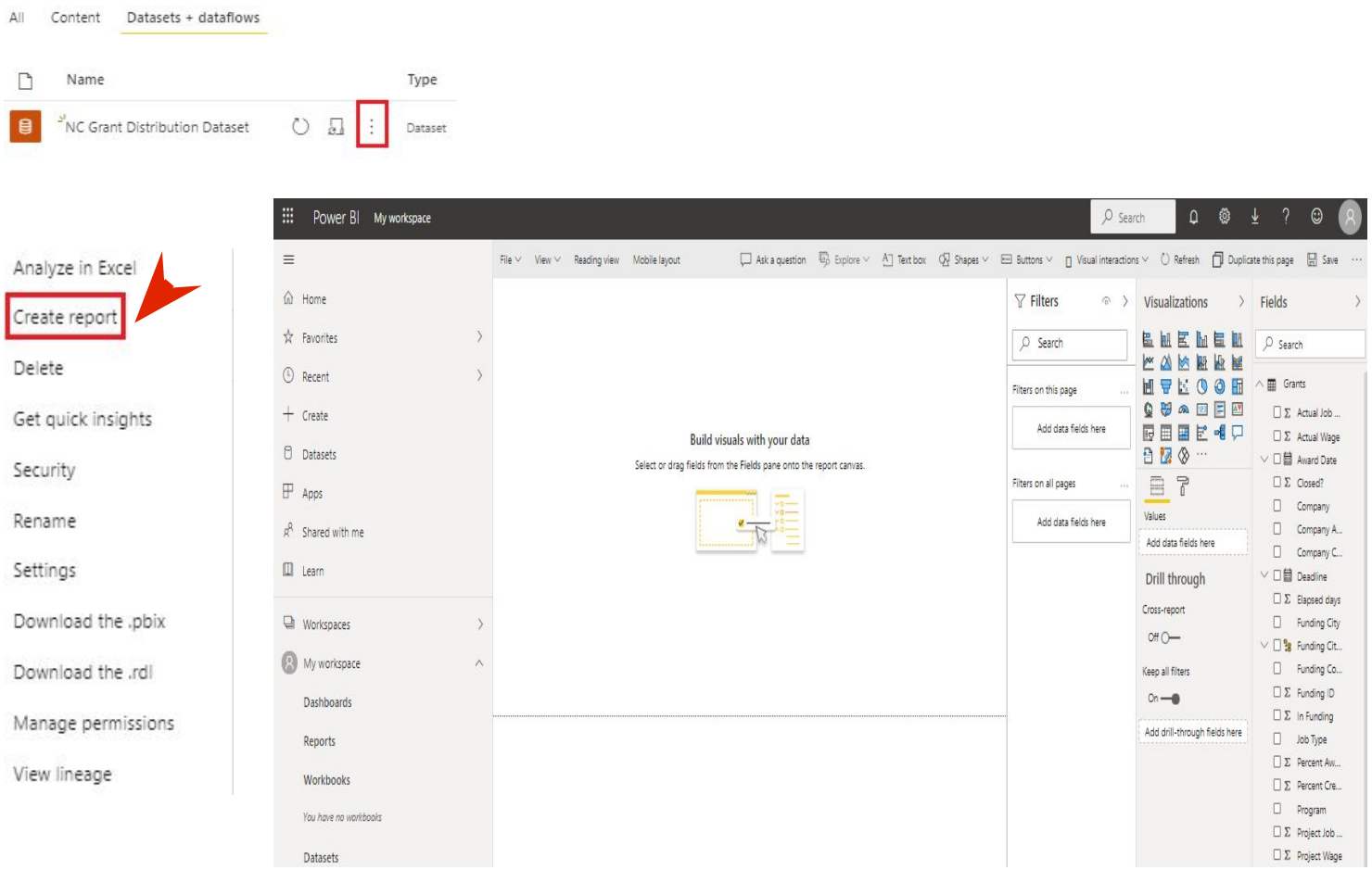
- Knowing how to refresh your dataset is critical in delivering the most accurate results
- Go to the 'Datasets' tab of the workspace and click on the 'Schedule Refresh' button
- From here, you can set the Gateway connection (connector to the underlining data source). If your data is locally in your 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





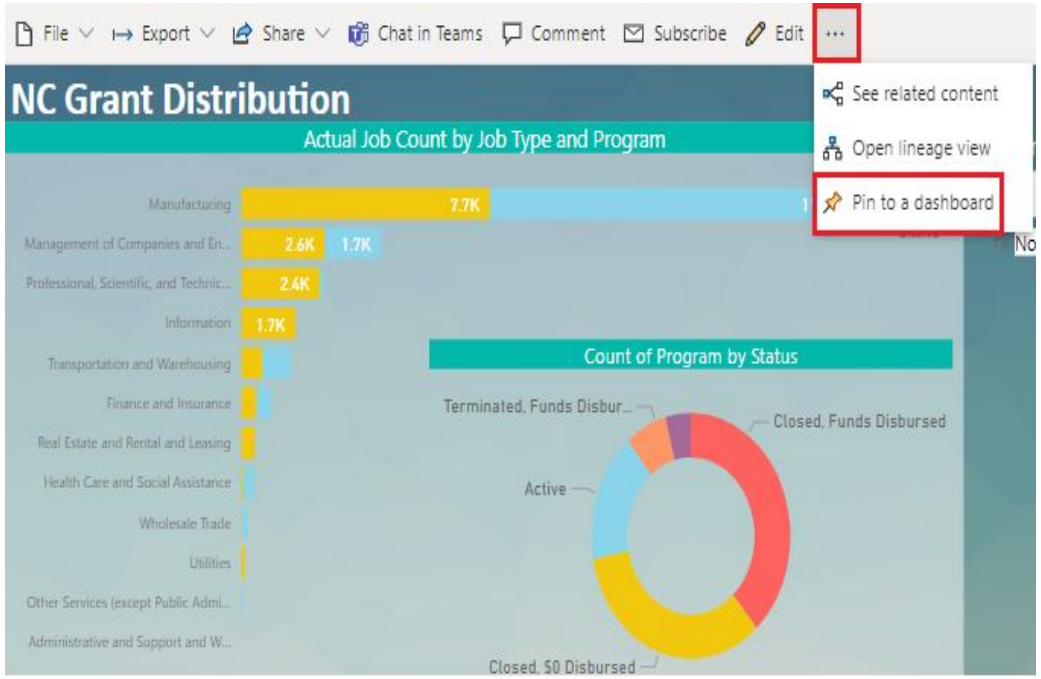
Building your online report

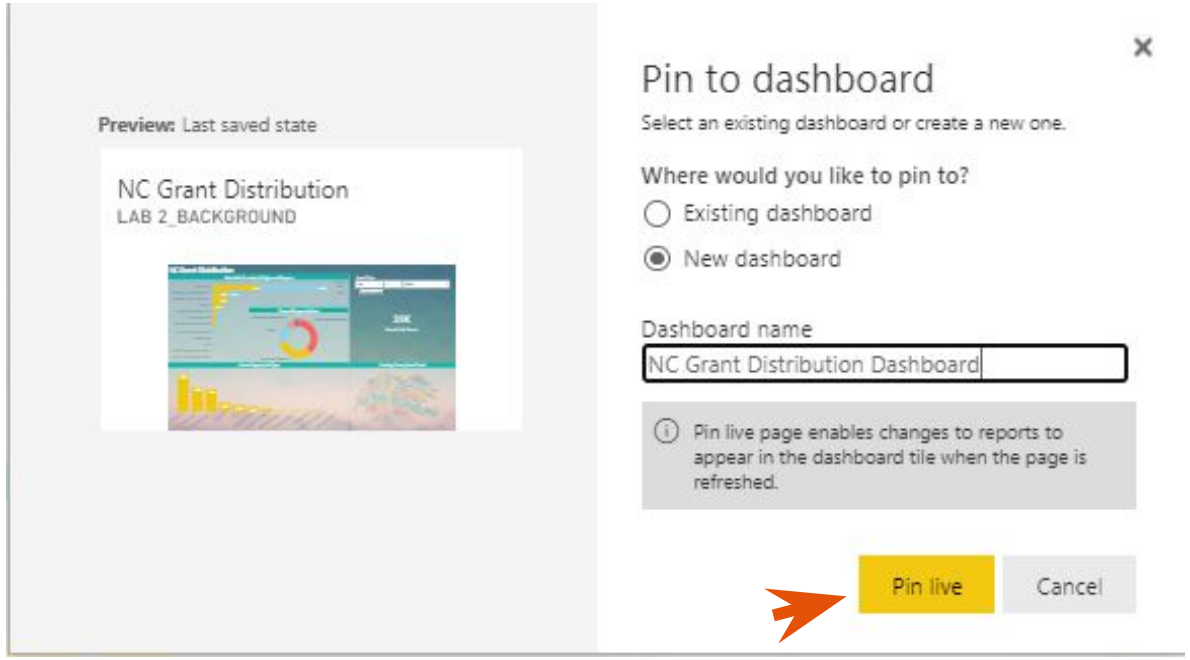
- You can create a report online from an existing dataset by choosing 'Create Report' button on the Datasets tab options
- Then, the report development environment will show up in the browser



Pinning your dashboards

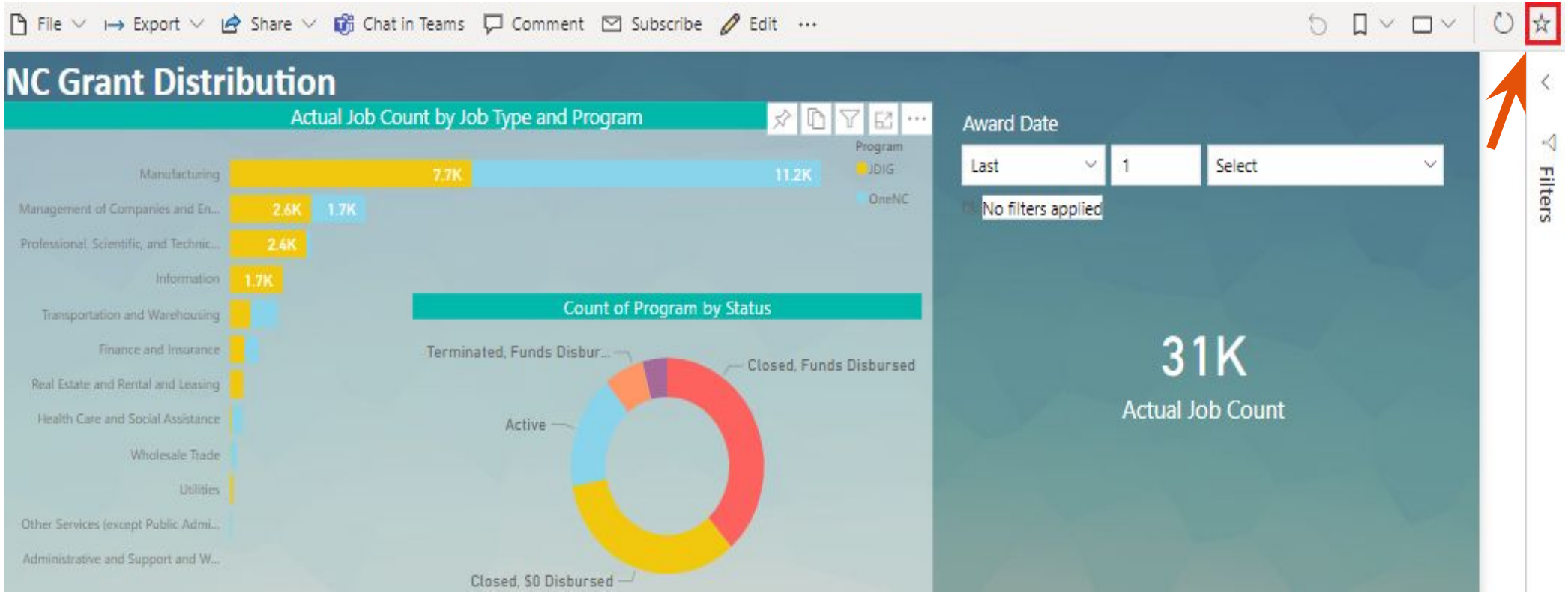
- You can create Dashboard from existing Reports in the same workspace
- Go to a report on your Workspace, and then find the Pin Visual
- Then you can pin your visual to an existing dashboard or a new dashboard





Add to your favorites

- You can add any dashboard or report to your Favorites

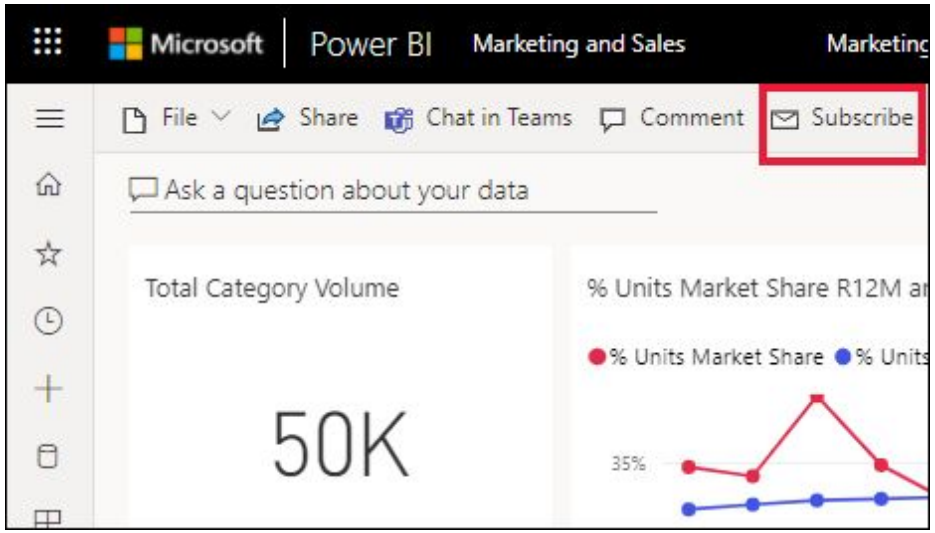


Data Alerts

- 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

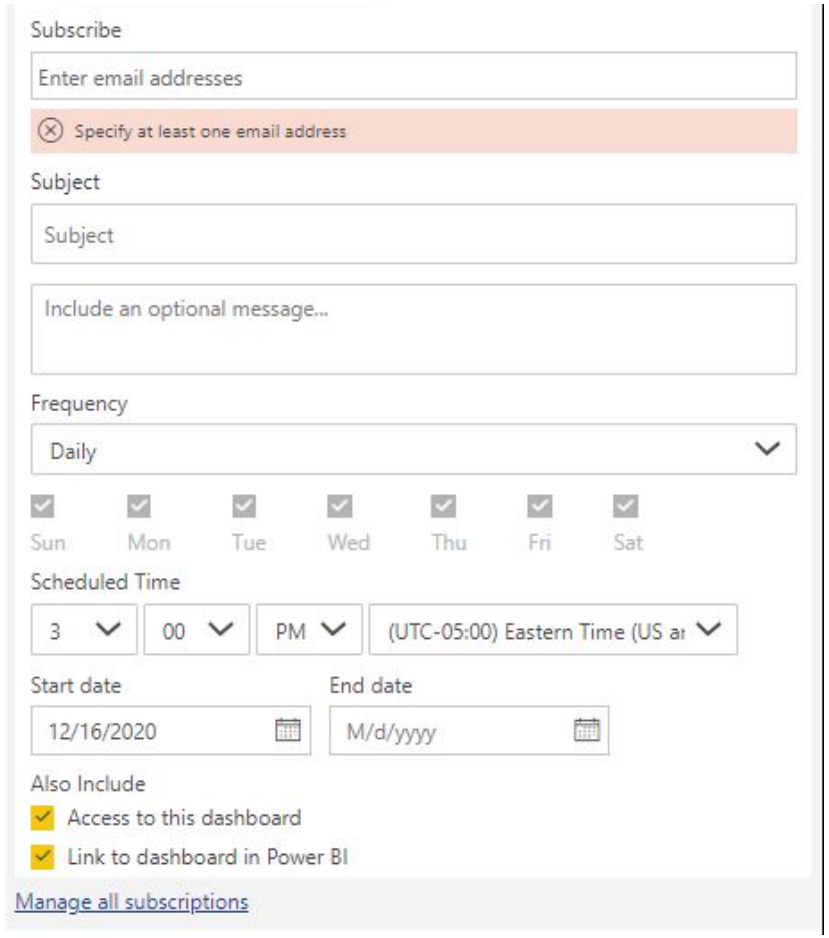
Subscriptions

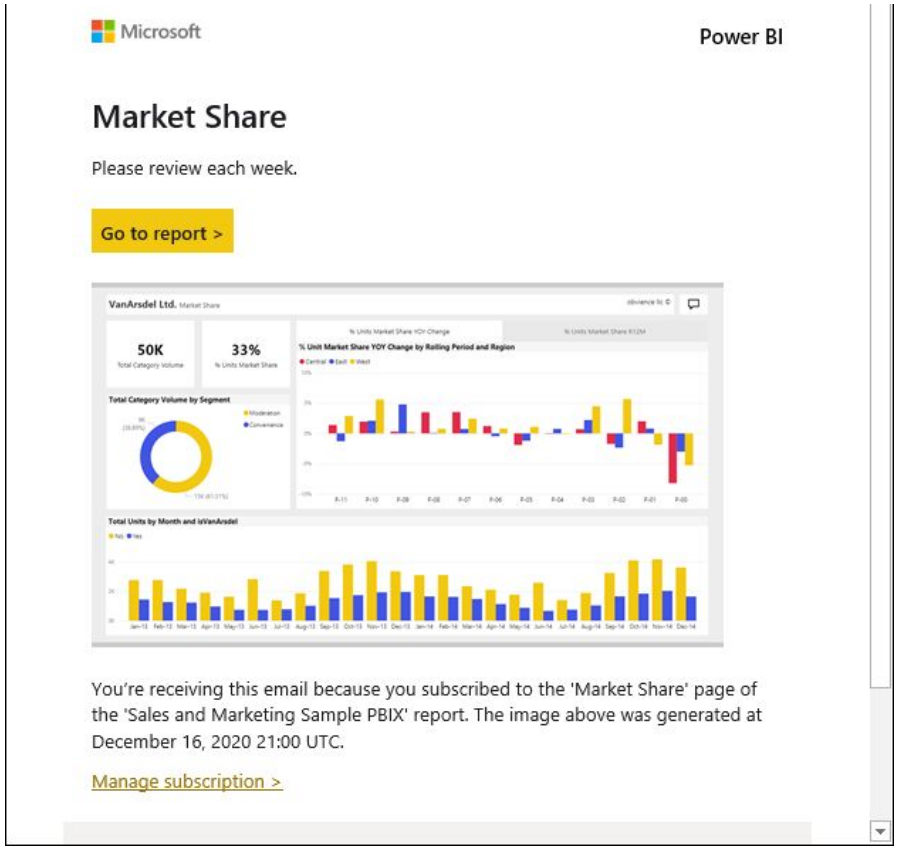
- Subscriptions help keep track of dashboards
- Power BI will email a snapshot to specified email addresses
- Subscriptions require a Power BI Pro or Premium License



Subscriptions

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





Knowledge Check 1

Lab 3

Data Alerts

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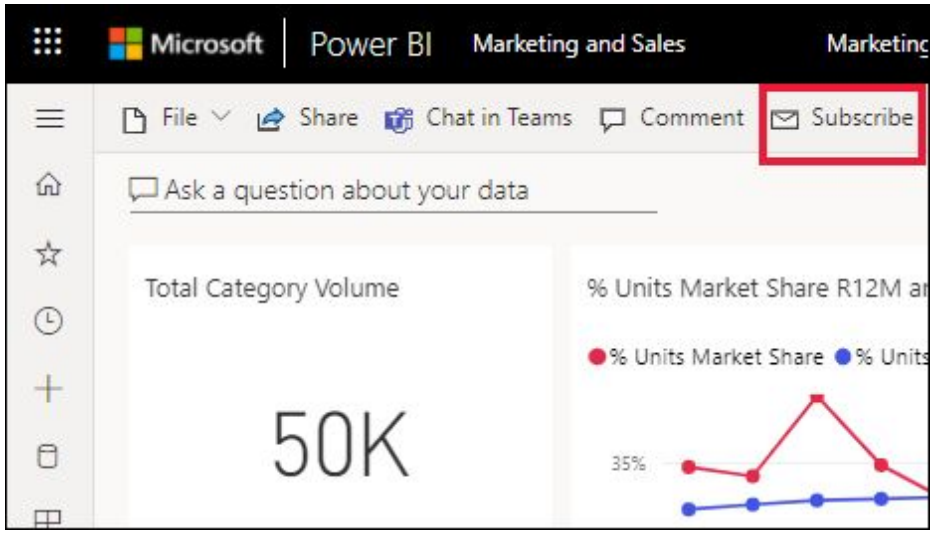

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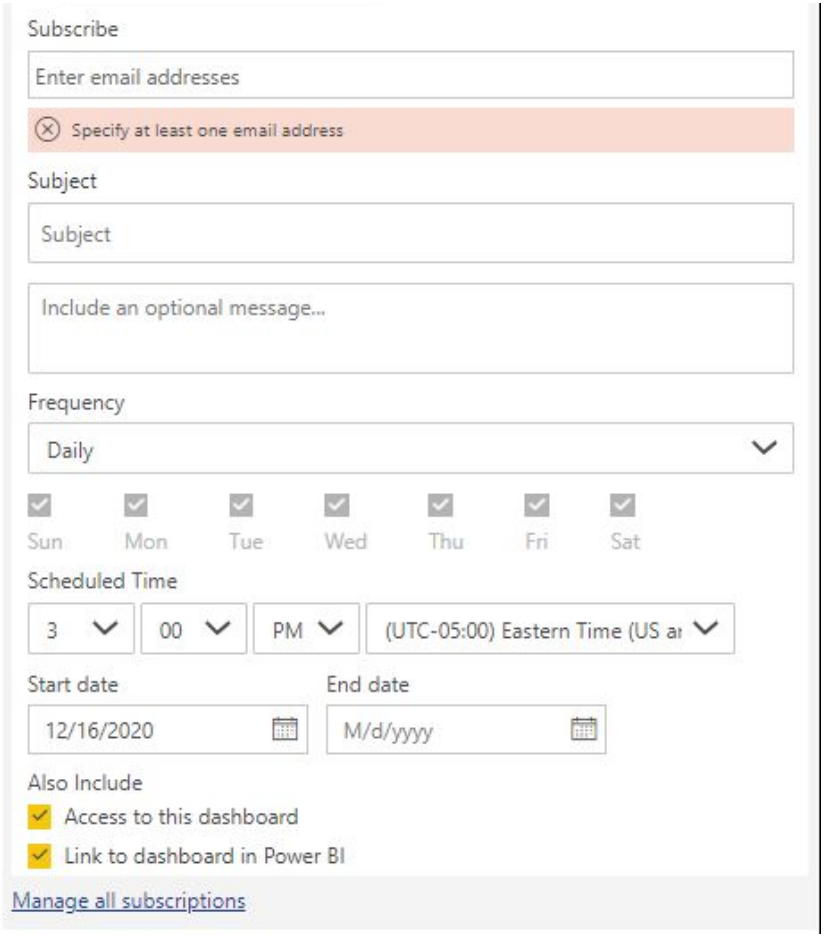
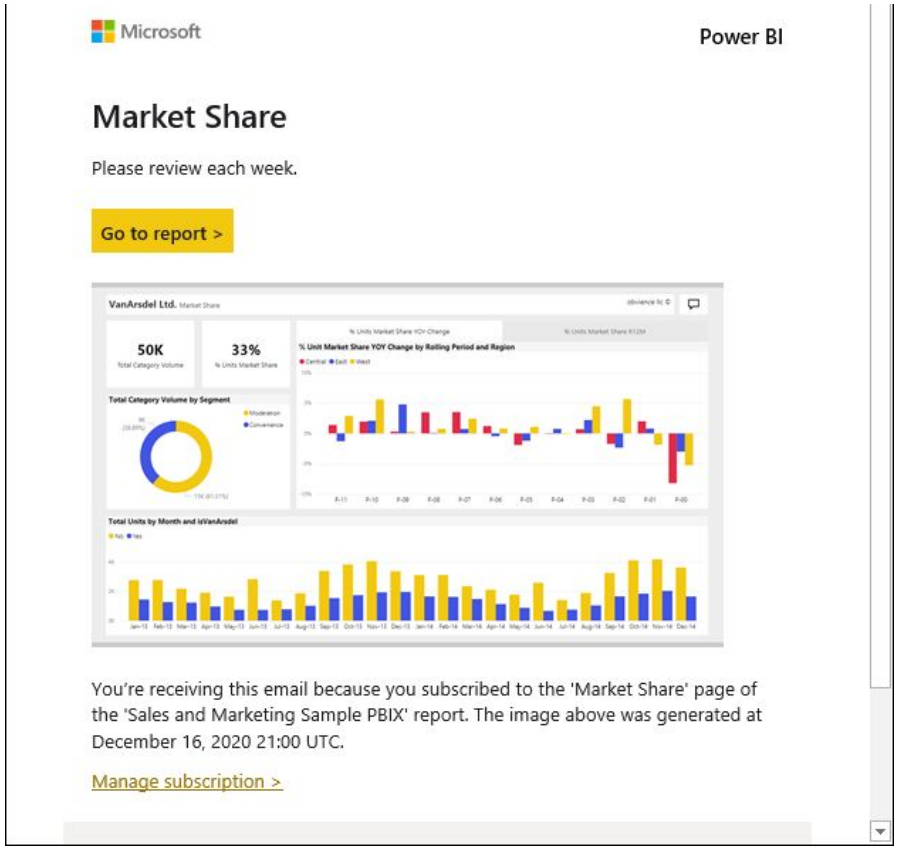




Outline for today

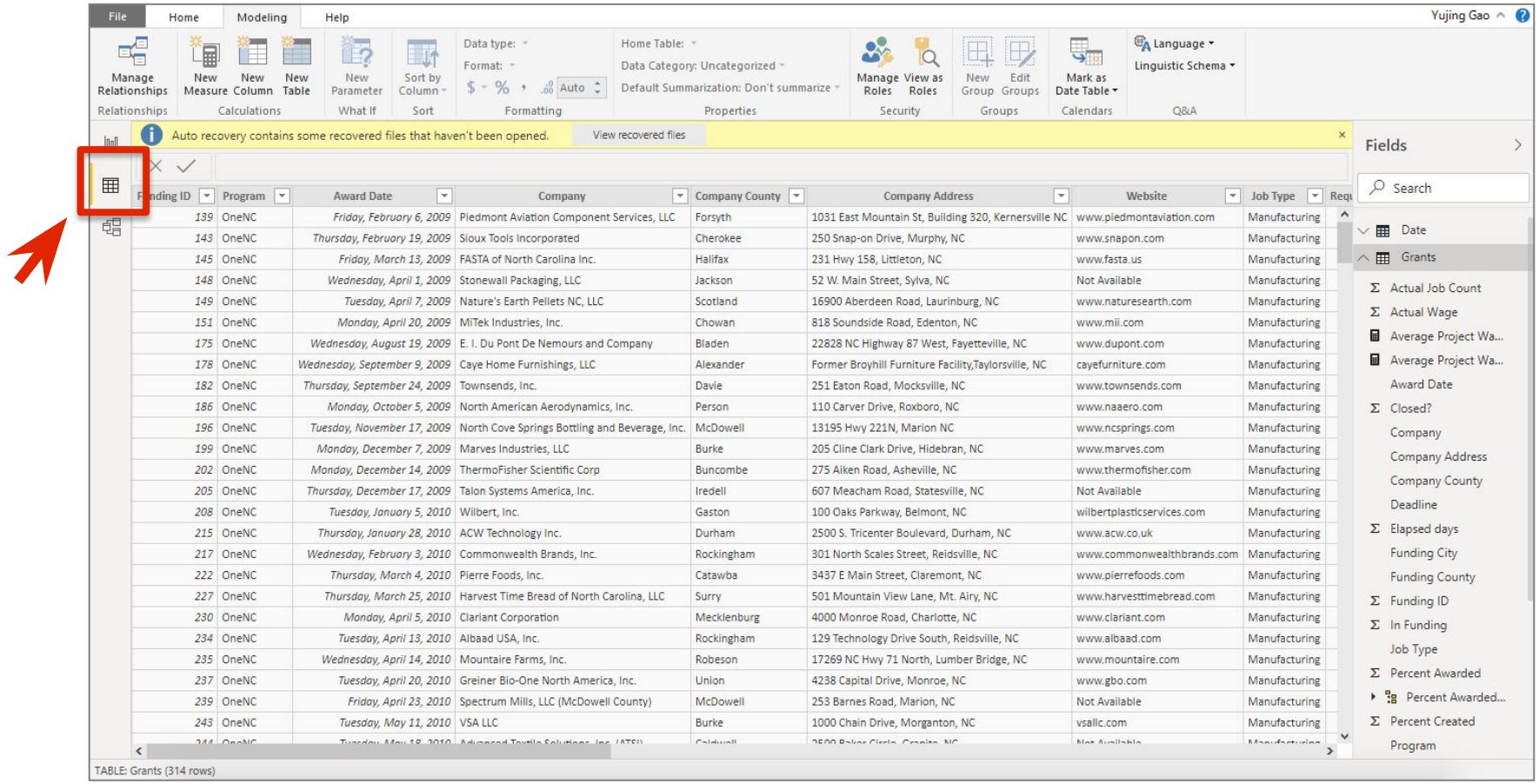
- 1. Explain the additional functions of Power BI web service
- 2. Program in Power BI using DAX language to manipulate data
- 3. Create a map visual
- 4. Workshop: practice your skills

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

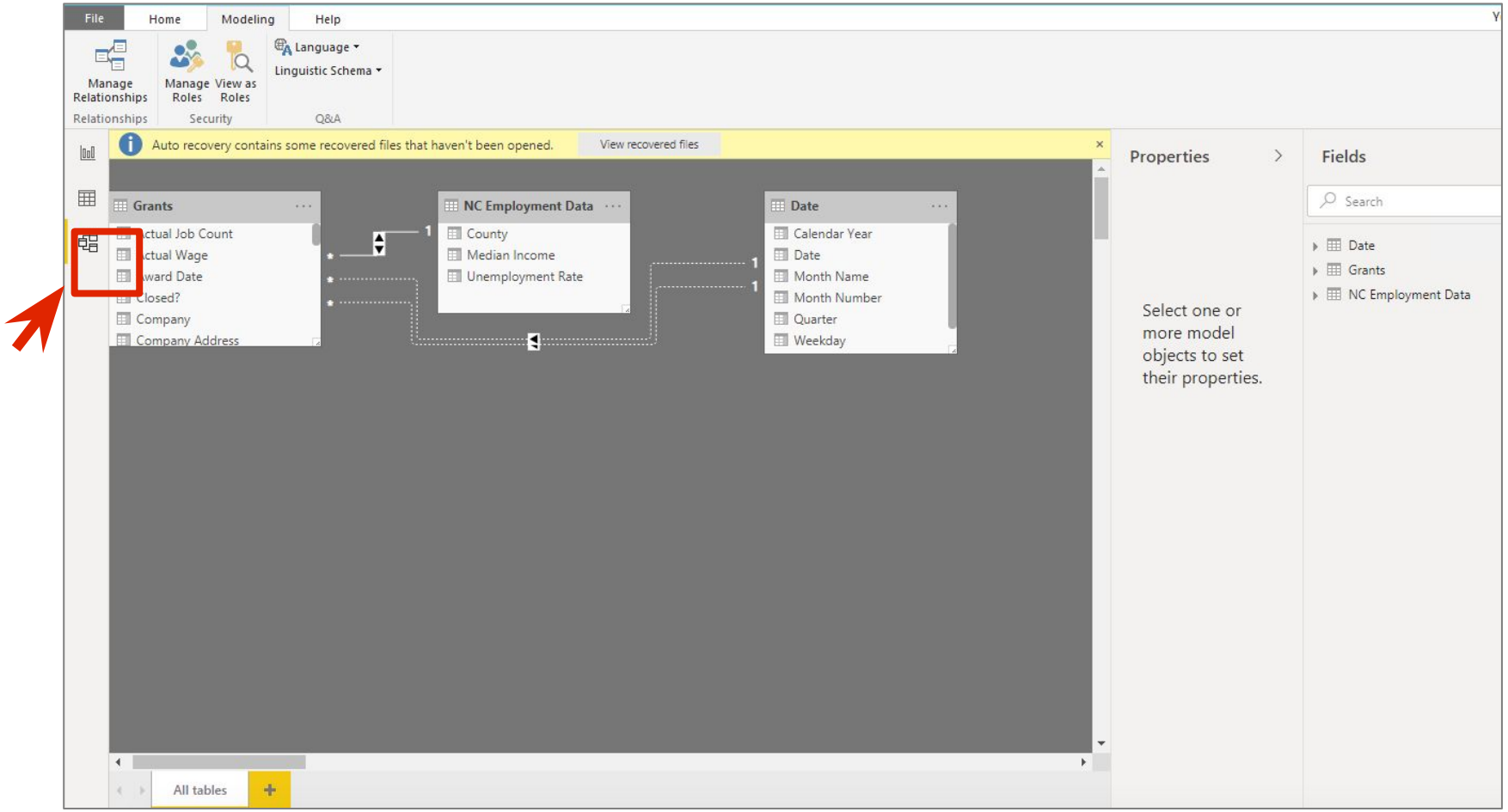
- Data Tab has all the tables in detailed data view (as opposed to Power Query in Edit Queries, Window which only provides data preview and does not store actual data)



Funding ID	Program	Award Date	Company	Company County	Company Address	Website	Job Type
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.naturesearth.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	cayefurniture.com	Manufacturing
182	OneNC	Thursday, September 24, 2009	Townsends, Inc.	Davie	251 Eaton Road, Mocksville, NC	www.townsends.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	vsallc.com	Manufacturing

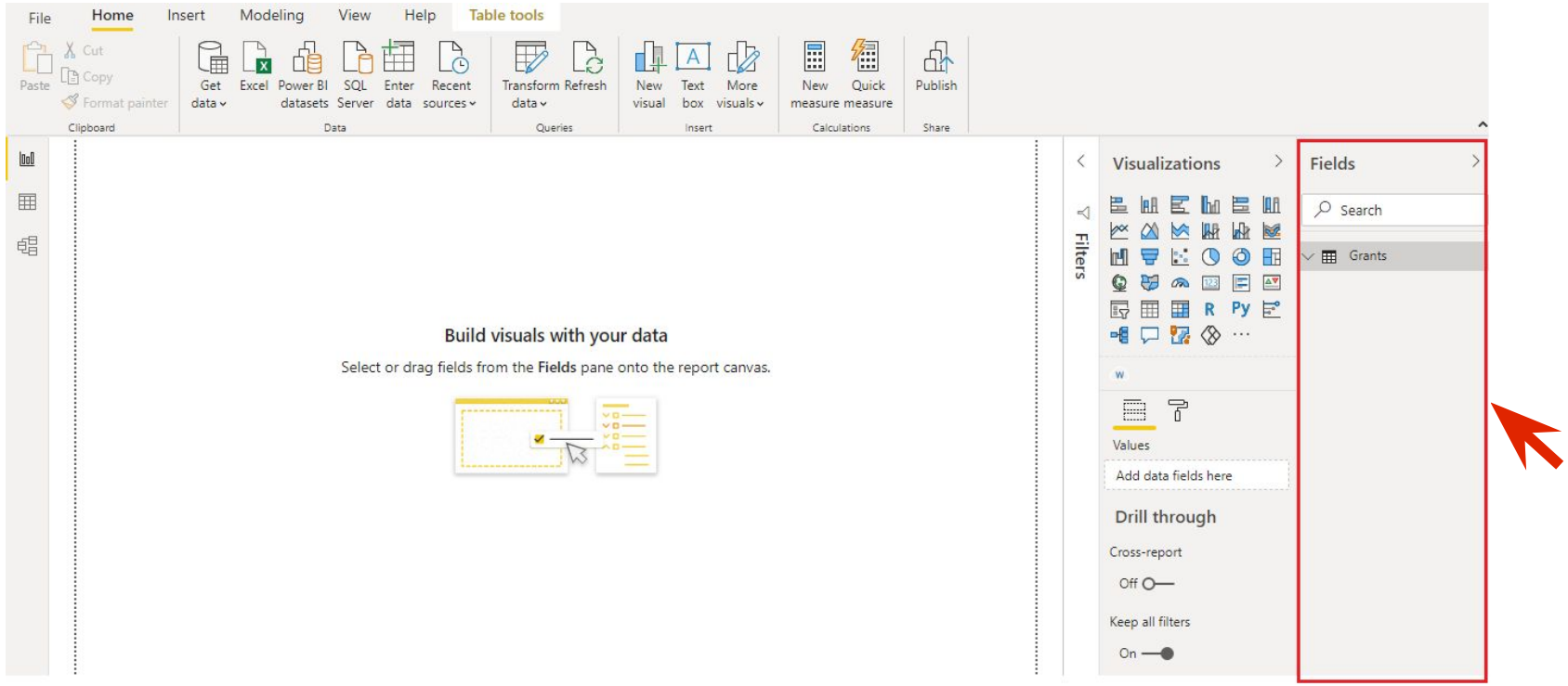
Understanding Relationship Tab

- 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

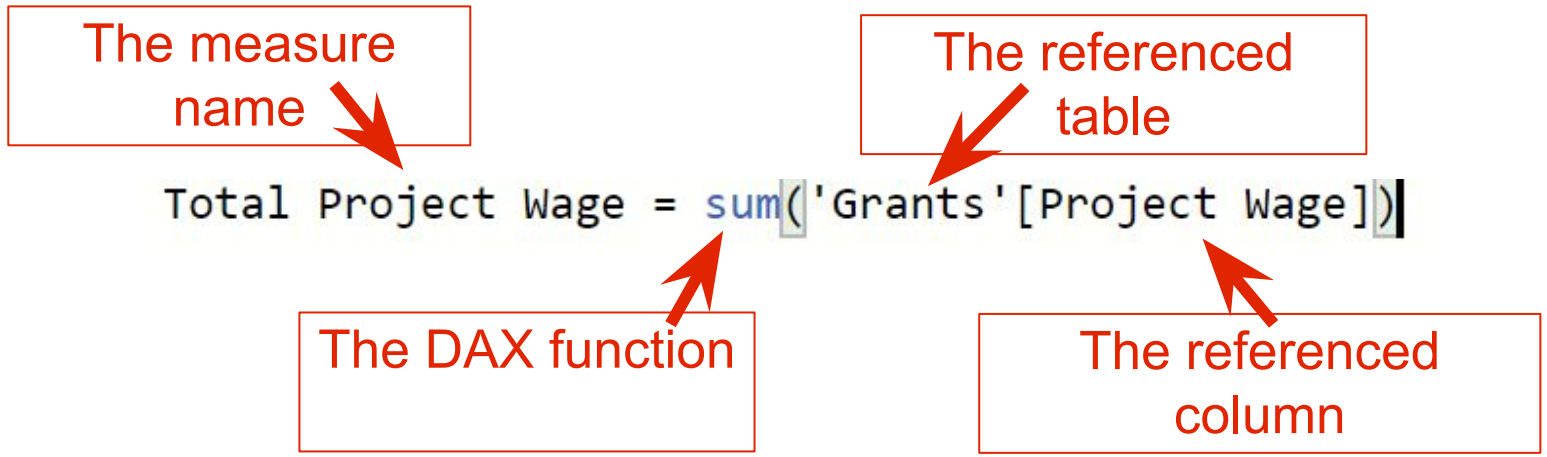
Calculate ‘total project wage’

- The grant officer wants to know the total project wage
- The total project wage is the sum of 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.

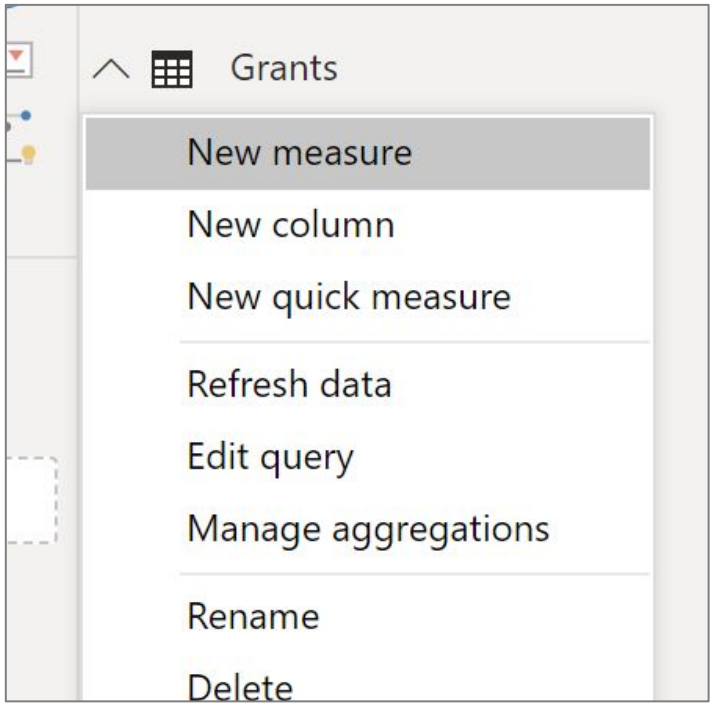


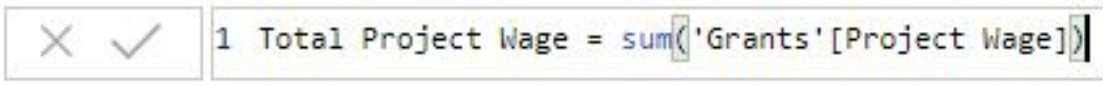
Introduction to measures

- 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])





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

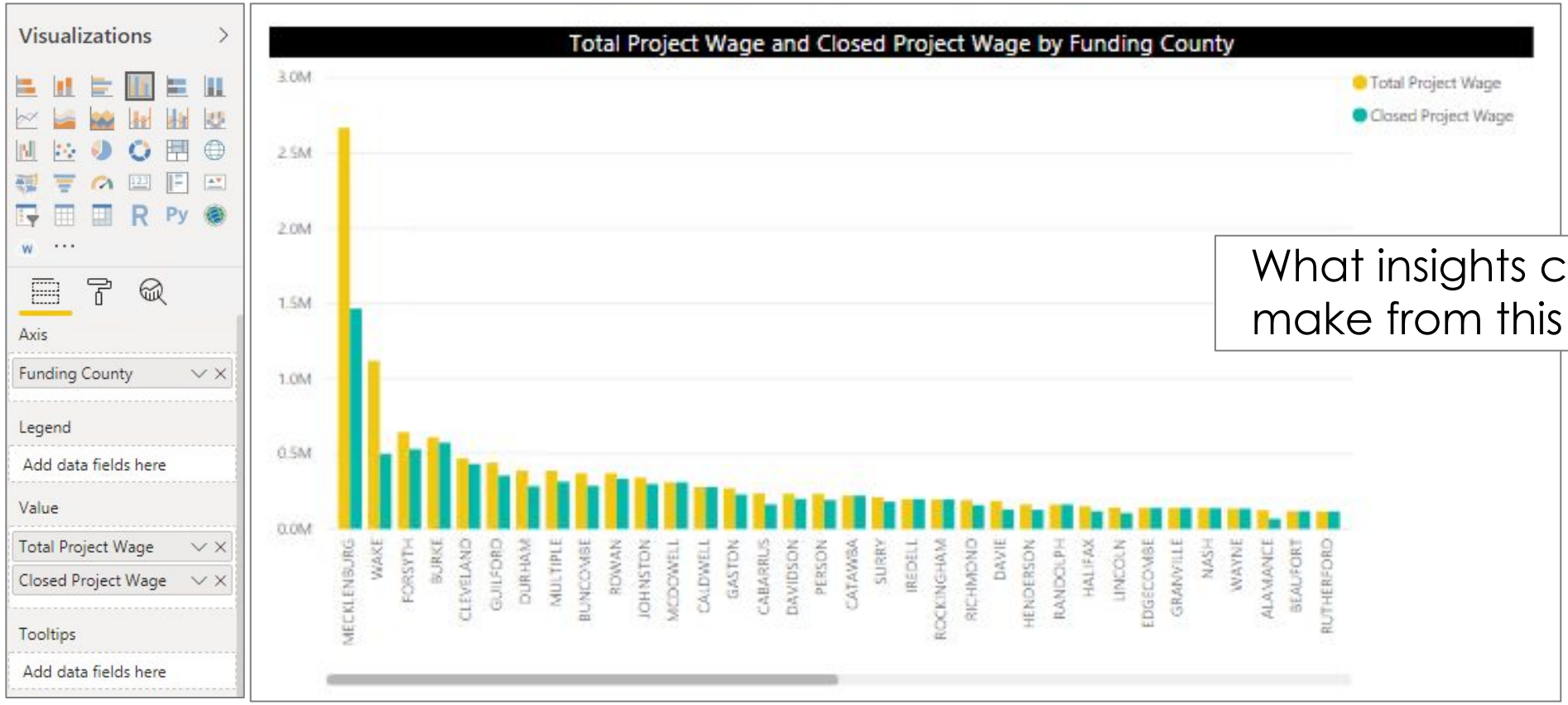
- You did it! You just created a measure using DAX, and not an easy one at that
- What this formula will do is calculate the total project wage for the closed grants, depending on the filters applied in a report

```
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



What insights can you make from this chart?

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 Copy

```
AVERAGE(<column>)
```

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>)

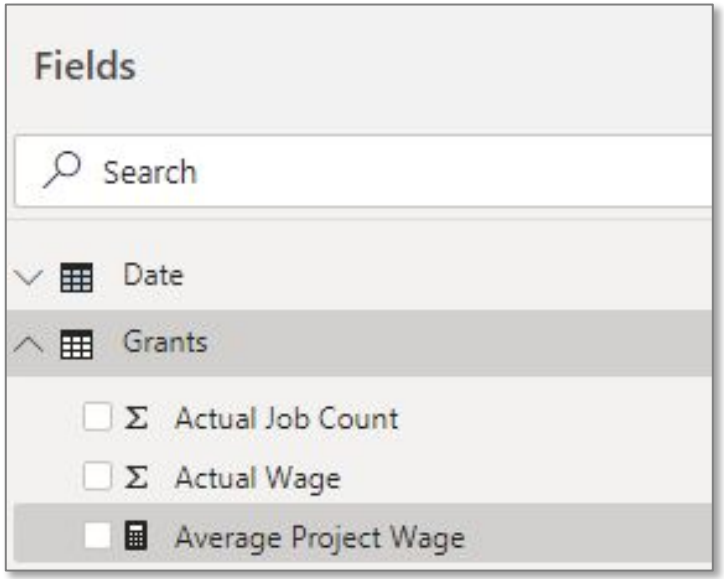
Parameters

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

Step 2: calculate ‘Average Project Wage’

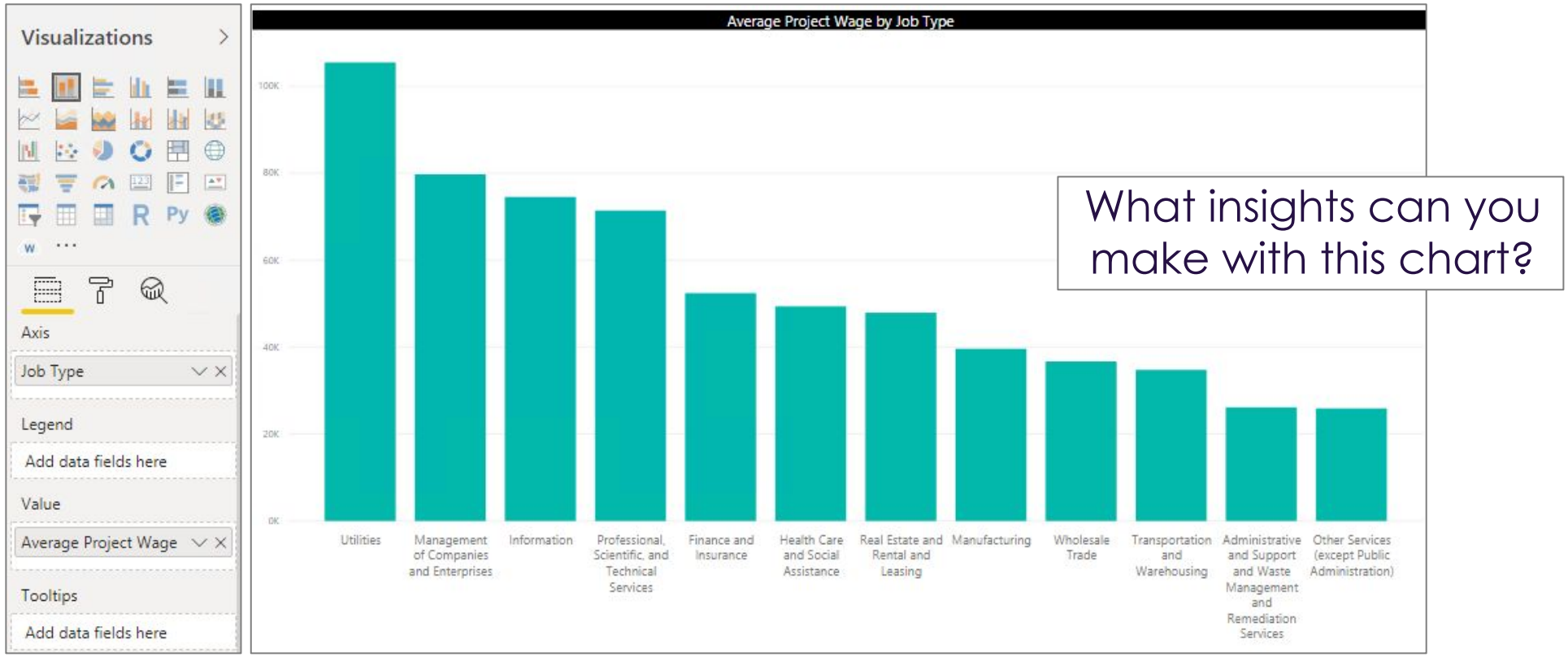
- Right click on ‘Grants’ table and add a New measure
- Average Project Wage = AVERAGE(Grants[Project Wage])
- Under the ‘Grants’ table, a new field ‘Average Actual Wage’ showed up.

```
1 Average Project Wage = AVERAGE(Grants[Project Wage])
```



Step 3: visualize in 'Reports' pane

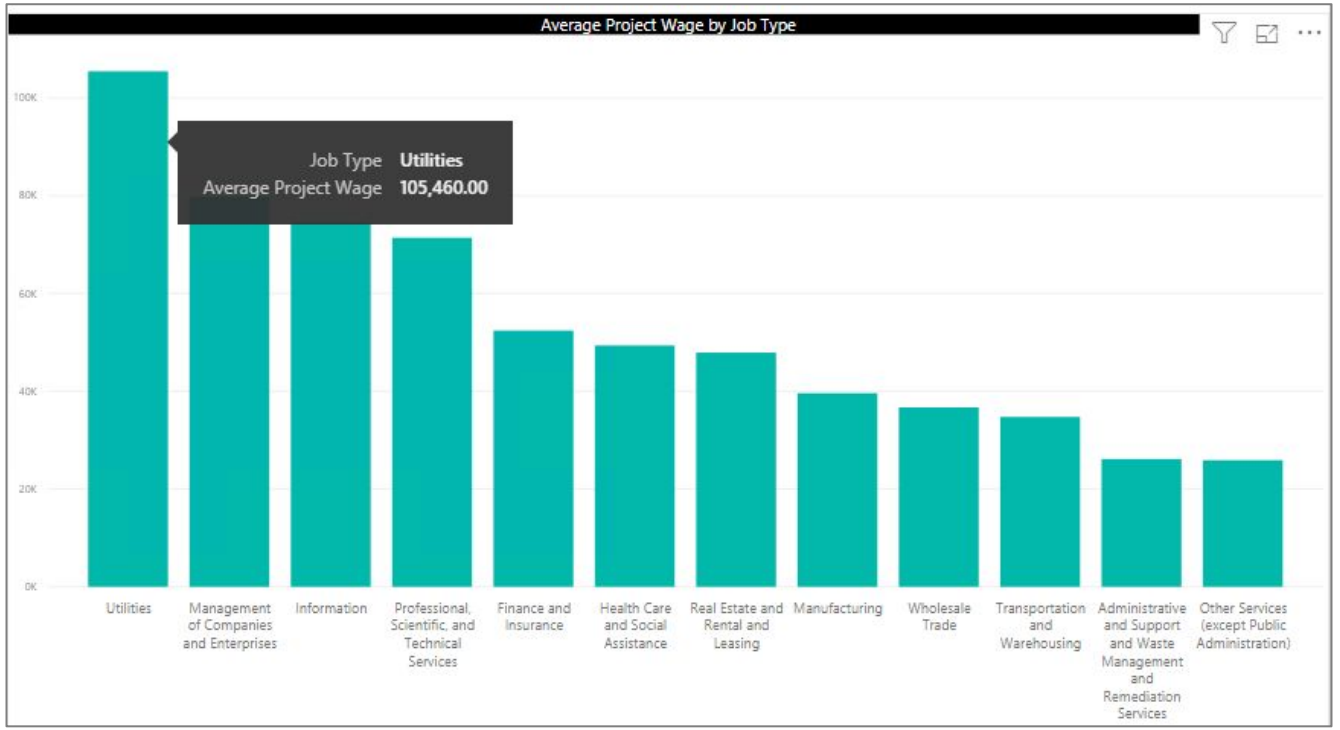
- Let's put [Average Project Wage] measure in a column chart, and then added [Job Type] field in Grants table as Axis, we'd get something like this:



What insights can you make with this chart?

Formatting your measure

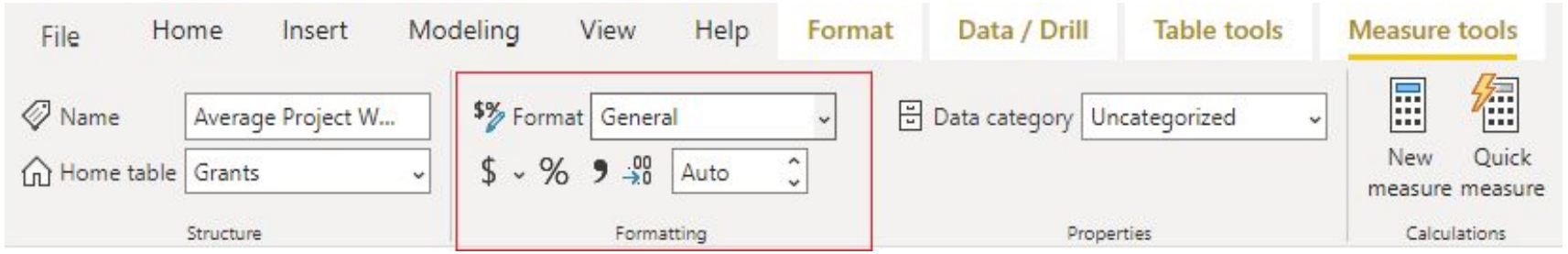
- Hover on the column chart, you can see the 'Average Project Wage' for the 'Job Type' you choose. You will find the value of Average Project Wage is in decimal



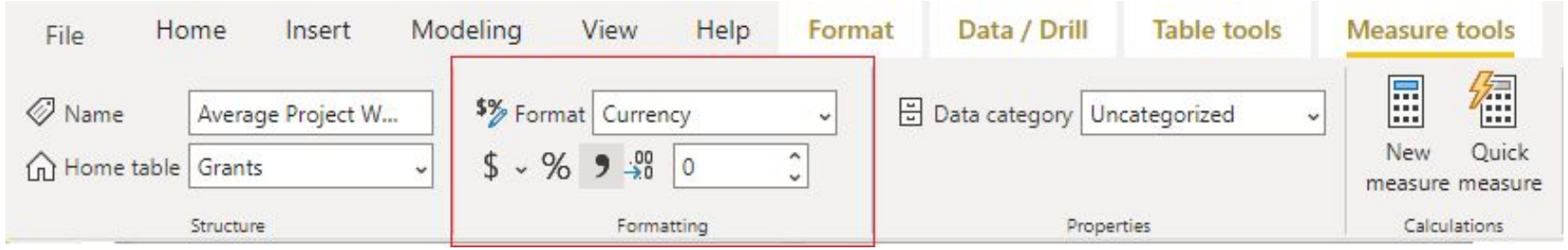
How can we change the decimal value into currency?

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

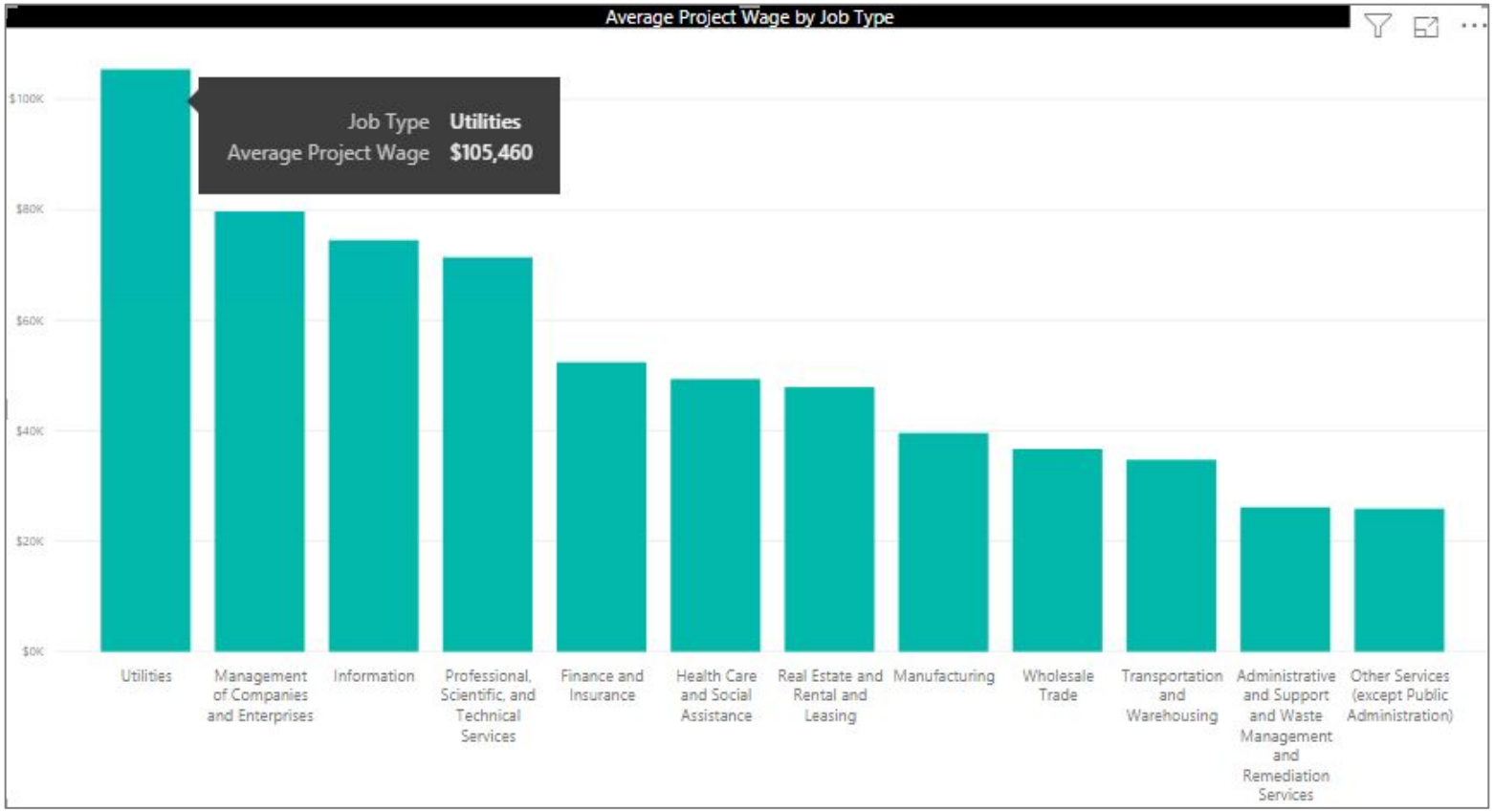


- Click on Format > 'Currency'
- Type 0 on the decimal field



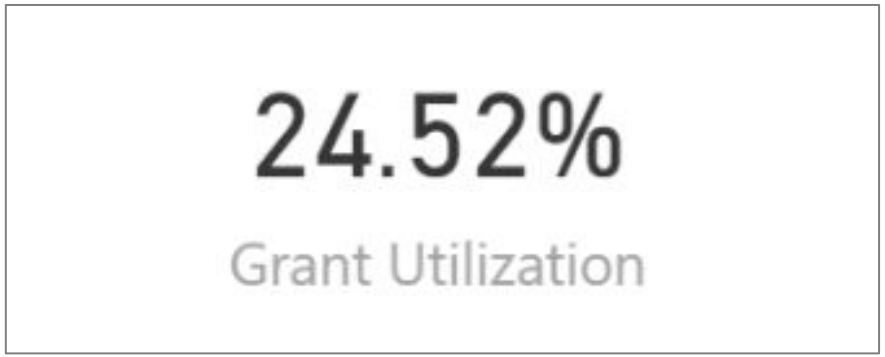
Changed to currency

- 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

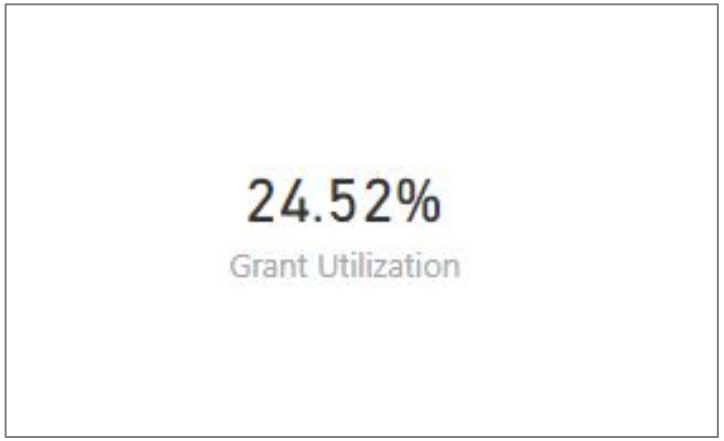
Calculate Total Award * Percent Awarded for each row in Grants Table

Calculate grant utilization

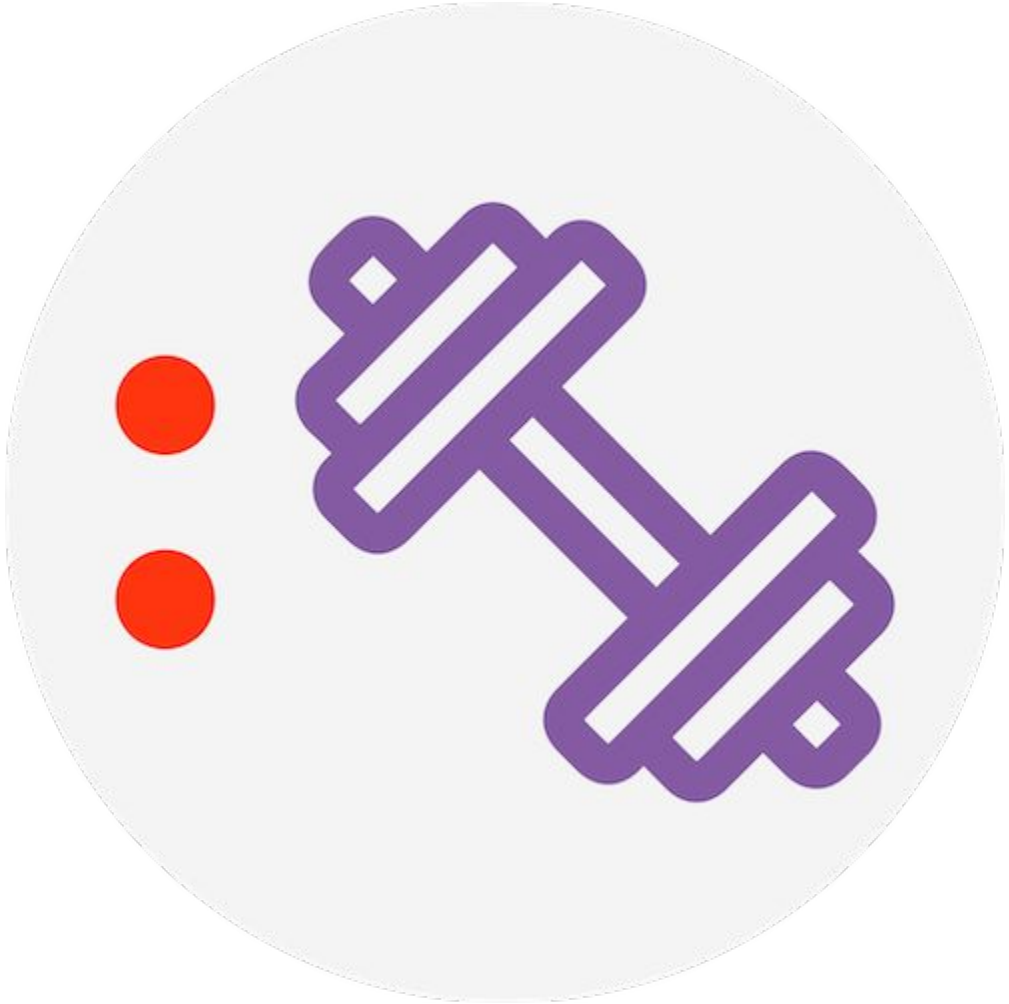
Measure Formula	Format
Way 1: Grant Utilization = [Actual Used Awards]/[Total Grant Amount]	Percentage
Way 2: Grant Utilization = DIVIDE([Actual used awards $],[Total Awards $],0)	Percentage

Visualize grant utilization

- Go to the "Reports" pane and visualize data



Exercise



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 =	

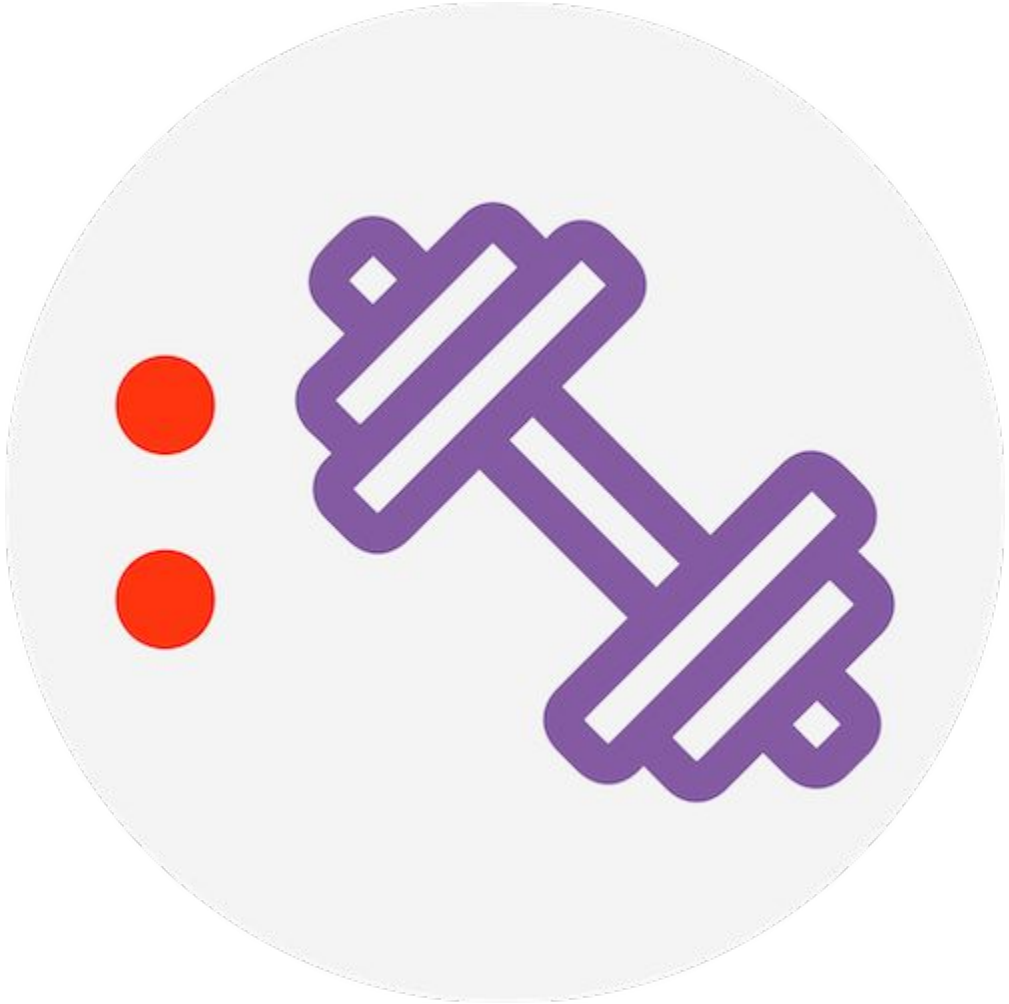
Step 1: calculate job fulfillment

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

Exercise



Knowledge Check 2

Outline for today

- 1. Explain the additional functions of Power BI web service
- 2. Program in Power BI using DAX language to manipulate data
- 3. Create a map visual
- 4. Workshop: practice your skills

Introduction to calculated columns

Unlike measure, calculated columns are DAX syntax applied on physical table by adding physical calculated columns

Properties of calculated columns:

- Each row in a calculated column shares the same formula
- No “A1” Style Reference, only table and column reference
- Stored statically with the file
- You can think of Power BI as ‘Excel Formulas+”. Easy to learn from beginning and become more powerful then you learn more

Logical Columns vs Physical Columns

- Measure > logical column
- If you navigate to the ‘Data’ section on the left side of Power BI desktop window, you won’t see the measure in the physical data
- Calculated column > physical column
- If you navigate to the ‘Data’ section on the left side of Power BI desktop window, you will see the new column in the physical data

Create calculated columns

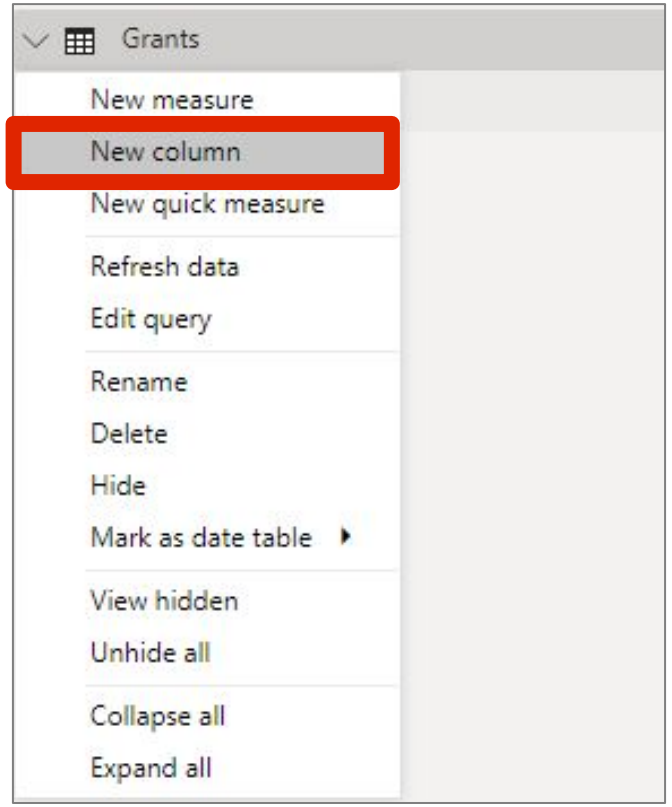
We are going to create a map visual with calculated columns

- Although we have county field, we cannot use it in the map visual because county names in United State are not unique
- In order to make each county unique, we will incorporate state with county
- We'll add a new column in 'Grants' table which has County name combine with State name

Map of every Springfield in the US

Create new column

- Right click on the ‘Grants’ table on the Fields panel and click on ‘New column’ then the formula bar will show up under the top tool bar



Create ‘State County’ column

- The CONCATENATE () Function Syntax: = CONCATENATE(<text1>, <text2>)
- The CONCATENATE function joins two text strings into one text string

Calculated Column Formula	Format
State County = CONCATENATE('Grants'[Funding County]," County NC")	Text

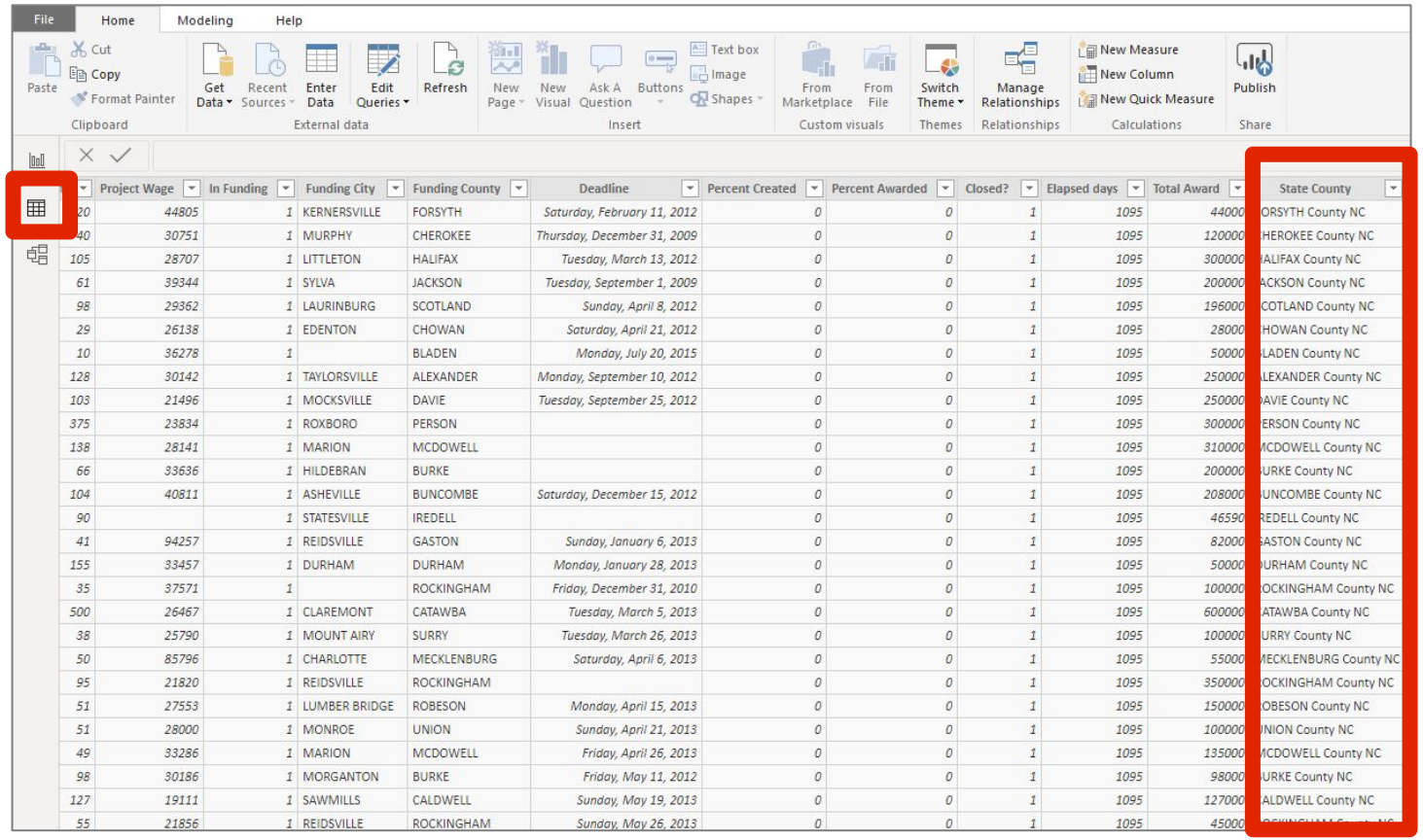
‘State County’ column

- You will see a new column has been added under ‘Grant’ table
- It has a unique icon in front of it to distinguish against other original source columns

‘State County’ column

- Go to the ‘Data’ section on the left side of Power BI desktop window

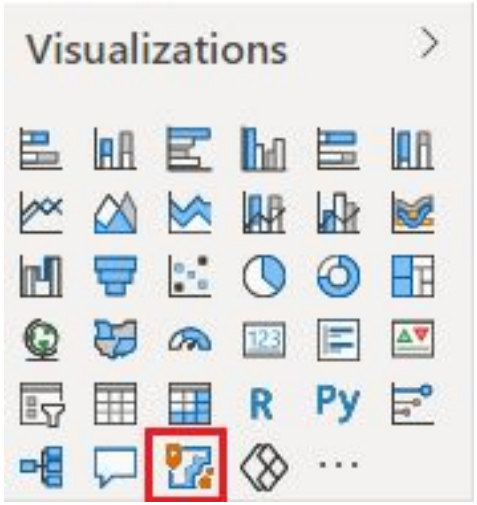
- You can see the new column ‘State County ‘ in the list of columns under the ‘Grants’ table just like other physical columns



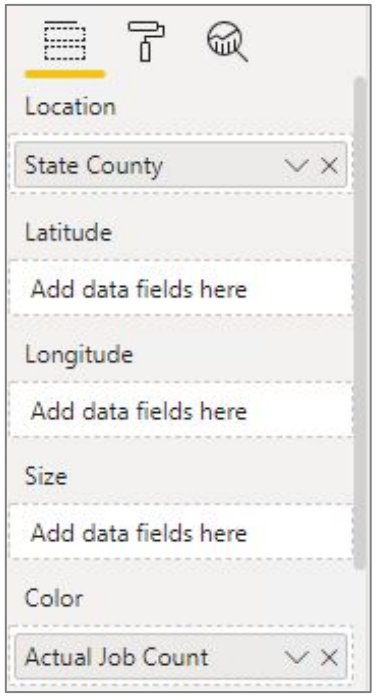
Project Wage	In Funding	Funding City	Funding County	Deadline	Percent Created	Percent Awarded	Closed?	Elapsed days	Total Award	State County
44805	1	KERNERSVILLE	FORSYTH	Saturday, February 11, 2012	0	0	1	1095	44000	ORSYTH County NC
30751	1	MURPHY	CHEROKEE	Thursday, December 31, 2009	0	0	1	1095	120000	HEROKEE County NC
28707	1	LITTLETON	HALIFAX	Tuesday, March 13, 2012	0	0	1	1095	300000	ALIFAX County NC
39344	1	SYLVA	JACKSON	Tuesday, September 1, 2009	0	0	1	1095	200000	ACKSON County NC
29362	1	LAURINBURG	SCOTLAND	Sunday, April 8, 2012	0	0	1	1095	196000	COTLAND County NC
26138	1	EDENTON	CHOWAN	Saturday, April 21, 2012	0	0	1	1095	28000	HOWAN County NC
36278	1		BLADEN	Monday, July 20, 2015	0	0	1	1095	50000	LADEN County NC
30142	1	TAYLORSVILLE	ALEXANDER	Monday, September 10, 2012	0	0	1	1095	250000	LEXANDER County NC
21496	1	MOCKSVILLE	DAVIE	Tuesday, September 25, 2012	0	0	1	1095	250000	AVIE County NC
23834	1	ROXBORO	PERSON		0	0	1	1095	300000	ERSON County NC
28141	1	MARION	MCDOWELL		0	0	1	1095	310000	CDOWELL County NC
33636	1	HILDEBRAN	BURKE		0	0	1	1095	200000	URKE County NC
40811	1	ASHEVILLE	BUNCOMBE	Saturday, December 15, 2012	0	0	1	1095	208000	UNCOMBE County NC
	1	STATESVILLE	IREDELL		0	0	1	1095	46590	REDELL County NC
94257	1	REIDSVILLE	GASTON	Sunday, January 6, 2013	0	0	1	1095	82000	ASTON County NC
33457	1	DURHAM	DURHAM	Monday, January 28, 2013	0	0	1	1095	50000	URHAM County NC
37571	1		ROCKINGHAM	Friday, December 31, 2010	0	0	1	1095	100000	OCKINGHAM County NC
26467	1	CLAREMONT	CATAWBA	Tuesday, March 5, 2013	0	0	1	1095	600000	ATAWBA County NC
25790	1	MOUNT AIRY	SURRY	Tuesday, March 26, 2013	0	0	1	1095	100000	URRY County NC
85796	1	CHARLOTTE	MECKLENBURG	Saturday, April 6, 2013	0	0	1	1095	55000	ECKLENBURG County NC
21820	1	REIDSVILLE	ROCKINGHAM		0	0	1	1095	350000	OCKINGHAM County NC
27553	1	LUMBER BRIDGE	ROBESON	Monday, April 15, 2013	0	0	1	1095	150000	OBESON County NC
28000	1	MONROE	UNION	Sunday, April 21, 2013	0	0	1	1095	100000	NION County NC
33286	1	MARION	MCDOWELL	Friday, April 26, 2013	0	0	1	1095	135000	CDOWELL County NC
30186	1	MORGANTON	BURKE	Friday, May 11, 2012	0	0	1	1095	98000	URKE County NC
19111	1	SAWMILLS	CALDWELL	Sunday, May 19, 2013	0	0	1	1095	127000	ALDWELL County NC
21856	1	REIDSVILLE	ROCKINGHAM	Sunday, May 26, 2013	0	0	1	1095	45000	

Create map visual

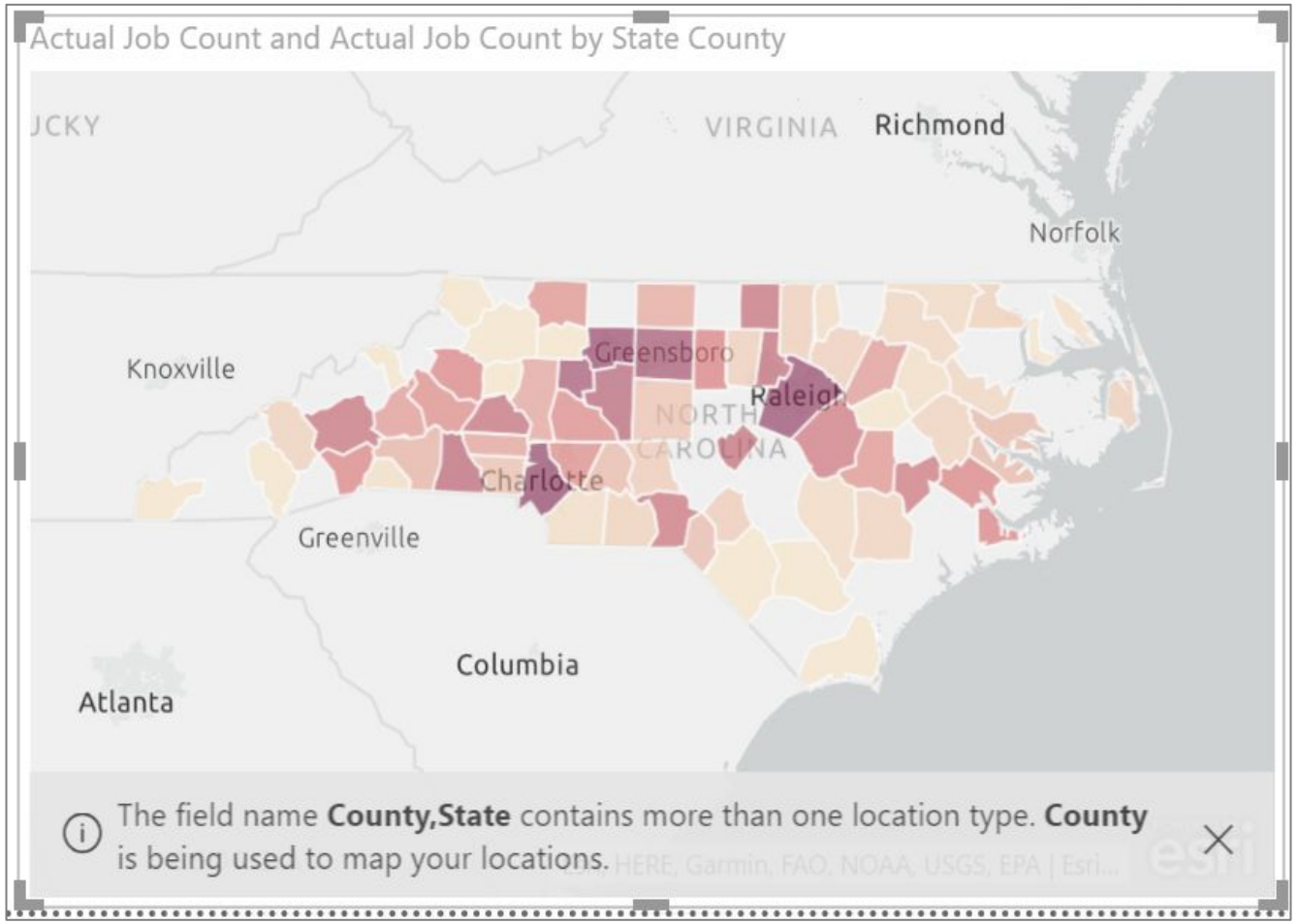
- Flip back to 'Report' view, add a 'ArcGIS map'



- Drag our new calculated column 'State County' from 'Grants' table to the Location field, and drag 'Actual Job Count' to the Color field of the map visual.



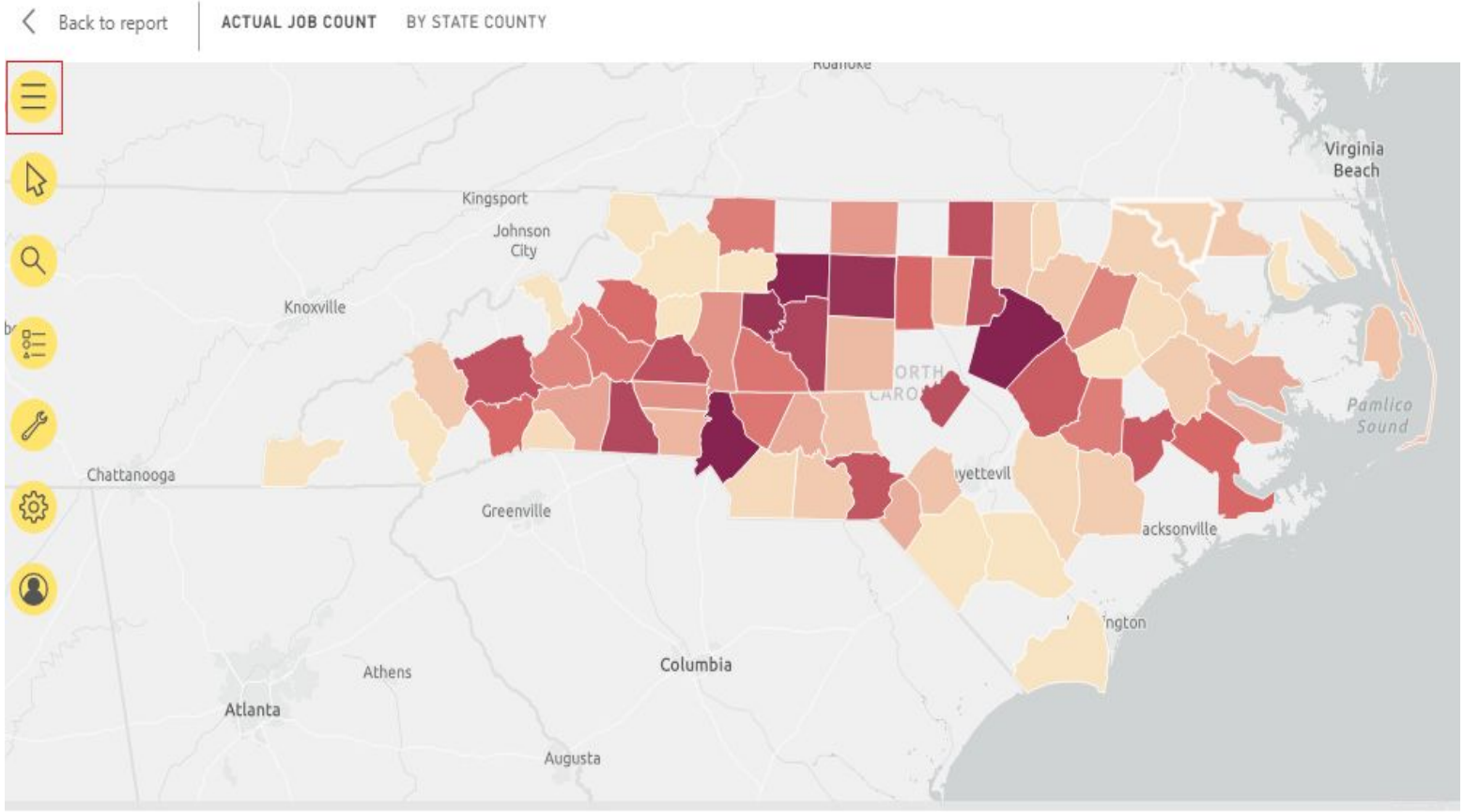
Create map visual



Can we add more information to this map?

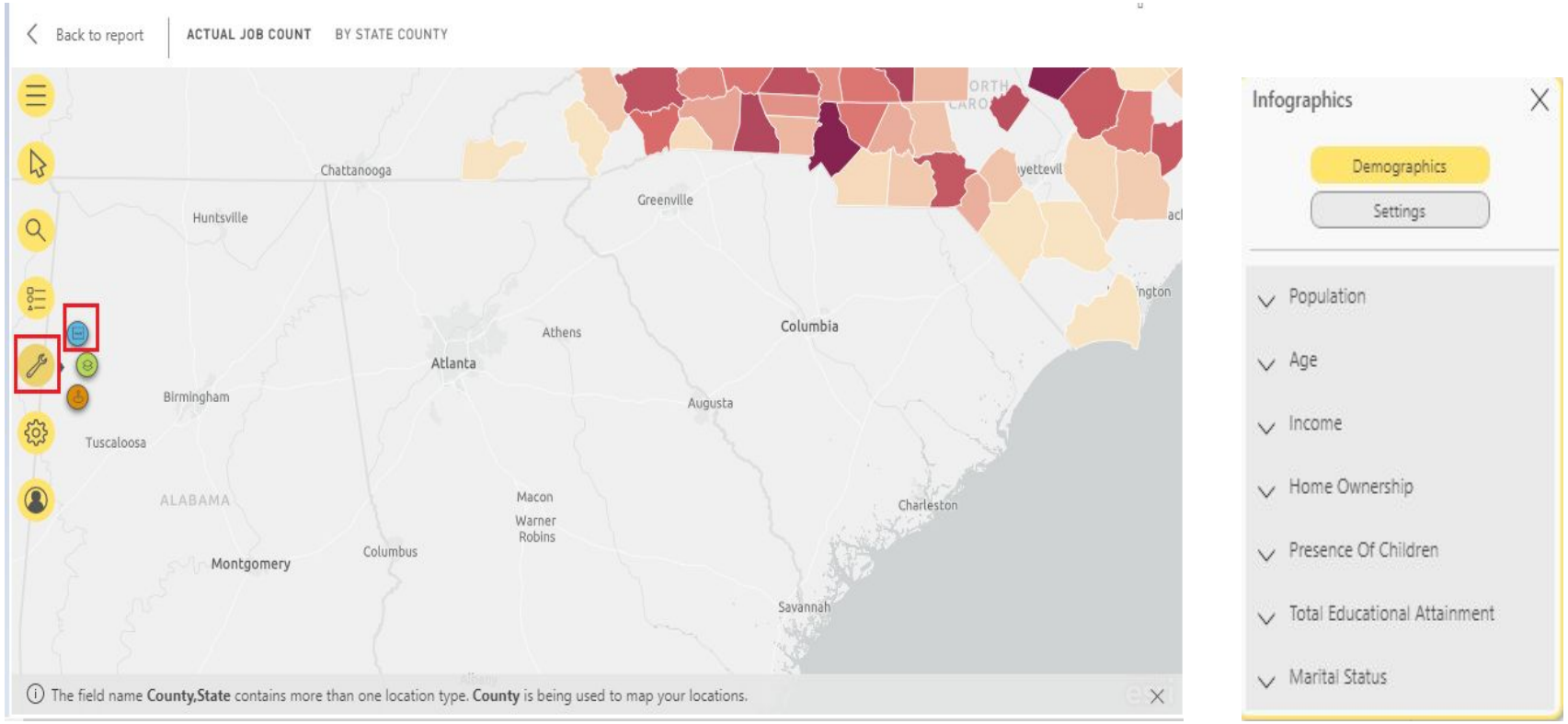
Add ArcGIS data points

- You can add ArcGIS prebuilt data points such as population geographic information by clicking on the 'three horizontal lines' on the top left corner of the visual.

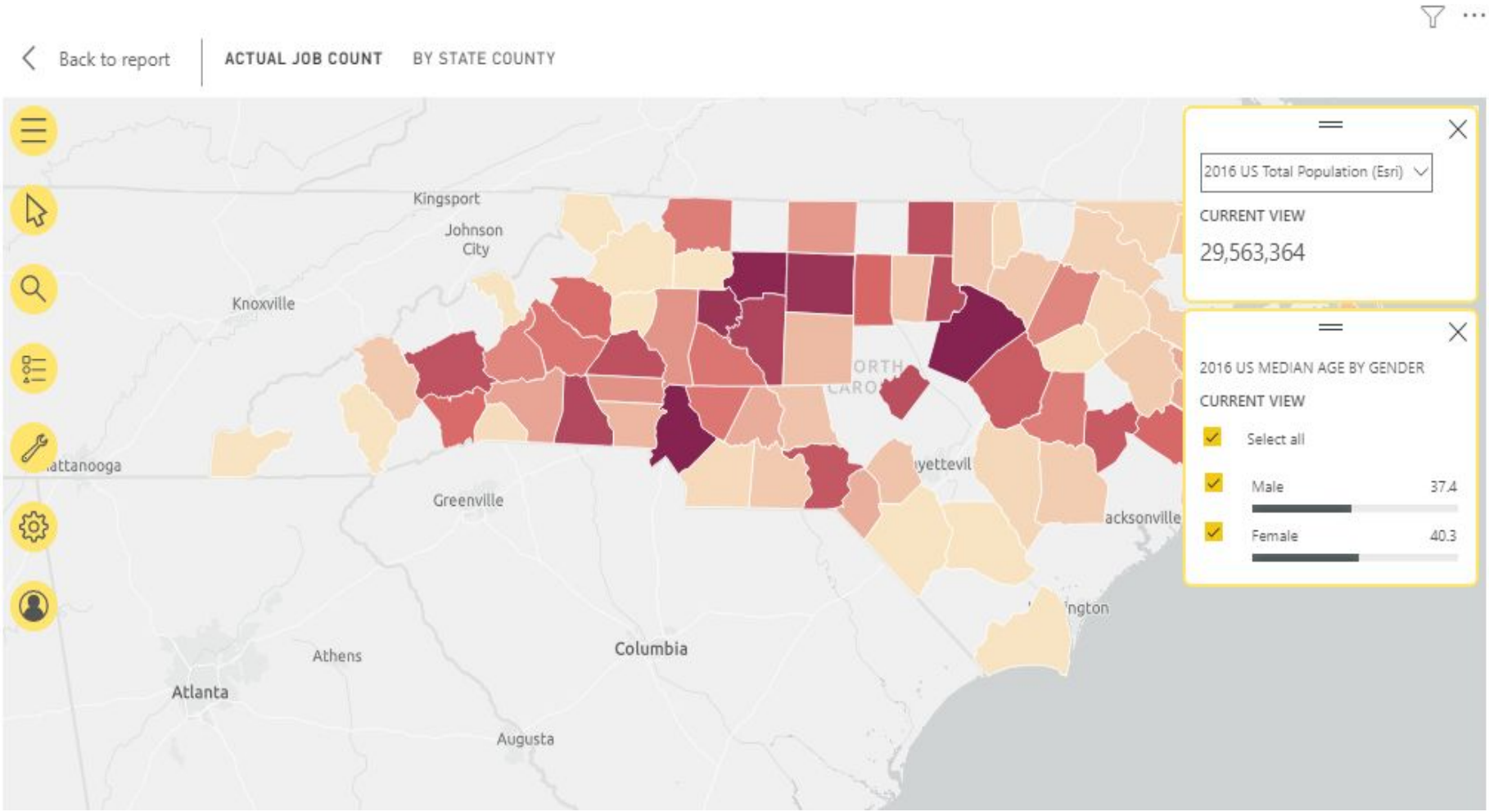


Select demographics

- Choose the 'Analysis tools' and select 'Infographics' and choose some of the demographics on the left side data points



Map with demographics



Knowledge Check 3

Outline for today

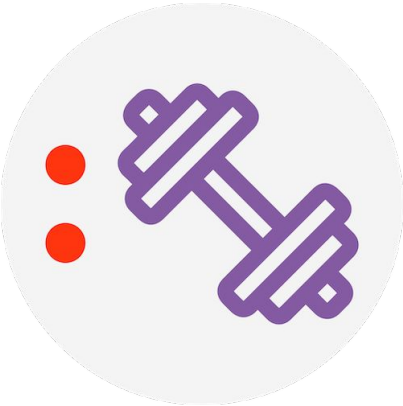
- 1. Explain the additional functions of Power BI web service
- 2. Program in Power BI using DAX language to manipulate data
- 3. Create a map visual
- 4. Workshop: practice your skills

Workshop

- Now it's your turn

- Use the dataset you're interested in the Power BI Workshop folder to practice your skills!

- Try to:
  - Build reports and find insights in your data
  - Publish your report to Power BI Service and share your report with coworkers



Workshop Dataset 1

US Permanent Visa Application Dataset

Context:

A permanent labor certification issued by the Department of Labor (DOL) allows an employer to hire a foreign worker to work permanently in the United States.

Research Questions: Can you predict visa decisions based on employee/employer/wage? How does this data compare to H1B decisions in this dataset?

Content:

Data covers 2012-2017 and includes information on employer, position, wage offered, employee education and past visa history, associated lawyers, and final decision.

Reference link: https://www.kaggle.com/jboysen/us-perm-visas

US Permanent Visa Application Dataset

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	application_type	case_no	case_status	class_of_admission	country_of_citze	decision_date	employer_city	employer_name	employer_postal_code	employer_state	job_info_work_city	job_info_work_state	naics_2007_us_code
2	PERM	A-07323-97014	Certified	J-1	ARMENIA	2/1/12	NEW YORK	NETSOFT USA INC.	10010	NY	New York	NY	541512
3	PERM	A-07332-99439	Denied	B-2	POLAND	12/21/11	CARLSTADT	PINNACLE ENVIRONEMNTAL CORP	7072	NY	New York	NY	562211
4	PERM	A-07333-99643	Certified	H-1B	INDIA	12/1/11	GLEN ALLEN	SCHNABEL ENGINEERING, INC.	23059	VA	Lutherville	MD	541330
5	PERM	A-07339-01930	Certified	B-2	SOUTH KOREA	12/1/11	FLUSHING	EBENEZER MISSION CHURCH	11354	NY	Flushing	NY	813110
6	PERM	A-07345-03565	Certified	L-1	CANADA	1/26/12	ALBANY	ALBANY INTERNATIONAL CORP.	12204	NY	Albany	NY	333291
7	PERM	A-07352-06288	Denied	EWI	ECUADOR	1/26/12	CARLSTADT	PINNACLE ENVIRONEMNTAL CORP	7072	NY	New York	NY	562910
8	PERM	A-07354-06926	Certified-Expired	H-1B	MEXICO	10/7/11	TROY	EMMA WILLARD SCHOOL	12180	NY	Troy	NY	611110
9	PERM	A-08004-10147	Denied	E-2	CANADA	2/6/12	POMPANO BEAC	FDS ALUMINUM LLC	33069	FL	POMPANO BEACH	FL	331312
10	PERM	A-08004-10184	Certified	H-1B	CANADA	2/29/12	WILMINGTON	ELECTRONIC DATA SYSTEMS CORPC	19808	DE	Fort Worth	TX	541511
11	PERM	A-08010-11785	Denied	E-2	PAKISTAN	3/30/12	BROOKLYN	AMER BROTHERS INTERNATIONAL,	11208	NY	Brooklyn	NY	452990
12	PERM	A-08057-27232	Withdrawn	H-1B	INDIA	3/5/12	BETHESDA	AQUAS, INC.	20814	MD	Bethesda	MD	541511
13	PERM	A-08058-28001	Certified	H-1B	SINGAPORE	1/6/12	NEW YORK	NINE MUSES AND APOLLO INC	10012	NY	New York	NY	711410
14	PERM	A-08076-33611	Certified	H-1B	RUSSIA	1/26/12	SADDLE BROOK	FASTPULSE TECHNOLOGY, INC.	7663	NJ	Saddle Brook	NJ	541512
15	PERM	A-08085-36053	Certified	H-1B	INDIA	12/9/11	ATLANTA	INTEC BILLING, INC	30346	GA	Atlanta	GA	541511
16	PERM	A-08104-41821	Certified		MEXICO	1/30/12	BLADENSBURG	ERNEST MAIER, INC.	20710	MD	Blandesburg	MD	327121
17	PERM	A-08120-47187	Certified-Expired	EWI	ECUADOR	10/13/11	WEST HEMPSTE	NIKO DEVELOPMENT CORP	11552	NY	WEST HEMPTEAD	NY	238320
18	PERM	A-08127-49255	Certified	H-1B	INDIA	12/5/11	PLAINSBORO	COMPUNNEL SOFTWARE GROUP, I	8536	NJ	MONMOUTH JN.	NJ	541511
19	PERM	A-08148-55775	Certified		CANADA	3/26/12	JACKSON HEIGH	V.H.C. USA INCD/B/A VITAMIN HOM	11372	NY	JACKSON HEIGHTS	NY	44619
20	PERM	A-08162-60225	Denied	EWI	MEXICO	10/7/11	LODI	VITAMIA PASTA BOY, INC	7644	NJ	LODI	NJ	722110
21	PERM	A-08164-61023	Certified		POLAND	12/13/11	EAST HAZEL CRE	REFIX TRUCK & TRAILER REPAIR	60429	IL	East Hazel Crest	IL	81111
22	PERM	A-08176-64095	Certified	H-1B	VENEZUELA	11/3/11	DALLAS	HSB SOLOMON ASSOCIATES LLC	75240	TX	Dallas	TX	541
23	PERM	A-08182-66284	Certified-Expired	E-1	JAPAN	10/6/11	NEW YORK	WORLD JOINT CORP. D/B/A IACE TF	10017	NY	Torrance	CA	561510
24	PERM	A-08190-68131	Denied	B-2	SOUTH AFRICA	1/23/12	JACKSONVILLE	KANTICORP.DBA EMERSON INN	32256	FL	Jacksonville	FL	721110
25	PERM	A-08190-68200	Denied	EWI	MEXICO	10/12/11	NEW BRUNSWIC	MAMCO INC. DBA: OLD MAN RAFFE	8901	NJ	NEW BRUNSWICK	NY	722110
26	PERM	A-08271-91261	Denied	H-1B	CHINA	2/16/12	LOUISVILLE	LOUISVILLE (JEFFERSON COUNTY) I	40204	KY	Louisville	KY	
27	PERM	A-08200-71216	Withdrawn	H-1B	RUSSIA	10/14/11	DEERFIELD	TAKEDA PHARMACEUTICALS NORTI	60015	IL	Deerfield	IL	325412
28	PERM	A-08203-71676	Certified-Expired		MEXICO	10/21/11	ROCK SPRINGS	ROCKY MOUNTAIN CASING CREWS	82902	WY	Rock Springs	WY	23712
29	PERM	A-08211-73870	Denied	EWI	MEXICO	10/11/11	BROOKLYN	L.A. BURRITO, INC	11211	NY	BROOKLYN	NY	722110
30	PERM	A-08211-74089	Certified	H-1B	INDIA	2/7/12	NEW YORK	MCKINSEY & COMPANY, INC UNITE	10022	NY	Atlanta	GA	54161
31	PERM	A-08212-74295	Denied		INDIA	11/15/11	DAYTON	INDUS VALLEY CONSULTANTS, INC	45458	OH	Dayton	OH	541511
32	PERM	A-08220-76622	Denied	EWI	ECUADOR	10/25/11	ASTORIA	VORDONIA CONTRACTING & SUPLI	11102	NY	ASTORIA	NY	23
33	PERM	A-08221-77017	Denied	EWI	MEXICO	11/3/11	STATEN ISLAND	VICTORY PRODUCE,LLC. DBA TOP T	10314	NY	STATEN ISLAND	NY	445230
34	PERM	A-08221-77195	Certified	H-1B	PHILIPPINES	12/29/11	GREENVILLE	GREENVILLE PUBLIC SCHOOL DISTR	38702	MS	Greenville	MS	61111
35	PERM	A-08224-77312	Certified	H-1B	TURKEY	2/16/12	NORWOOD	ANALOG DEVICES INC.	2062	MA	Wilmington	MA	334413

us_perm_visas +

Workshop Dataset 2

Traffic and Pedestrian Stops by Police in NC Dataset

Context:

On a typical day, police officers make more than 50,000 traffic stops. This dataset includes information on factors that is to help researchers, journalists, and policymakers investigate and improve interactions between police and the public.

Research questions: How predictable are the stop rates? Are there times and places that reliably generate stops?

Content:

This dataset includes stop data from North Carolina, covering all of 2010 onwards.

Reference link:
https://www.kaggle.com/stanford-open-policing/stanford-open-policing-project-north-carolina

Traffic and Pedestrian Stops by Police in NC

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	id	state	stop_date	police_depar	driver_gende	driver_age_r	driver_age	driver_race_	driver_race	violation_raw	violation	search_conducted	contraband_	stop_outcome	is_arrested
2	NC-2000-00(	NC	1/1/00	NC State Hig	M	35	35	B N	Black	Vehicle Equipment Violation	Equipment	TRUE	FALSE	Arrest	TRUE
3	NC-2000-00(	NC	1/1/00	NC State Hig	M	20	20	W N	White	Other Motor Vehicle Violation	Other	FALSE	FALSE	Written Warning	FALSE
4	NC-2000-00(	NC	1/1/00	NC State Hig	F	26	26	W N	White	Safe Movement Violation	Safe movem	FALSE	FALSE	Written Warning	FALSE
5	NC-2000-00(	NC	1/1/00	NC State Hig	F	48	48	W N	White	Speed Limit Violation	Speeding	FALSE	FALSE	Citation	FALSE
6	NC-2000-00(	NC	1/1/00	NC State Hig	F	18	18	B N	Black	Speed Limit Violation	Speeding	FALSE	FALSE	No Action	FALSE
7	NC-2000-00(	NC	1/1/00	NC State Hig	M	25	25	W N	White	Impaired Driving	DUI	TRUE	FALSE	Citation	FALSE
8	NC-2000-00(	NC	1/1/00	NC State Hig	F	30	30	B N	Black	Vehicle Equipment Violation	Equipment	FALSE	FALSE	Written Warning	FALSE
9	NC-2000-00(	NC	1/1/00	NC State Hig	M	40	40	W N	White	Safe Movement Violation	Safe movem	FALSE	FALSE	Written Warning	FALSE
10	NC-2000-00(	NC	1/1/00	NC State Hig	M	40	40	W N	White	Speed Limit Violation	Speeding	FALSE	FALSE	Citation	FALSE
11	NC-2000-00(	NC	1/1/00	NC State Hig	M	25	25	B N	Black	Seat Belt Violation	Seat belt	FALSE	FALSE	Citation	FALSE
12	NC-2000-00(	NC	1/1/00	NC State Hig	M	28	28	W N	White	Investigation	Other	FALSE	FALSE	Verbal Warning	FALSE
13	NC-2000-00(	NC	1/1/00	NC State Hig	M	21	21	B N	Black	Other Motor Vehicle Violation	Other	FALSE	FALSE	Verbal Warning	FALSE
14	NC-2000-00(	NC	1/1/00	NC State Hig	F	22	22	W N	White	Vehicle Equipment Violation	Equipment	FALSE	FALSE	Citation	FALSE
15	NC-2000-00(	NC	1/1/00	NC State Hig	M	31	31	B N	Black	Speed Limit Violation	Speeding	FALSE	FALSE	Arrest	TRUE
16	NC-2000-00(	NC	1/1/00	NC State Hig	F	23	23	W N	White	Speed Limit Violation	Speeding	FALSE	FALSE	Citation	FALSE
17	NC-2000-00(	NC	1/1/00	NC State Hig	M	27	27	W N	White	Impaired Driving	DUI	FALSE	FALSE	Verbal Warning	FALSE
18	NC-2000-00(	NC	1/1/00	NC State Hig	F	50	50	W N	White	Speed Limit Violation	Speeding	FALSE	FALSE	Citation	FALSE
19	NC-2000-00(	NC	1/1/00	NC State Hig	F	44	44	B N	Black	Other Motor Vehicle Violation	Other	FALSE	FALSE	Verbal Warning	FALSE
20	NC-2000-00(	NC	1/1/00	NC State Hig	M	25	25	W N	White	Safe Movement Violation	Safe movem	FALSE	FALSE	Written Warning	FALSE
21	NC-2000-00(	NC	1/1/00	NC State Hig	F	22	22	W N	White	Seat Belt Violation	Seat belt	FALSE	FALSE	Citation	FALSE
22	NC-2000-00(	NC	1/1/00	NC State Hig	M	20	20	B N	Black	Impaired Driving	DUI	TRUE	FALSE	Citation	FALSE
23	NC-2000-00(	NC	1/1/00	NC State Hig	M	17	17	W N	White	Speed Limit Violation	Speeding	FALSE	FALSE	Written Warning	FALSE
24	NC-2000-00(	NC	1/1/00	NC State Hig	M	19	19	W N	White	Traffic Light/Sign Violation	Stop sign/lig	FALSE	FALSE	Citation	FALSE
25	NC-2000-00(	NC	1/1/00	NC State Hig	M	60	60	W N	White	Safe Movement Violation	Safe movem	FALSE	FALSE	Written Warning	FALSE
26	NC-2000-00(	NC	1/1/00	NC State Hig	F	33	33	W N	White	Impaired Driving	DUI	TRUE	FALSE	Arrest	TRUE
27	NC-2000-00(	NC	1/1/00	NC State Hig	M	20	20	W N	White	Impaired Driving	DUI	TRUE	FALSE	Arrest	TRUE
28	NC-2000-00(	NC	1/1/00	NC State Hig	M	21	21	W N	White	Speed Limit Violation	Speeding	FALSE	FALSE	Citation	FALSE
29	NC-2000-00(	NC	1/1/00	NC State Hig	M	33	33	W N	White	Vehicle Equipment Violation	Equipment	FALSE	FALSE	Written Warning	FALSE
30	NC-2000-00(	NC	1/1/00	NC State Hig	F	18	18	W N	White	Traffic Light/Sign Violation	Stop sign/lig	FALSE	FALSE	Written Warning	FALSE
31	NC-2000-00(	NC	1/1/00	NC State Hig	F	45	45	W N	White	Speed Limit Violation	Speeding	FALSE	FALSE	Citation	FALSE
32	NC-2000-00(	NC	1/1/00	NC State Hig	M	20	20	W N	White	Impaired Driving	DUI	TRUE	FALSE	Arrest	TRUE
33	NC-2000-00(	NC	1/1/00	NC State Hig	M	37	37	W N	White	Vehicle Equipment Violation	Equipment	FALSE	FALSE	Written Warning	FALSE
34	NC-2000-00(	NC	1/1/00	NC State Hig	M	49	49	B N	Black	Impaired Driving	DUI	FALSE	FALSE	Written Warning	FALSE

Workshop Dataset 3

The Official Record of U.S. Foreign Aid Dataset

Context:

Foreign assistance is aid given by the United States to other countries to support global peace, security, and development efforts, and provide humanitarian relief during times of crisis. It is a strategic, economic, and moral imperative for the United States and vital to U.S. national security.

Content:

Explore the official U.S. Foreign Aid country data across sectors, implementing agencies, and activities.

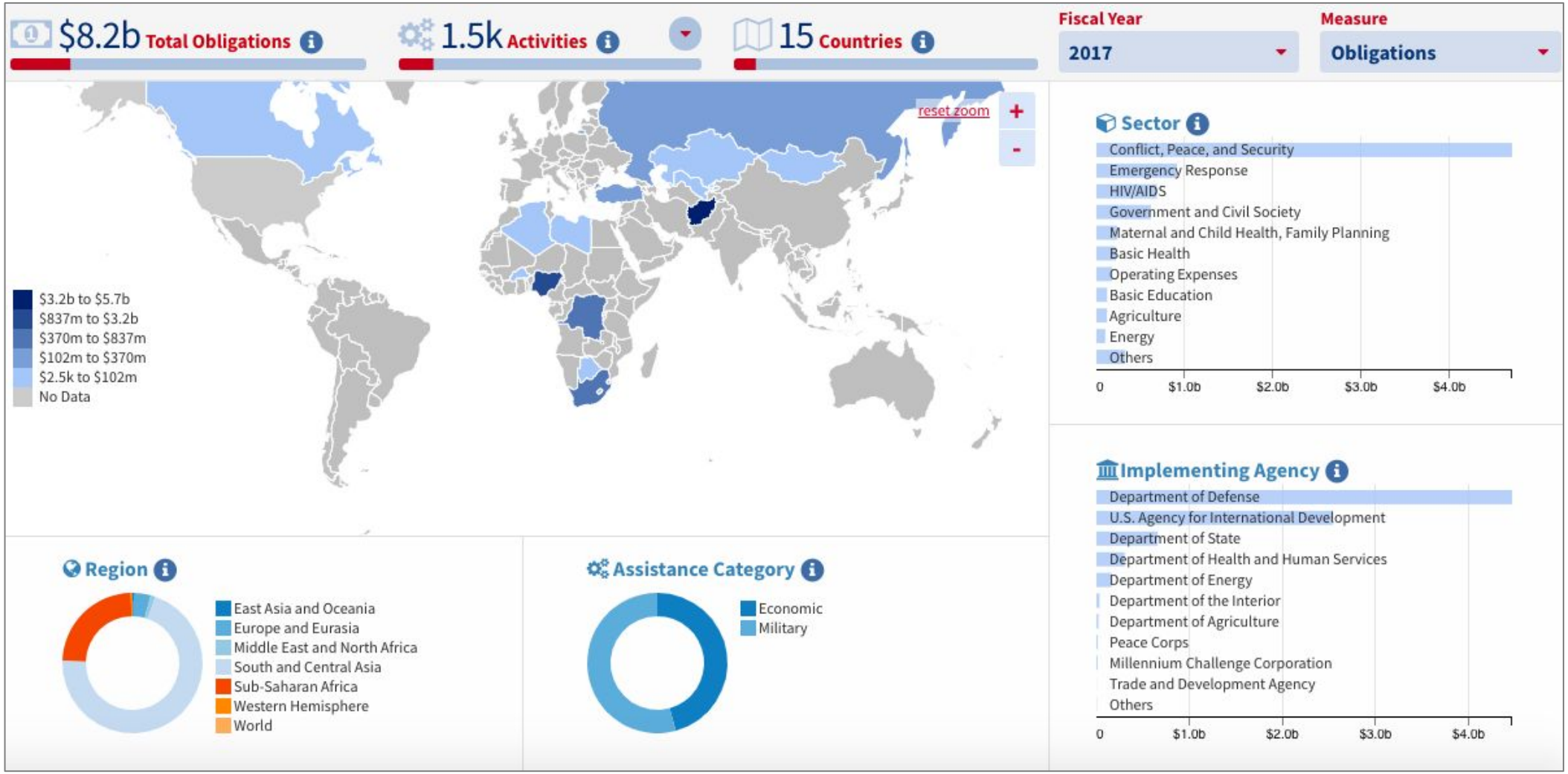
Reference link: https://www.kaggle.com/vinayshanbhag/us-foreign-aid and https://explorer.usaid.gov/

The Official Record of U.S. Foreign Aid Dataset

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	country_id	country_code	country_nam	region_id	region_name	income_grou	income_grou	income_grou	implementin	implementin	implementin	implementin	subagency_a	subagency_n	channel_cate	channel_cate	channel_sub	channel_sub	channel_id	channel_nam
2	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	7	Multilateral	18	Multilateral	4000158	Global Fund
3	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	7	Multilateral	18	Multilateral	4000158	Global Fund
4	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	7	Multilateral	18	Multilateral	4000158	Global Fund
5	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	7	Multilateral	18	Multilateral	4000158	Global Fund
6	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	7	Multilateral	18	Multilateral	4000158	Global Fund
7	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	7	Multilateral	18	Multilateral	4000158	Global Fund
8	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	7	Multilateral	18	Multilateral	4000158	Global Fund
9	368	IRQ	Iraq	3	Middle East	3	Upper Middl	UMIC	1	USAID	U.S. Agency	28	ME	Bureau for M	8	Enterprises	19	Enterprises -	4001520	Bechtel Corp
10	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	7	Multilateral	18	Multilateral	4000158	Global Fund
11	368	IRQ	Iraq	3	Middle East	3	Upper Middl	UMIC	1	USAID	U.S. Agency	28	ME	Bureau for M	8	Enterprises	19	Enterprises -	4001520	Bechtel Corp
12	376	ISR	Israel	3	Middle East	4	High Income	HIC	1	USAID	U.S. Agency	37	ANE	Bureau for A	1	Government	2	Government	2000070	Government
13	376	ISR	Israel	3	Middle East	4	High Income	HIC	1	USAID	U.S. Agency	37	ANE	Bureau for A	1	Government	2	Government	2000070	Government
14	368	IRQ	Iraq	3	Middle East	3	Upper Middl	UMIC	1	USAID	U.S. Agency	28	ME	Bureau for M	8	Enterprises	19	Enterprises -	4001520	Bechtel Corp
15	376	ISR	Israel	3	Middle East	4	High Income	HIC	1	USAID	U.S. Agency	28	ME	Bureau for M	1	Government	2	Government	2000070	Government
16	376	ISR	Israel	3	Middle East	4	High Income	HIC	1	USAID	U.S. Agency	28	ME	Bureau for M	1	Government	2	Government	2000070	Government
17	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	7	Multilateral	18	Multilateral	4000158	Global Fund
18	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	7	Multilateral	18	Multilateral	4000158	Global Fund
19	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	3	NGO	5	NGO - Unite	4001519	Partnership f
20	400	JOR	Jordan	3	Middle East	3	Upper Middl	UMIC	1	USAID	U.S. Agency	28	ME	Bureau for M	1	Government	2	Government	2000072	Government
21	400	JOR	Jordan	3	Middle East	3	Upper Middl	UMIC	1	USAID	U.S. Agency	28	ME	Bureau for M	1	Government	2	Government	2000072	Government
22	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	8	Enterprises	19	Enterprises -	4000669	Chemonics Ir
23	368	IRQ	Iraq	3	Middle East	3	Upper Middl	UMIC	1	USAID	U.S. Agency	28	ME	Bureau for M	8	Enterprises	19	Enterprises -	4001520	Bechtel Corp
24	1002	WLD	World	7	World	NULL	NULL	NULL	6	HHS	Department	10	CDC	Centers for D	7	Multilateral	18	Multilateral	4000158	Global Fund
25	586	PAK	Pakistan	4	South and Ce	2	Lower Middl	LMIC	1	USAID	U.S. Agency	20	ASIA	Bureau for A	1	Government	2	Government	2000107	Government
26	586	PAK	Pakistan	4	South and Ce	2	Lower Middl	LMIC	1	USAID	U.S. Agency	20	ASIA	Bureau for A	1	Government	2	Government	2000107	Government
27	376	ISR	Israel	3	Middle East	4	High Income	HIC	1	USAID	U.S. Agency	28	ME	Bureau for M	1	Government	2	Government	2000070	Government
28	376	ISR	Israel	3	Middle East	4	High Income	HIC	1	USAID	U.S. Agency	28	ME	Bureau for M	1	Government	2	Government	2000070	Government
29	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	3	NGO	5	NGO - Unite	4001519	Partnership f
30	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	7	Multilateral	18	Multilateral	4000158	Global Fund
31	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	7	Multilateral	18	Multilateral	4000158	Global Fund
32	368	IRQ	Iraq	3	Middle East	3	Upper Middl	UMIC	1	USAID	U.S. Agency	28	ME	Bureau for M	8	Enterprises	19	Enterprises -	4001520	Bechtel Corp
33	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	3	NGO	5	NGO - Unite	4001519	Partnership f
34	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	3	NGO	5	NGO - Unite	4001519	Partnership f
35	1002	WLD	World	7	World	NULL	NULL	NULL	1	USAID	U.S. Agency	25	GH	Bureau for G	7	Multilateral	18	Multilateral	4000158	Global Fund

us_foreign_aid +

The Official Record of U.S. Foreign Aid Dataset



Conclusions

- Power BI is a business analytics service that delivers insights to enable fast, informed decisions.

- You can:
  - Transform data into stunning visuals and share them with colleagues on any device.
  - Visually explore and analyze data—on-premises and in the cloud—all in one view.
  - Collaborate on and share customized dashboards and interactive reports.
  - Scale across your organization with built-in governance and security.

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/UCy2rBgj4M1tzK-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

Congratulations!

- 1. Explain the additional functions of Power BI web service
- 2. Program in Power BI using DAX language to manipulate data
- 3. Create a map visual
- 4. Workshop: practice your skills