

# Introduction to Tableau

**Josh Mills, Data Science Leader (Sr. Consultant)**

**Enterprise Analytics Office**

2021



## Agenda

- Overview of Tableau
- A Quick Tour of Tableau's Interface (interactive)
- Quick Hits and General Tips and Tricks
- Lab Exercise – Analysis of TV Doctor Medical Spend
- Additional Resources

For this course, the instructor should have provided you with an Excel file named “TV Doctor Medical Spend”

Screenshots from Tableau 2018.1.5 are shown throughout this presentation. Nationwide IT regularly updates Tableau at least a couple times a year, so the screenshots shown may not reflect the most recent interface updates.

## Why Use Tableau?

- **Tableau is the enterprise-approved standard for data visualization**
- **Tableau is in the top 3 list of technical skills with the biggest increases in demand, according to Forbes**
- **Tableau can connect to a wide variety of data sources**
  - Local data files (Excel, CSV, Access)
  - Relational databases (Teradata, Netezza, Oracle, DB2)
  - Analytics platforms (Google Analytics, Splunk, BigInsights)
- **Visualizations produced by Tableau can be published on Tableau Server, which can be viewed by anyone with a NWIE ID**
  - Published workbooks can be accessed through a web browser
  - Tableau Server provides extensive security options for limiting access to sensitive data

## How has Tableau been used within EAO?

- **Data exploration**

- Tableau's drag-and-drop interface makes it easy to explore data sets

- **Monitoring of key business metrics and processes**

- A growing number of dashboards published by EAO are accessed by business partners and leadership on a regular basis

- **Portfolio management and time tracking**

- EAO historically used Tableau to create, publish and share views of our department's portfolio of work using data from NCOMPASS

# A Quick Tour of Tableau

**How to load data and build a visualization  
(or a “viz”)**

# Suggested Data Format

Tableau can read many different data formats (Excel, CSV, etc), but the data should be formatted so that it's easy for Tableau to read. Some examples...

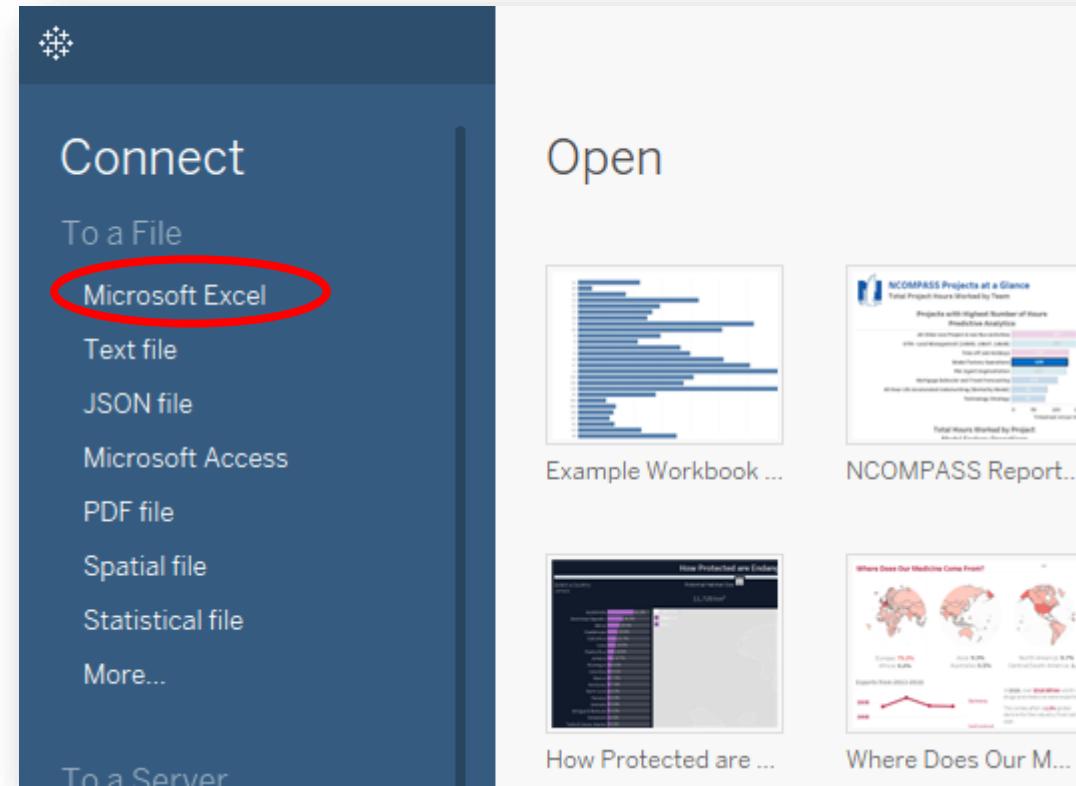
**GOOD**

A	B	C	D	E	F	G	H
Week Ending	State	PPC Spend	Magazine Spend	Syndicated Spend	Network Prime Spend	Performance Revenue	
1/1/2014	AL	\$265.02	\$298.00	\$16.34	\$78,976.57	1.21	\$39,673.00
1/8/2014	AL	\$421.55	\$474.00	\$766.72	\$199,812.40	2.88	\$94,856.00
1/15/2014	AL	\$450.00	\$506.00	\$1,514.49	\$227,701.97	3.18	\$100,072.00
1/22/2014	AL	\$314.82	\$354.00	\$56.97	\$111,448.00	1.76	\$44,279.00
1/29/2014	AL	\$508.70	\$572.00	\$6,091.60	\$290,976.43	3.78	\$132,059.00
2/5/2014	AL	\$329.05	\$370.00	\$81.00	\$121,750.06	1.91	\$34,791.00
2/12/2014	AL	\$104.94	\$118.00	\$0.20	\$12,383.11	0.69	\$3,461.00
2/19/2014	AL	\$157.41	\$177.00	\$0.95	\$27,862.00	0.02	\$5,330.00
2/26/2014	AL	\$592.30	\$666.00	\$43,239.44	\$394,470.21	4.64	\$43,225.00
3/5/2014	AL	\$147.63	\$166.00	\$0.72	\$24,506.54	0.14	\$2,131.00
3/12/2014	AL	\$608.31	\$684.00	\$62,776.15	\$416,081.06	4.80	\$12,436.00

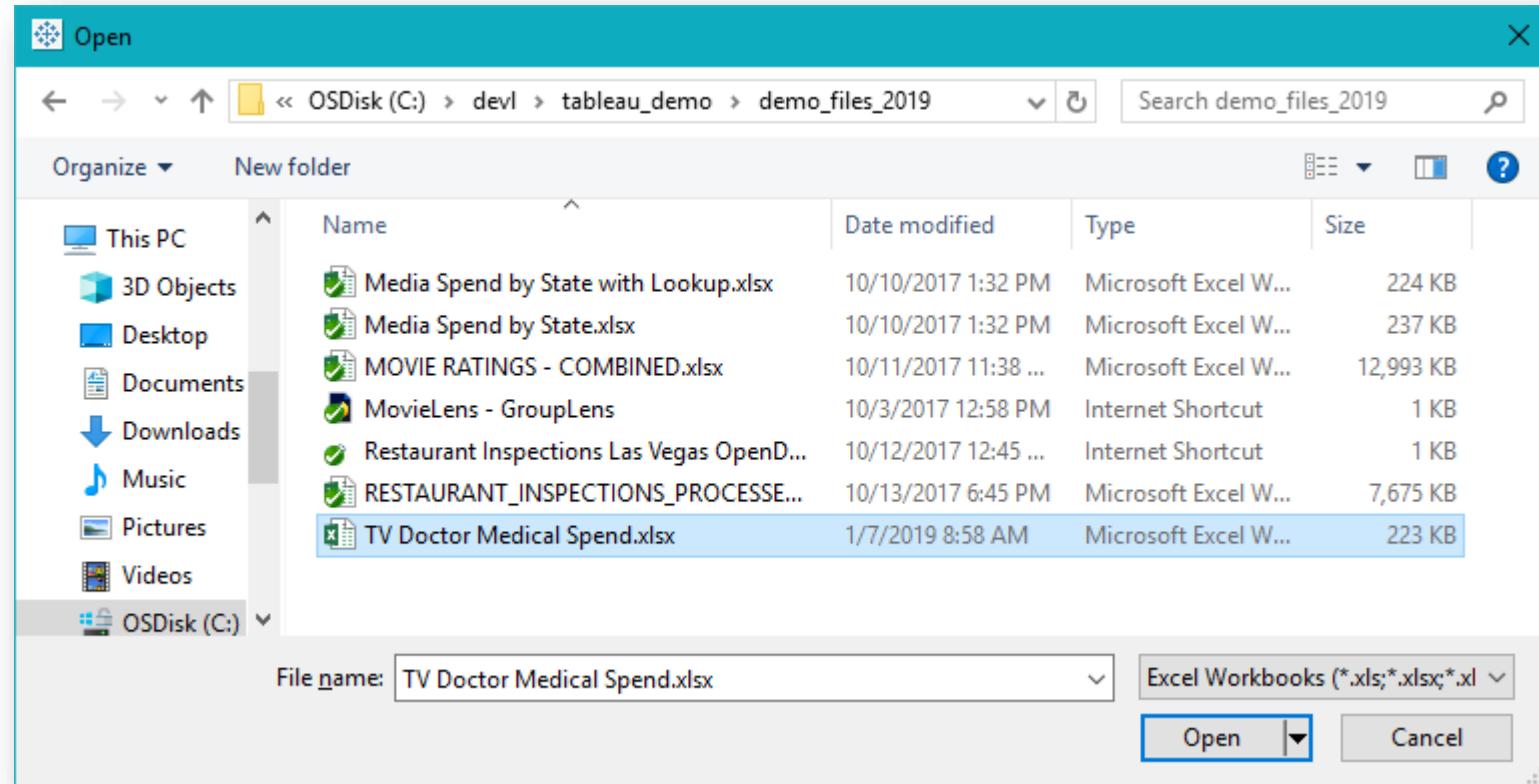
**BAD**

A	B	C	D	E	F	G	H	I	J	K	L	M
<b>TABLE 1. NON-INSTITUTIONAL POPULATION AGED 15 YEARS OLD AND OVER AND LABOUR FORCE</b>												
BY EMPLOYMENT STATUS, AGE AND SEX												
3RD QUARTER 2012												
Age group (years)	Period	Non institutional population 15 years old and over	Labour force					Percentage			Not in labour force	
			Total labour force	Persons with jobs	Unemployed		Labour Force Participation Rate %	Unem- ployed as a per- centage of labour force				
					Total unem- ployed	Persons without jobs and seeking work			Other unem- ployed			
(3) + (4)	(5) + (6)	(5) + (6)	(2) + (1)	(4) + (2)	(1) - (2)							
Both Sexes (Hundreds '00)												
Total all ages	3rd Qtr.	11	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	4th	Qtr. 11	10 065	6 095	5 780	315	226	89	60.6	5.2	3 971	
	1st	Qtr. 12	10 080	6 219	5 961	259	153	106	61.7	4.2	3 860	
	2nd	Qtr. 12	10 095	6 235	5 896	338	248	92	61.8	5.4	3 860	
	3rd	Qtr. 12	10 146	6 273	5 968	305	250	56	61.8	4.9	3 873	
			10 179	6 315	6 009	306	221	85	62.0	4.8	3 864	

After opening Tableau, click on “Connect to data” in the top left corner. Choose “Microsoft Excel”

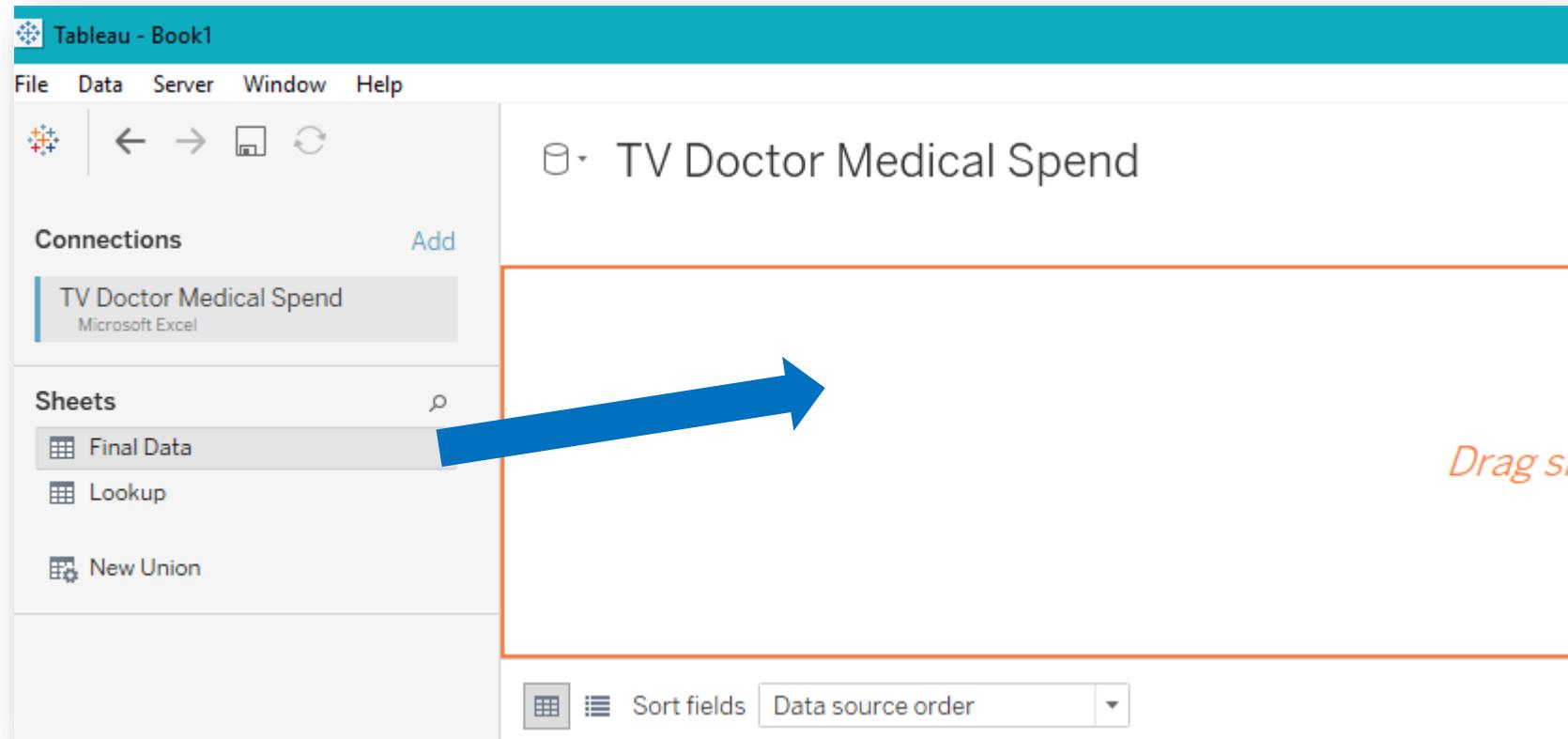


Navigate to where you saved “TV Doctor Medical Spend” and select the file. Click “Open”

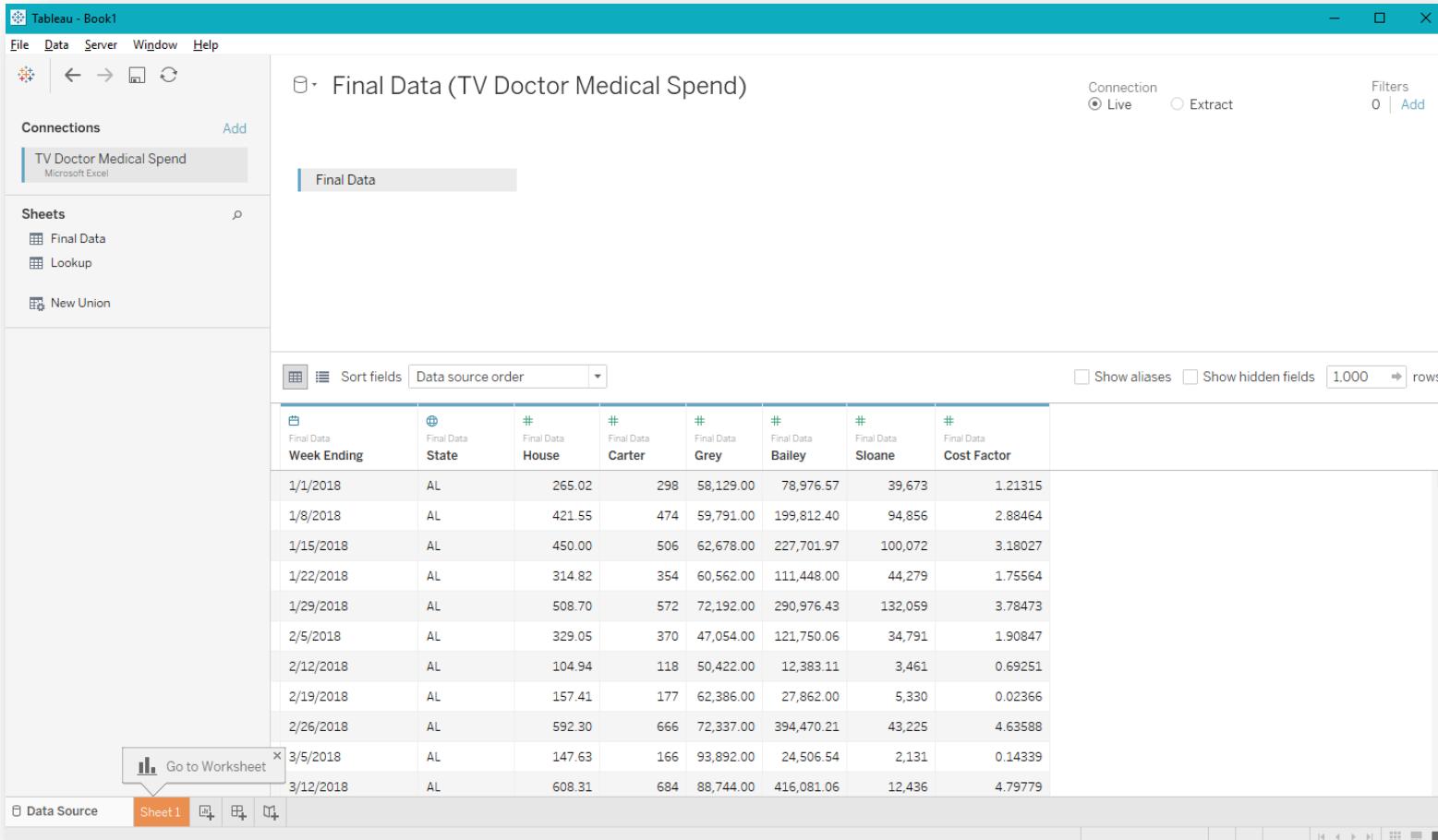


# Enterprise Analytics Office

Drag the “Final Data” worksheet to the canvas in the top right area. A preview of your data will appear



Click the “Live” radio button in the top right portion of the window to create a live connection



The screenshot shows the Tableau software interface with the following details:

- Title Bar:** Tableau - Book1
- Menu Bar:** File, Data, Server, Window, Help
- Toolbars:** Standard toolbar with icons for back, forward, search, and refresh.
- Connections:** TV Doctor Medical Spend (Microsoft Excel) is selected.
- Sheets:** Final Data (selected), Lookup, New Union.
- Preview Area:** Shows a data grid for "Final Data" with columns: Week Ending, State, House, Carter, Grey, Bailey, Sloane, Cost Factor. The data spans from 1/1/2018 to 3/12/2018.
- Top Right:** Connection status: Live (radio button selected), Extract, Filters 0 | Add.
- Bottom:** Go to Worksheet button, Data Source tab (highlighted), Sheet 1 tab, and other navigation icons.

Live connections to your source data files can be a significant time-saver. Any visualizations you've built using live connections will automatically update whenever the source data files are updated.

Click on “Sheet 1” to complete the connection setup process

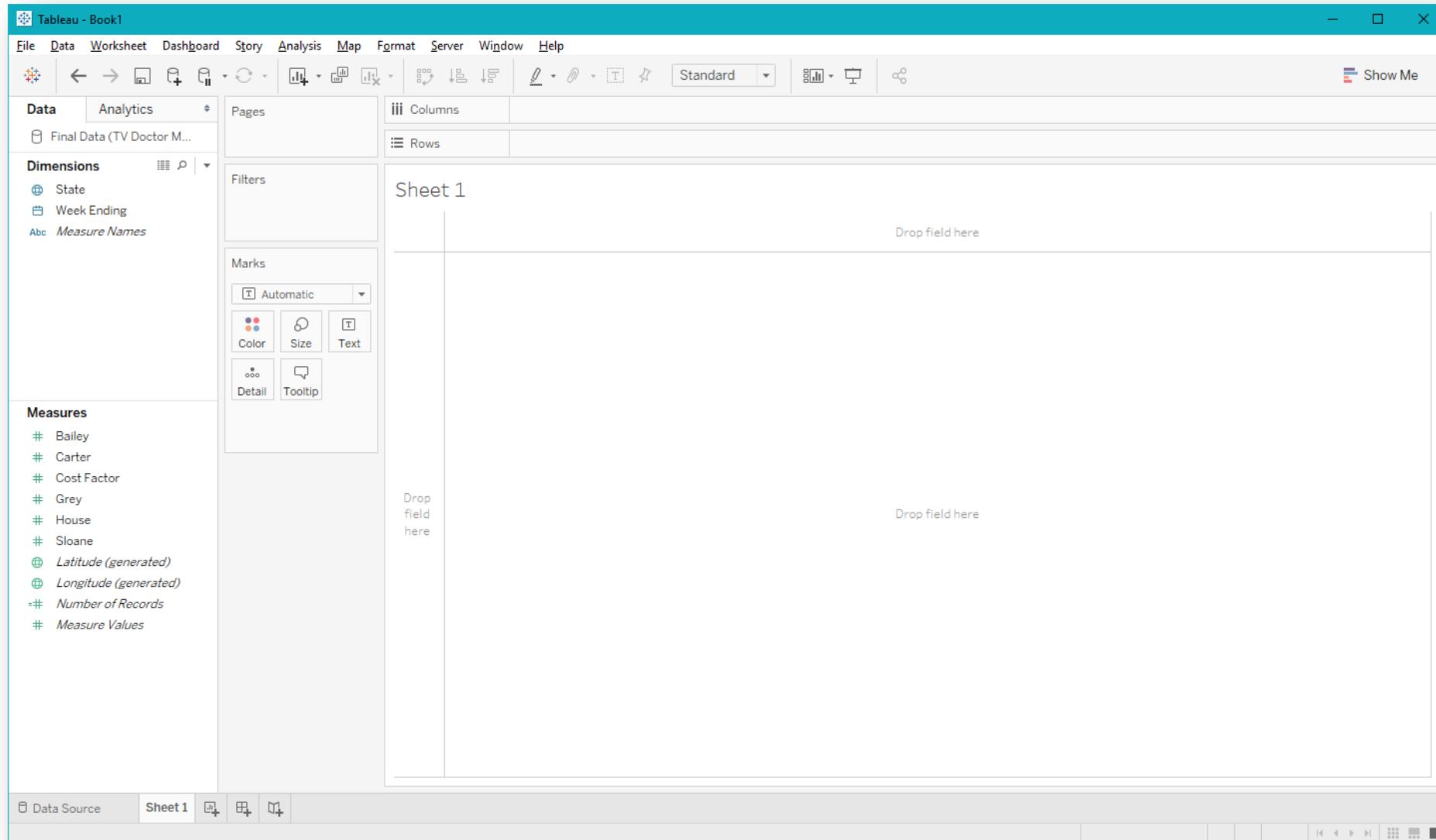
The screenshot shows the Tableau interface with the following details:

- Title Bar:** Tableau - Book1
- Menu Bar:** File, Data, Server, Window, Help
- Connections:** TV Doctor Medical Spend (Microsoft Excel)
- Sheets:** Final Data (selected), Lookup, New Union
- Preview Area:** Final Data (TV Doctor Medical Spend) showing a table with columns: Week Ending, State, House, Carter, Grey, Bailey, Sloane, Cost Factor.
- Bottom Navigation:** Go to Worksheet, Sheet 1 (highlighted with a red circle), and other sheet icons.

Week Ending	State	House	Carter	Grey	Bailey	Sloane	Cost Factor
1/1/2018	AL	265.02	298	58,129.00	78,976.57	39,673	1.21315
1/8/2018	AL	421.55	474	59,791.00	199,812.40	94,856	2.88464
1/15/2018	AL	450.00	506	62,678.00	227,701.97	100,072	3.18027
1/22/2018	AL	314.82	354	60,562.00	111,448.00	44,279	1.75564
1/29/2018	AL	508.70	572	72,192.00	290,976.43	132,059	3.78473
2/5/2018	AL	329.05	370	47,054.00	121,750.06	34,791	1.90847
2/12/2018	AL	104.94	118	50,422.00	12,383.11	3,461	0.69251
2/19/2018	AL	157.41	177	62,386.00	27,862.00	5,330	0.02366
2/26/2018	AL	592.30	666	72,337.00	394,470.21	43,225	4.63588
3/5/2018	AL	147.63	166	93,892.00	24,506.54	2,131	0.14339
3/12/2018	AL	608.31	684	88,744.00	416,081.06	12,436	4.79779

# Enterprise Analytics Office

The main Tableau window will open. Tableau files are known as “workbooks” and individual views are “sheets,” similar to Excel





# Enterprise Analytics Office

This is the area that displays available data connections.

The screenshot shows the Tableau software interface. The top menu bar includes File, Data, Worksheet, Dashboard, Story, Analysis, Map, Format, Server, Window, and Help. The left sidebar has tabs for Data and Analytics, with 'Final Data (TV Doctor M...)' selected. Under 'Dimensions', there are State and Week Ending, and under 'Measures', there are Bailey, Carter, Cost Factor, Grey, House, Sloane, Latitude (generated), Longitude (generated), Number of Records, and Measure Values. A large tooltip box is overlaid on the interface, containing the text 'This is the area that displays available data connections.' The main workspace is labeled 'Sheet 1'.

Right-click on the data source and choose “View Data” to view the raw data of the data source

The screenshot illustrates the process of viewing raw data from a data source. On the left, a context menu is open for a data source named 'Final Data (TV Doctor Medical Spend)'. The 'Edit Data Source...' option is selected. On the right, a new window titled 'View Data: Final Data (TV Doctor Medical Spend)' displays 2,544 rows of data. The data is presented in a grid with the following columns: State, Week Ending, Bailey, Carter, Cost Factor, Grey, House, Number of Records, and Sloane. The data shows various weekly medical spend figures across different states, with Alabama (AL) being the primary state represented.

State	Week Ending	Bailey	Carter	Cost Factor	Grey	House	Number of Records	Sloane
AL	1/1/2018	78,976.57	298	1.21315	58,129.00	265.02	1	39,673
AL	1/8/2018	199,812.40	474	2.88464	59,791.00	421.55	1	94,856
AL	1/15/2018	227,701.97	506	3.18027	62,678.00	450.00	1	100,072
AL	1/22/2018	111,448.00	354	1.75564	60,562.00	314.82	1	44,279
AL	1/29/2018	290,976.43	572	3.78473	72,192.00	508.70	1	132,059
AL	2/5/2018	121,750.06	370	1.90847	47,054.00	329.05	1	34,791
AL	2/12/2018	12,383.11	118	0.69251	50,422.00	104.94	1	3,461
AL	2/19/2018	27,862.00	177	0.02366	62,386.00	157.41	1	5,330
AL	2/26/2018	394,470.21	666	4.63588	72,337.00	592.30	1	43,225
AL	3/5/2018	24,506.54	166	0.14339	93,892.00	147.63	1	2,131
AL	3/12/2018	416,081.06	684	4.79779	88,744.00	608.31	1	12,436
AL	3/19/2018	435,774.52	700	4.94147	67,432.00	622.54	1	3,812
AL	3/26/2018	15,968.91	134	0.50366	72,689.00	119.17	1	748
AL	4/2/2018	145,873.30	405	2.24004	74,477.00	360.18	1	2,194
AL	4/9/2018	428,336.11	694	4.88762	25,635.00	617.20	1	12,912
AL	4/16/2018	187,366.14	459	2.74539	55,577.00	408.21	1	12,609
AL	4/23/2018	229,505.54	508	3.19868	44,819.00	451.78	1	25,387
AL	4/30/2018	140,874.34	398	2.17400	56,367.00	353.96	1	30,945

Tableau - Book1

File Data Worksheet Dashboard Story Analysis Map Format Server Window Help

Show Me

Data Analytics

Final Data (TV Doctor M...)

Dimensions

- State
- Week Ending
- Measure Names

Measures

- Bailey
- Carter
- Cost Factor
- Grey
- House
- Sloane
- Latitude (generated)
- Longitude (generated)
- Number of Records
- Measure Values

Pages Columns Rows

Filters Sheet 1

Marks

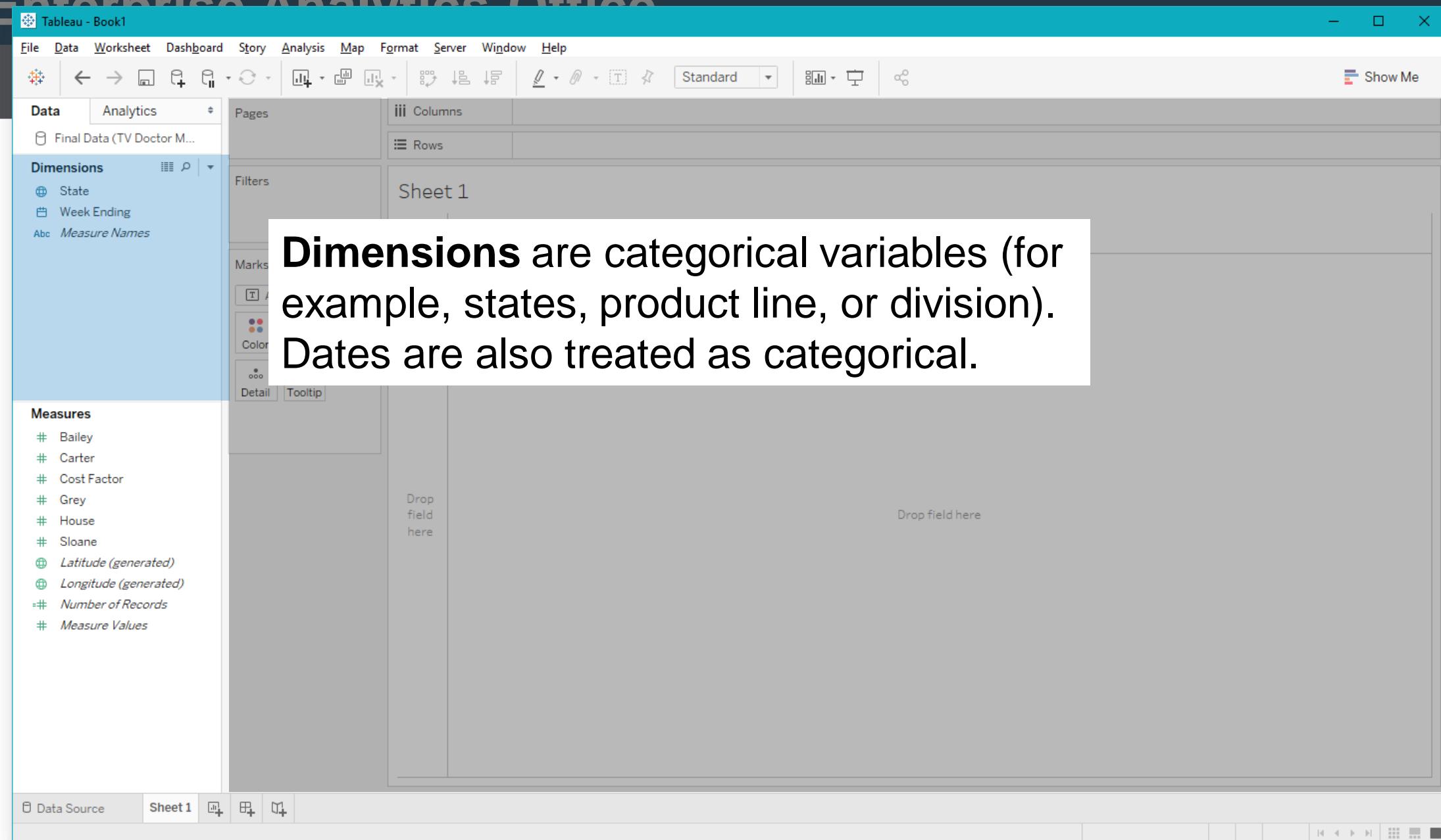
Color

Detail Tooltip

Drop field here

Drop field here

Data Source Sheet 1



**Dimensions are categorical variables (for example, states, product line, or division). Dates are also treated as categorical.**

Tableau - Book1

File Data Worksheet Dashboard Story Analysis Map Format Server Window Help

Show Me

Data Analytics

Final Data (TV Doctor M...)

Dimensions

- State
- Week Ending
- Measure Names

Marks

- Automatic
- Color
- Size
- Text
- Detail
- Tooltip

Measures

- Bailey
- Carter
- Cost Factor
- Grey
- House
- Sloane
- Latitude (generated)
- Longitude (generated)
- Number of Records
- Measure Values

Pages Columns Rows

Sheet 1

Drop field here

**Measures are numerical variables (such as spend and revenue).**

Data Source Sheet 1



Tableau - Book1

File Data Worksheet Dashboard Story Analysis Map Format Server Window Help

Show Me

Data Analytics

Final Data (TV Doctor M...)

Dimensions

- State
- Week Ending
- Abc Measure Names

Filters

Marks

- Automatic
- Color
- Size
- Text
- Detail
- Tooltip

Measures

- Bailey
- Carter
- Cost Factor
- Grey
- House
- Sloane
- Latitude (generated)
- Longitude (generated)
- Number of Records
- Measure Values

Drop field here

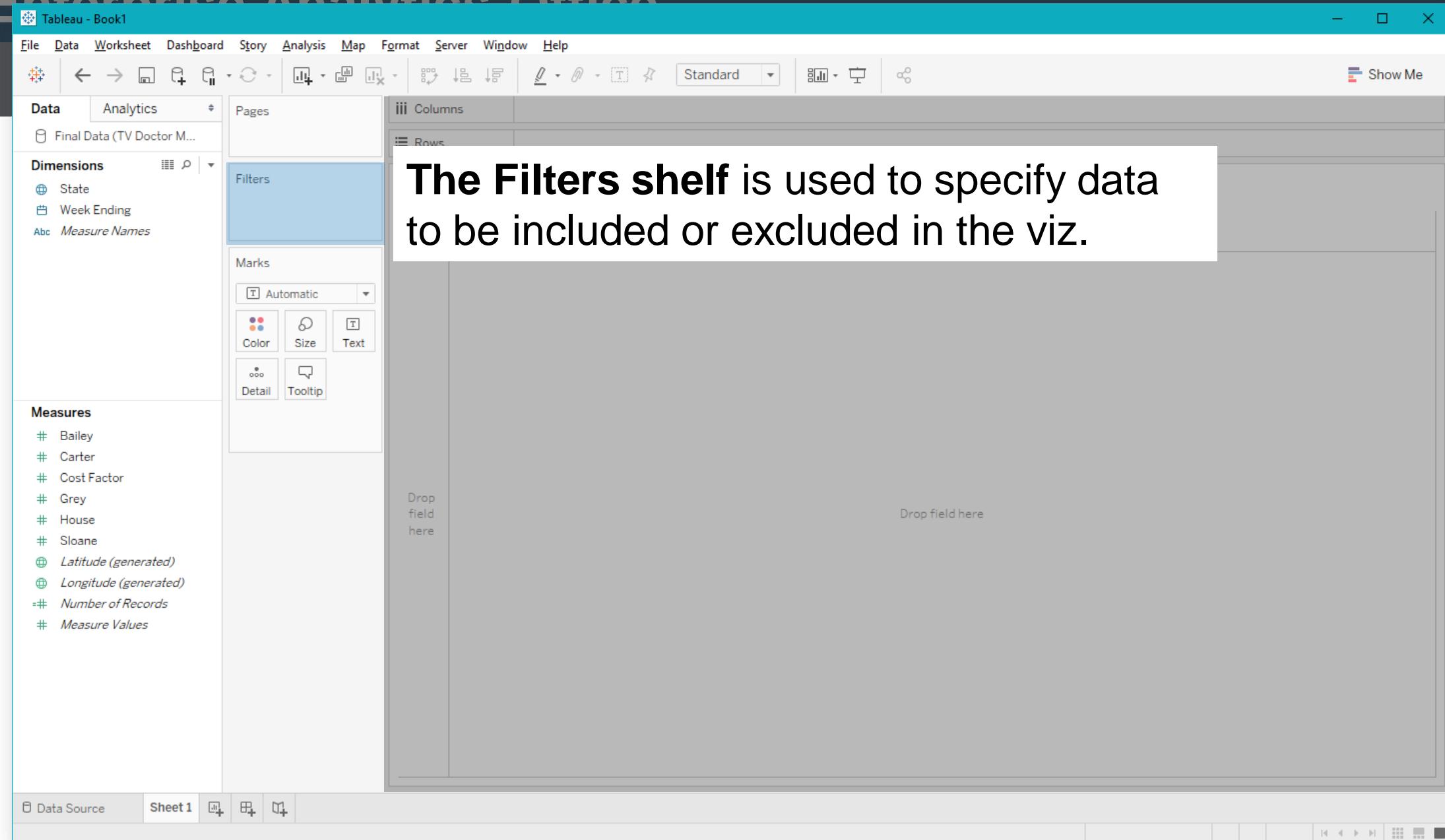
Drop field here

Pages Columns Rows

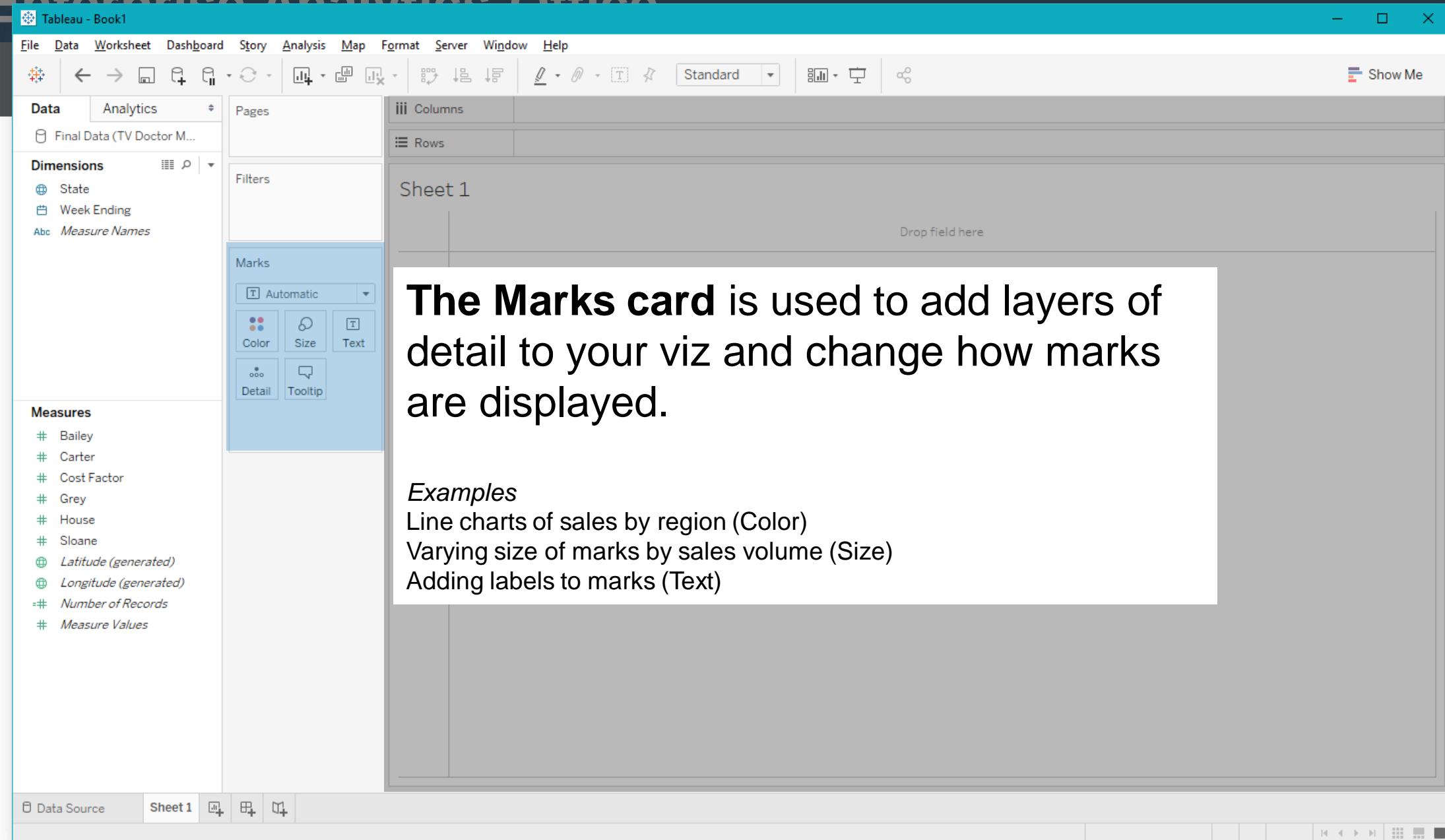
Data Source Sheet 1

The screenshot shows the Tableau desktop application. The top menu bar includes File, Data, Worksheet, Dashboard, Story, Analysis, Map, Format, Server, Window, and Help. A 'Show Me' button is located in the top right. The left sidebar has tabs for Data and Analytics, with 'Final Data (TV Doctor M...)' selected. Under Dimensions, there are three items: State, Week Ending, and Abc Measure Names. The Filters and Marks shelves are also visible. The main workspace is large and contains the text 'Drop field here' twice, indicating where to place data fields. The bottom navigation bar includes Data Source, Sheet 1, and various icons for saving and sharing.

The Filters shelf is used to specify data to be included or excluded in the viz.



The screenshot shows the Tableau software interface with the title bar "Tableau - Book1". The menu bar includes File, Data, Worksheet, Dashboard, Story, Analysis, Map, Format, Server, Window, and Help. The ribbon has sections for Data, Analytics, Pages, Columns, and Rows. On the left, the Data pane shows "Final Data (TV Doctor M...)" and lists Dimensions: State, Week Ending, and Measure Names; Measures: Bailey, Carter, Cost Factor, Grey, House, Sloane, Latitude (generated), Longitude (generated), Number of Records, and Measure Values. The Marks shelf is set to "Automatic" with options for Color, Size, Text, Detail, and Tooltip. The main workspace is a light gray area with two "Drop field here" placeholder boxes. A callout box highlights the "Filters" shelf, which is currently selected and highlighted in blue. The bottom navigation bar includes Data Source, Sheet 1, and various icons for saving, publishing, and sharing.



The Marks card is used to add layers of detail to your viz and change how marks are displayed.

*Examples*

- Line charts of sales by region (Color)
- Varying size of marks by sales volume (Size)
- Adding labels to marks (Text)

Tableau - Book1

File Data Worksheet Dashboard Story Analysis Map Format Server Window Help

Show Me

Data Analytics

Final Data (TV Doctor M...)

Dimensions

- State
- Week Ending

Measure Names

Marks

Automatic

Color

Detail

Pages

Columns

Rows

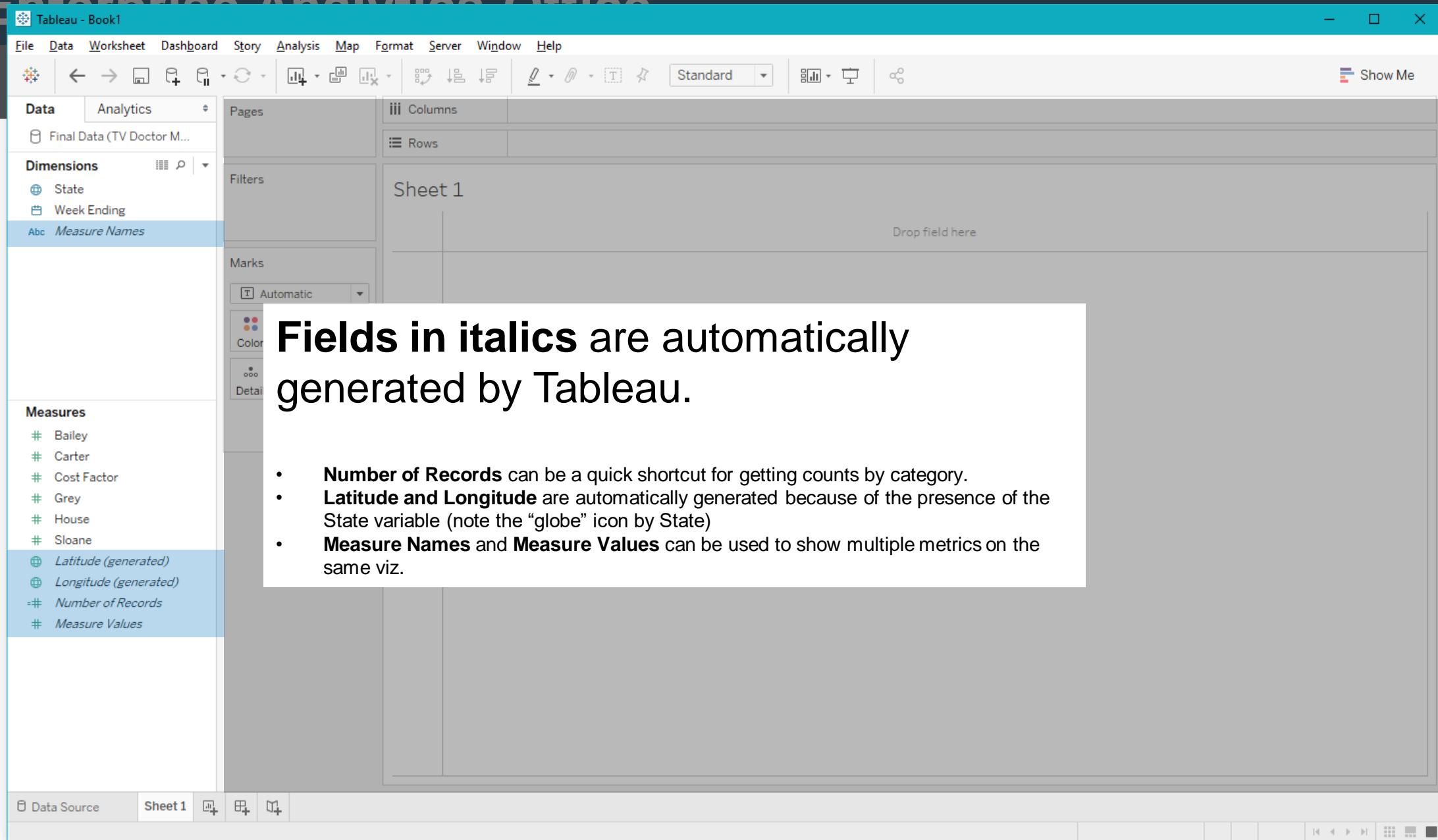
Sheet 1

Drop field here

Fields in **italics** are automatically generated by Tableau.

- **Number of Records** can be a quick shortcut for getting counts by category.
- **Latitude and Longitude** are automatically generated because of the presence of the State variable (note the “globe” icon by State)
- **Measure Names** and **Measure Values** can be used to show multiple metrics on the same viz.

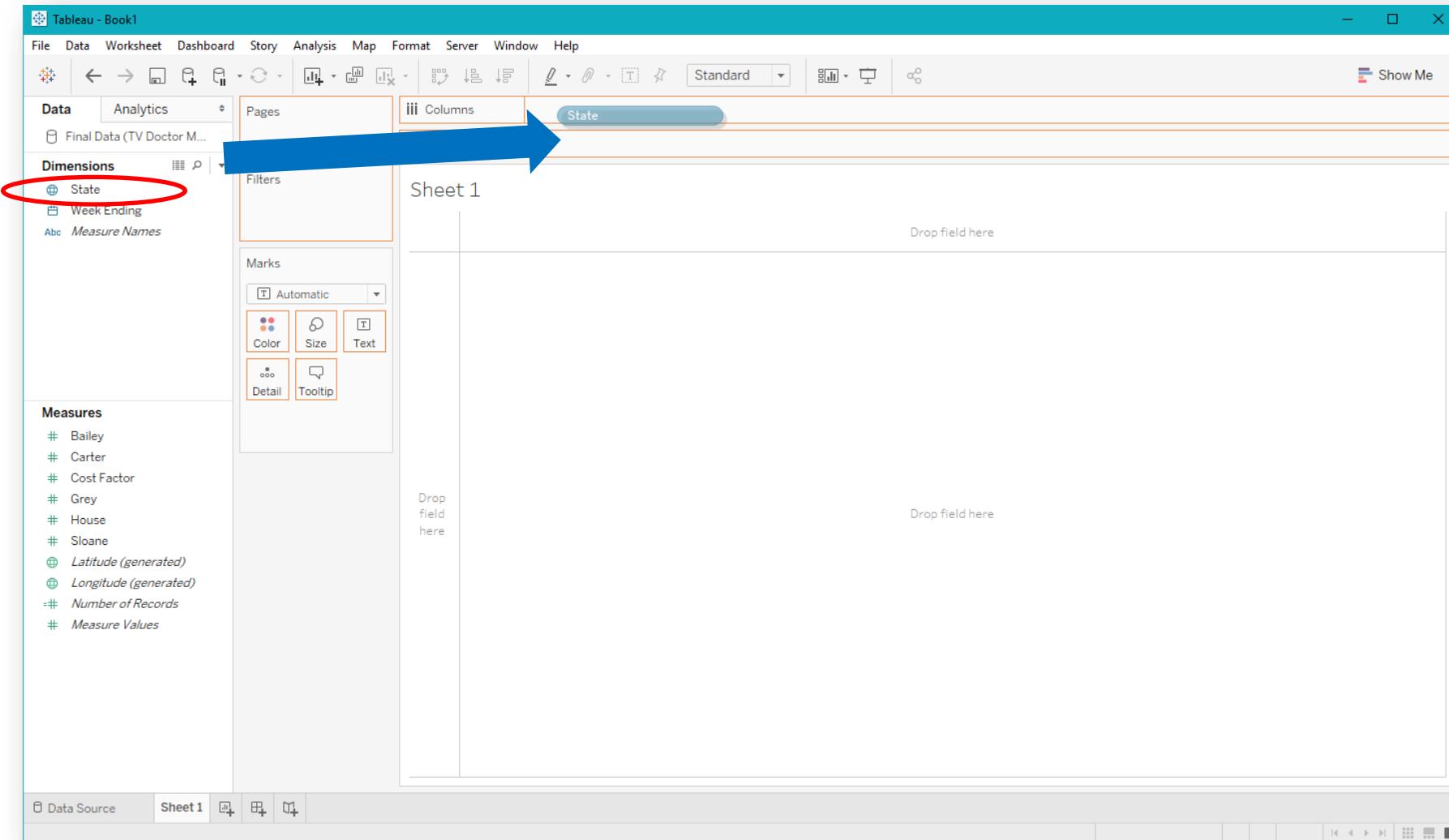
Data Source Sheet 1



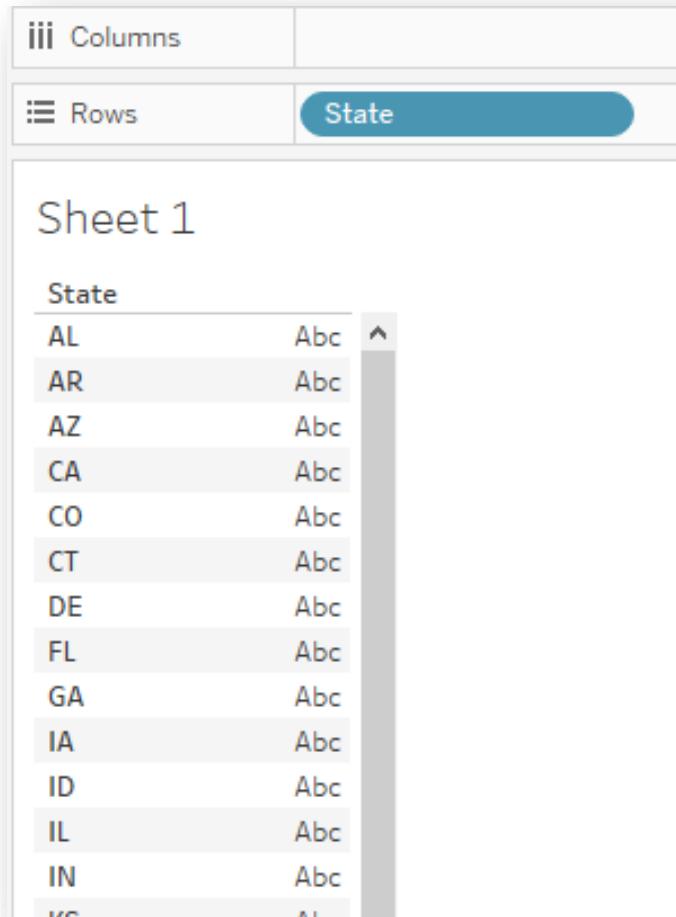
## Description of Example Data File (TV Doctor Medical Spend)

- This Excel file contains weekly research & development spend by several famous doctors portrayed on TV, for the lower 48 states
- Description of Columns
  - **Week Ending:** Date (1/1-12/31/18)
  - **State:** Two-letter abbreviation
  - **Spend (\$), by Doctor** (column name in **Bold**):
    - Dr. Miranda **Bailey**
    - Dr. John **Carter**
    - Dr. Meredith **Grey**
    - Dr. Gregory **House**
    - Dr. Mark **Sloane**
  - **Cost Factor:** Fictional blend of macroeconomic and internal metrics that represent the overall regulatory and competitive environment

To start building your viz, click “State” and drag it to the Rows shelf



## Tableau will show all values of State contained within the data source



The screenshot shows the Tableau Data pane. At the top, there are two tabs: "Columns" and "Rows". The "Rows" tab is selected, and the word "State" is highlighted with a blue background. Below the tabs, the title "Sheet 1" is visible. Under the "State" column header, a list of US states is displayed in rows, each with the state name followed by three placeholder letters ("Abc"). The states listed are AL, AR, AZ, CA, CO, CT, DE, FL, GA, IA, ID, IL, IN, and KS.

State	Abc
AL	Abc
AR	Abc
AZ	Abc
CA	Abc
CO	Abc
CT	Abc
DE	Abc
FL	Abc
GA	Abc
IA	Abc
ID	Abc
IL	Abc
IN	Abc
KS	Abc

- In Tableau jargon, we have just placed a “pill” on the Rows shelf
- Note the “Abc” text. These are placeholders until additional fields are placed onto the canvas.
- When dragging a dimension onto the canvas, Tableau will attempt to show all possible values for that dimension (you may get a warning message if you attempt to display a dimension with more than 500 distinct values)

Next, drag “Grey” to the Columns shelf. This is the total R&D spend by Dr. Meredith Grey.

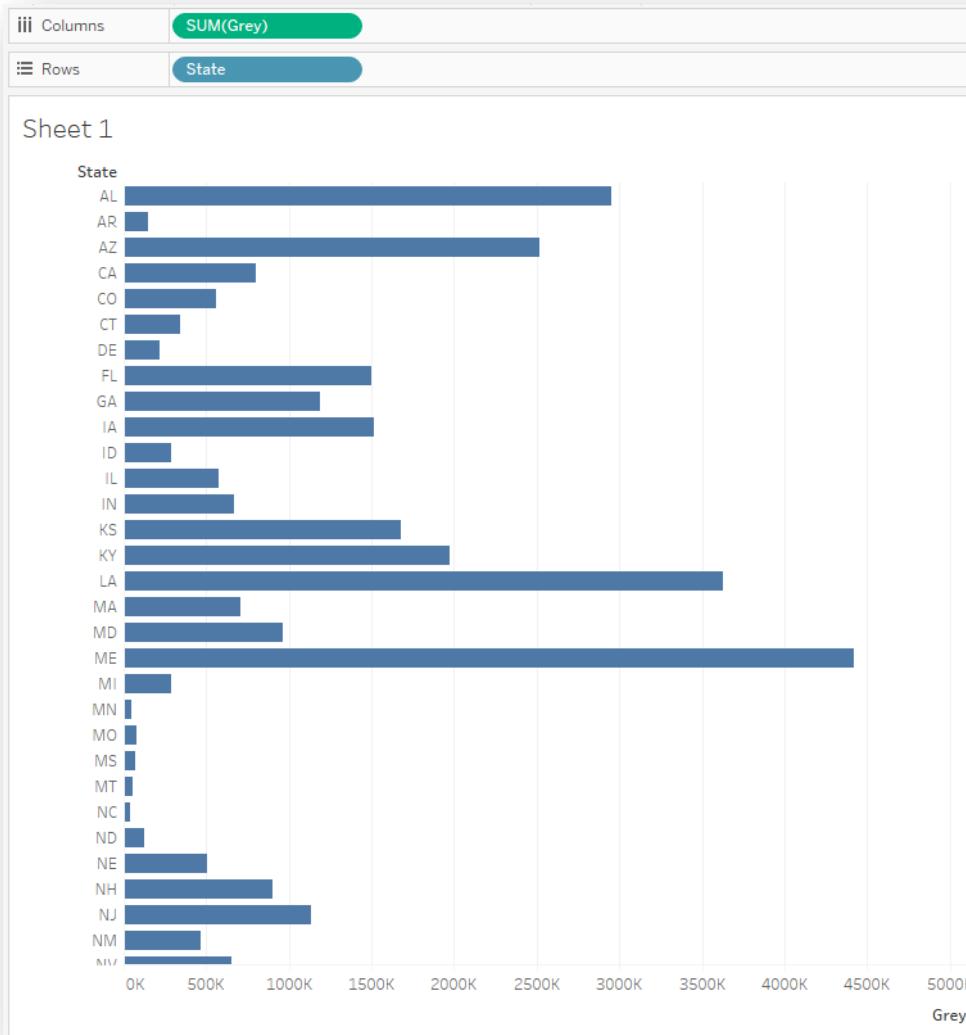
The screenshot shows the Tableau interface with the following details:

- Data pane:** Shows the "Data" tab selected. A blue arrow points from the "Measures" section towards the "Columns" shelf.
- Measures section:** Contains measures: Bailey, Carter, Cost Factor, **Grey**, House, Sloane, Latitude (generated), Longitude (generated), Number of Records, and Measure Values. The "Grey" measure is circled in red.
- Columns shelf:** Displays the "SUM(Grey)" measure.
- Rows shelf:** Displays the "State" dimension.
- Sheet 1:** Shows a list of states with their corresponding "Abc" values.

State	Abc
AL	Abc
AR	Abc
AZ	Abc
CA	Abc
CO	Abc
CT	Abc
DE	Abc
FL	Abc
GA	Abc
IA	Abc
ID	Abc
IL	Abc
IN	Abc
KS	Abc
KY	Abc
LA	Abc
MA	Abc
MD	Abc
ME	Abc
MI	Abc
MN	Abc

- Measures will default to a sum across each dimension.
- In this case, the sum of spend by Dr. Grey for the entire year will be calculated for each state.

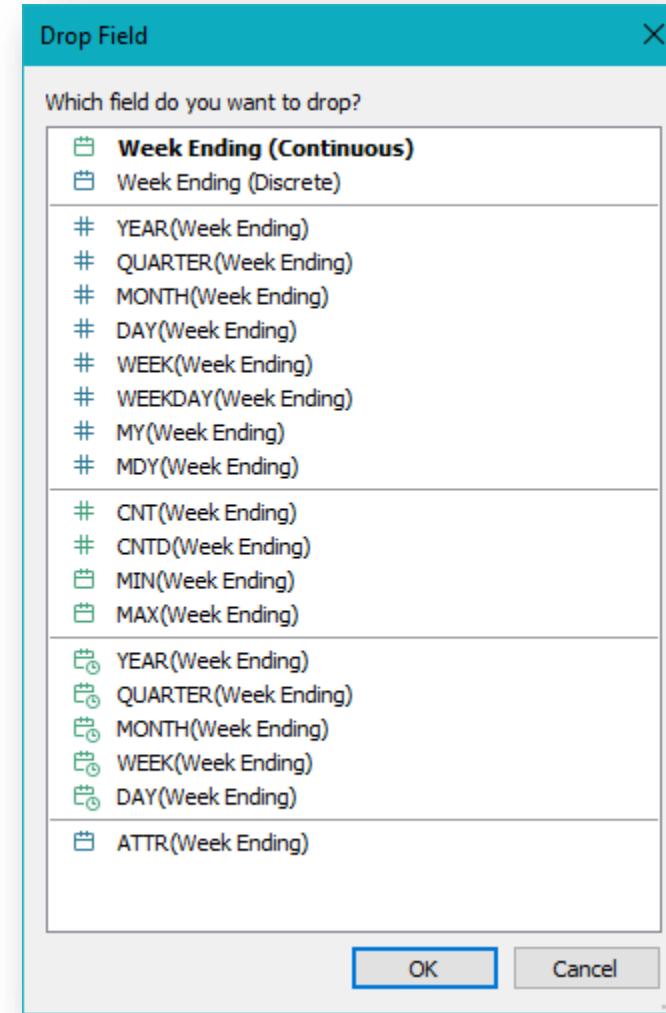
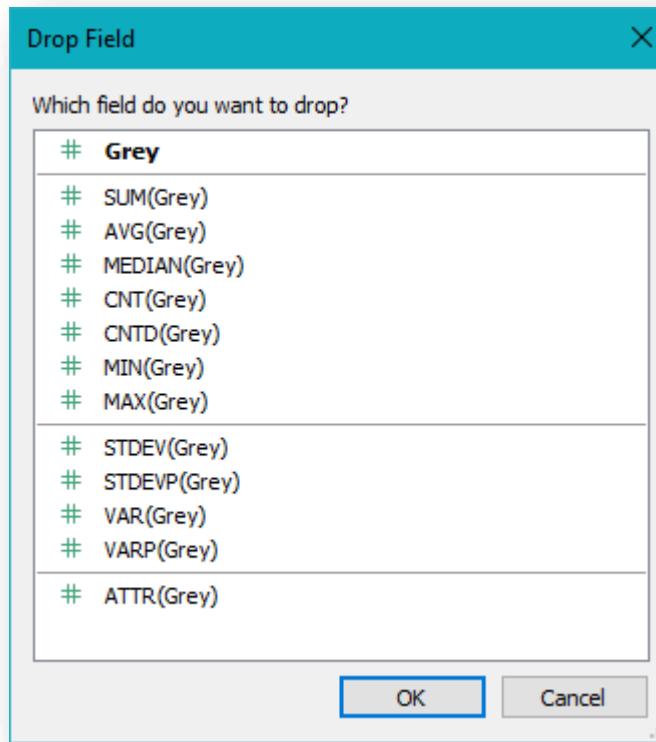
Tableau will automatically determine the most appropriate viz as new dimensions and measures are dragged onto the canvas



- Tableau has chosen to display the data as a bar chart by state. This is Tableau's "best guess" as to how the data should be displayed.
- The "Show Me" menu, to be demonstrated later, trial-and-error, and feedback from colleagues can help you zero in on the most appropriate viz.

# Enterprise Analytics Office

Hint: RIGHT-CLICK on a measure when dragging to get a list of aggregation options. This trick works for dates as well.

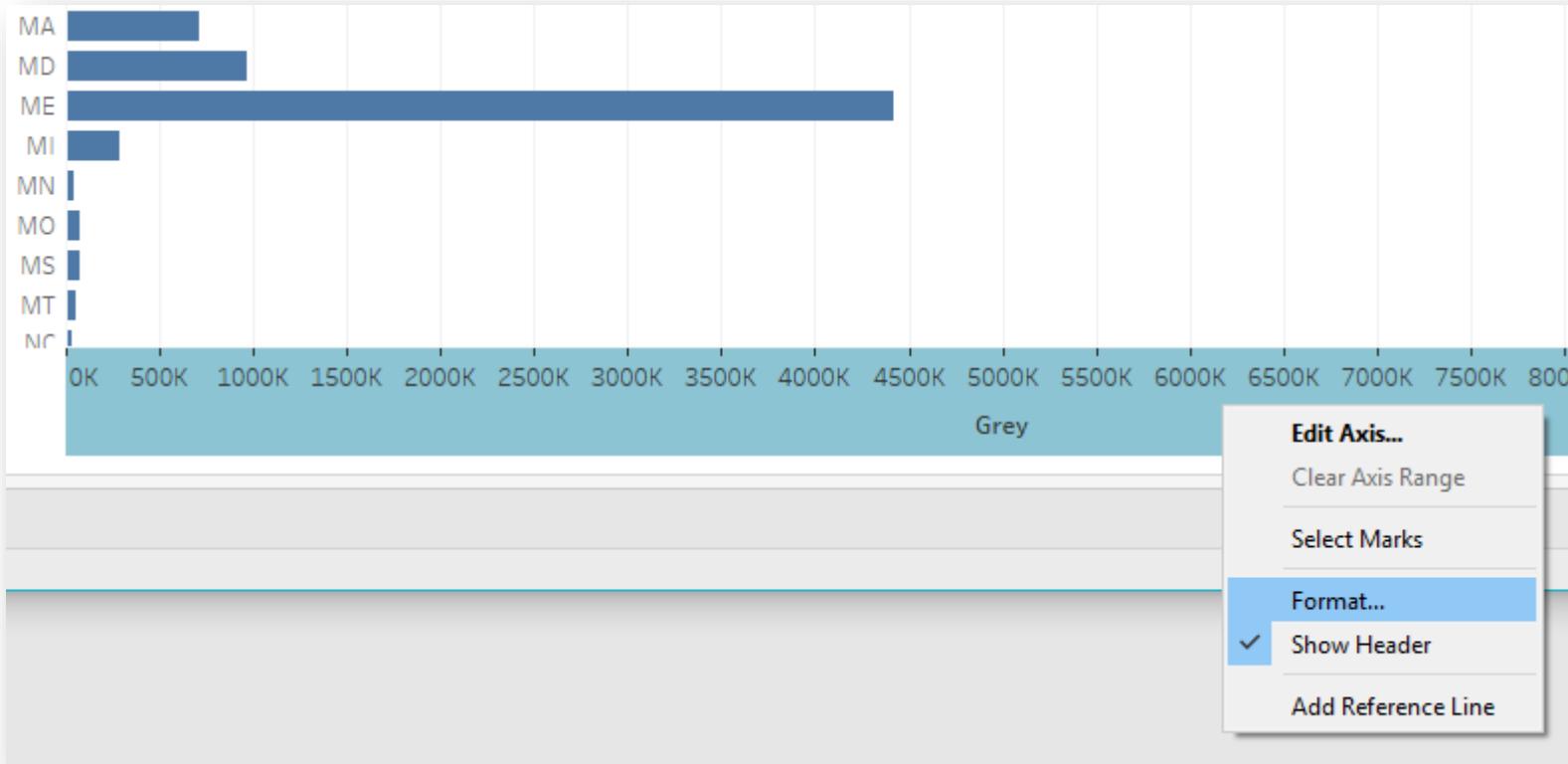


NOTE: This functionality is not available in the Tableau Server web authoring interface.

Proprietary & Confidential. Unauthorized use or publication of any part of this document outside of Nationwide is strictly prohibited.

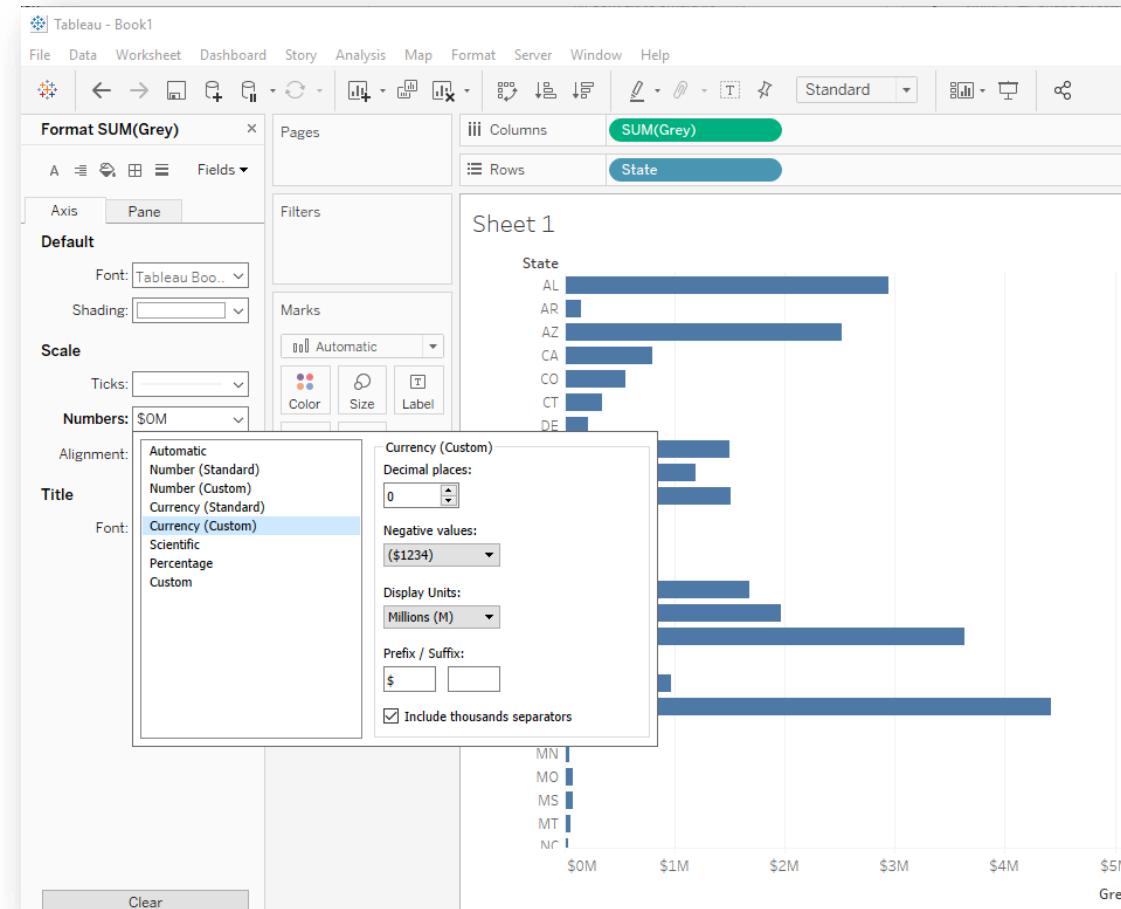
© 2021 Nationwide Mutual Insurance Company

To format spend in dollars, right-click the x-axis and choose “Format”

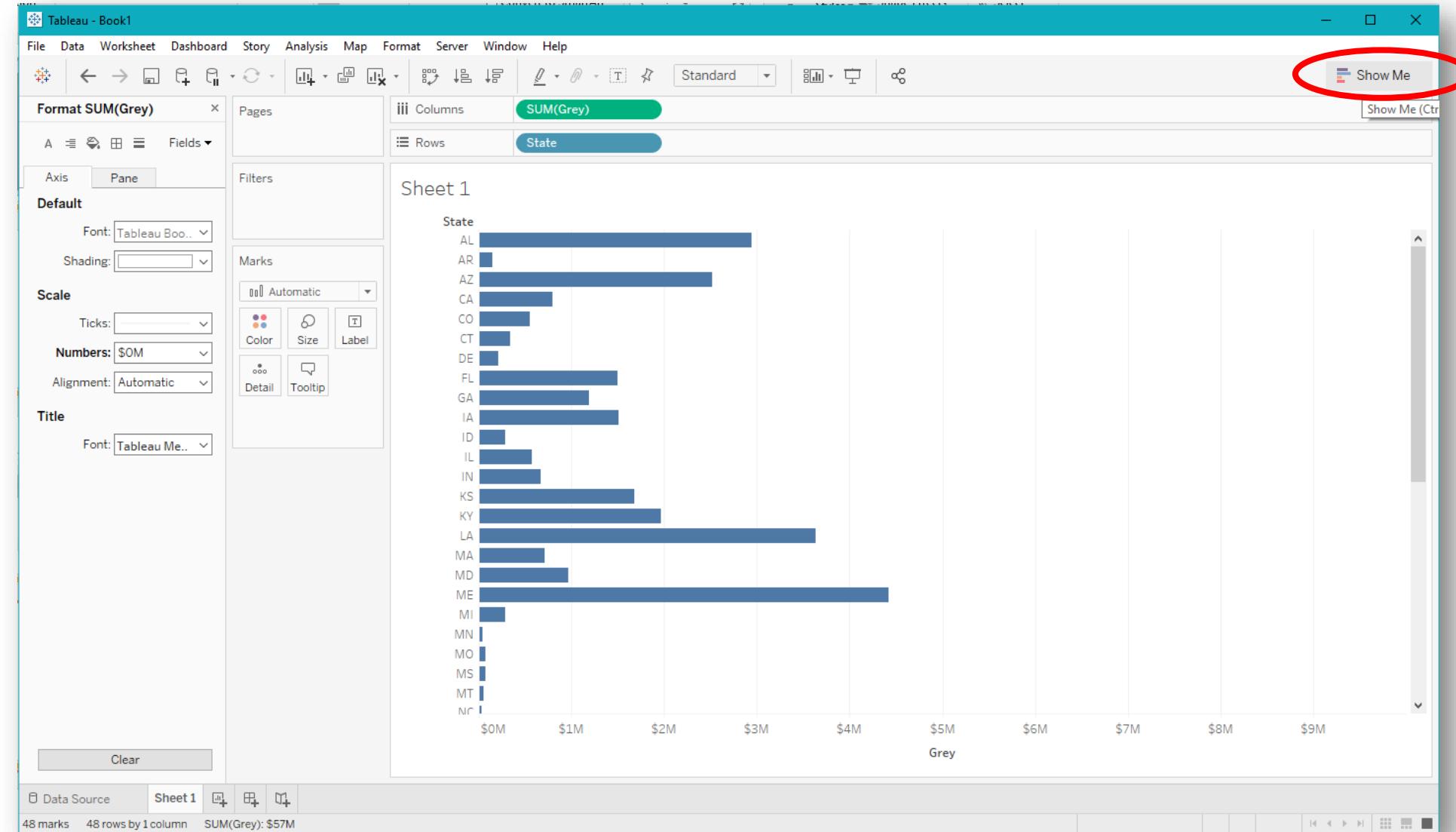


# Enterprise Analytics Office

Formatting in Tableau is done on the left-hand side of the window. Options for formatting are similar to that in Excel. Use the settings as shown in the screenshot.

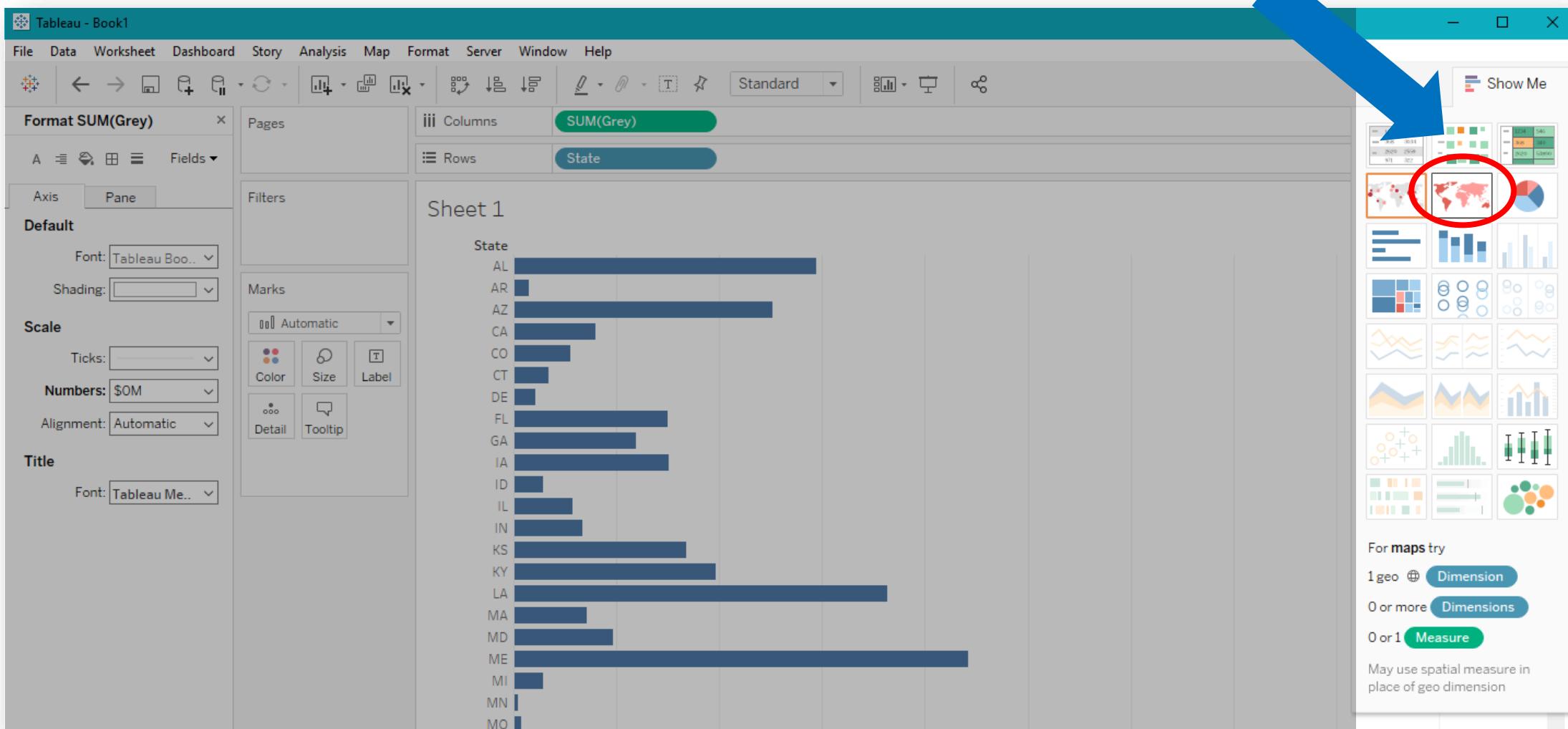


The “Show Me” tab provides an easy-to-use way to find the best type of visualization suited to your data. Click on it to open



# Enterprise Analytics Office

The “Show Me” tab will highlight potential visualization types that match the data being shown. Click on the red map (circled).



A screenshot of the Tableau software interface. On the left, the 'Format SUM(Grey)' pane is open, showing settings for font, shading, scale, numbers, and alignment. The main workspace displays a horizontal bar chart titled 'Sheet 1' with 'State' on the y-axis and an unnamed measure on the x-axis. The bars represent values for various US states, with AL having the longest bar and MO the shortest. To the right of the chart is the 'Show Me' feature, which suggests different visualization types based on the current data context. A large blue arrow points from the text above towards the 'Show Me' pane. Within this pane, a small world map icon is circled in red, indicating it is a potential visualization type for the current data.

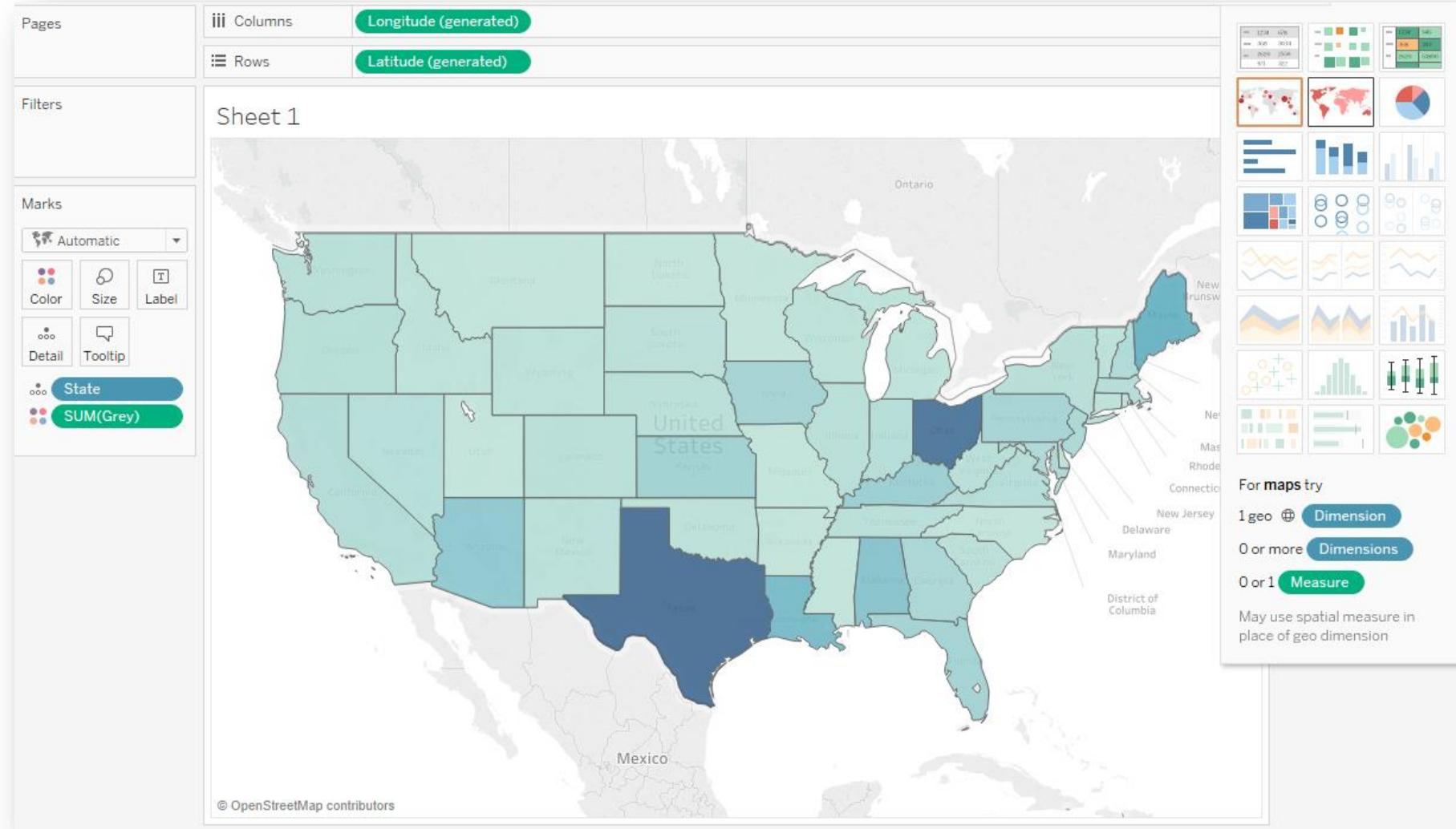
For maps try

- 1 geo ⚙ Dimension
- 0 or more Dimensions
- 0 or 1 Measure

May use spatial measure in place of geo dimension

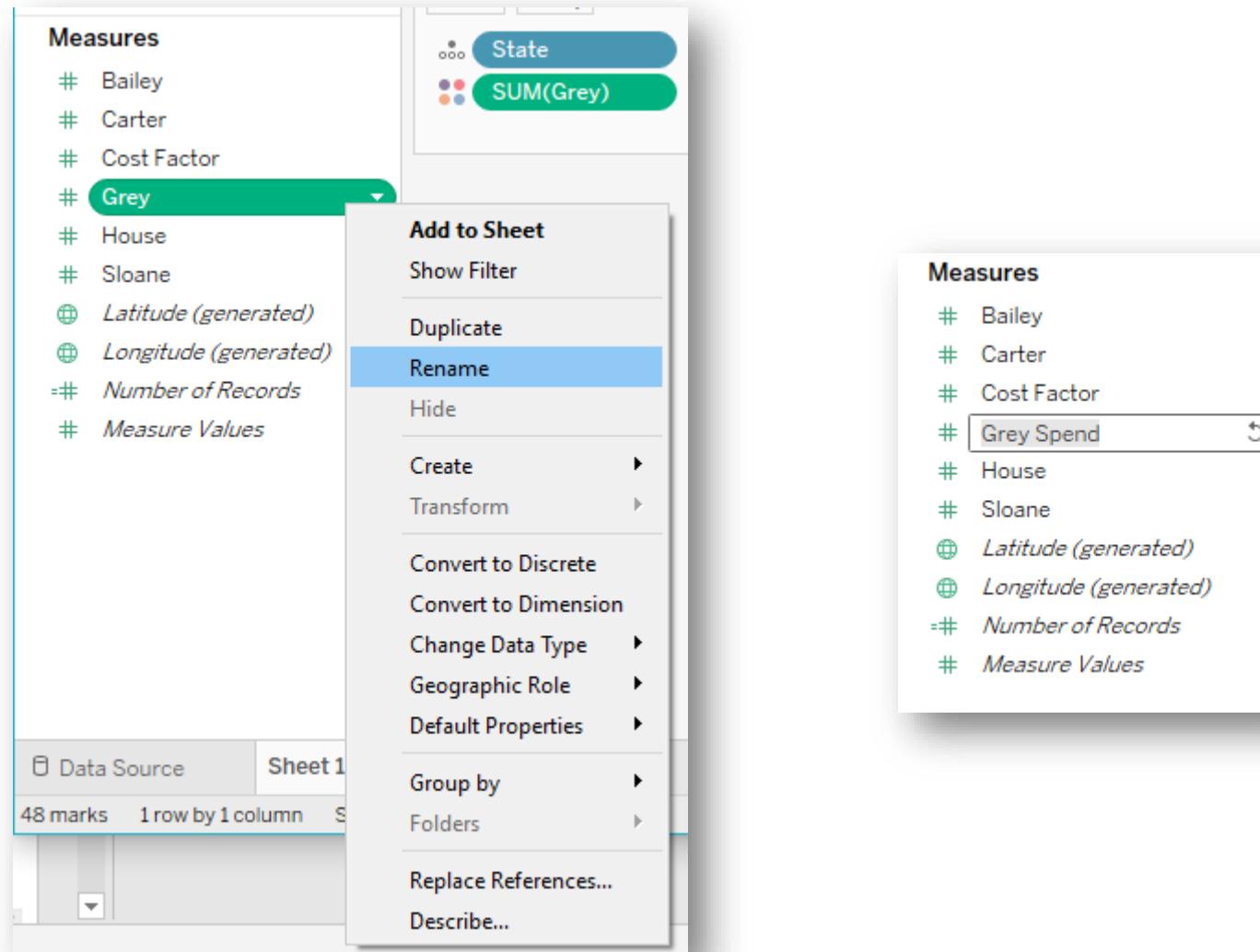
State	Value
AL	Very High Value
AR	Low Value
AZ	Medium-High Value
CA	Medium Value
CO	Medium-Low Value
CT	Very Low Value
DE	Very Low Value
FL	Medium-High Value
GA	Medium Value
IA	Medium Value
ID	Very Low Value
IL	Medium-Low Value
IN	Medium-Low Value
KS	Medium-High Value
KY	Medium-High Value
LA	Very High Value
MA	Medium-Low Value
MD	Medium-Low Value
ME	Very High Value
MI	Very Low Value
MN	Very Low Value
MO	Very Low Value

Tableau can easily create maps if your data has geographical variables (state, county, ZIP)

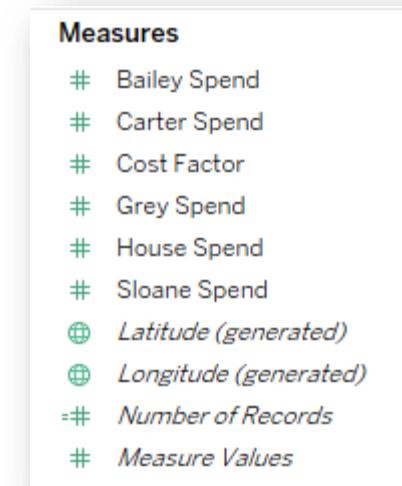


# Enterprise Analytics Office

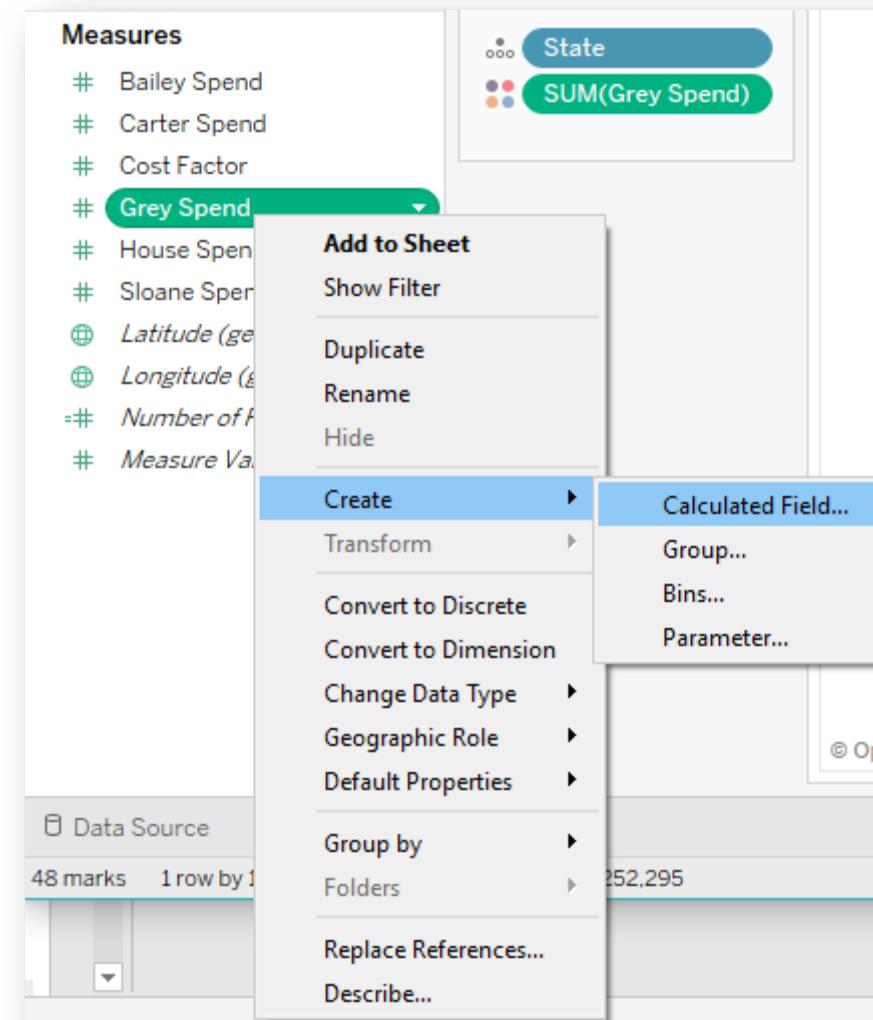
Fields can be renamed to provide more clarity. For example, right-click on “Grey” in Measures and Choose “Rename” and rename the field to “Grey Spend”



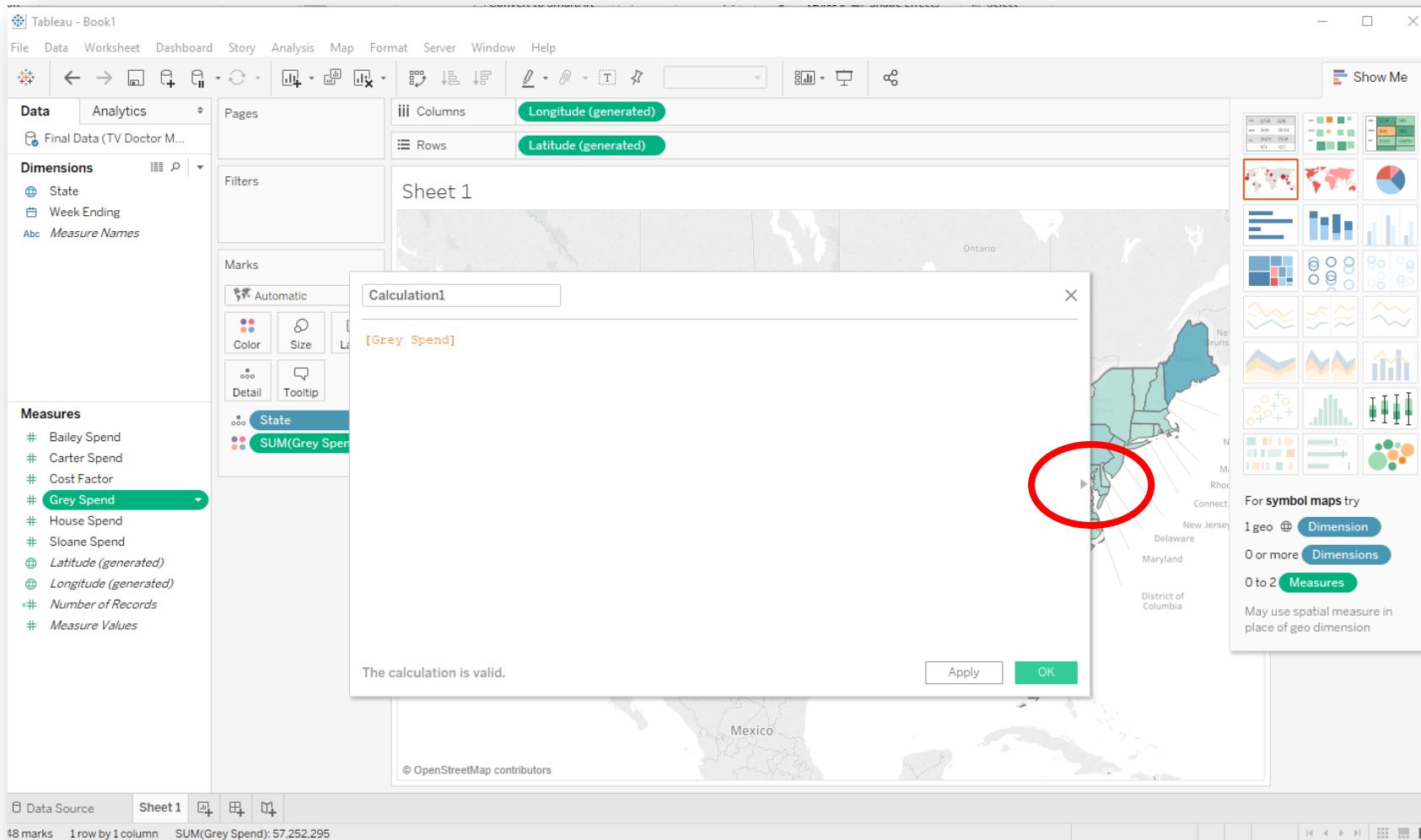
**Rename the other four spend measures to include “Spend” in the name**



Next, we will derive a calculated field to calculate total spend across all five doctors. To get started, right-click on “Grey Spend” and choose “Create → Calculated Field”

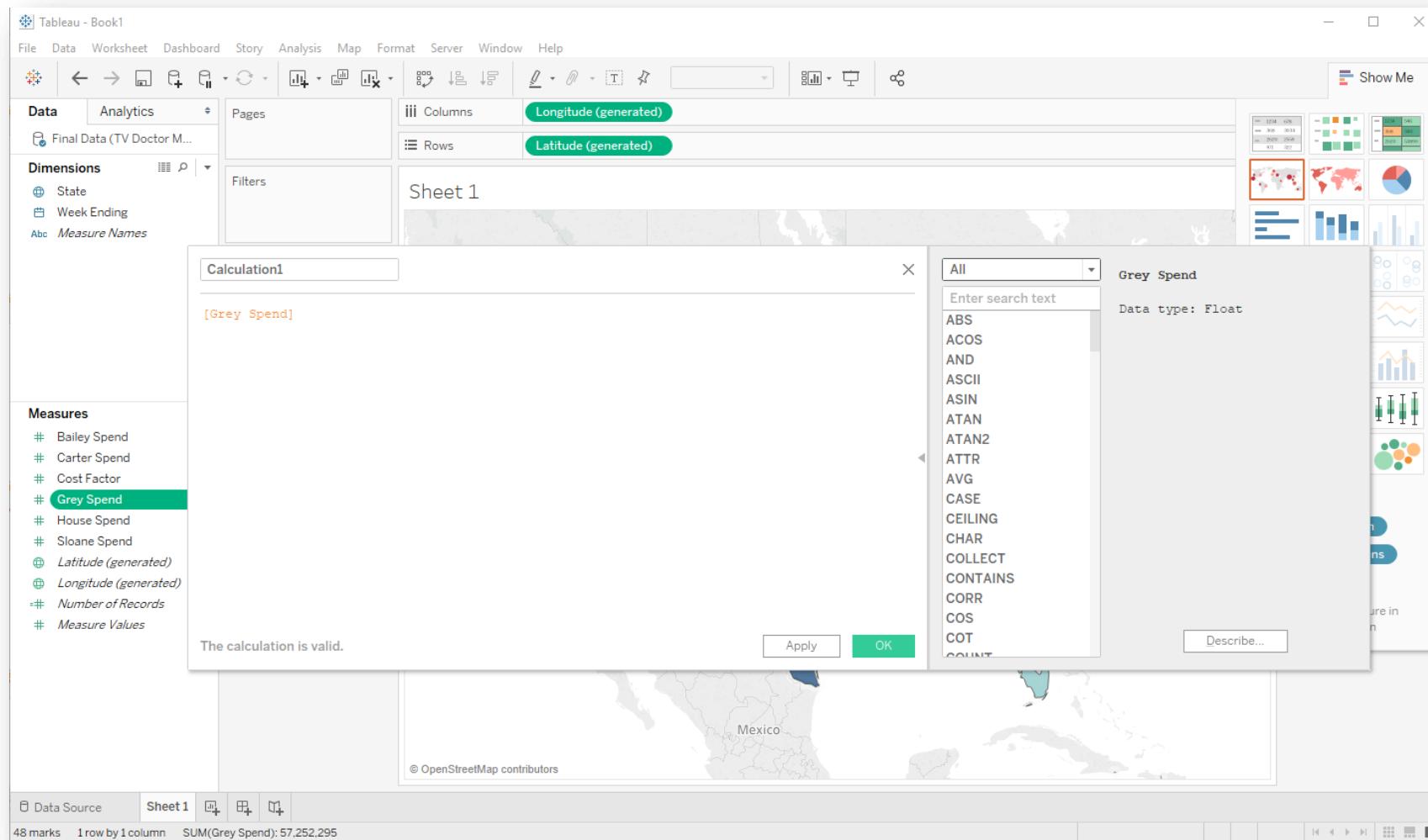


If using calculated fields for the first time, click on the right arrow to show available functions



The screenshot shows the Tableau interface with a calculated field dialog open. The dialog is titled "Calculation1" and contains the formula "[Grey Spend]". Below the formula, a message says "The calculation is valid." At the bottom of the dialog are "Apply" and "OK" buttons. The background shows a map of the Eastern United States with states colored by their "Grey Spend" values. A red circle highlights the state of Connecticut. The Tableau interface includes a menu bar, toolbars, and various data and visualization panels.

Tableau includes a large number of numeric and string functions that can be used to derive new fields



The screenshot shows the Tableau interface with a map of Mexico and Central America. A calculation dialog box is open, displaying a list of available functions. The function `Grey Spend` is selected and highlighted in green.

**Calculation1**

[Grey Spend]

The calculation is valid.

Apply OK

All

Grey Spend

Data type: Float

- ABS
- ACOS
- AND
- ASCII
- ASIN
- ATAN
- ATAN2
- ATTR
- AVG
- CASE
- CEILING
- CHAR
- COLLECT
- CONTAINS
- CORR
- COS
- COT
- COUNT

© OpenStreetMap contributors

48 marks 1 row by 1 column SUM(Grey Spend): 57,252,295

## A wide variety of numeric, string, and date functions are available to be used

The screenshot shows the Tableau Data Source interface with several function categories displayed:

- String**: LTRIM(string)  
Returns the string with any leading spaces removed.  
Example: LTRIM(" Sales") = "Sales"
- Date**: DATEADD(date\_part, interval, date)  
Adds an increment to the specified date and returns the new date. The increment is defined by the interval and the date\_part.  
Example: DATEADD('month', 3, #2004-04-15#) = 2004-07-15 12:00:00 AM
- Aggregate**: MEDIAN(expression)  
Returns the median of a single expression. MEDIAN can be used with numeric fields only. Null values are ignored.  
Example: MEDIAN([Profit])
- Table Calculation**: RUNNING\_MAX(expression)  
Returns the running maximum of the given expression, from the first row in the partition to the current row.  
Example: RUNNING\_MAX(MAX([Profit])) = running maximum of Profit

For this calculation, name the new field “Total Spend”

The screenshot shows a Tableau calculation editor. In the top-left, there's a text input field containing "Total Spend". Below it, the formula "[Grey Spend]" is entered. A message at the bottom left says "The calculation is valid." At the bottom right of the editor are two buttons: "Apply" and "OK". To the right of the editor is a tooltip for the "RUNNING\_MAX(expression)" function. The tooltip has a title "Table Calculation" and a dropdown menu with "Enter search text". The main list contains various table calculation functions: FIRST, INDEX, LAST, LOOKUP, PREVIOUS\_VALUE, RANK, RANK\_DENSE, RANK\_MODIFIED, RANK\_PERCENTILE, RANK\_UNIQUE, RUNNING\_AVG, RUNNING\_COUNT, RUNNING\_MAX (which is highlighted), RUNNING\_MIN, RUNNING\_SUM, SCRIPT\_BOOL, SCRIPT\_INT, and SCRIPT\_DATE.

Total Spend

[Grey Spend]

The calculation is valid.

Apply OK

Table Calculation

Enter search text

FIRST  
INDEX  
LAST  
LOOKUP  
PREVIOUS\_VALUE  
RANK  
RANK\_DENSE  
RANK\_MODIFIED  
RANK\_PERCENTILE  
RANK\_UNIQUE  
RUNNING\_AVG  
RUNNING\_COUNT  
**RUNNING\_MAX**  
RUNNING\_MIN  
RUNNING\_SUM  
SCRIPT\_BOOL  
SCRIPT\_INT  
SCRIPT\_DATE

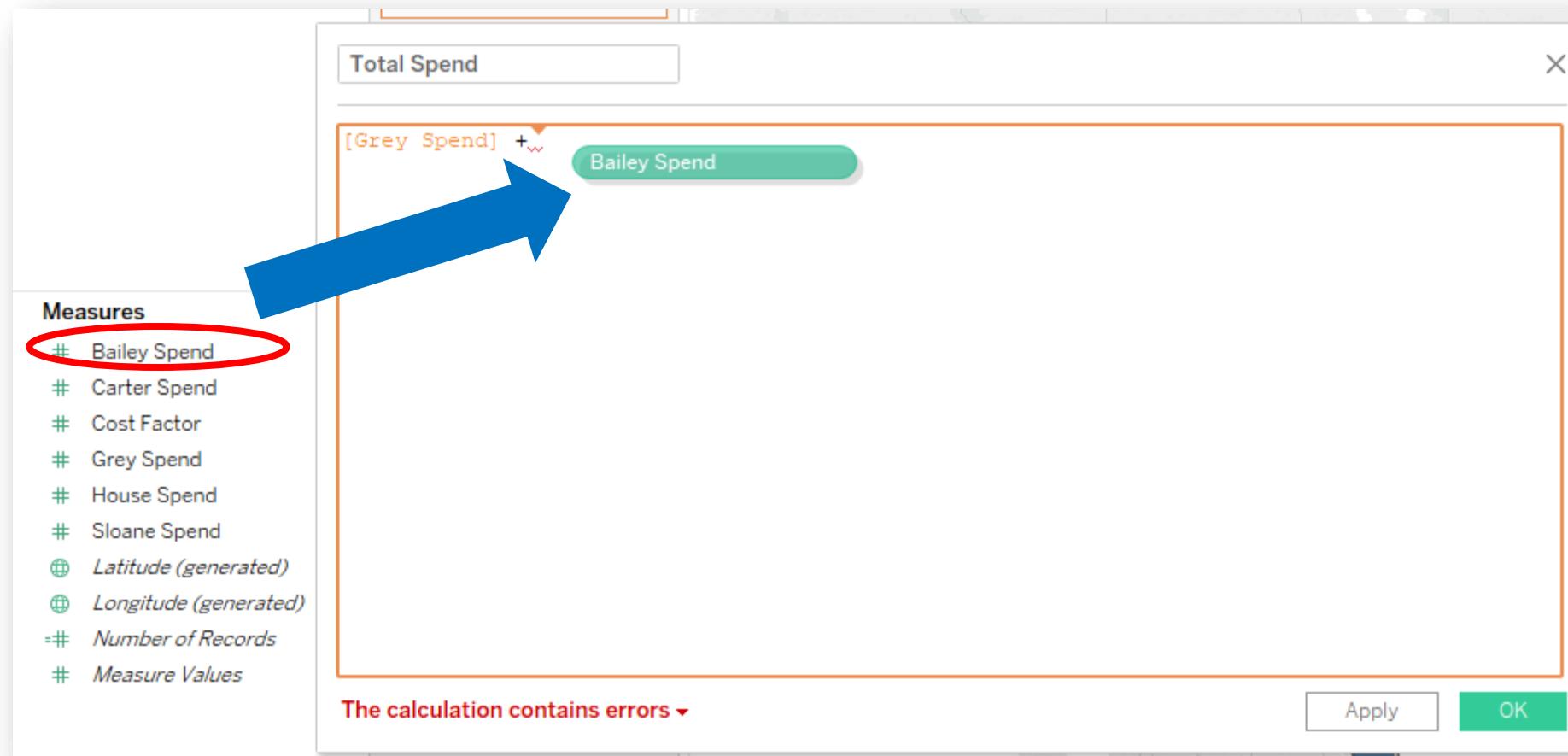
**RUNNING\_MAX(expression)**

Returns the running maximum of the given expression, from the first row in the partition to the current row.

Example:  
RUNNING\_MAX(MAX([Profit])) = running maximum of Profit

Example:  
RUNNING\_MAX(SUM([Profit])) = running maximum of SUM(Profit)

To build the field, type a plus “+” and drag and drop the other spend fields to the window



The final calculation should look like the screenshot below. Click OK.

The screenshot shows a Tableau calculation editor. On the left, a text input field contains the formula `[Grey Spend] + [Bailey Spend] + [Carter Spend] + [House Spend] + [Sloane Spend]`. Below the input field, a message says "The calculation is valid." At the bottom right are two buttons: "Apply" and "OK". On the right side, a tooltip for the `RUNNING_MAX(expression)` function is displayed. The tooltip includes the definition: "Returns the running maximum of the given expression, from the first row in the partition to the current row.", an example: "Example: `RUNNING_MAX(MAX([Profit]))` = running maximum of Profit", and another example: "Example: `RUNNING_MAX(SUM([Profit]))` = running maximum of SUM(Profit)".

Total Spend

[Grey Spend] + [Bailey Spend] + [Carter Spend] + [House Spend] + [Sloane Spend]

The calculation is valid.

Apply OK

Table Calculation

Enter search text

FIRST  
INDEX  
LAST  
LOOKUP  
PREVIOUS\_VALUE  
RANK  
RANK\_DENSE  
RANK\_MODIFIED  
RANK\_PERCENTILE  
RANK\_UNIQUE  
RUNNING\_AVG  
RUNNING\_COUNT  
RUNNING\_MAX  
RUNNING\_MIN  
RUNNING\_SUM  
SCRIPT\_BOOL  
SCRIPT\_INT  
SCRIPT\_REAL

RUNNING\_MAX(expression)

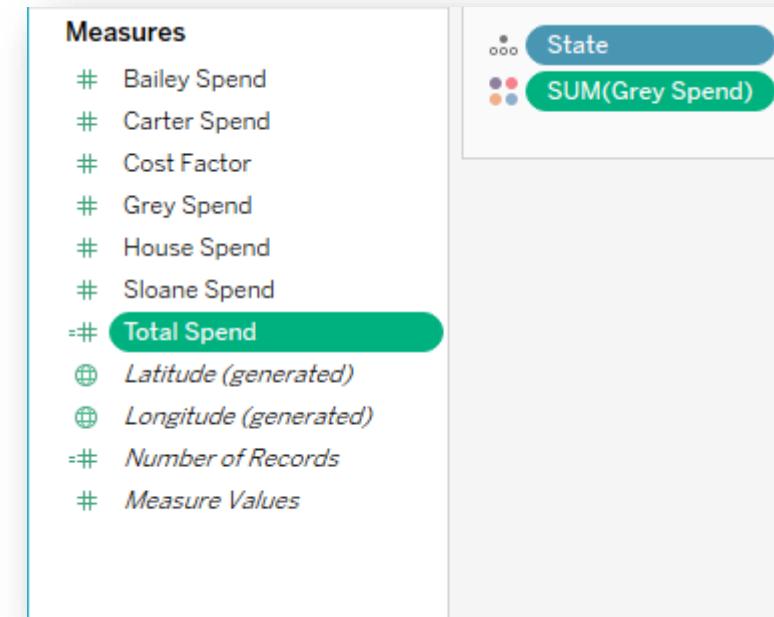
Returns the running maximum of the given expression, from the first row in the partition to the current row.

Example:  
`RUNNING_MAX(MAX([Profit]))` = running maximum of Profit

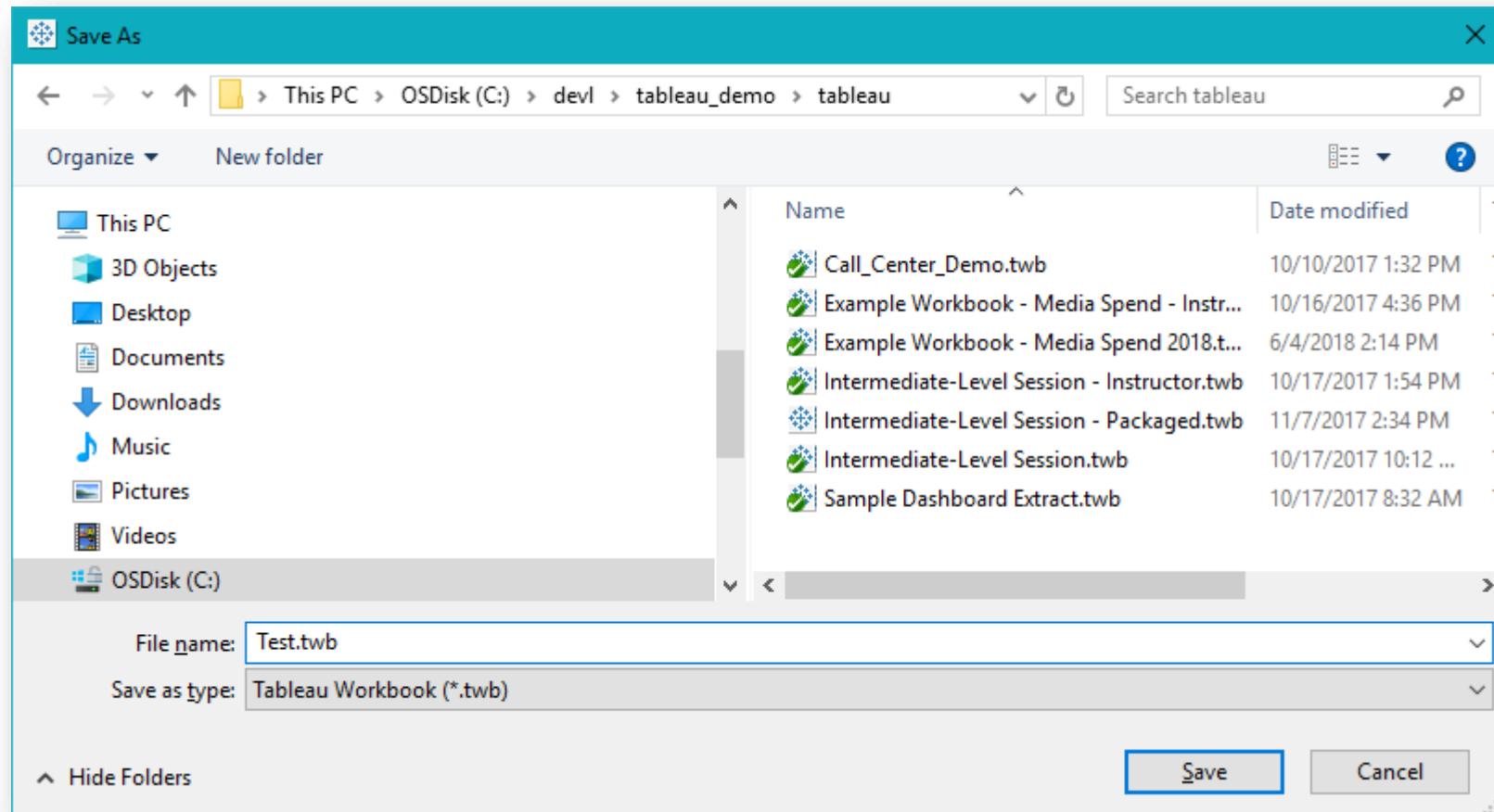
Example:  
`RUNNING_MAX(SUM([Profit]))` = running maximum of SUM(Profit)

# Enterprise Analytics Office

The new field will appear in the Measures shelf. A “=” next to the field indicates it is not included in the original data source

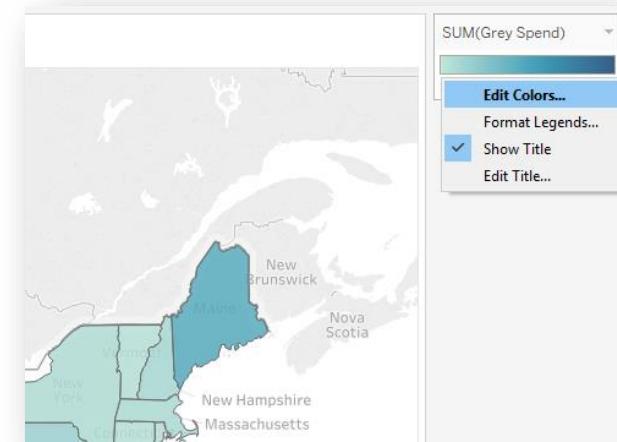
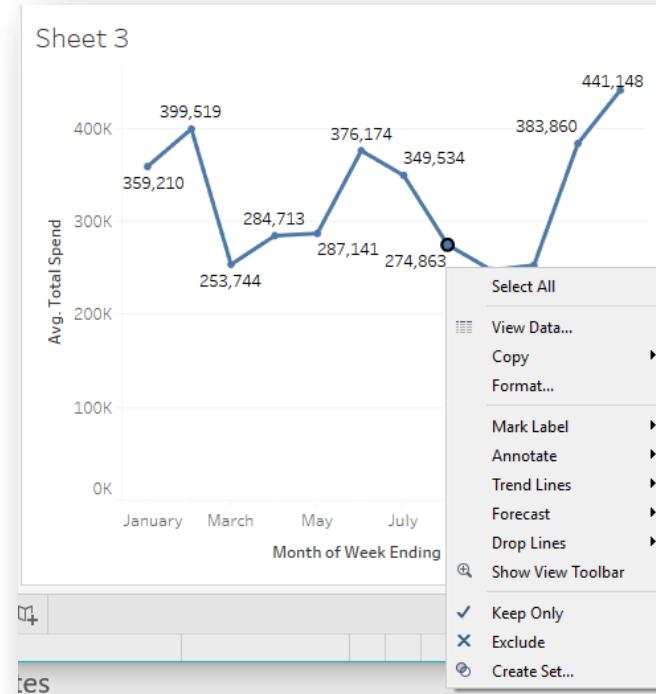
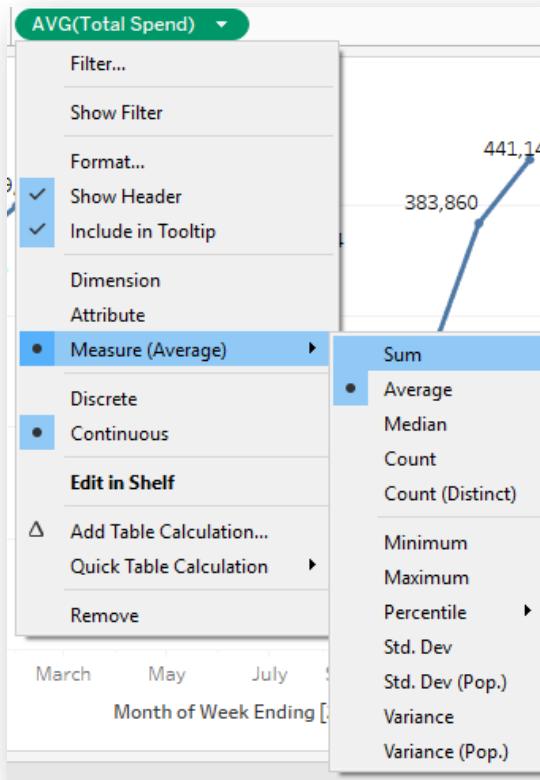


Save the workbook by choosing “File → Save”



# Quick Hits, Tips and Tricks

Right-clicks and drop-down menus provide a gateway to much of Tableau's power. A few examples are shown below.



## Changing Units of Aggregation

## Formatting Vizzes

## Modifying Color Schemes

## Aliases can be used to create more readable output for categorical data

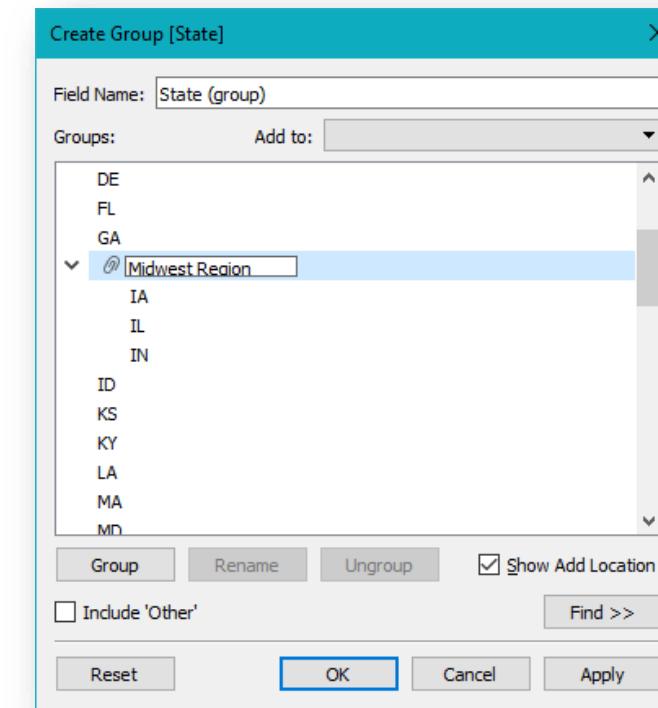
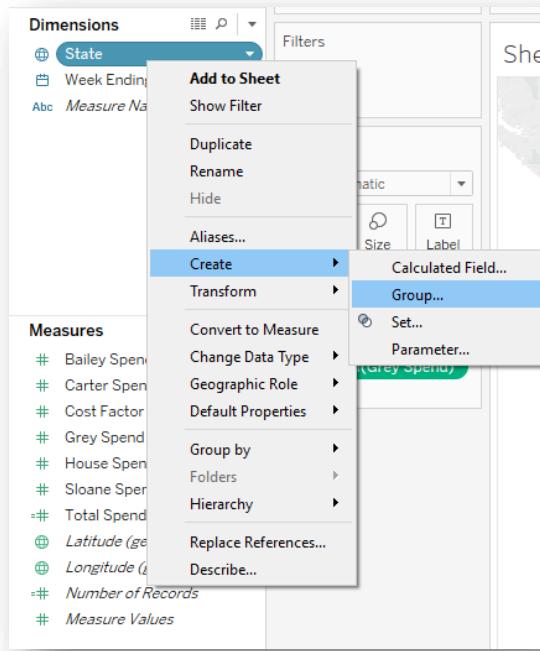
- For example, right-click “State” to view the drop-down menu. Choose “Aliases”
- State abbreviations could be replaced with the full state name by double-clicking under “Value (Alias)”

The screenshot shows the Enterprise Analytics Office interface. On the left, there's a navigation bar with tabs for Data, Analytics, and Pages. Below it, a sidebar lists dimensions and measures. The 'Dimensions' section includes a 'State' dimension, which is selected and highlighted in blue. A context menu is open for this dimension, with 'Aliases...' highlighted. To the right, a modal window titled 'Edit Aliases [State]' displays a table of aliases. The table has three columns: Member, Has Alias, and Value (Alias). The 'Member' column lists state abbreviations (AL, AR, AZ, CA, CO, CT, DE, FL, GA, IA, ID, IL, IN, KS, KY). The 'Has Alias' column contains asterisks (\*). The 'Value (Alias)' column contains the full state names (Alabama, Arkansas, Arizona, California, Colorado, Connecticut, Delaware, Florida, Georgia, Iowa, Idaho, Illinois, Indiana, Kansas, Kentucky). The 'CA' row is currently selected. At the bottom right of the modal is a 'Clear Aliases' button.

Member	Has Alias	Value (Alias)
AL	*	Alabama
AR	*	Arkansas
AZ	*	Arizona
CA	*	California
CO		Colorado
CT		Connecticut
DE		Delaware
FL		Florida
GA		Georgia
IA		Iowa
ID		Idaho
IL		Illinois
IN		Indiana
KS		Kansas
KY		Kentucky

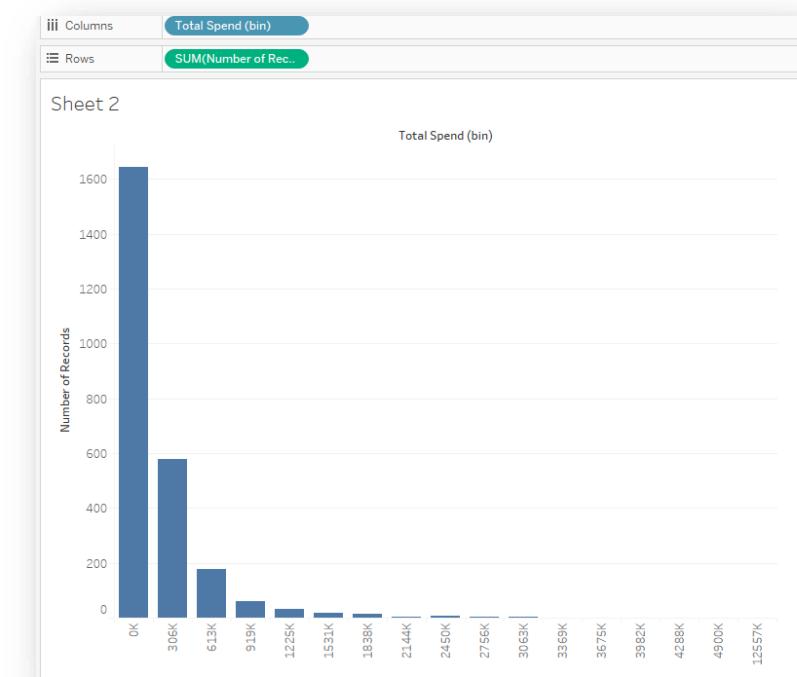
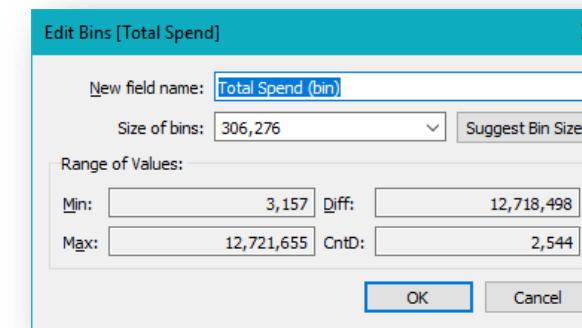
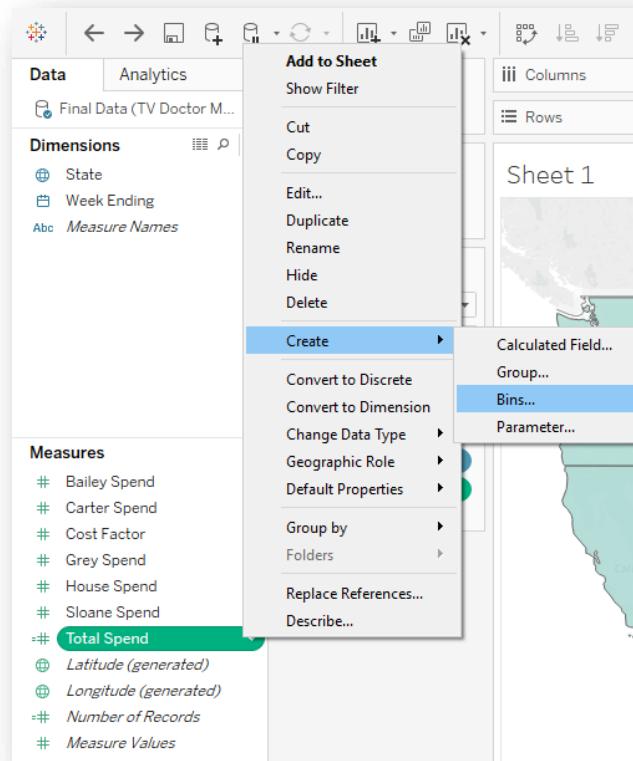
## Groups can be used to group related categories

- For example, right-click on “State” and choose Create → Group
- Control-click to select multiple fields then click “Group” to create a new group

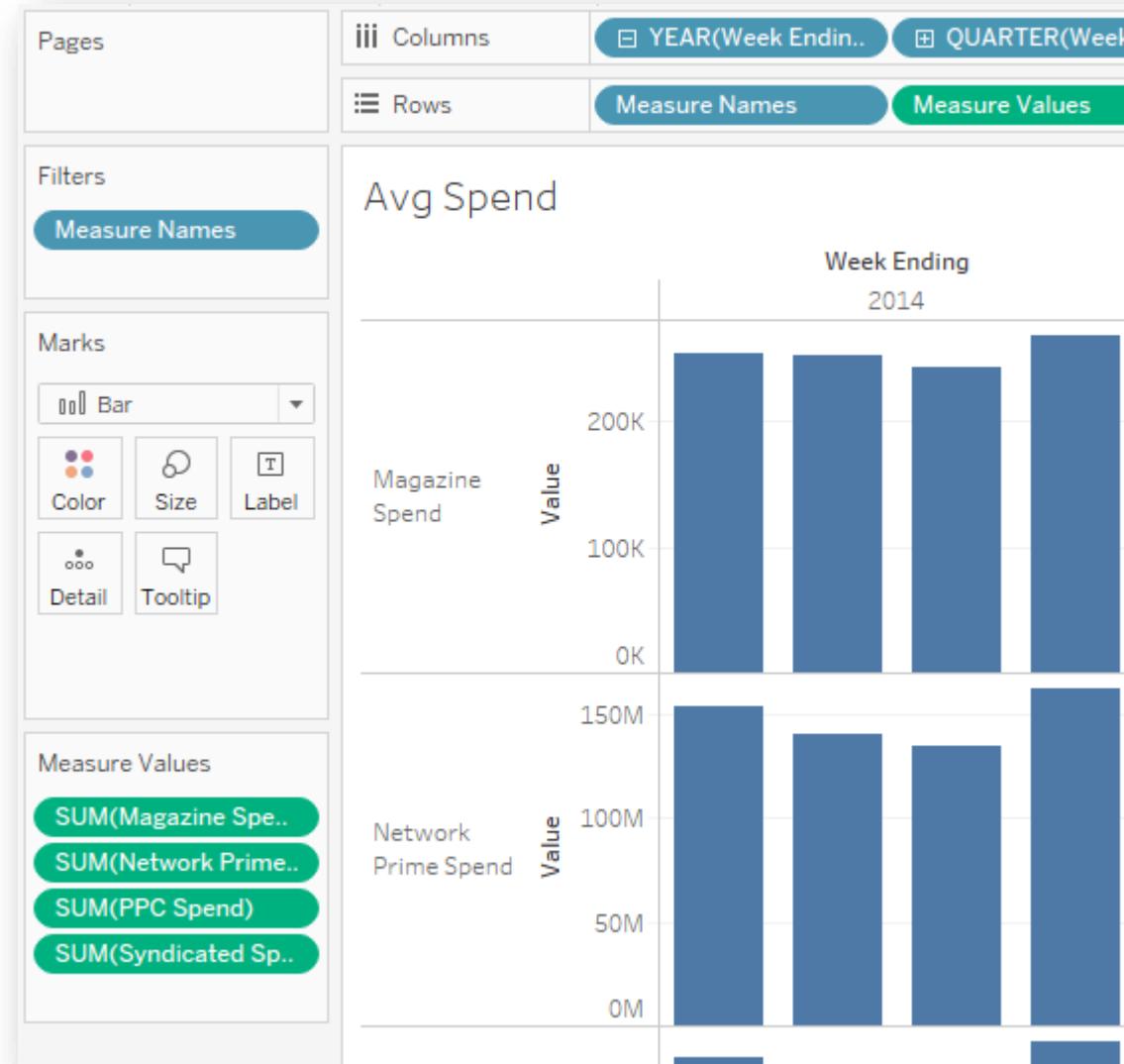


## Bins can be used to create histograms of categorical variables

- For example, right-click on “Network Prime Spend” and choose Create → Bins
- Experiment with different bin sizes to determine what works best for your data
- A new dimension will be created that can be used to create histograms

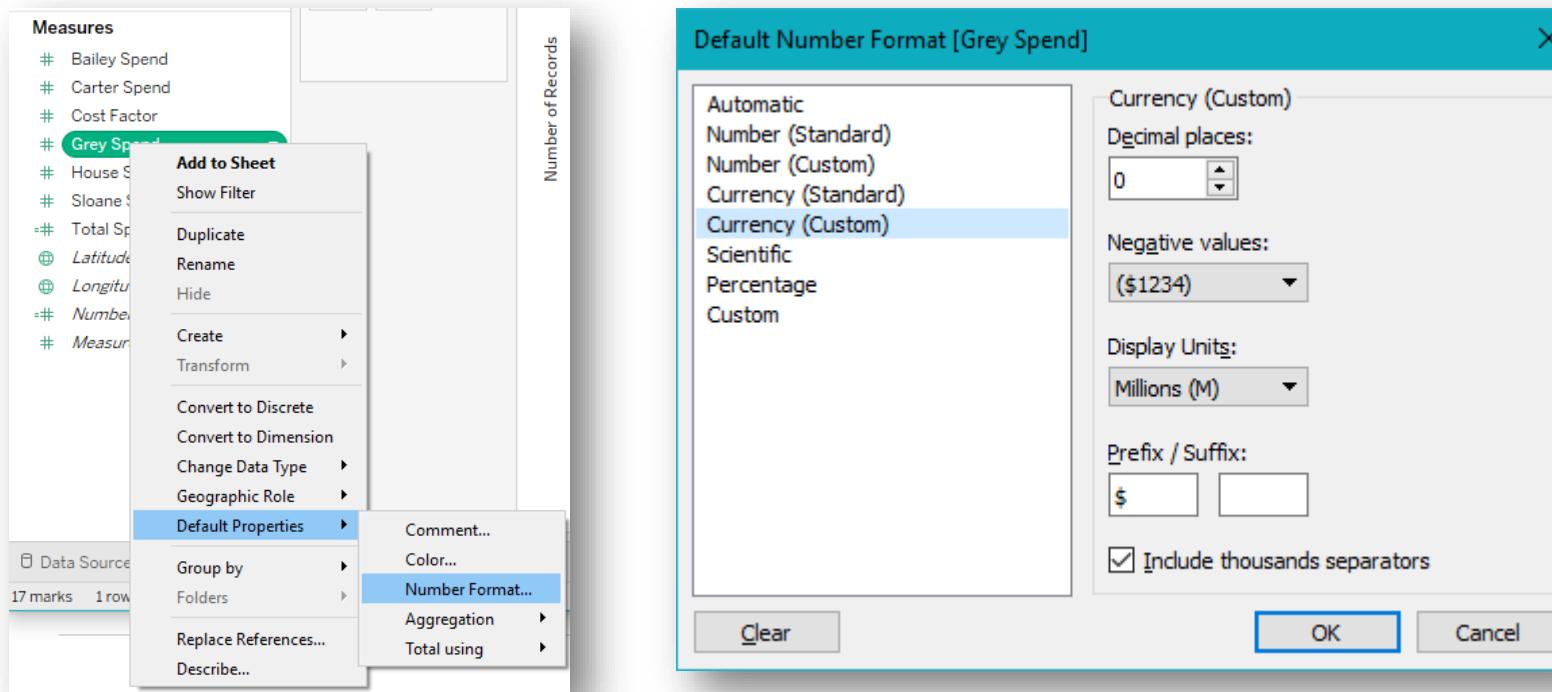


Measure Names and Measure Values can be used to display multiple measures on one viz



Default formats can be useful when you want a field (such as revenue) to maintain a consistent format or aggregation level

- For example, right-click “Grey Spend” and choose “Default Properties” → “Number Format”
- Change the format to “Currency (Custom)” with no decimal places and units in millions
- All new and current vizzes will now use this number format



**TIP:** Control-click to select multiple fields

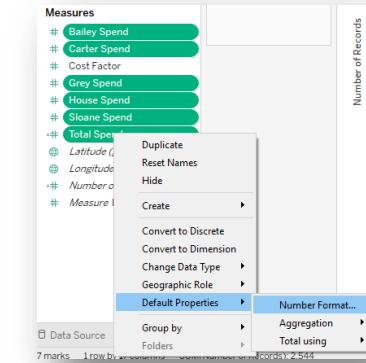
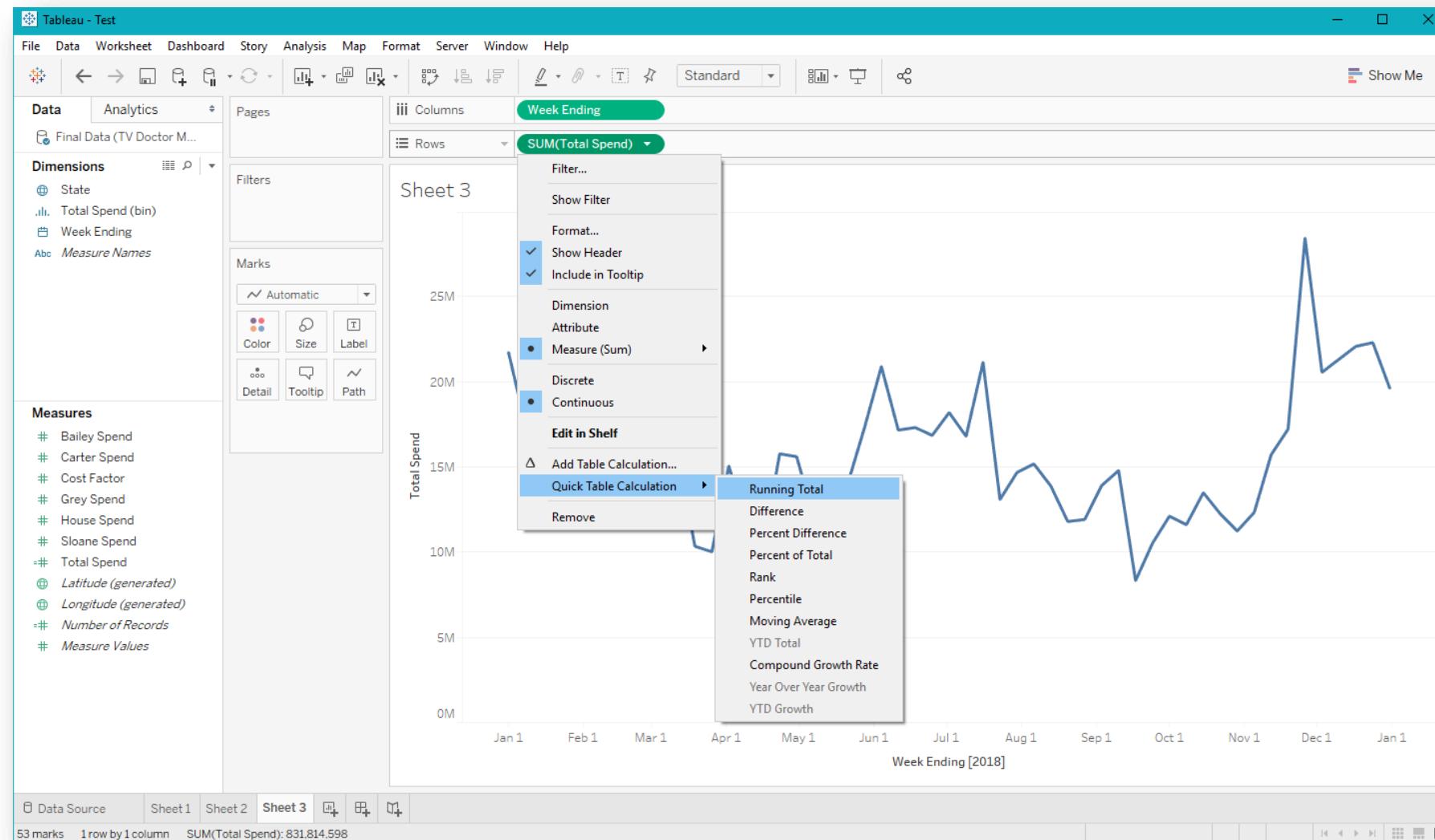
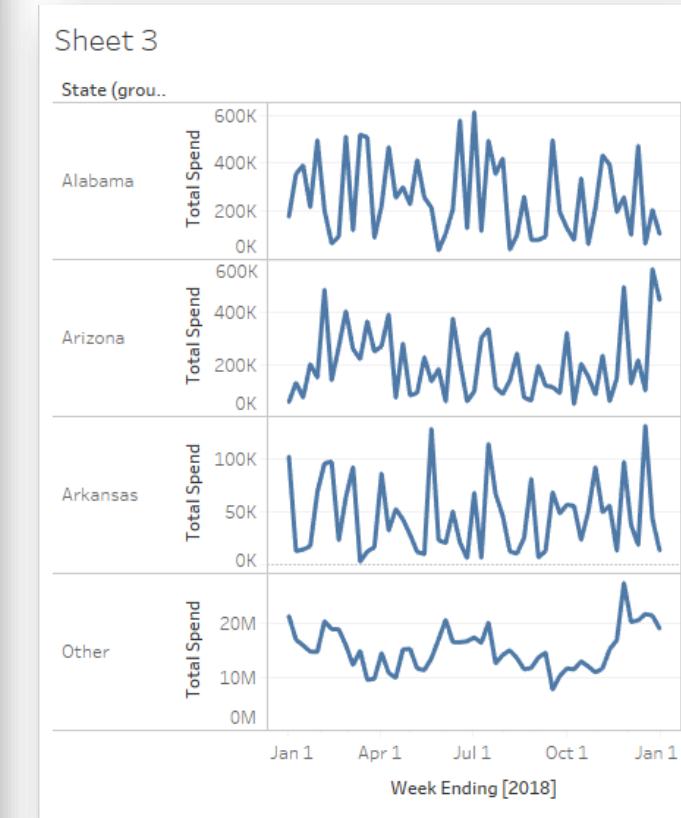
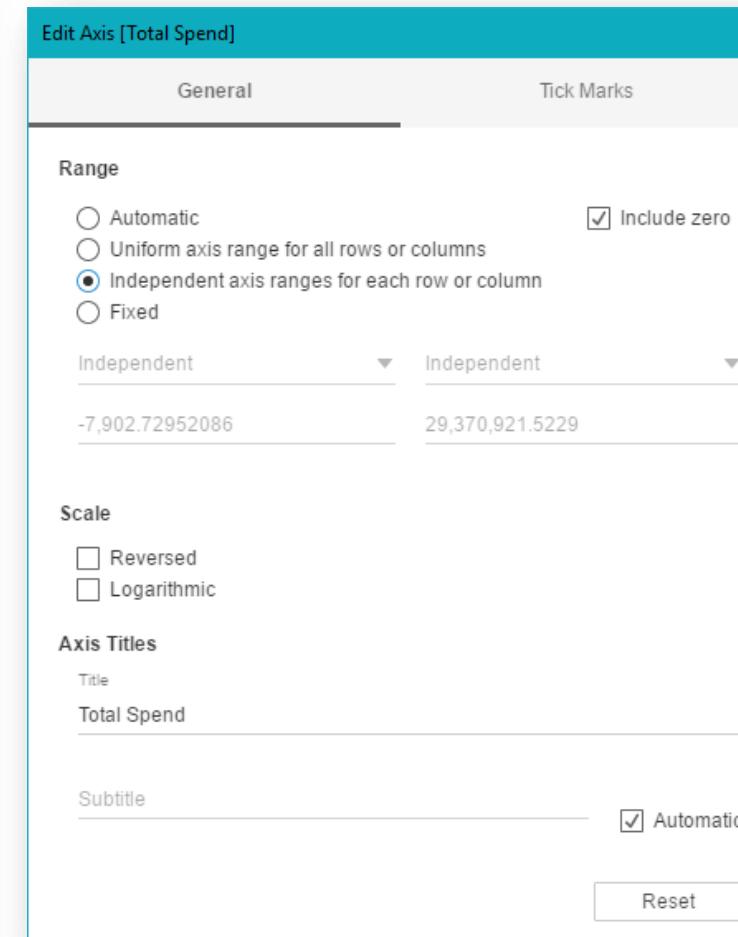
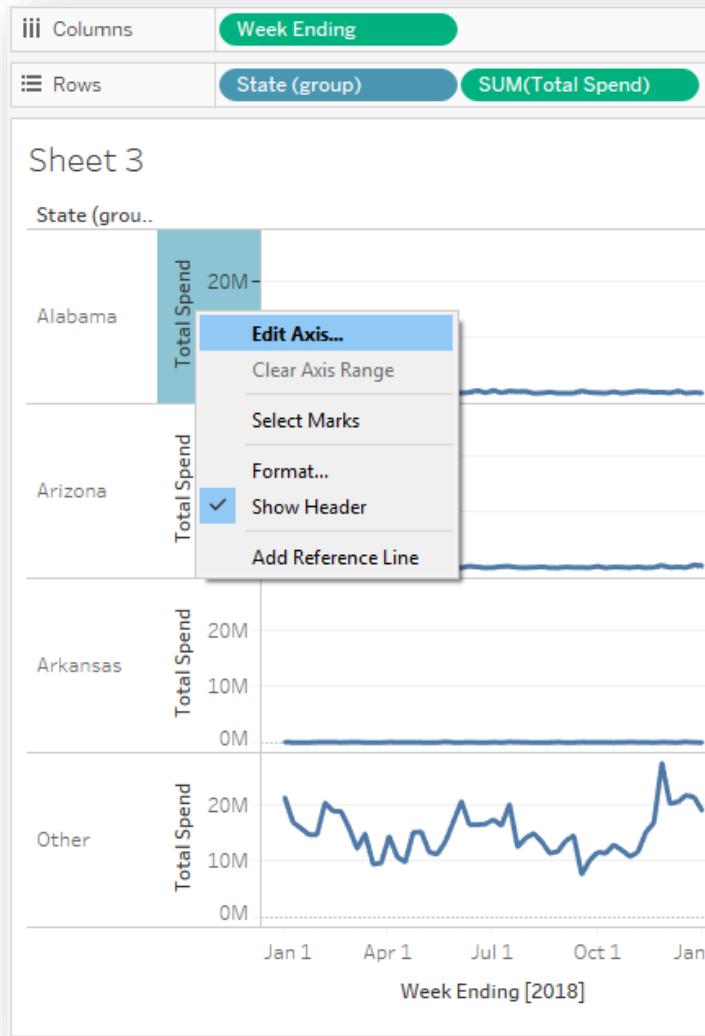


Table calculations can be used to transform existing measures based on the dimensions in your views



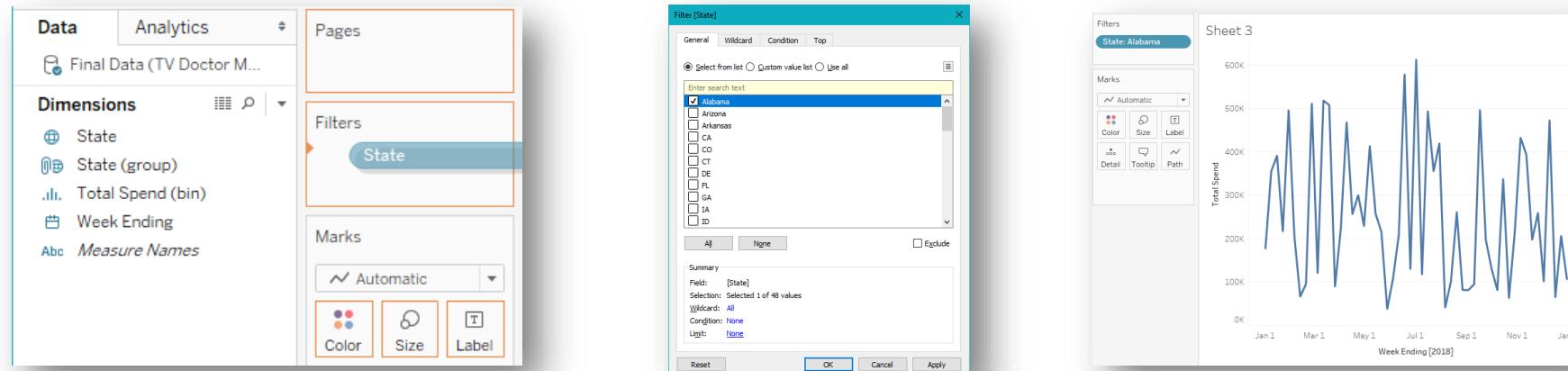
# Enterprise Analytics Office

When working with dimensions, it may be helpful to show independent ranges for each axis. To do this and view other axis settings, right-click on the axis and choose “Edit Axis”

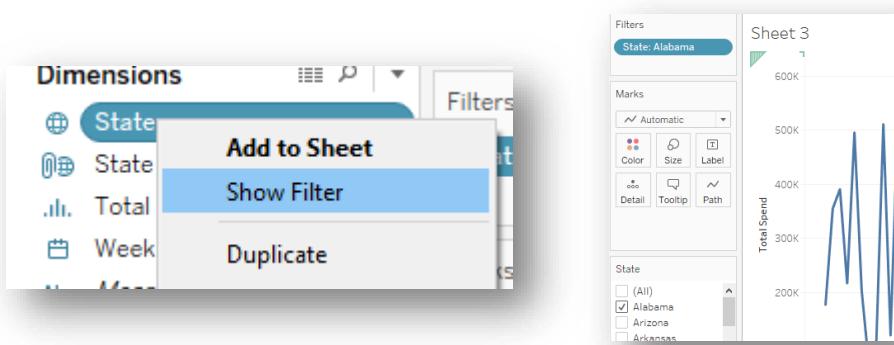


To add filters to a viz, drag the variable you want to filter onto the Filters shelf

- Filters are covered in greater detail in the “Building Your Tableau Toolkit” session

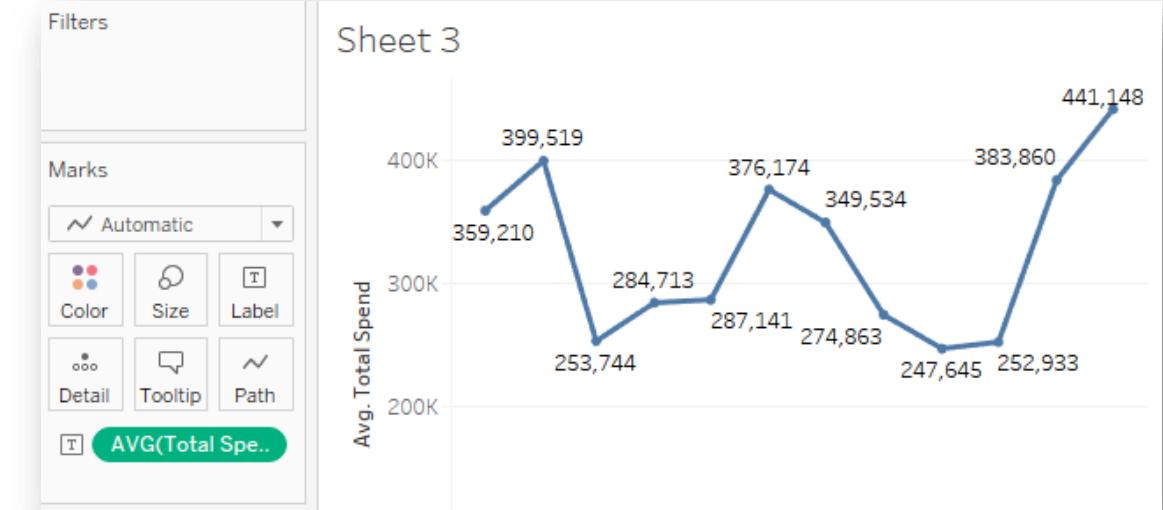
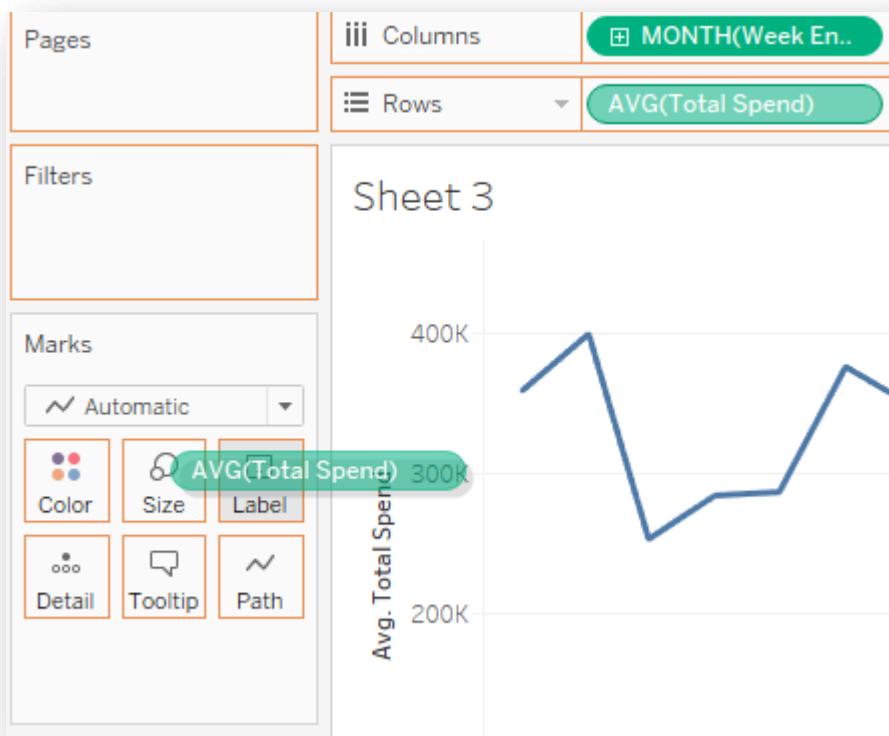


Add interactive filters by right-clicking on a field and choosing “Show Filter”



To use an existing pill on the canvas, control-click on the pill and drag the pill to the desired location

- For example, to add labels to a viz showing average spend, control-click on the AVG(Total Spend) pill and drag it to “Label”



# Hands-on Lab Exercise

## TV Doctor Medical Spend

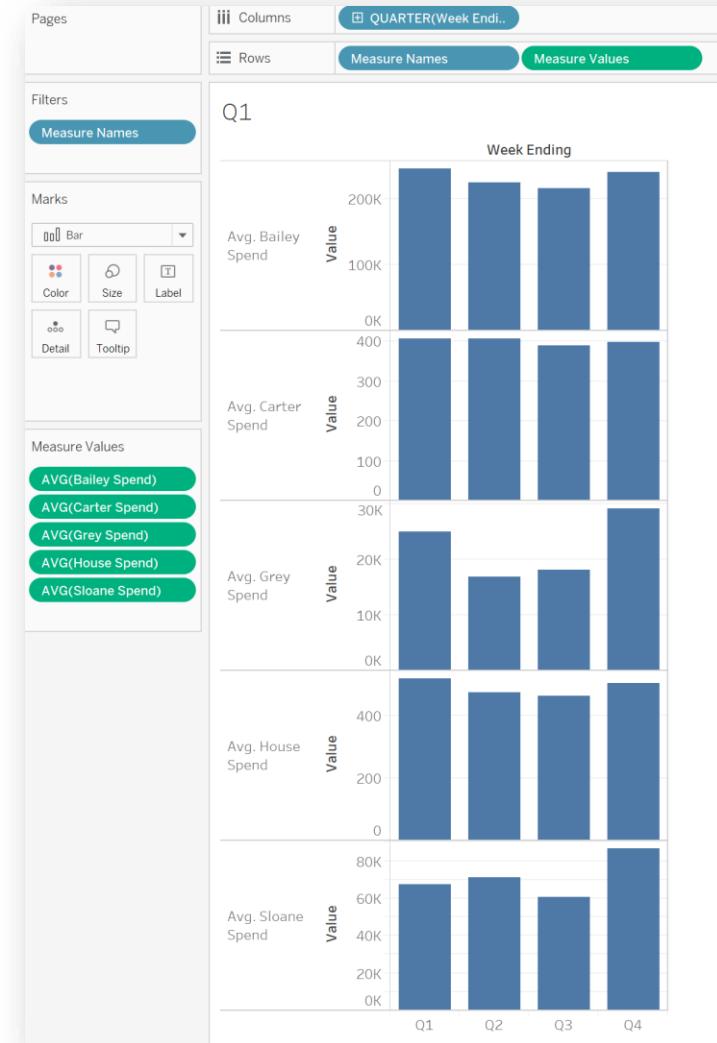
## Description of Example Data File (TV Doctor Medical Spend)

- This Excel file contains weekly research & development spend by several famous doctors portrayed on TV, for the lower 48 states
- Description of Columns
  - **Week Ending:** Date (1/1-12/31/18)
  - **State:** Two-letter abbreviation
  - **Spend (\$), by Doctor** (column name in **Bold**):
    - Dr. Miranda **Bailey**
    - Dr. John **Carter**
    - Dr. Meredith **Grey**
    - Dr. Gregory **House**
    - Dr. Mark **Sloane**
  - **Cost Factor:** Fictional blend of macroeconomic and internal metrics that represent the overall regulatory and competitive environment

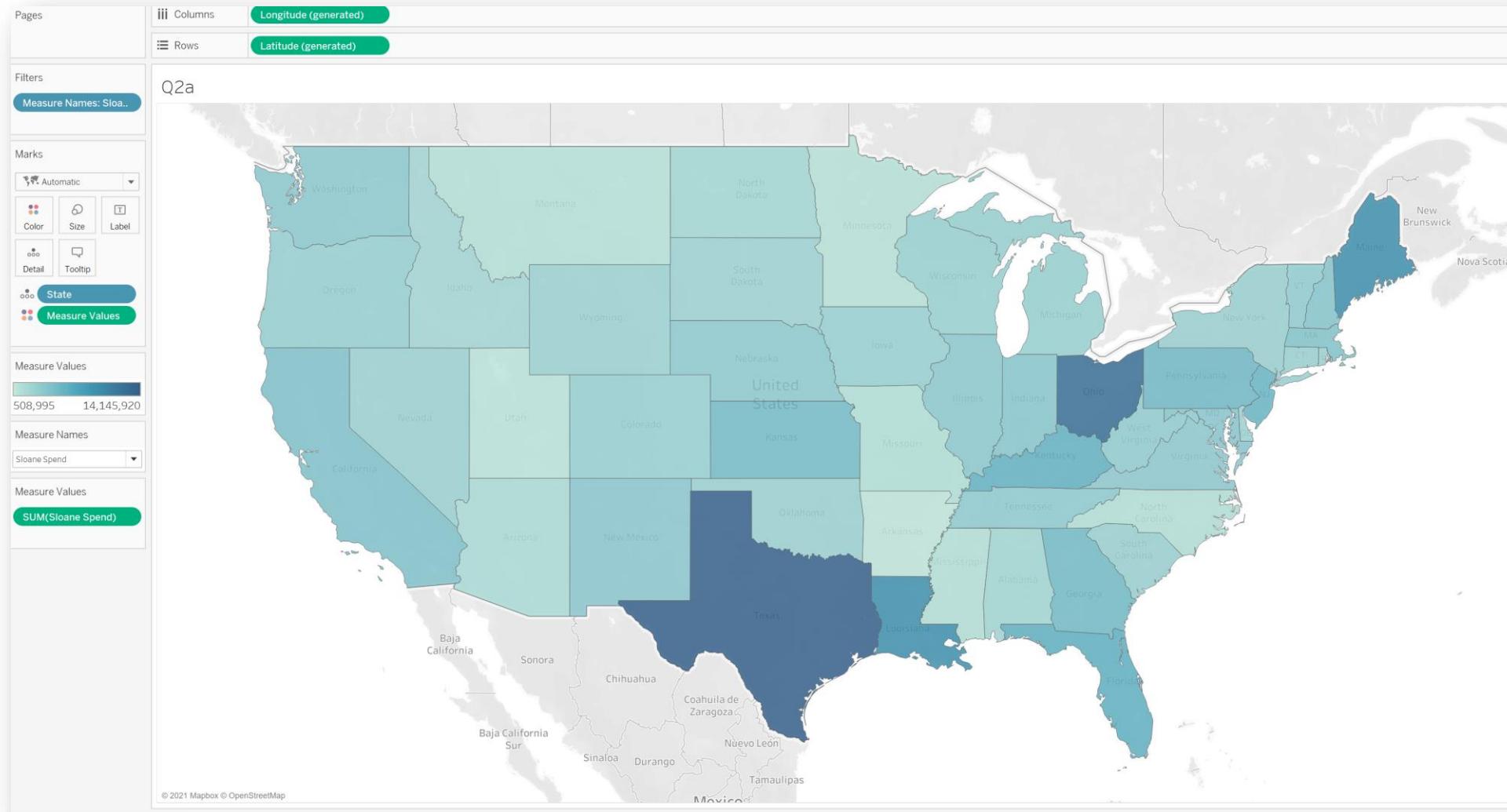
## Your task is to build visualizations that answer the following questions

1. What is the average spend by doctor, by quarter?
2. How does R&D spend vary by state and by doctor?
3. Is there a particular time of year that large month-to-month changes in spend occur? For which doctor(s)?
4. Does there appear to be any type of correlation between the Cost Factor and R&D spend?

## Example Viz – Question 1



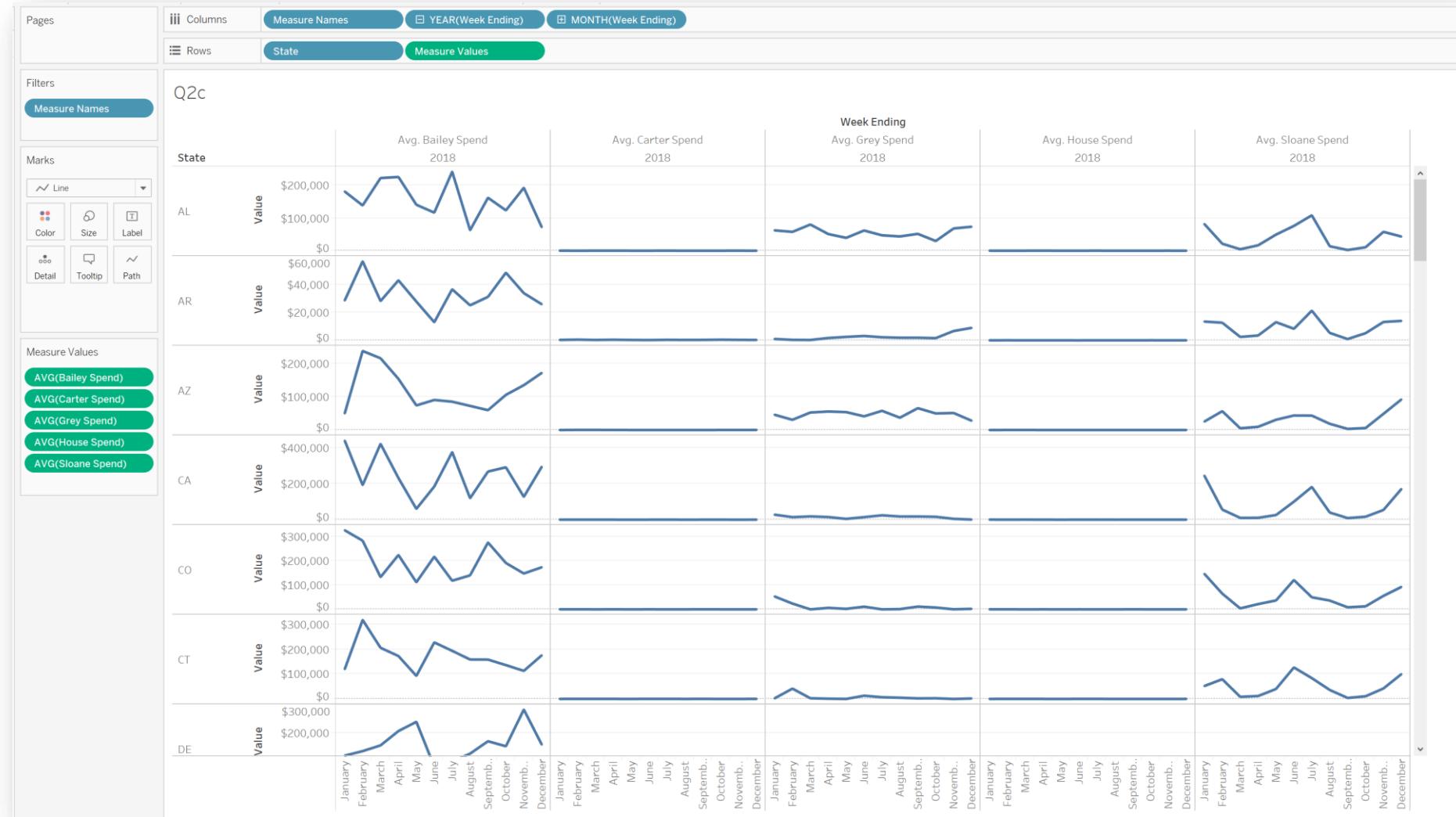
## Example Viz – Question 2



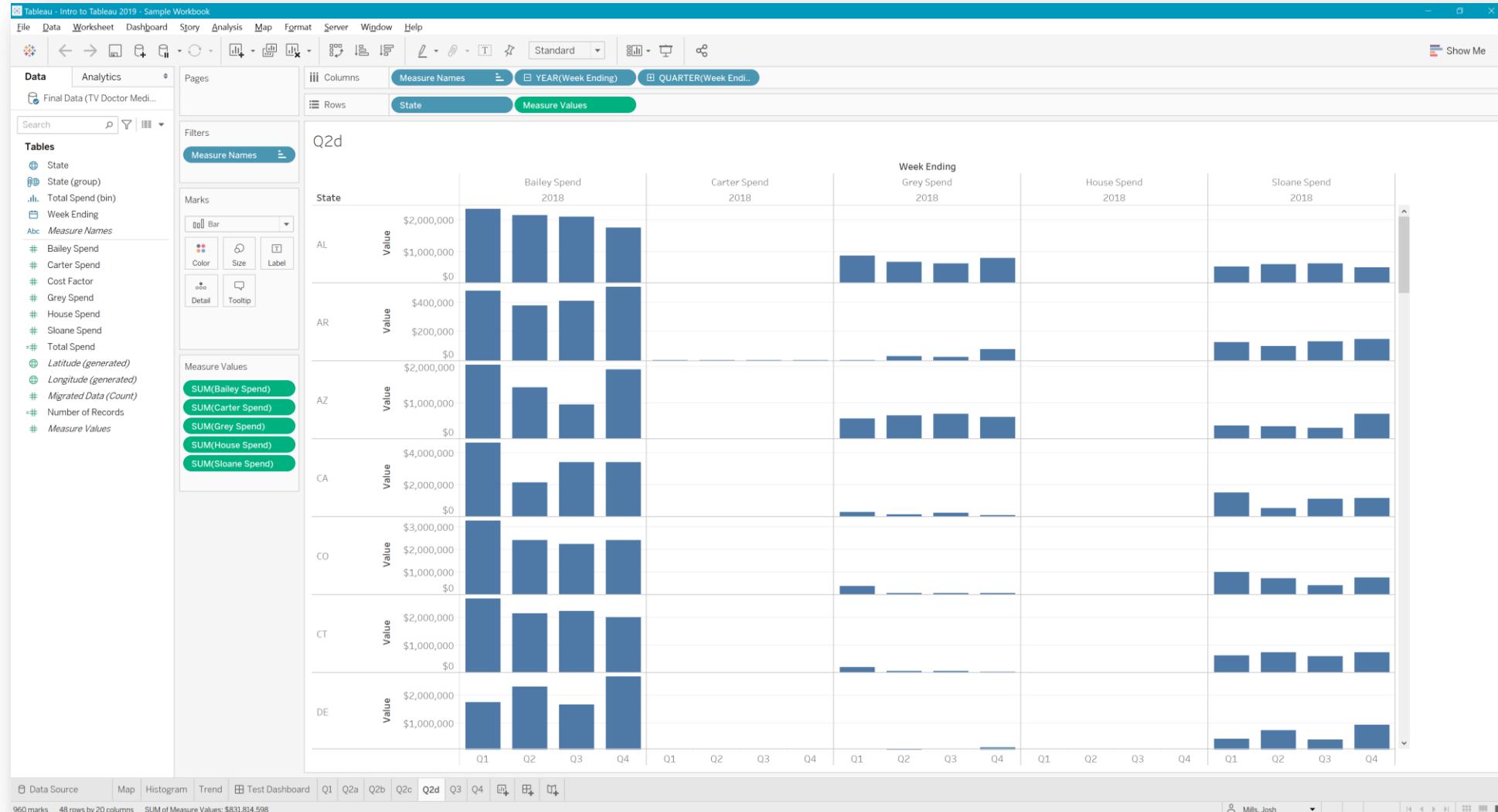
## Example Viz – Question 2



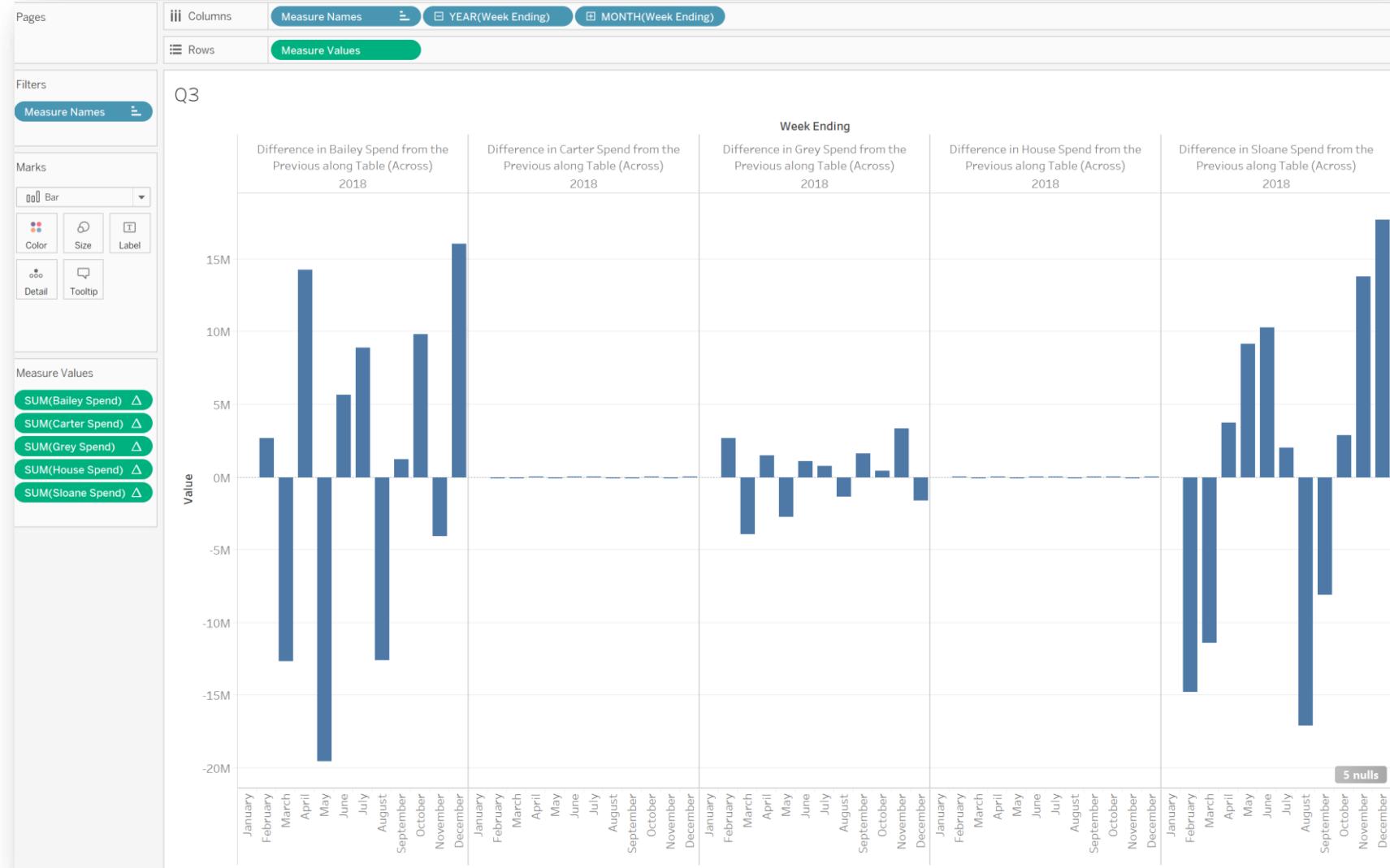
## Example Viz – Question 2



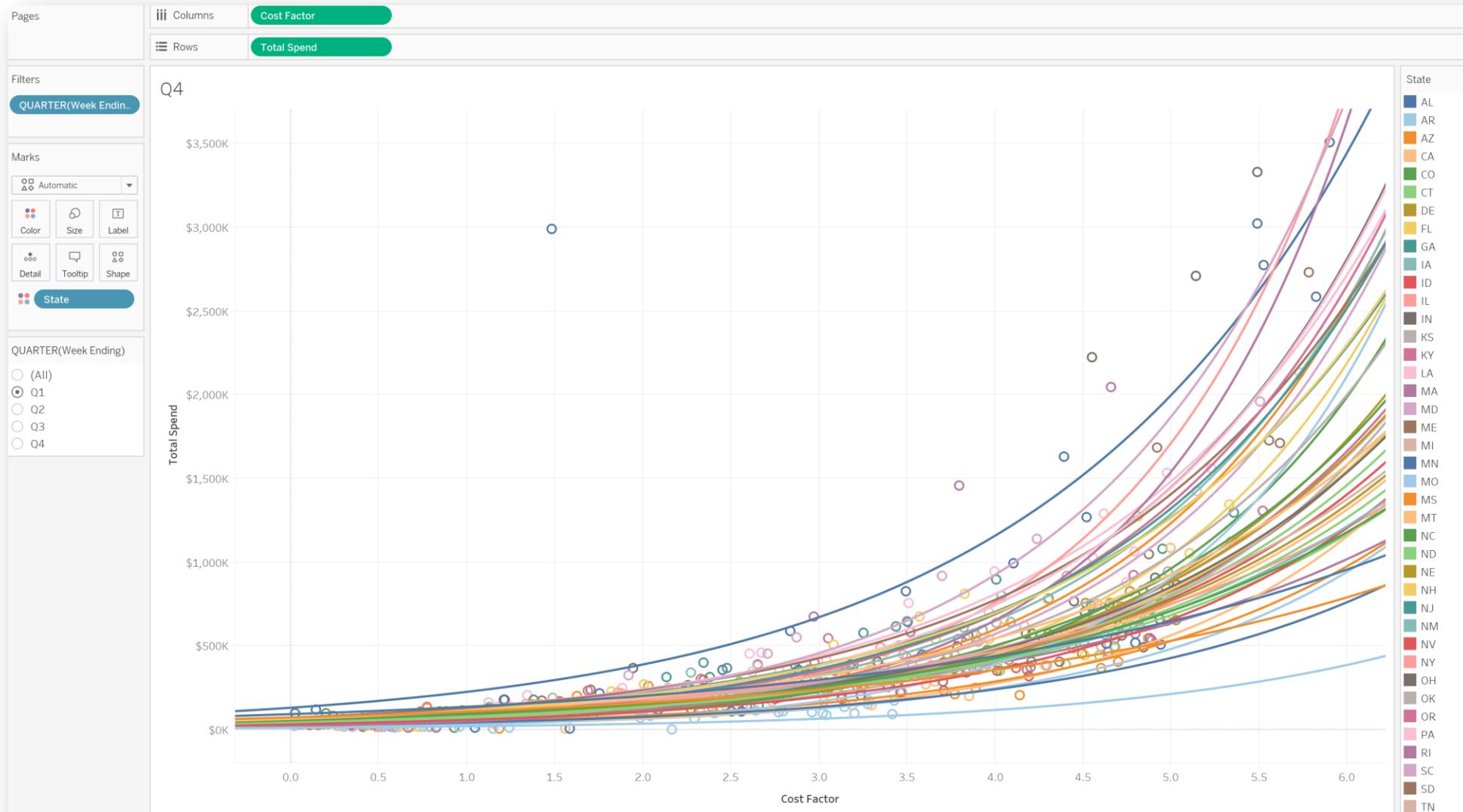
## Example Viz – Question 2



## Example Viz – Question 3



## Example Viz – Question 4



# Additional Resources and Further Information

## Internal Resources

### ▪ Nationwide Tableau SharePoint Site

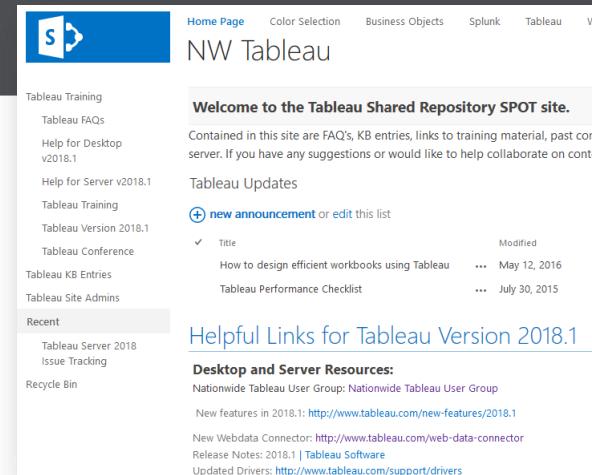
- <https://onyourside.sharepoint.com/sites/tableau/SitePages/Home.aspx>
- Contains FAQs about licensing and renewals

### ▪ Tableau Users Yammer Group

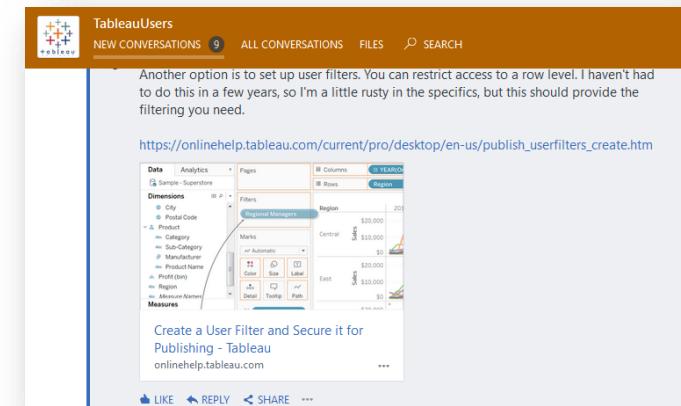
- [https://www.yammer.com/nationwide.com/#/threads/inGroup?type=in\\_group&feedId=482035](https://www.yammer.com/nationwide.com/#/threads/inGroup?type=in_group&feedId=482035)
- Great resource for ideas and troubleshooting
- 660 active users as of 5/14/21

### ▪ Tableau User Group

- <https://onyourside.sharepoint.com/sites/TableauUsers>
- Contains useful materials and links for learning Tableau



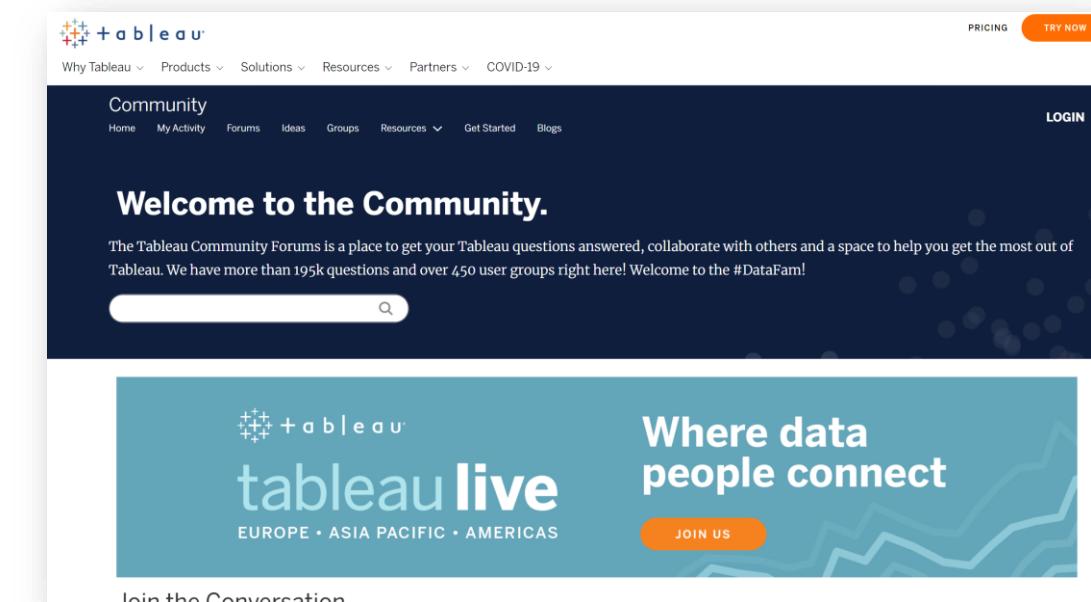
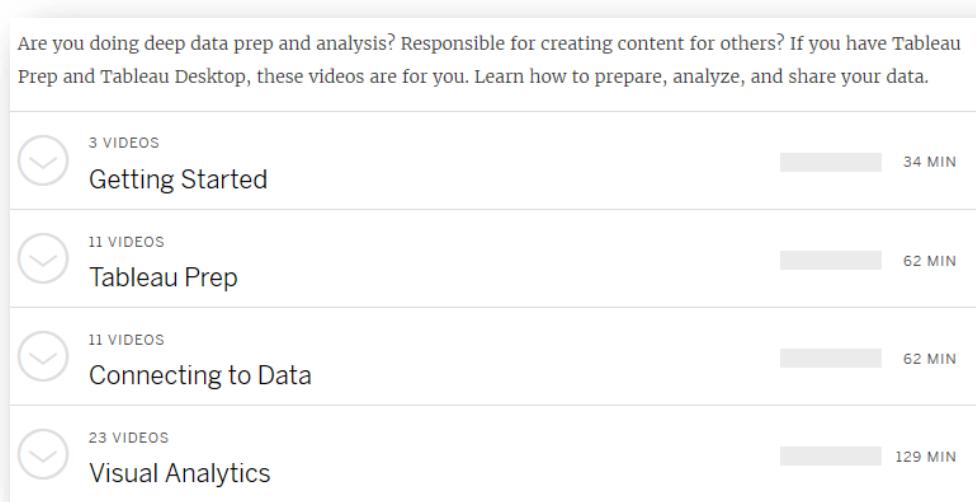
The screenshot shows the homepage of the Nationwide Tableau SharePoint Site. At the top right, there is a navigation bar with links for Home Page, Color Selection, Business Objects, Splunk, Tableau, and Help. Below the navigation is a large blue header with the Tableau 'S' logo. The main content area has a sidebar on the left containing links for Tableau Training, Tableau FAQs, Help for Desktop v2018.1, Help for Server v2018.1, Tableau Updates, and a recent items section. The main content area features a "Welcome to the Tableau Shared Repository SPOT site." message, a "new announcement" link, and a "Helpful Links for Tableau Version 2018.1" section.



The screenshot shows a Yammer post from the TableauUsers group. The post includes a screenshot of a Tableau dashboard with a tooltip overlay that says "Create a User Filter and Secure it for Publishing - Tableau onlinehelp.tableau.com". The post has a like, reply, share, and more options button at the bottom.

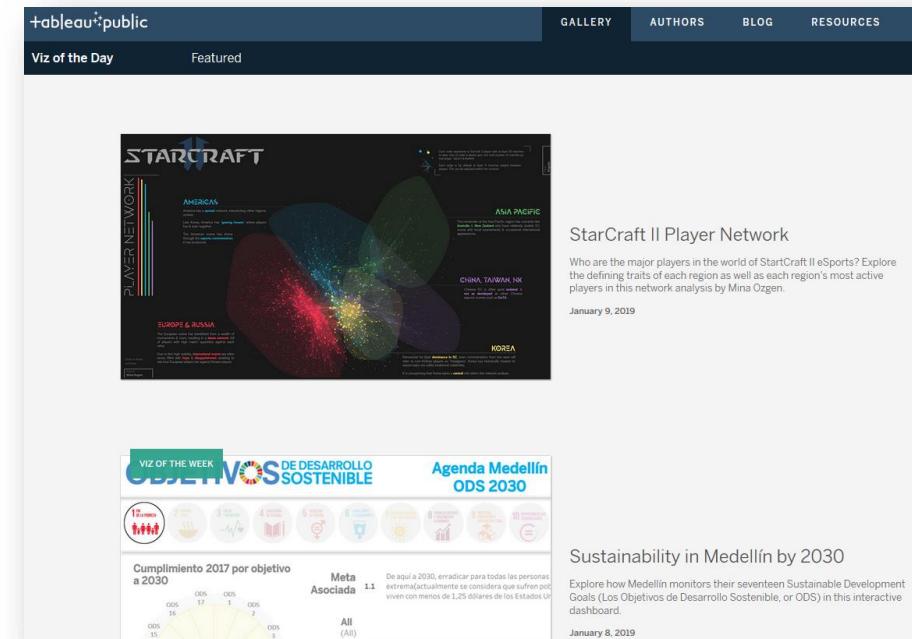
## External Resources

- **Training Videos** – Tableau has many hours of training videos that walk you through both basic and advanced features. (Free registration required)
  - <http://www.tableau.com/learn/training>
- **Communities and Forums** – Tableau's online forums provide a wealth of knowledge to answer almost any question you would have about Tableau
  - <http://community.tableau.com>



# Tableau Public Viz Gallery

- URL: <https://public.tableau.com/en-us/s/gallery>
- Contains a wide variety of examples of interesting vizzes and dashboards from authors across the worlds
- Many of these vizzes can be downloaded and used as inspiration
- **WARNING:** Do NOT publish any vizzes containing NW-owned data to Tableau Public!



The screenshot displays the Tableau Public website interface. At the top, there's a dark header with the 'tableau public' logo, a search bar, and navigation links for GALLERY, AUTHORS, BLOG, and RESOURCES. Below the header, there are tabs for 'Viz of the Day' and 'Featured'. The main content area shows two dashboard cards.

**StarCraft II Player Network**: This card features a complex network visualization titled 'StarCraft II'. It shows interconnected clusters of colored dots representing different regions: AMERICAS (red), ASIA PACIFIC (blue), CHINA, TAIWAN, HK (green), KOREA (yellow), and EUROPE & RUSSIA (purple). The visualization is overlaid on a dark background with text describing the player network. It was published on January 9, 2019.

**Sustainability in Medellín by 2030**: This card is labeled 'VIZ OF THE WEEK' and 'OBJETIVOS DE DESARROLLO SOSTENIBLE'. It displays a dashboard titled 'Agenda Medellín ODS 2030'. The dashboard includes a grid of icons representing various UN Sustainable Development Goals (SDGs) and a chart showing progress towards Goal 1 (No Poverty) from 2015 to 2017. It also includes a section on extreme poverty and a summary of the 17 SDGs. It was published on January 8, 2019.

## Tableau Server Information (EAO)

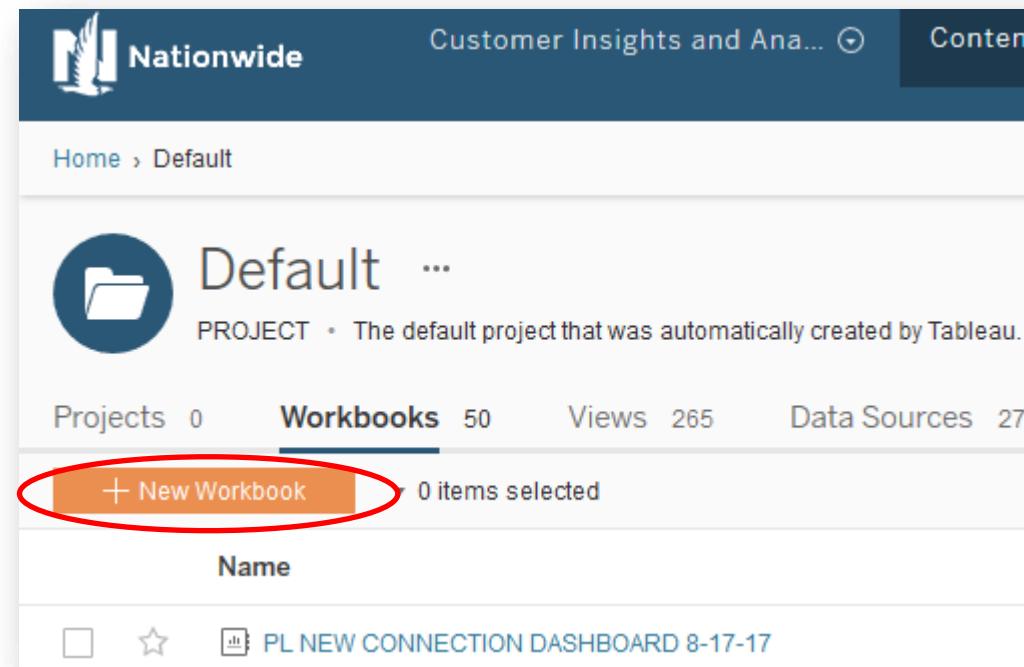
- **EAO Contact:** Josh Mills ([millj148@nationwide.com](mailto:millj148@nationwide.com))
  - Questions on access, permissions, general support
- **Enterprise Contact:** Tableau Server Infrastructure Group
  - [NSC-TABLEAU-INFRASTRUCTURE-team.email@nationwide.com](mailto:NSC-TABLEAU-INFRASTRUCTURE-team.email@nationwide.com)
  - Questions on upgrades, installations, licensing, server status
- **Tableau Server Location:**
  - [Tableau Server Test](#)
  - [Tableau Server Prod](#)

# Appendix

## A Quick Tour of Tableau's Web Authoring Interface

# Enterprise Analytics Office

Navigate to your department's Tableau Server site, then click on "New Workbook"



A window will appear with the list of available published data sources. Choose “TV Doctor Medical Spend” and click “Add data source”

Connect to Data

Search data sources 

Name	Views: All	Workbooks	Connects To	Project	Owner
NF_EMAIL_LEADS (RPT_MCIA_APP.NF_EMAIL_LEADS) (RPT_MCIA_APP) (2)	2193	5	nidbc.nwie.net	Nationwide Financial	Minogu, J
NOE HVS Analysis Custom SQL	0	0	nidbc.nwie.net	MarTech	Myers, I
NPV_FINAL_PROPERTY_OUTPUT (CA_SIF.NPV_FINAL_PROPERTY_OUTPUT) (CA_SIF)	115	1	nidbc.nwie.net	Google Analytics	Pitzer, C
NPV_FINAL_PROPERTY_OUTPUT (CA_SIF.NPV_FINAL_PROPERTY_OUTPUT) (CA_SIF)	0	0	nidbc.nwie.net	Partner Requests	Pitzer, C
NSS Sales Calls Daily	0	0	nhplorac0004-vip.nwie.net	Default	Mills, J
PLSC 90d Call and HH 2	0	0	nidbc.nwie.net	Default	Colucci, M
Policy Type Summary	44	2	nidbc.nwie.net	Default	Whetzel, S
Quote Events and Policies	549	1	nidbc.nwie.net	Household Metrics	Tkach, I
Quote Events by Channel and All Products	0	0	nidbc.nwie.net	Default	Tkach, I
Quote Events by Chnl and Product	0	0	nidbc.nwie.net	Default	Tkach, I
SA 90 Day Policy Cancel Reasons	0	0	nidbc.nwie.net	Default	Kurtz, J
SA 90 Day Retained by Risk Category	0	0	nidbc.nwie.net	Default	Kurtz, J
spot.nwie.net/site/MarTechStrategy/_vti_bin/ListData.svc/TeamInitiatives	95	0	http://spot.nwie.net/site...	MarTech	Stauffer, J
SRH_EQ_Load_File_Final_4Tableau (CA_PAY_PER_MKTG.SRH_EQ_Load_File_Final_4Tabl...	45	0	nidbc.nwie.net	Partner Requests	Hartman, J
State Tiles (Grid Map Source)	44	2	Grid Map Source.xlsx	Default	Whetzel, S
TV Doctor Medical Spend	0	0	TV Doctor Medical Spen...	Default	Mills, J

 Add data source



# Enterprise Analytics Office

New Workbook

X

File Data Worksheet Dashboard Analysis Map Format Help

Mills, Josh ▾



Show Me

Data Analytics

TV Doctor Medical Sp...

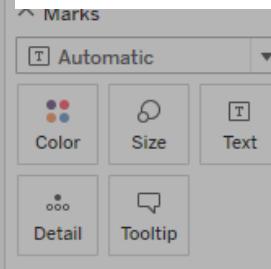
## Dimensions

- State
- Week Ending
- Measure Names

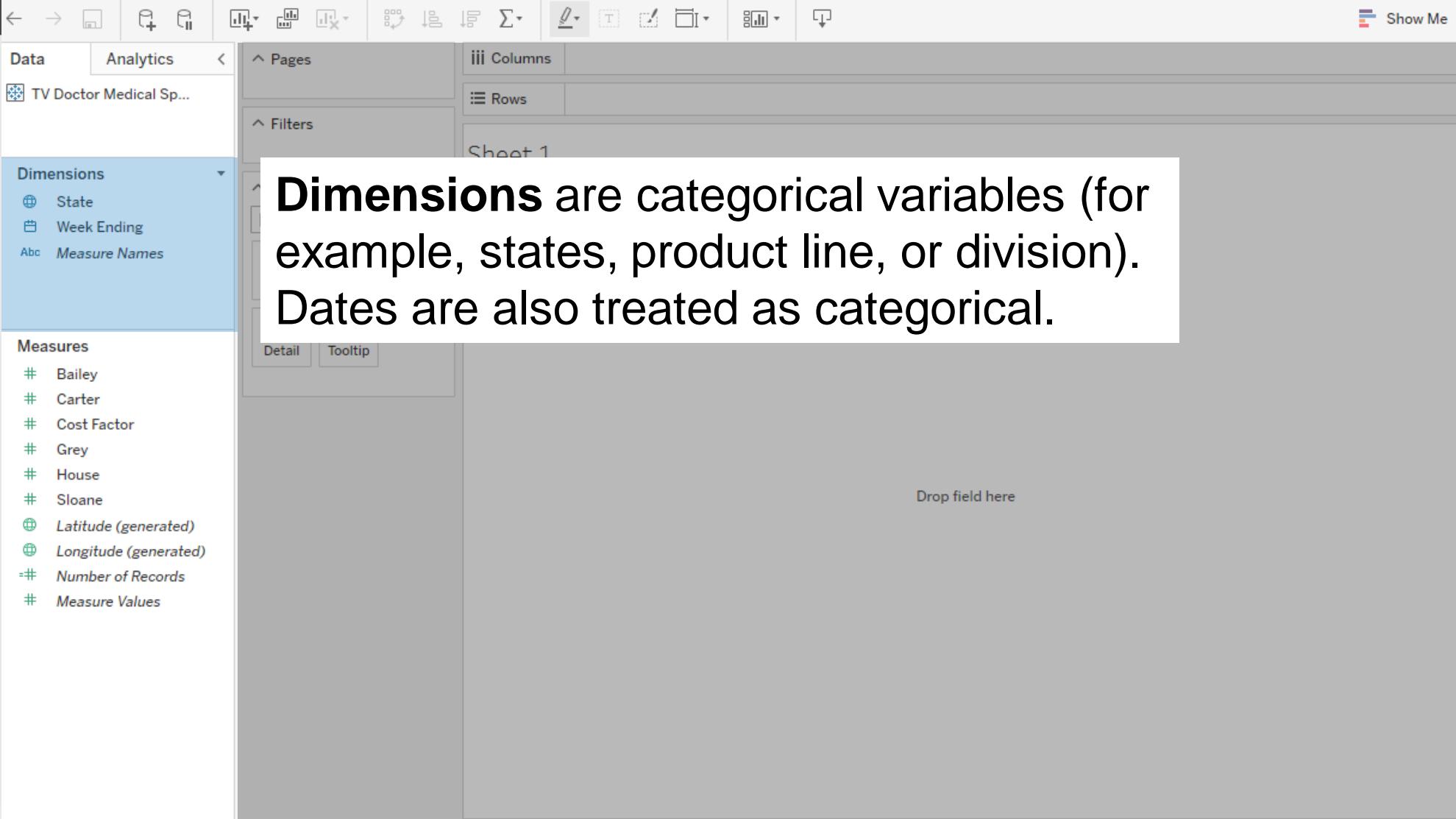
## Measures

- Bailey
- Carter
- Cost Factor
- Grey
- House
- Sloane
- Latitude (generated)
- Longitude (generated)
- Number of Records
- Measure Values

This is the area that displays available data connections.



Drop field here



The screenshot shows the Enterprise Analytics Office software interface. At the top, there's a navigation bar with 'File', 'Data', 'Worksheet', 'Dashboard', 'Analysis', 'Map', 'Format', and 'Help' options. A user profile 'Mills, Josh' is also visible. Below the navigation bar is a toolbar with various icons for data manipulation. On the left side, there's a sidebar with sections for 'Dimensions' (listing 'State', 'Week Ending', and 'Measure Names') and 'Measures' (listing 'Bailey', 'Carter', 'Cost Factor', 'Grey', 'House', 'Sloane', and several generated fields like 'Latitude (generated)' and 'Longitude (generated)'). The main workspace is a large area with a grid for dragging dimensions and measures, with a placeholder text 'Drop field here'. A callout box in the center of the workspace contains the following text:

**Dimensions** are categorical variables (for example, states, product line, or division). Dates are also treated as categorical.



# Enterprise Analytics Office

New Workbook

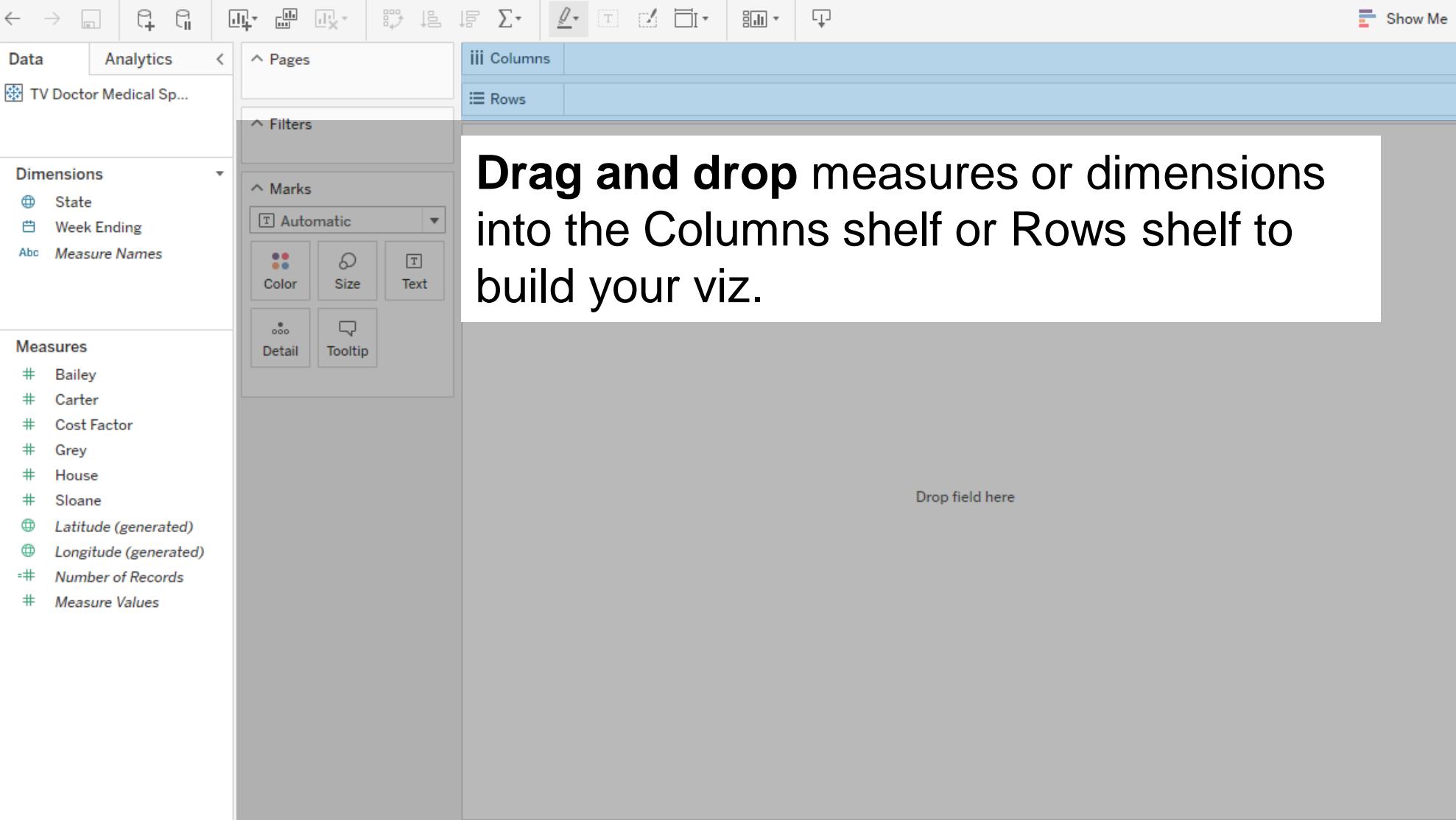
X

File Data Worksheet Dashboard Analysis Map Format Help

Mills, Josh ▾

The screenshot shows the Tableau software interface. On the left, the Data pane displays a project named "TV Doctor Medical Sp...". Under Dimensions, "State" and "Week Ending" are listed, along with "Measure Names". Under Measures, several fields are listed: Bailey, Carter, Cost Factor, Grey, House, Sloane, Latitude (generated), Longitude (generated), Number of Records, and Measure Values. The Marks shelf on the right shows the "Automatic" mark type selected, with options for Color, Size, and Text. The main workspace is titled "Sheet 1" and contains a placeholder text "Drop field here". A large white callout box with a black border is overlaid on the workspace, containing the text: "Measures are numerical variables (such as spend and revenue)."

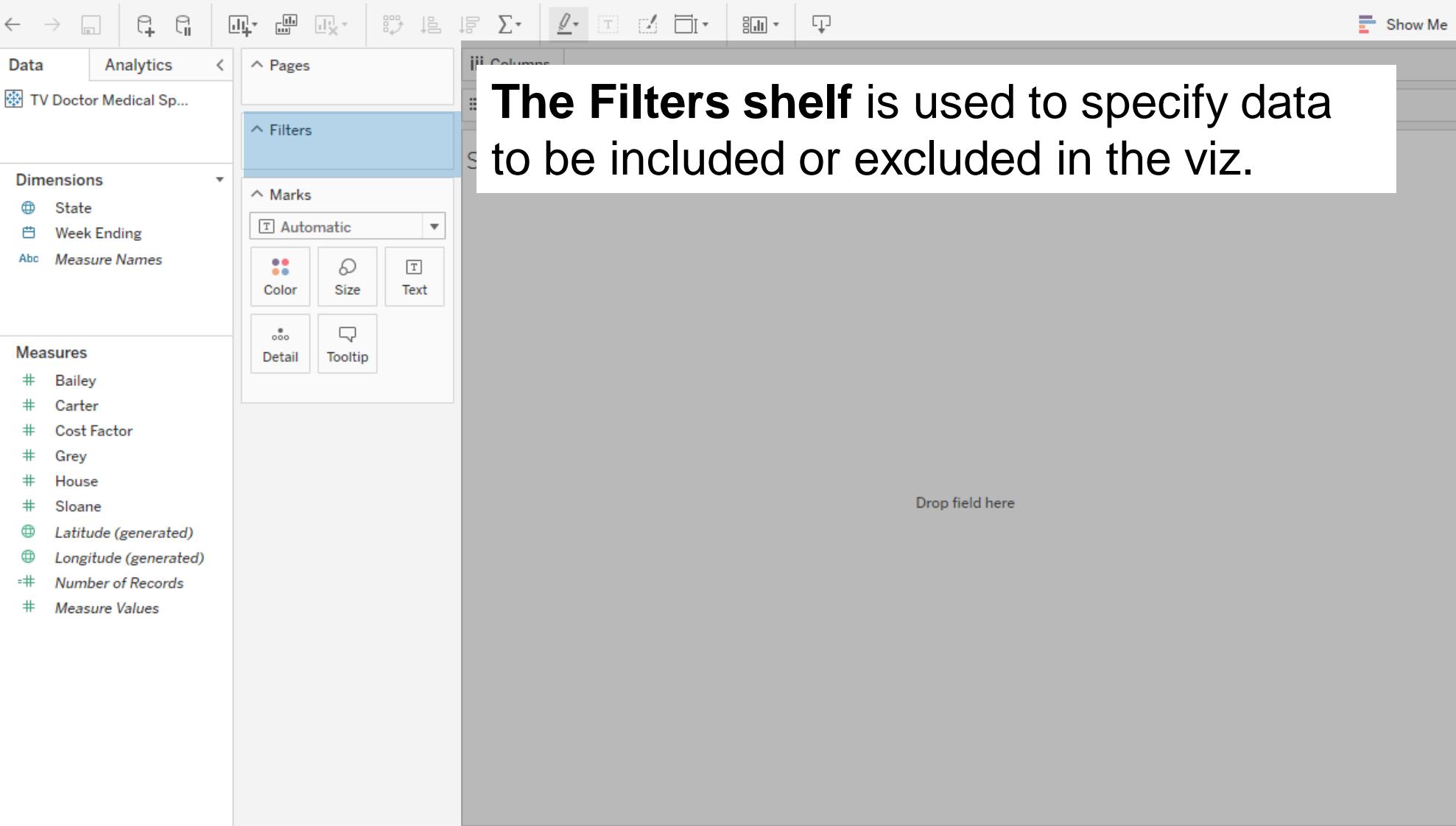
**Measures are numerical variables (such as spend and revenue).**



The screenshot shows the Tableau desktop application interface. On the left, there's a sidebar with 'Data' and 'Analytics' tabs, and a list of data sources including 'TV Doctor Medical Sp...'. Below that are sections for 'Dimensions' (State, Week Ending, Measure Names) and 'Measures' (Bailey, Carter, Cost Factor, Grey, House, Sloane, Latitude (generated), Longitude (generated), Number of Records, Measure Values). The main workspace is a large gray area with a placeholder text 'Drop field here'. Above the workspace, a prominent callout box contains the text: 'Drag and drop measures or dimensions into the Columns shelf or Rows shelf to build your viz.'

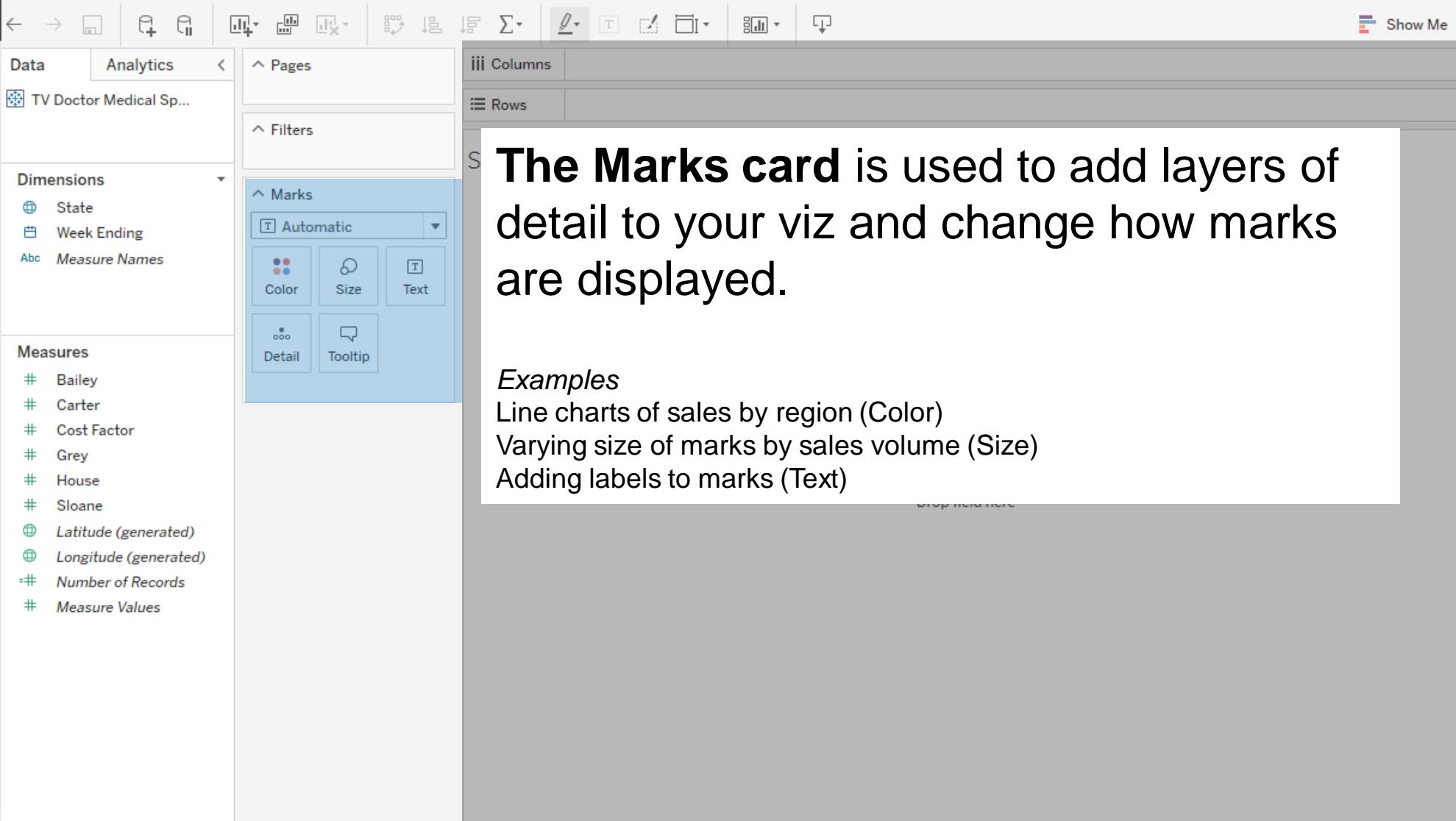
Drag and drop measures or dimensions into the Columns shelf or Rows shelf to build your viz.

Drop field here



The Filters shelf is used to specify data to be included or excluded in the viz.

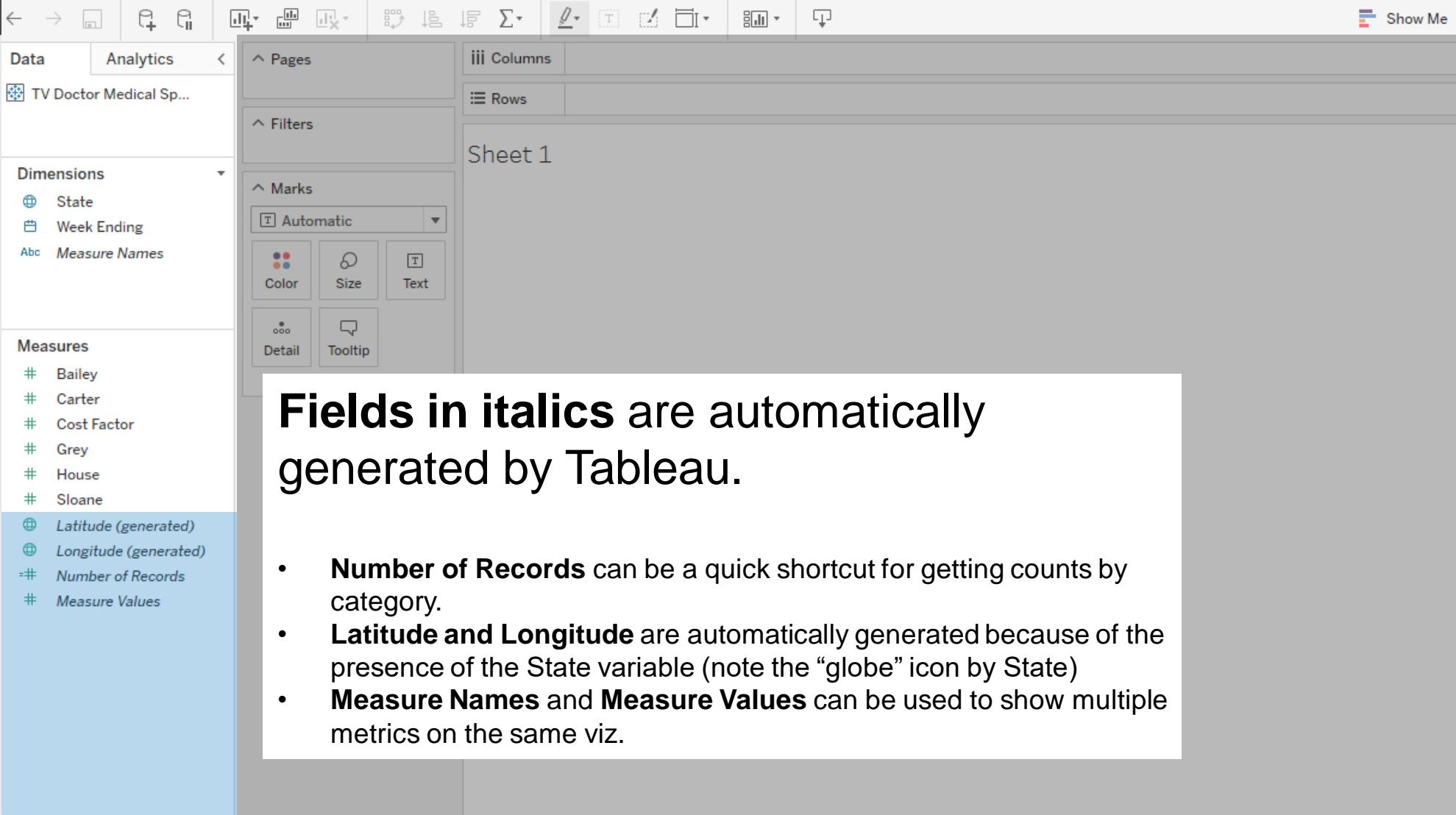
The screenshot shows the Tableau desktop interface with a "New Workbook" title bar. The menu bar includes File, Data, Worksheet, Dashboard, Analysis, Map, Format, and Help. A user profile for "Mills, Josh" is visible in the top right. The toolbar has various icons for navigation, selection, and analysis. On the left, the Data pane lists a single dataset: "TV Doctor Medical Sp...". The Dimensions pane includes "State" and "Week Ending", and the Measure Names pane includes "Bailey", "Carter", "Cost Factor", "Grey", "House", "Sloane", and several generated fields like "Latitude (generated)" and "Longitude (generated)". The Marks shelf is set to "Automatic" and shows options for Color, Size, Text, Detail, and Tooltip. A large white box highlights the "Filters" shelf, which is currently empty. A placeholder text "Drop field here" is visible in the workspace area.



The Marks card is used to add layers of detail to your viz and change how marks are displayed.

*Examples*

- Line charts of sales by region (Color)
- Varying size of marks by sales volume (Size)
- Adding labels to marks (Text)



The screenshot shows the Tableau desktop application interface. On the left, the Data pane lists dimensions like State and Week Ending, and measures like Bailey, Carter, Cost Factor, Grey, House, Sloane, and generated fields Latitude and Longitude. The Marks shelf on the right shows options for Color, Size, Text, Detail, and Tooltip.

## Fields in **italics** are automatically generated by Tableau.

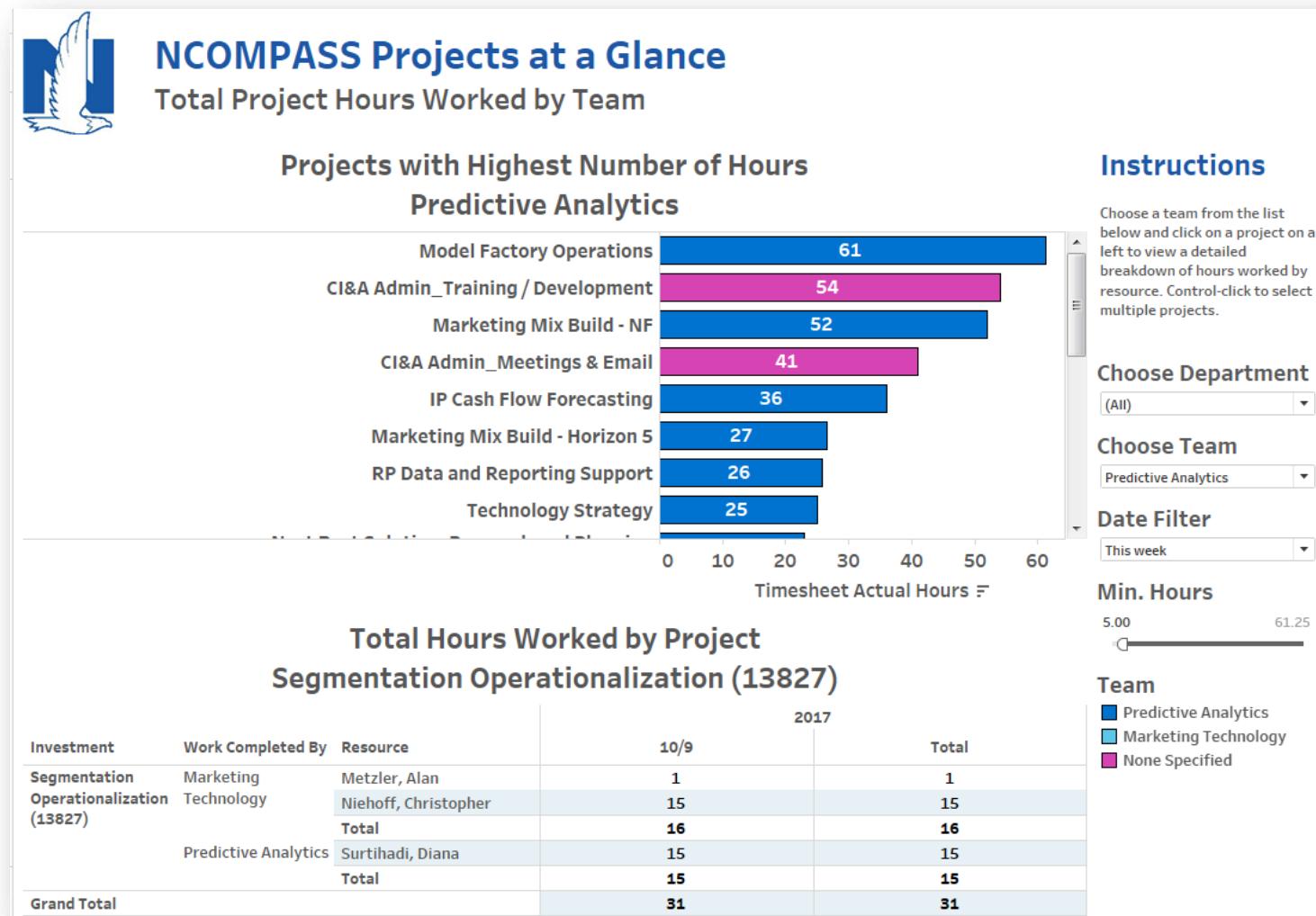
- **Number of Records** can be a quick shortcut for getting counts by category.
- **Latitude and Longitude** are automatically generated because of the presence of the State variable (note the “globe” icon by State)
- **Measure Names** and **Measure Values** can be used to show multiple metrics on the same viz.

# Appendix

## Dashboard Design in Brief

# Enterprise Analytics Office

Dashboards can provide a comprehensive view of different aspects of your data, and they can also contain images, text, and even web page links to build a comprehensive user experience



To create a dashboard, choose “New Dashboard” from the Dashboard menu

- Tableau’s dashboard interface provides options for placing a mix of sheets, text, static images, and even links to web pages
- Dashboards can be formatted to fit to specific dimensions (e.g. desktop screen, laptop screen), or they can scale to the screen they are being viewed on

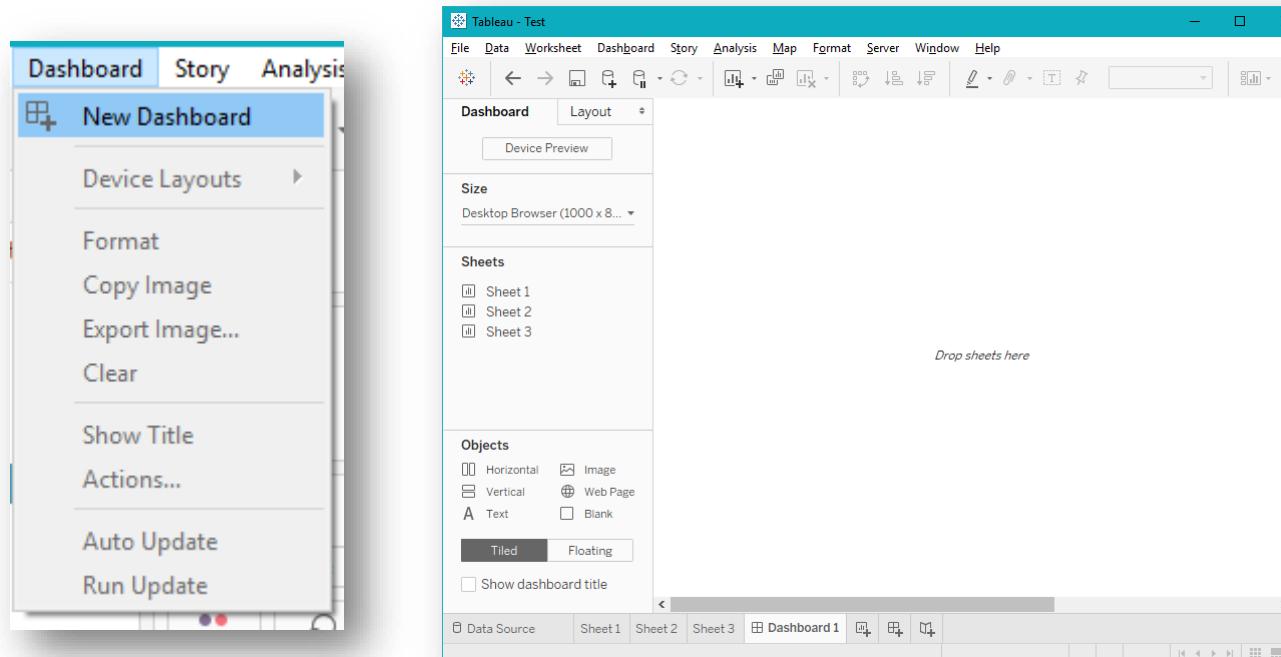


Tableau - Test

File Data Worksheet Dashboard Story Analysis Map Format Server Window Help

Show Me

Dashboard Layout Device Preview

Size Desktop Browser (1000 x 800)

Sheets

- Map
- Histogram
- Trend

Drop sheets here

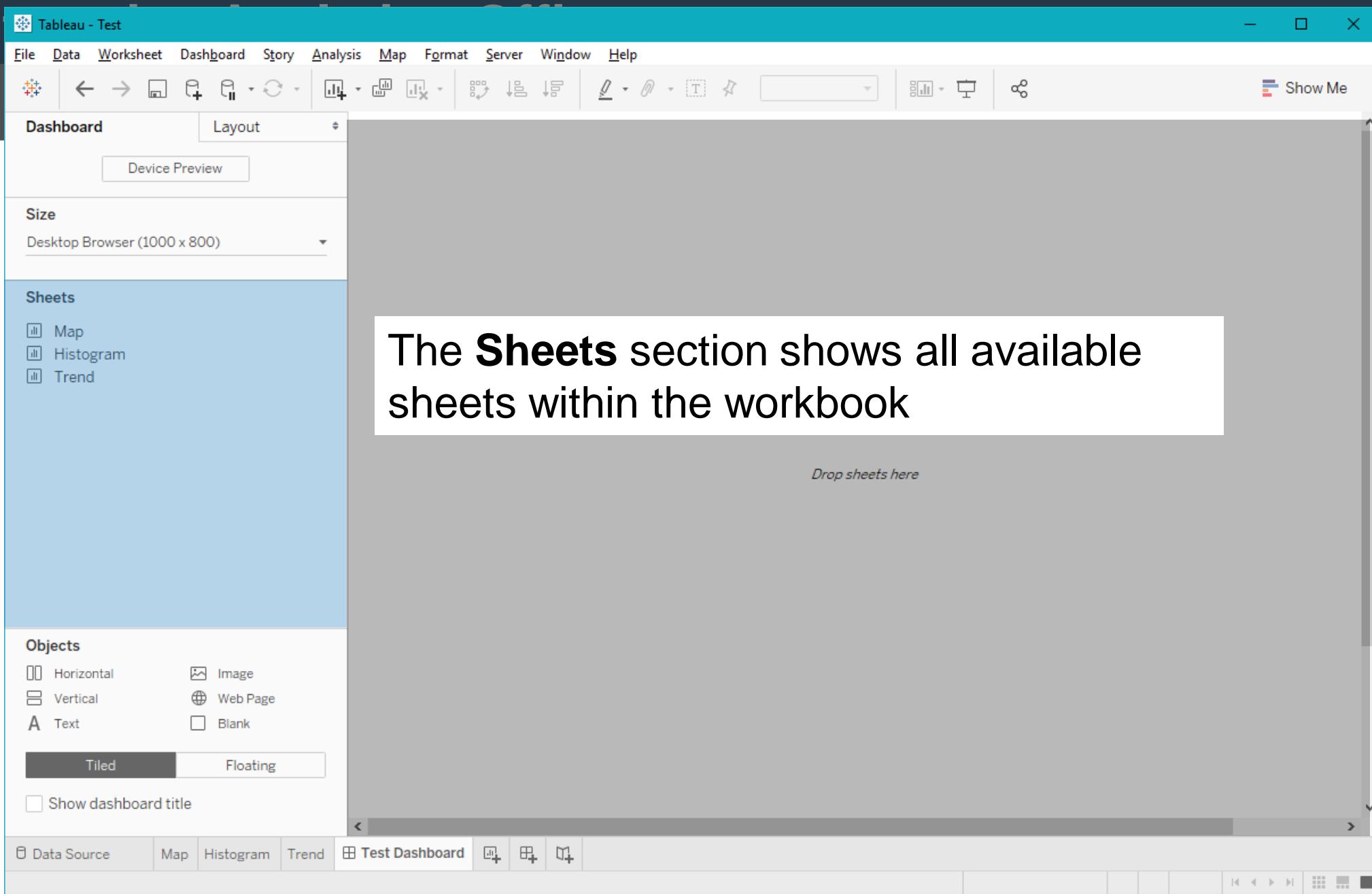
Objects

- Horizontal
- Vertical
- Text
- Image
- Web Page
- Blank

Tiled Floating

Show dashboard title

Data Source Map Histogram Trend Test Dashboard   





En

Tableau - Test

File Data Worksheet Dashboard Story Analysis Map Format Server Window Help

Show Me

Dashboard Layout Device Preview

Size Desktop Browser (1000 x 800)

Sheets

- Map
- Histogram
- Trend

Objects

- Horizontal
- Vertical
- A Text
- Image
- Web Page
- Blank

Tiled Floating

Show dashboard title

Data Source Map Histogram Trend Test Dashboard

## Different **Objects** can be dragged onto the canvas

- Examples include static images, static text, and placeholder containers to streamline the look and feel of your dashboard
- Tableau also offers the option to show dashboard components as floating objects, although this is generally not recommended

Tableau - Test

File Data Worksheet Dashboard Story Analysis Map Format Server Window Help

Show Me

Dashboard Layout Device Preview

Size Desktop Browser (1000 x 800)

Sheets

- Map
- Histogram
- Trend

Objects

- Horizontal
- Vertical
- Text
- Image
- Web Page
- Blank

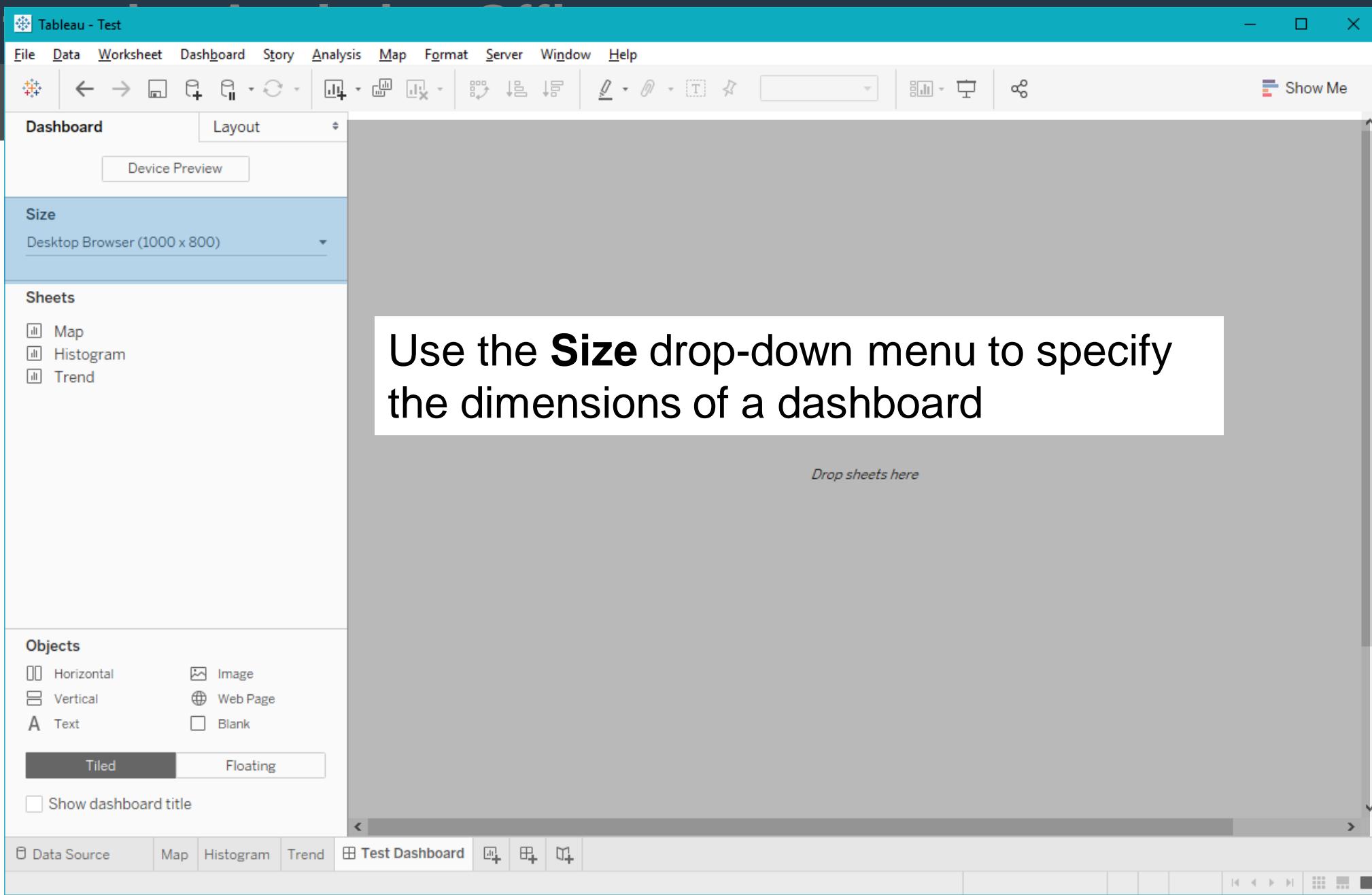
Tiled Floating

Show dashboard title

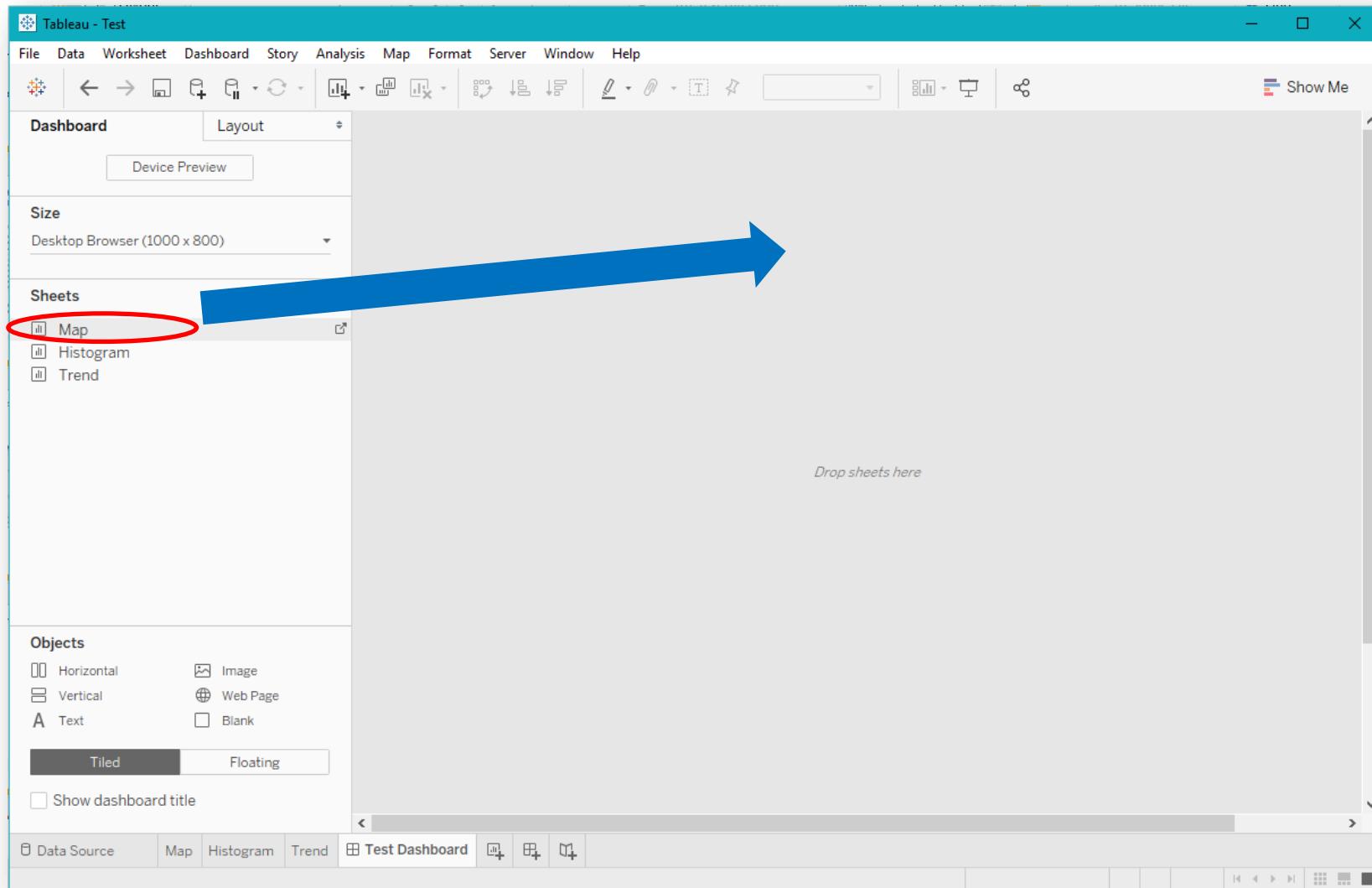
Data Source Map Histogram Trend Test Dashboard   

Drop sheets here

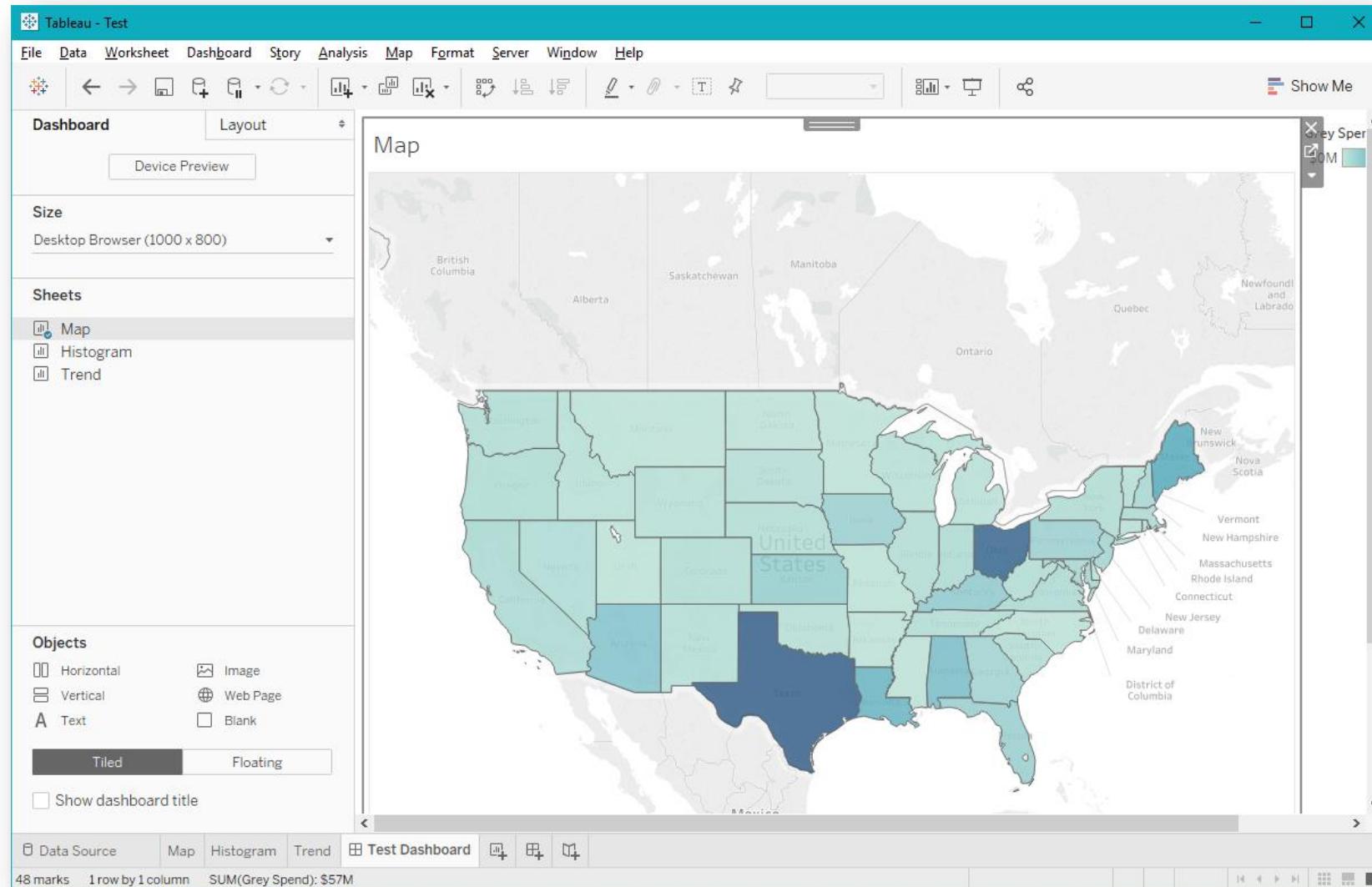
**Use the **Size** drop-down menu to specify the dimensions of a dashboard**



Add a view to a dashboard by dragging and dropping the view onto the canvas

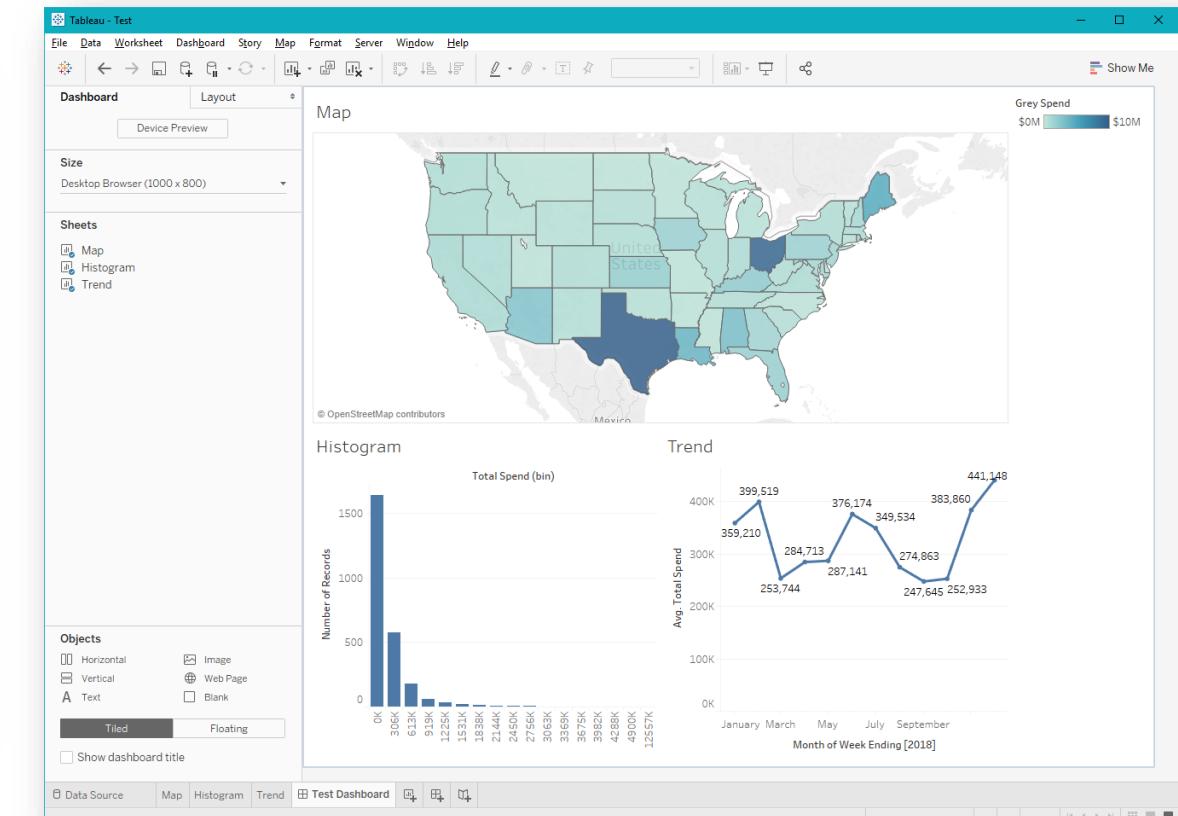
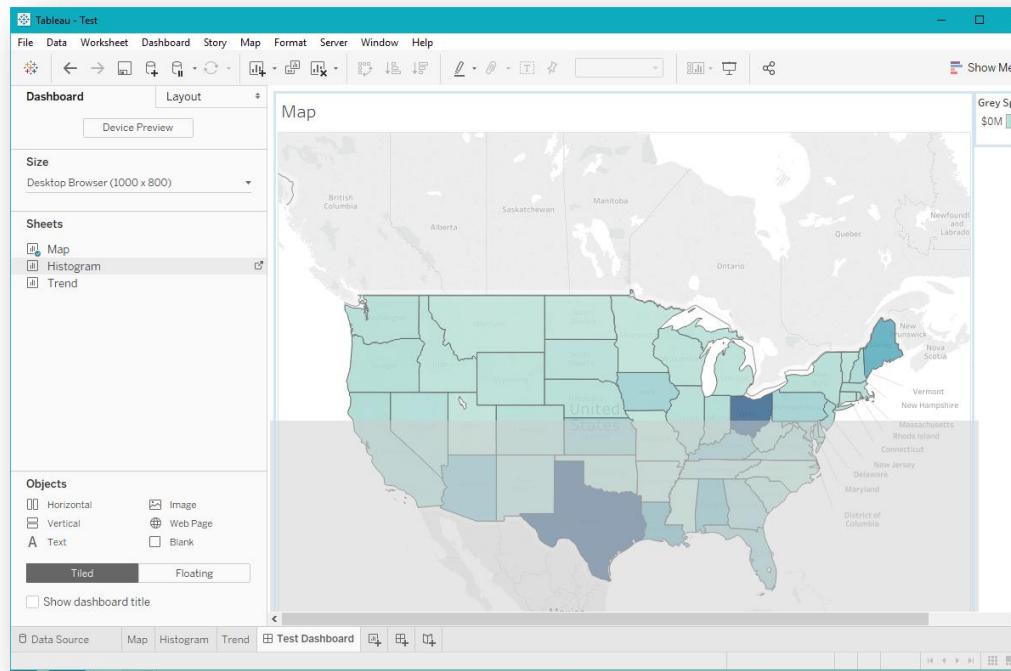


Add a view to a dashboard by dragging and dropping the view onto the canvas



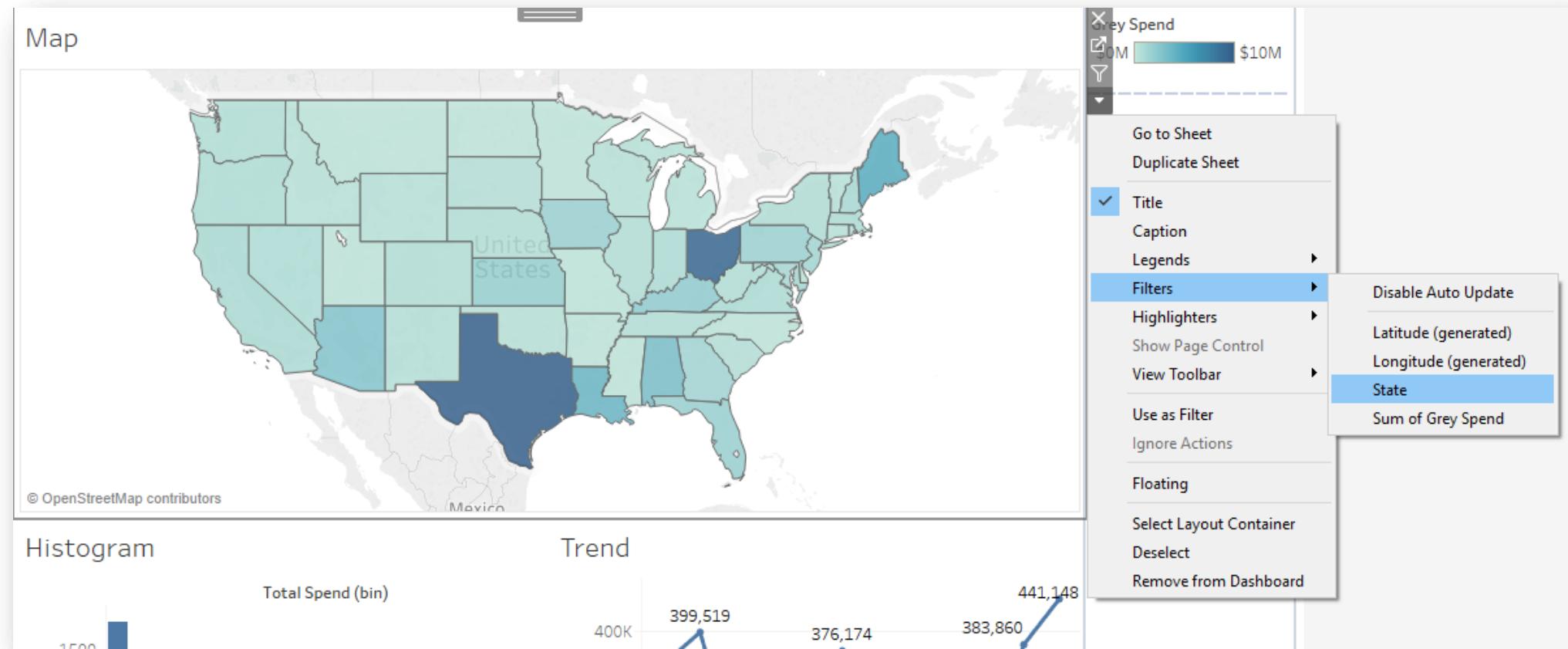
# Enterprise Analytics Office

Drag additional views to the dashboard canvas to determine how your content should be arranged. Filters and legends associated with each view will automatically be added



Other elements of a viz (such as additional filters) can be added by clicking on the drop-down menu from the title bar of each viz

TIP: Select “Use as Filter” to enable filtering of all views on the dashboard based on the selections made within the view in which the filter is being applied. (e.g. Selecting Ohio on the map will filter all other views to show only Ohio)



## A few general guidelines on dashboards

- Less can be more. Just because you can add 5 different views to a dashboard doesn't mean you should. Do not overwhelm the end user with too much information!
- The design of each dashboard will depend on the type of audience. For non-technical audiences, aim for a streamlined appearance, with clear instructions for how the dashboard should be used. Filters can provide drill-down capability, but don't use too many. Apply polish to how you present your views. Use the Nationwide brand colors, logos, and photos.
- For more technical audiences, make it easy to quickly drill down into the data. Sometimes additional filters will be necessary. If a quick answer is needed, don't spend too much time on the appearance – just do what it takes to get the job done.
- When working with many different views and filters, it can become difficult to rearrange the canvas into the exact layout you're looking for. Using horizontal and vertical containers can help ease this process somewhat.