

# Tableau

## Overview

Tableau is a data visualization and data analysis tool. It has the capability to connect to external data sources, join various data sets, summarize, and display data in dashboard format.

## Installing Tableau

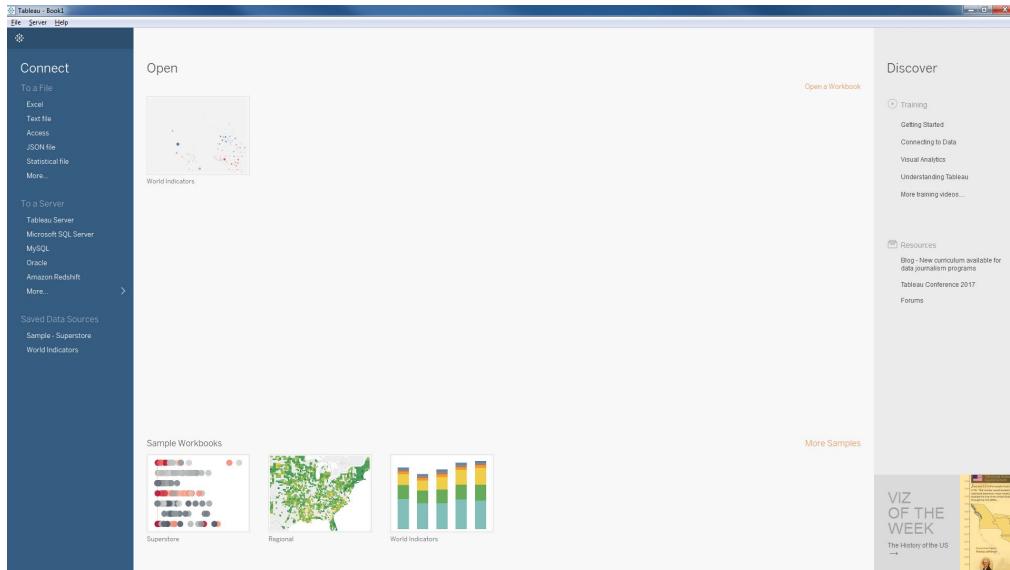
1. [Download the latest version of Tableau Desktop and Tableau Prep Builder here](#)
2. Click on the link above and select “Download Tableau Desktop” and “Download Tableau Prep Builder”. On the form, enter your school email address for Business E-mail and enter the name of your school for Organization. (Syracuse University)
3. Activate with your product key: TCS4-FECF-8B20-9DF2-FB12
4. Already have a copy of Tableau Desktop installed? Update your license in the application: Help menu → Manage Product Keys

## Starting Tableau

1. Click on the Start button in the lower left corner of Windows
2. Click on All Programs, then click on Tableau

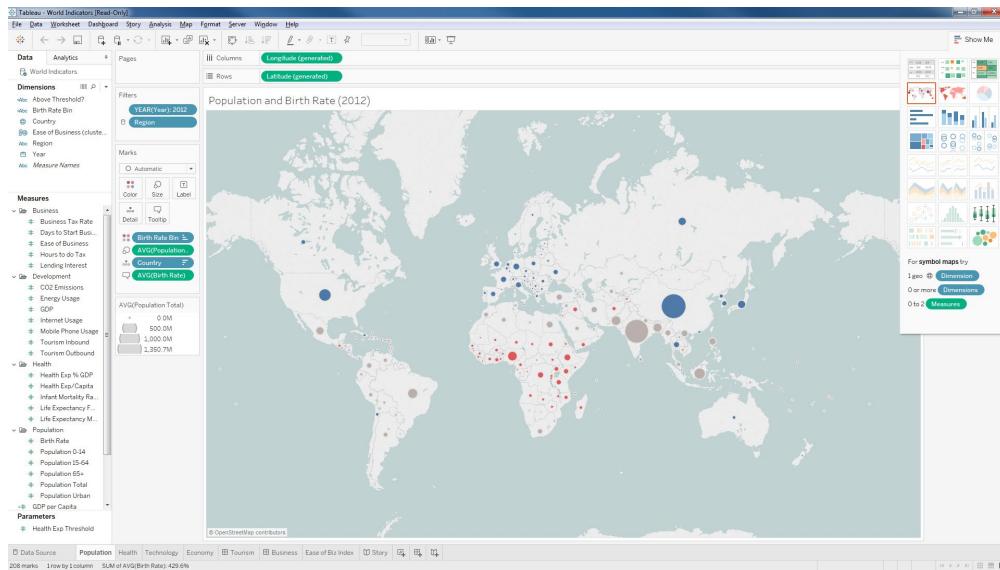
## Guided Tour of Tableau Capabilities

After opening Tableau, you should see a screen similar to the following:

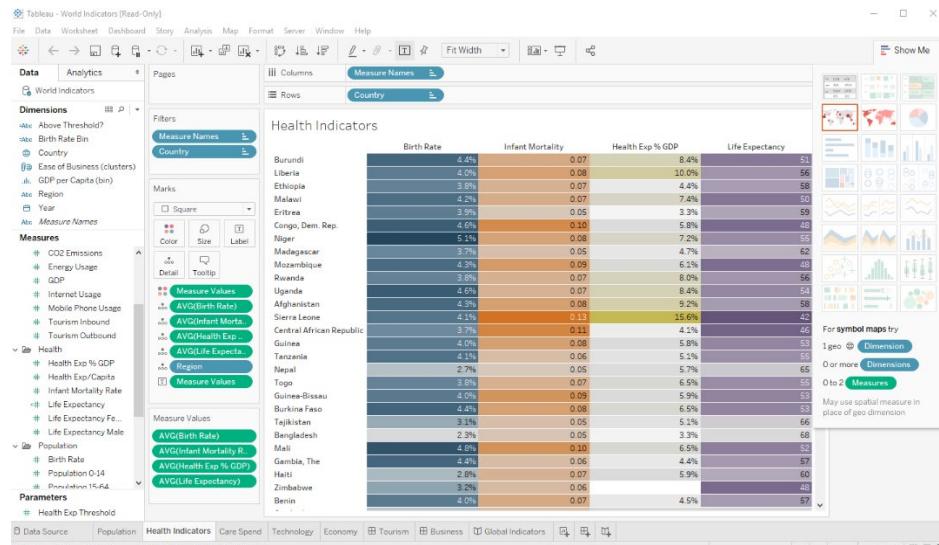


The area labeled Workbooks will display previously used workbooks (workbook history). If this is the first time you've opened Tableau, this will be blank. At the bottom of the screen are sample workbooks.

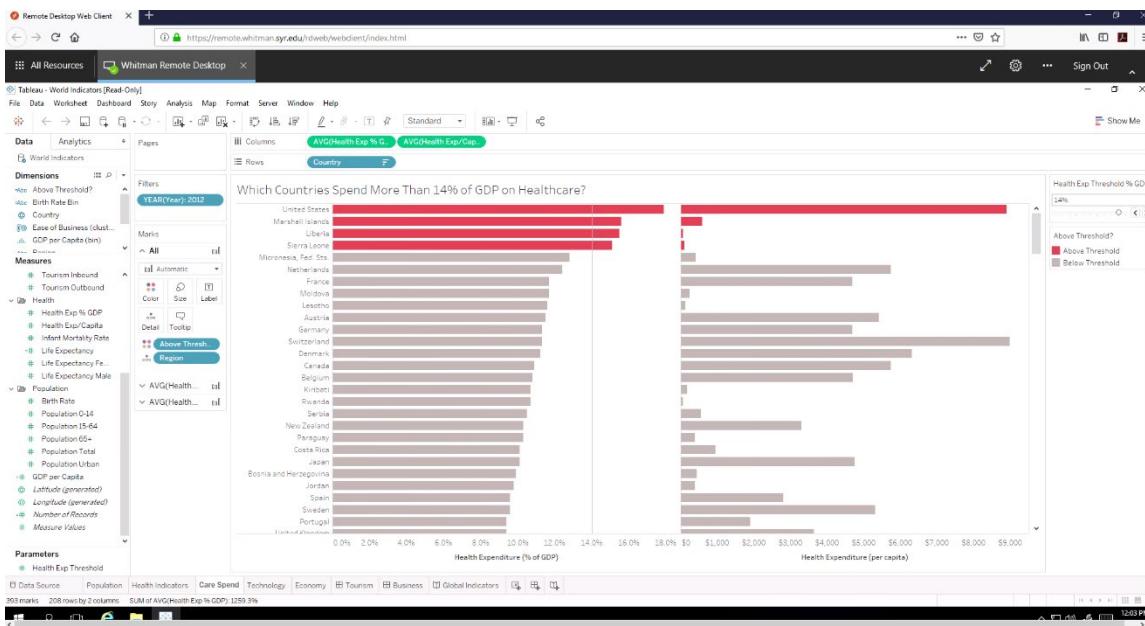
- Click on the World Indicators sample workbook. This displays the Population dashboard.



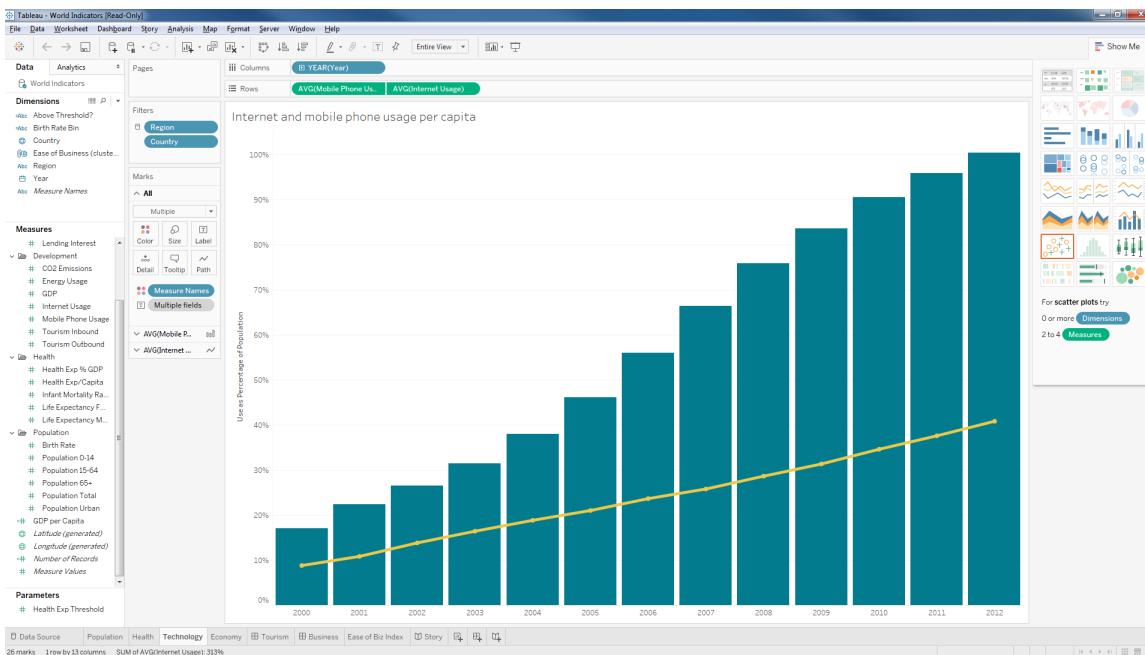
- In the upper left corner is a section labeled Data. The data source is listed below the word Data, in this case, World Indicators
- In the lower left corner are the data measures (columns in Excel).
  - # raw numeric data
  - =# calculated numeric field
  - # generated geographical field
  - Abc alphanumeric field
- In the main part of the screen is the graphic display, in this case, a geographic heat map of average population by country
- At the bottom are the Tableau tabs. Click on Health Indicators dashboard. A dashboard can have multiple views of the data simultaneously. In this example, Birth Rate, Infant Mortality, Health Exp % of GDP, and Life Expectancy are listed.



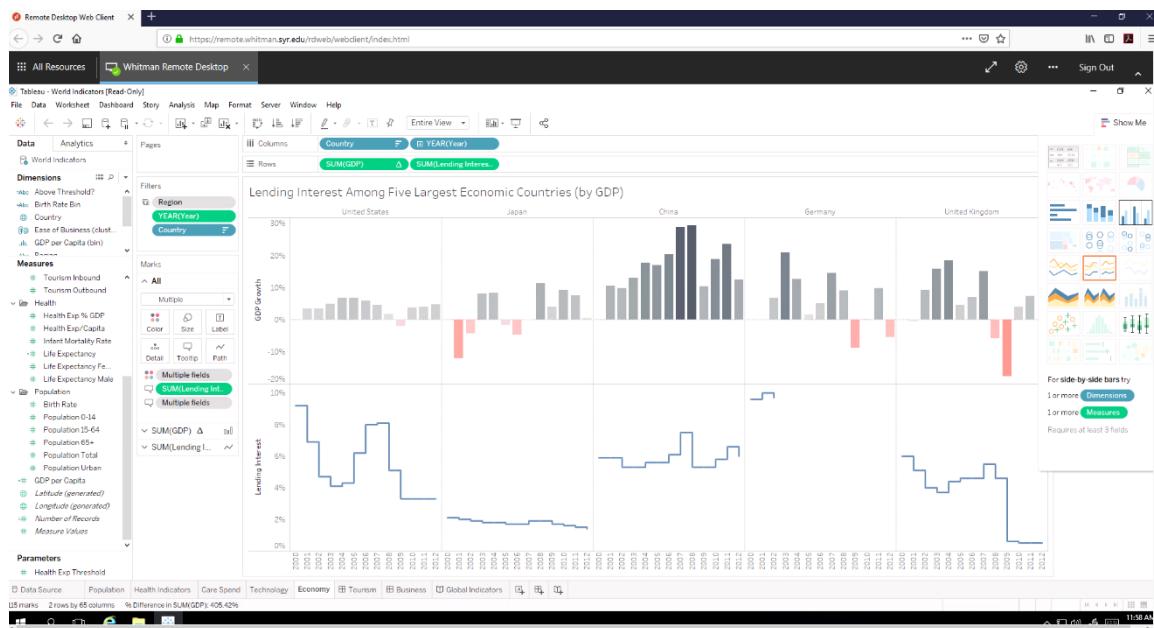
6. Click on the Care Spend tab at the bottom of the screen.



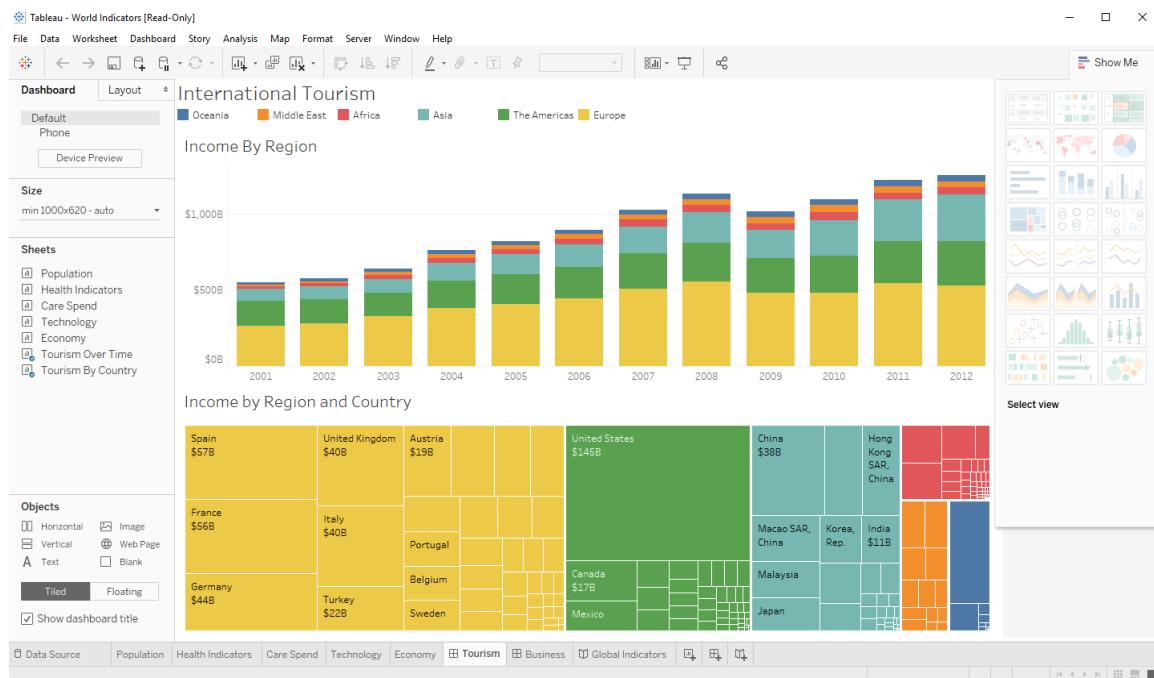
7. Click on the Technology tab.



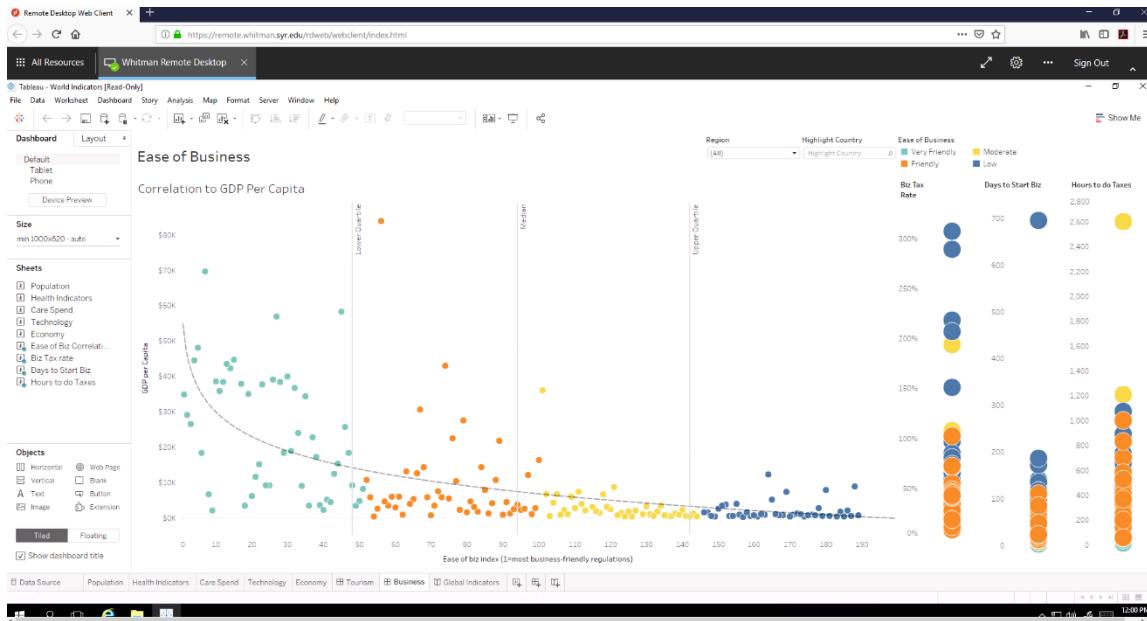
## 8. Click on the Economy tab.



## 9. Click on the Tourism tab.

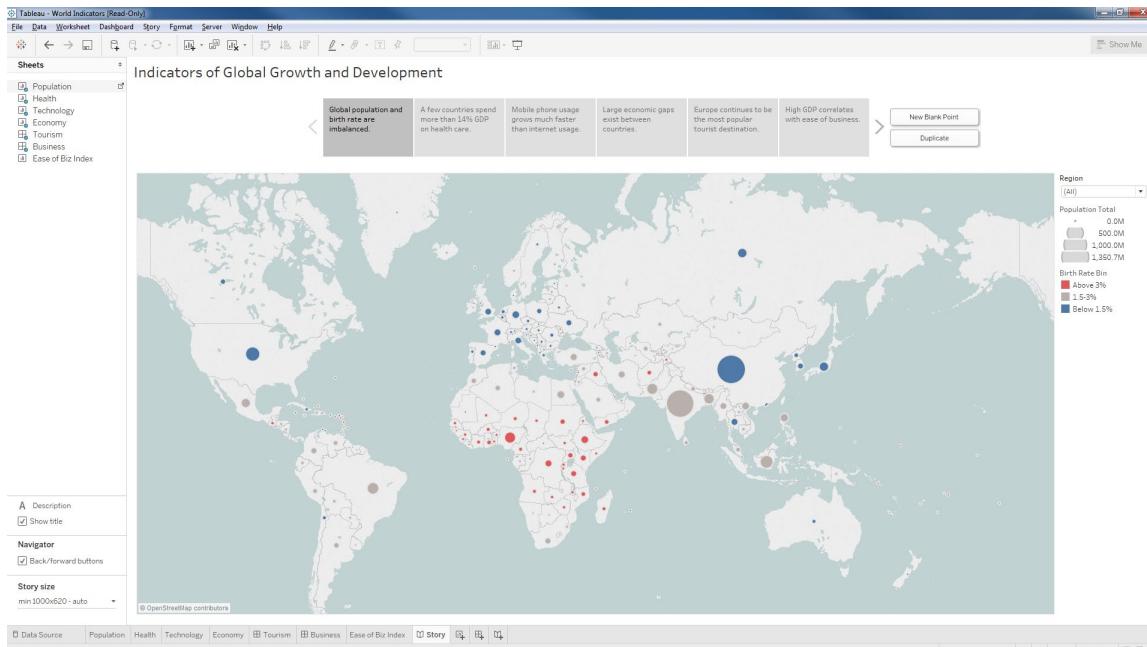


10. Click on the Business tab.

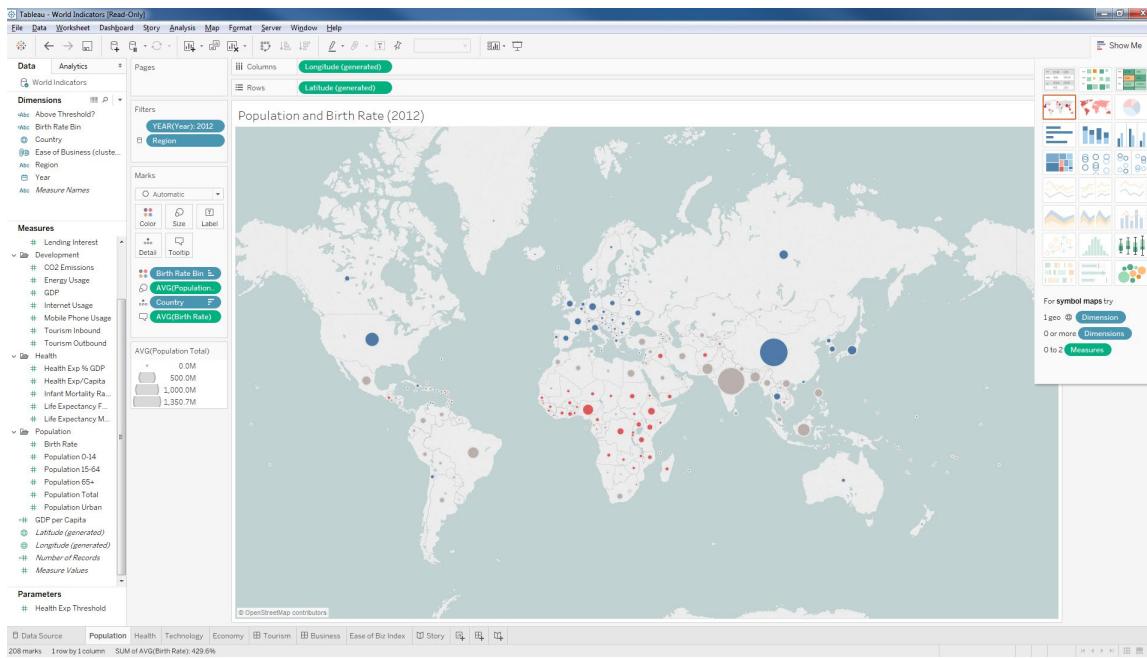


11. Finally, click on the Global Indicators tab. This is the final product of a story set of dashboards.

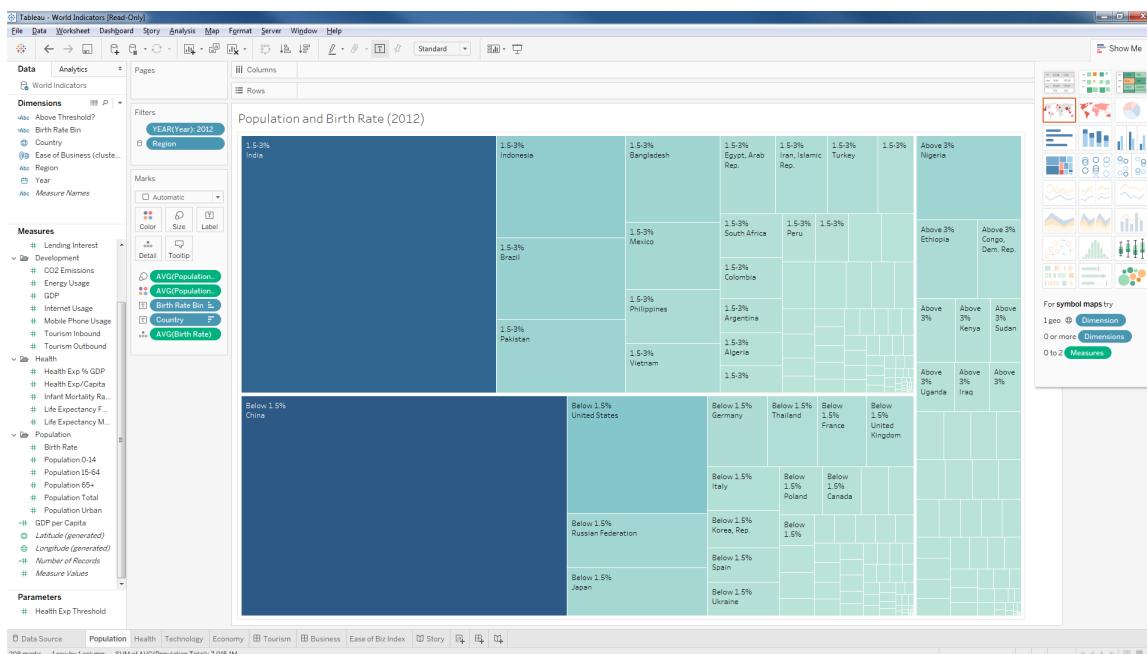
12. Click on each of the shaded boxes at the top to walk through the story.



13. Click back on the Population tab at the bottom of the screen. The Show Me menu in the upper right corner displays the graphic options and describes how many dimensions and measures can be used.



14. Navigate through each of the examples in the Show Me box. Only one example is shown below.



## Download Data Using Access

- **Warning – there might be a Tableau version incompatibility; if a download from Access generates a warning, go to the page on Download Data Using Excel**

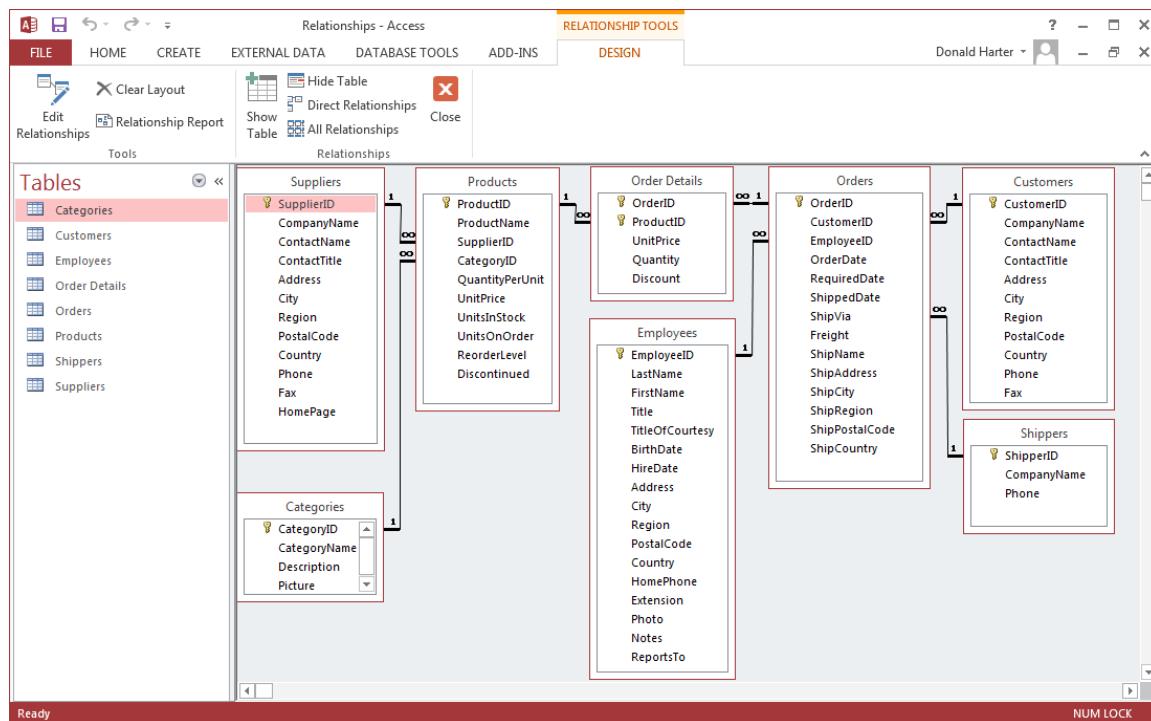
1. Download the Orders Access database from BlackBoard to your Desktop

## Opening a new Tableau Workbook

2. To open a new Tableau Workbook, click on File, New

## Connecting to Data in Tableau

3. We will use Orders data extracted from an Access data base to construct our dashboards. The data and relationships among tables are shown below.



4. To connect to the orders data, click on Data, New Data Source
5. Under the word Connect, To a File, click on Microsoft Access
6. Click on Browse, locate and click on your Orders Database, then click Open, and click Open a second time

The screenshot shows the Tableau Web Client interface. On the left, there's a sidebar titled 'Connections' with 'Orders' selected. Below it is a 'Table' section with icons for Categories, Customers, Employees, Order Details, Orders, Products, Shippers, and Suppliers. The main workspace is titled '(+) Orders (2)' and contains the placeholder text 'Drag tables here'. At the bottom, there are tabs for 'Data Source' and 'Sheet1'.

7. The tables from the Access database are listed on the left. Double click on Suppliers. The table appears in the top box, the fields and data appear in the bottom of the screen.

The screenshot shows the Tableau Web Client interface. On the left, there's a sidebar titled 'Connections' with 'Orders' selected. Below it is a 'Table' section with icons for Categories, Customers, Employees, Order Details, Orders, Products, Shippers, and Suppliers. The main workspace is titled '(+) Suppliers (Orders)' and shows a table with 12 columns: Supplier ID, Company Name, Contact Name, Contact Title, Address, City, Region, Postal Code, Country, Phone, Fax, and Home Page. The table contains 12 rows of data. At the bottom, there are tabs for 'Data Source' and 'Sheet1'.

| #           | Ale Suppliers            | Ale Suppliers            | Ale Suppliers           | Ale Suppliers            | Ale Suppliers | Ale Suppliers | Ale Suppliers | Ale Suppliers | Ale Suppliers  | Ale Suppliers  | Ale Suppliers             |           |
|-------------|--------------------------|--------------------------|-------------------------|--------------------------|---------------|---------------|---------------|---------------|----------------|----------------|---------------------------|-----------|
| Supplier ID | Supplier ID              | Company Name             | Contact Name            | Contact Title            | Address       | City          | Region        | Postal Code   | Country        | Phone          | Fax                       | Home Page |
| 1           | Exotic Liquids           | Charlotte Cooper         | Purchasing Manager      | 49 Gilbert St.           | London        | null          | E1 4SD        | UK            | (171) 555-2222 | null           | null                      |           |
| 2           | New Orleans Cajun Deli   | Shelley Burke            | Order Administrator     | P.O. Box 78934           | New Orleans   | LA            | 70117         | USA           | (180) 555-4822 | (#CAJUN)HTML   |                           |           |
| 3           | Grandma Kelly's Hom...   | Regina Murphy            | Sales Representative    | 707 Oxford Rd.           | Ann Arbor     | MI            | 48104         | USA           | (313) 555-6785 | (313) 555-3349 | null                      |           |
| 4           | Tokyo Traders            | Yoshi Negishi            | Marketing Manager       | 9-9 Seimai Muusashin...  | Tokyo         | null          | 100           | Japan         | (03) 3555-0111 | null           | null                      |           |
| 5           | Cooperativa de Queso...  | Antonio del Valle Saa... | Export Administrator    | Calle del Rosal 4        | Oviedo        | Asturias      | 33007         | Spain         | (98) 555-7654  | null           | null                      |           |
| 6           | Mayumi's                 | Mayumi Ohno              | Marketing Represent.    | 92 SetsukaChuo-ku        | Osaka         | null          | 545           | Japan         | (06) 431-7877  | null           | Mayumi's (on the Wor...   |           |
| 7           | Pavlova, Ltd.            | Ian Devling              | Marketing Manager       | 74 Rose St. Moonie Po... | Melbourne     | Victoria      | 3058          | Australia     | (03) 444-2343  | (03) 444-6588  | null                      |           |
| 8           | Specialty Biscuits, Ltd. | Peter Wilson             | Sales Representative    | 29 King's Way            | Manchester    | null          | M14 6SD       | UK            | (161) 555-4448 | null           | null                      |           |
| 9           | PB Knackebrot AB         | Lena Peterson            | Sales Agent             | Kalleagatan 13           | Goteborg      | null          | 4345 67       | Sweden        | 031-987 65 43  | 031-987 65 91  | null                      |           |
| 10          | Refrescos Americanas     | Carlos Diaz              | Marketing Manager       | Av. das Americas 2...    | Sao Paulo     | null          | 5442          | Brazil        | (11) 555-4640  | null           | null                      |           |
| 11          | Heli-Suwaren GmbH        | Petra Winkler            | Sales Manager           | Tiergartenstraße 5       | Berlin        | null          | 10785         | Germany       | (010) 5984510  | null           | null                      |           |
| 12          | Plutzer Lebensmittel...  | Martin Bein              | International Market... | Bogenallee 52            | Frankfurt     | null          | 60439         | Germany       | (069) 592755   | null           | Plutzer (on the World ... |           |

8. Next, double click on the box with Suppliers. This displays the physical table.
9. Double click on Products. Note that Products has been added to the list of tables at the top. Also, a relationship has been created. Click on the relationship. Which fields are used to create the join? What type of join is used?

The screenshot shows the Tableau Data Source interface. On the left, the 'Connections' pane lists 'Orders' (Microsoft Access). The main area shows a relationship diagram between 'Suppliers' and 'Products'. A table preview for 'Suppliers' is displayed, showing columns like Product ID, Product Name, SupplierID, Category ID, Quantity Per Unit, Unit Price, Units In Stock, and Reorder Level. A 'Go to Worksheet' button is highlighted with a yellow arrow.

10. Next, add Categories. Again the relationship between Products and Categories is created.

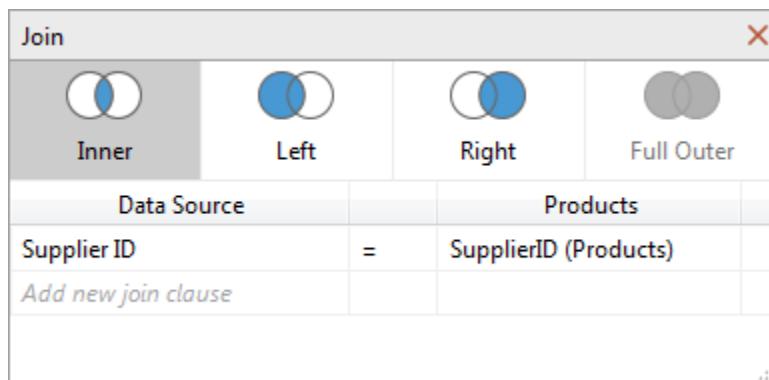
The screenshot shows the Tableau Data Source interface again. The 'Connections' pane now includes 'Categories'. The main area shows relationships between 'Suppliers', 'Products', and 'Categories'. A table preview for 'Categories' is shown, listing categories like Beverages, Food, and Drinkware. A 'Go to Worksheet' button is highlighted with a yellow arrow.

11. Finally, add Order Details. The relationship links Order Details to other tables through the Products table.

The screenshot shows the Tableau Data Source view. A connection named "Suppliers+ (Orders)" is selected. The interface includes a sidebar with "Connections" and "Tables" sections, and a toolbar with "Add" and "Extract" buttons. The main area displays a relationship diagram with four nodes: Suppliers, Products, Categories, and Order Details. Suppliers is connected to Products, which is connected to Categories. Order Details is connected to Products. Below the diagram is a preview of the "Order Details" table with columns: CategoryID, Category Name, Description, Picture, Order ID, Order Details, ProductID, UnitPrice, Quantity, Discount, Product ID, Product Name, SupplierID, and ProductCategoryID. The preview shows 14 rows of data for the Beverage category.

12. Click on each relationship. There are four different types of joins.

- Inner join: the data rows selected require that the fields (in this case, Supplier ID) must match from both tables; this is a simple intersection
- Left Join: all rows are selected from the table on the left; those rows with matching fields (Supplier ID) on the right table are also selected; this includes all rows from the left table and those rows from the right table that intersect
- Right Join: all rows are selected from the table on the right; those rows with matching fields (Supplier ID) on the left table are also selected; this includes all rows from the right table and those rows from the left table that intersect
- Full Outer Join: includes all rows from both the left and right table, inserting blanks when a value for the key field (Supplier ID) appears in one table but not the other



13. Save your workbook by clicking on File, Save As, then enter File name: Orders and click Save.

## Download Data Using Excel

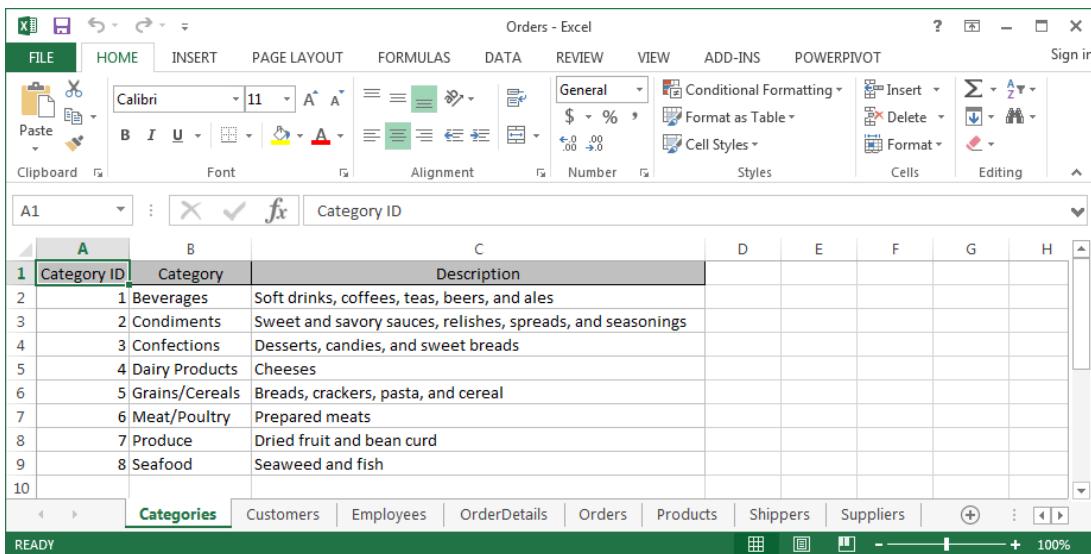
1. Download the Orders Excel spreadsheet from BlackBoard to your Desktop

## Opening a new Tableau Workbook

2. To open a new Tableau Workbook, click on File, New

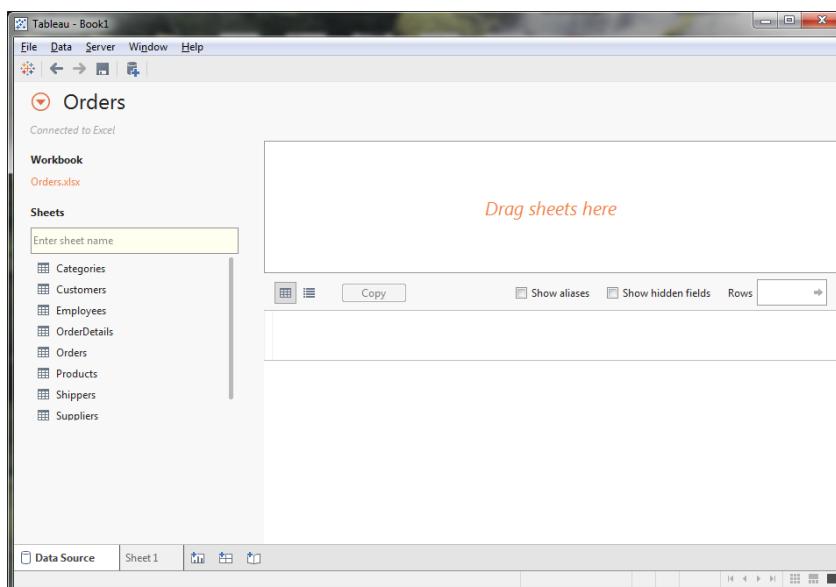
## Connecting to Data in Tableau

We will use Orders data extracted from an Excel spreadsheet to construct our dashboards. The data is shown below.



| A  | B           | C              | D  | E | F | G | H |
|----|-------------|----------------|--|---|---|---|---|
| 1  | Category ID | Category       | Description  |   |   |   |   |
| 2  | 1           | Beverages      | Soft drinks, coffees, teas, beers, and ales                |   |   |   |   |
| 3  | 2           | Condiments     | Sweet and savory sauces, relishes, spreads, and seasonings |   |   |   |   |
| 4  | 3           | Confections    | Desserts, candies, and sweet breads                        |   |   |   |   |
| 5  | 4           | Dairy Products | Cheeses  |   |   |   |   |
| 6  | 5           | Grains/Cereals | Breads, crackers, pasta, and cereal                        |   |   |   |   |
| 7  | 6           | Meat/Poultry   | Prepared meats   |   |   |   |   |
| 8  | 7           | Produce        | Dried fruit and bean curd                                  |   |   |   |   |
| 9  | 8           | Seafood        | Seaweed and fish   |   |   |   |   |
| 10 |             |                |  |   |   |   |   |

1. To connect to the orders data, click on Data, New Data Source
2. Under the word Connect, To a File, click on Microsoft Excel
3. Click on Browse, locate and click on your Orders Database, then click Open, and click Open a second time



3. The worksheets from the Excel workbook are listed on the left. Double click on Suppliers. The table appears in the top box.

| Supplier ID # | Supplier                 | Contact Name               | Contact Title             | Address       |
|---------------|--------------------------|----------------------------|---------------------------|---------------|
| 1             | Exotic Liquids           | Charlotte Cooper           | Purchasing Manager        | 49 Gilbert St |
| 2             | New Orleans Cajun Del... | Shelley Burke              | Order Administrator       | P.O. Box 789  |
| 3             | Grandma Kelly's Home...  | Regina Murphy              | Sales Representative      | 707 Oxford I  |
| 4             | Tokyo Traders            | Yoshi Nagase               | Marketing Manager         | 9-8 Sekimail  |
| 5             | Cooperativa de Quesos... | Antonio del Valle Saave... | Export Administrator      | Calle del Ro  |
| 6             | Mayumi's                 | Mayumi Ohno                | Marketing Representati... | 92 SetsukoC   |

4. Double click on the box with Suppliers to convert it to a physical  
 5. Double click on Products. Note that Products has been added to the list of tables at the top. Also, a relationship has been created. Click on the relationship. Which fields are used to create the join? What type of join is used?

| Product ID # | Product                   | Supplier (Products)      | Category       | Quantity Per Unit  |
|--------------|---------------------------|--------------------------|----------------|--------------------|
| 1            | Chai                      | Exotic Liquids           | Beverages      | 10 boxes x 20 bags |
| 4            | Chef Anton's Cajun Sea... | New Orleans Cajun Del... | Condiments     | 48 - 6 oz jars     |
| 6            | Grandma's Boysenber...    | Grandma Kelly's Home...  | Condiments     | 12 - 8 oz jars     |
| 9            | Mishi Kobe Niku           | Tokyo Traders            | Meat/Poultry   | 18 - 500 g pkgs.   |
| 11           | Queso Cabrales            | Cooperativa de Quesos... | Dairy Products | 1 kg pkg.          |
| 13           | Konbu                     | Mayumi's                 | Seafood        | 2 kg box           |

6. Next, add Categories. Again the relationship between Products and Categories is created.

The screenshot shows the Tableau Data Source view for a workbook connected to an Excel file named 'Orders.xlsx'. The 'Suppliers+ (Orders)' sheet is selected. A data flow diagram at the top shows relationships between 'Suppliers', 'Products', and 'Categories' tables. The 'Products' table is connected to both 'Suppliers' and 'Categories'. Below the diagram is a data preview table with columns: Category ID, Category (Categories), Description, Product ID, Product, and Supplier (Products). The data shows various product categories like Beverages, Condiments, Meat/Poultry, Dairy Products, and Seafood, along with their descriptions, product IDs, names, and suppliers.

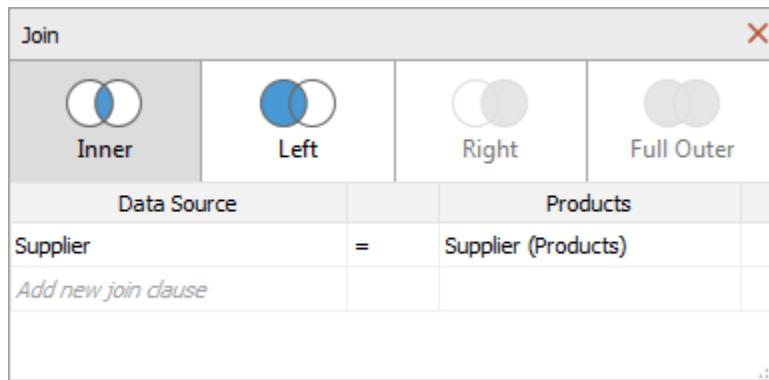
| Category ID | Category (Categories) | Description                  | Product ID | Product                   | Supplier (Products)     |
|-------------|-----------------------|------------------------------|------------|---------------------------|-------------------------|
| 1           | Beverages             | Soft drinks, coffees, tea... | 1          | Chai                      | Exotic Liquids          |
| 2           | Condiments            | Sweet and savory sauc...     | 4          | Chef Anton's Cajun Sea... | New Orleans Cajun Del.  |
| 2           | Condiments            | Sweet and savory sauc...     | 6          | Grandma's Boysenberry...  | Grandma Kelly's Home... |
| 6           | Meat/Poultry          | Prepared meats               | 9          | Mishi Kobe Niku           | Tokyo Traders           |
| 4           | Dairy Products        | Cheeses                      | 11         | Queso Cabrales            | Cooperativa de Quesos.  |
| 8           | Seafood               | Seaweed and fish             | 13         | Konbu                     | Mayumi's                |

7. Finally, add Order Details. The relationship links Order Details to other tables through the Products table.

The screenshot shows the Tableau Data Source view for the same workbook and sheet. The data flow diagram now includes a new connection from 'Products' to 'OrderDetails'. The 'OrderDetails' table is shown in the data preview table below, which includes columns for Order ID, Product (OrderDetails), and Unit Price (OrderDetails). The data shows specific order details for products like Chai, Chef Anton's Cajun Seafood, Grandma's Boysenberry, Mishi Kobe Niku, Queso Cabrales, and Konbu.

| Category ID | Category (Categories) | Description                  | Order ID | Product (OrderDetails)    | Unit Price (OrderDetails) |
|-------------|-----------------------|------------------------------|----------|---------------------------|---------------------------|
| 1           | Beverages             | Soft drinks, coffees, tea... | 10285    | Chai                      | 14.400                    |
| 2           | Condiments            | Sweet and savory sauc...     | 10309    | Chef Anton's Cajun Sea... | 17.600                    |
| 2           | Condiments            | Sweet and savory sauc...     | 10309    | Grandma's Boysenberry...  | 20.000                    |
| 6           | Meat/Poultry          | Prepared meats               | 10420    | Mishi Kobe Niku           | 77.600                    |
| 4           | Dairy Products        | Cheeses                      | 10248    | Queso Cabrales            | 14.000                    |
| 8           | Seafood               | Seaweed and fish             | 10276    | Konbu                     | 4.800                     |

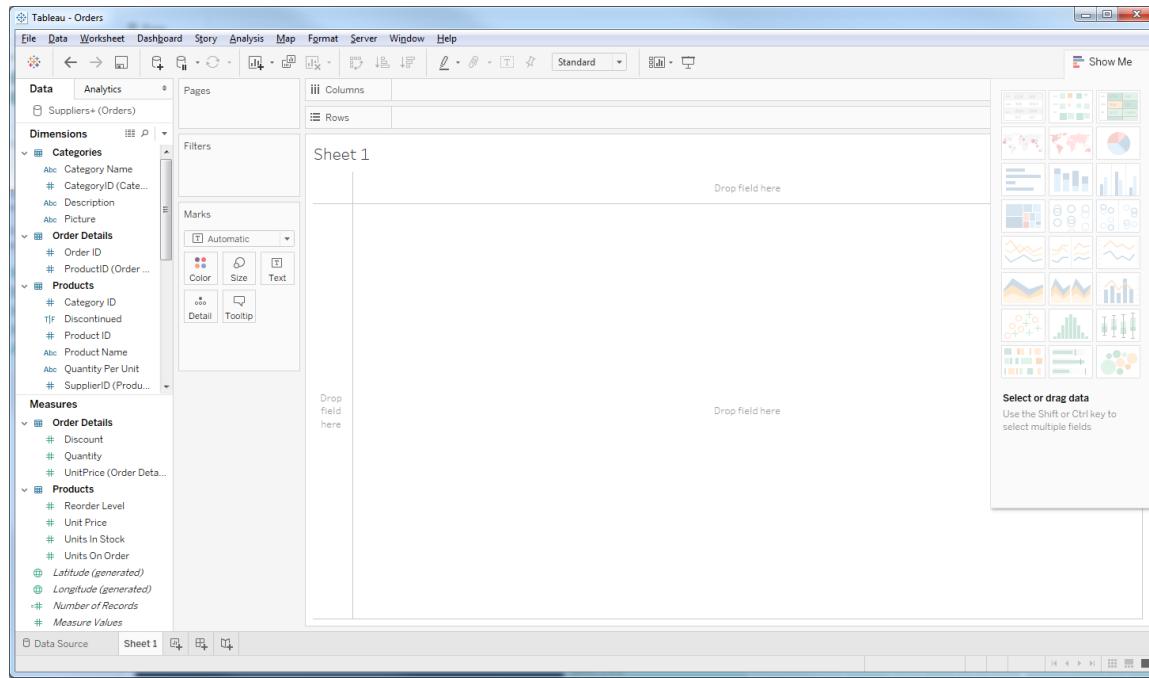
8. Click on each relationship. There are four different types of joins.
  - a. Inner join: the data rows selected require that the fields (in this case, Supplier) must match from both tables; this is a simple intersection
  - b. Left Join: all rows are selected from the table on the left; those rows with matching fields (Supplier) on the right table are also selected; this includes all rows from the left table and those rows from the right table that intersect
  - c. Right Join: all rows are selected from the table on the right; those rows with matching fields (Supplier) on the left table are also selected; this includes all rows from the right table and those rows from the left table that intersect
  - d. Full Outer Join: includes all rows from both the left and right table, inserting blanks when a value for the key field (Supplier) appears in one table but not the other



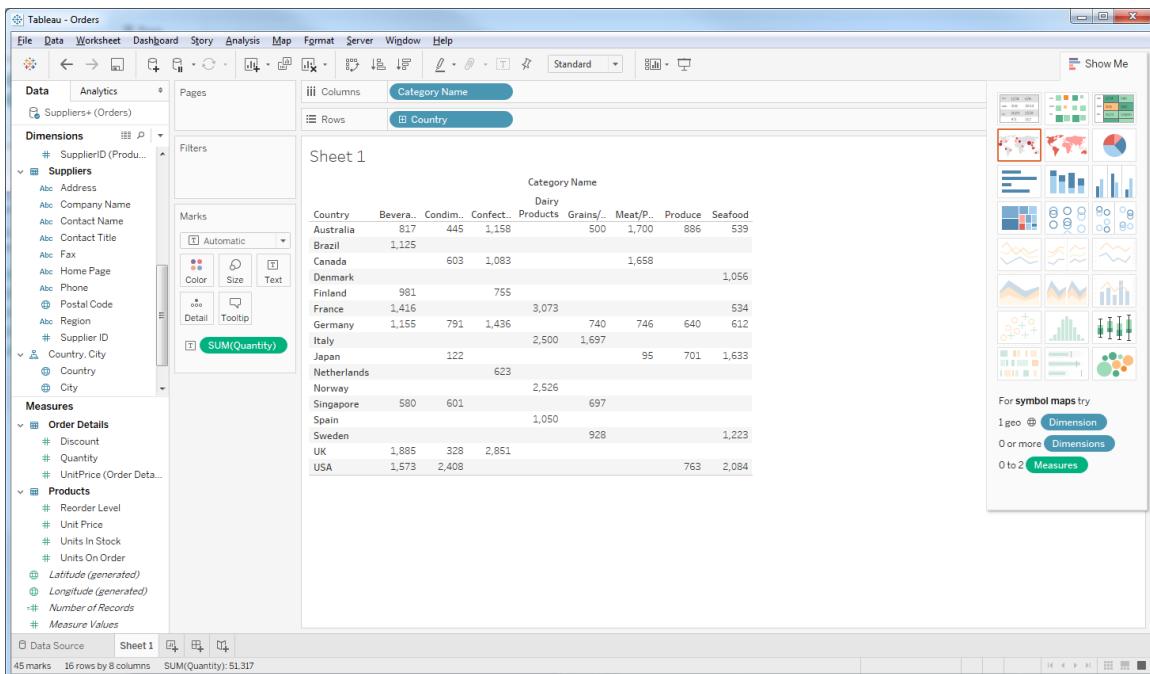
9. Save your workbook by clicking on File, Save As, then enter File name: Orders and click Save.

## Building Worksheets

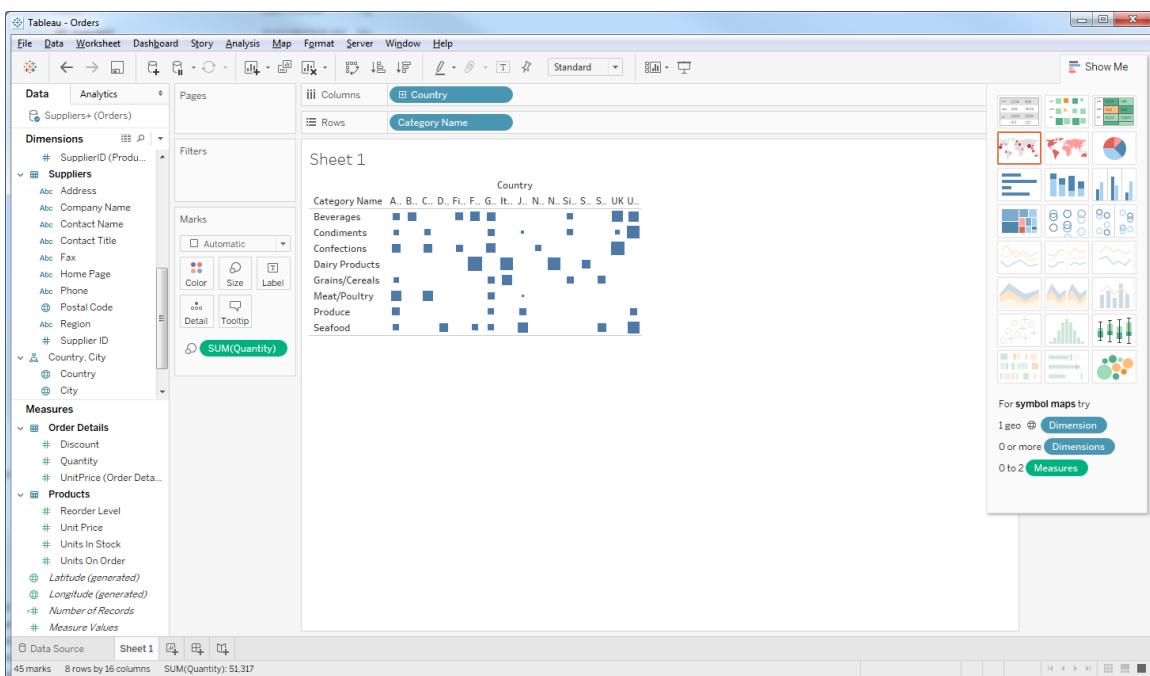
1. To return to Worksheet mode, Go to Worksheet – Sheet 1



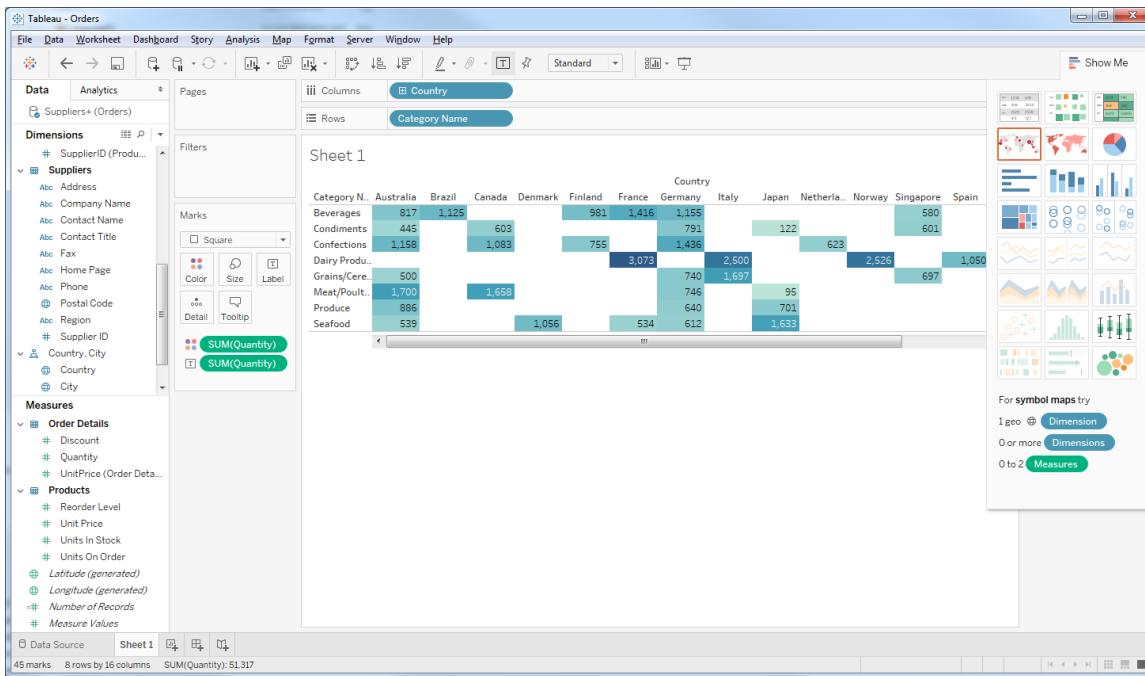
2. In the upper left, under Data, it shows that we are connected to the Orders database
3. Tables and fields are listed on the left. Numeric fields have #, alphanumeric have Abc, geographic fields have a globe, calculated fields are =#. Notice that Latitude and Longitude are generated from our raw data. Tableau uses any geographic notation (country, city, postal code) to derive latitude and longitude.
4. Near the top center of the page are sections labeled columns and rows. These will be filled in soon.
5. Below the Columns and Rows sections is a Drop field here area. This is where we build our table of data (like a Pivot Table)
6. Let's build a table with quantity ordered by category and supplier country.
7. First, from Categories: drag Category Name to Columns
8. Next, from Suppliers: drag Country to Rows
9. Finally, from OrderDetails: drag Quantity to the main part of the table
10. You can easily swap columns and rows by clicking on the icon at the top which shows columns and rows with an arrow between the two.



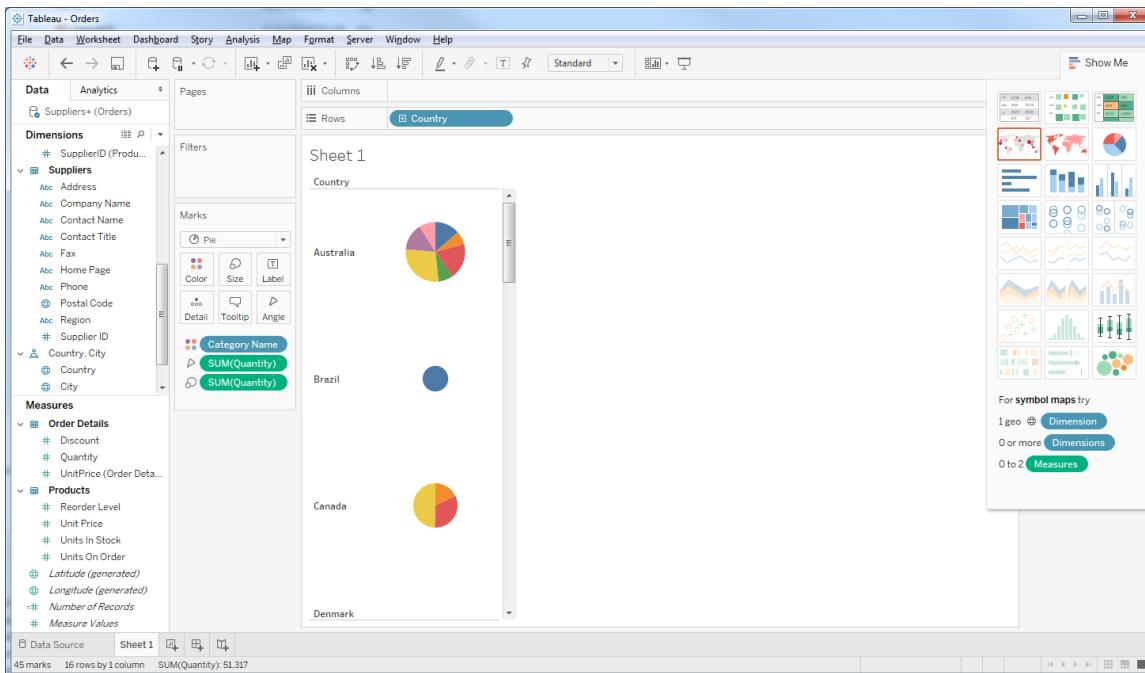
11. Let's now experiment with different formats and representations. Go to the upper right of the screen labeled Show Me. Move the cursor over each of the options in the Show Me box. The pop-up identifies how many dimensions and measures are supported by each option.
12. Click on the top middle icon (Heat Map) in the Show Me box. This displays size graphic instead of numbers, where the legend is on the left.



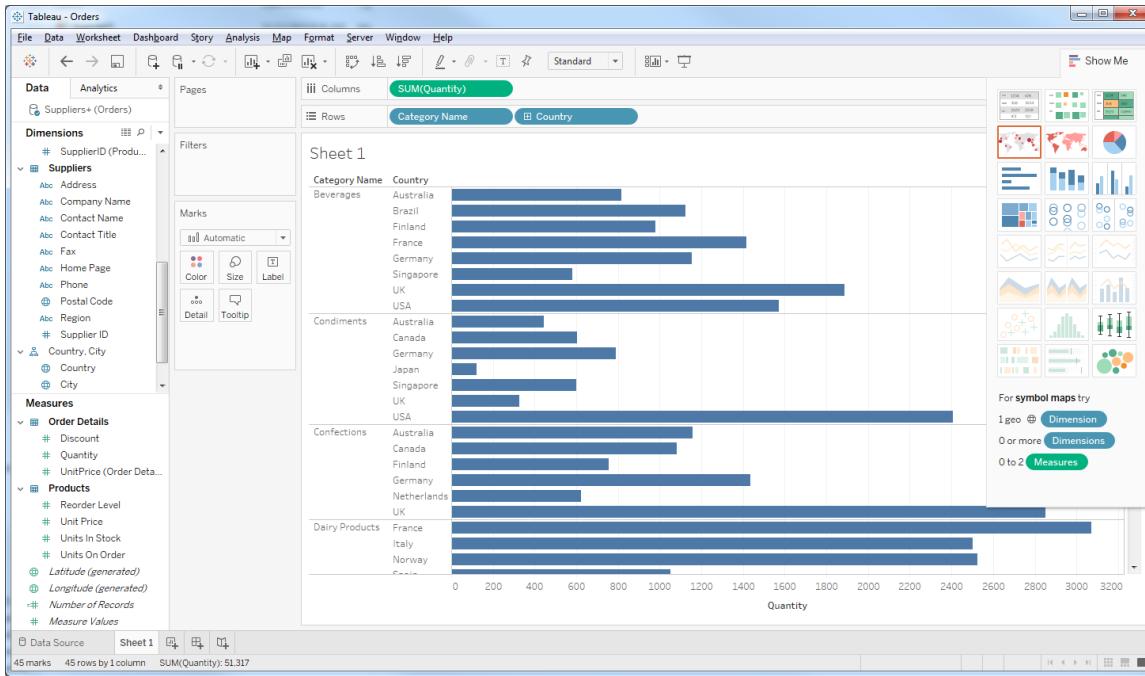
13. Next, click on the icon in the upper right (highlight tables) of the Show Me box. This is our data table with conditional formatting applied. The legend for the color scale is on the left.



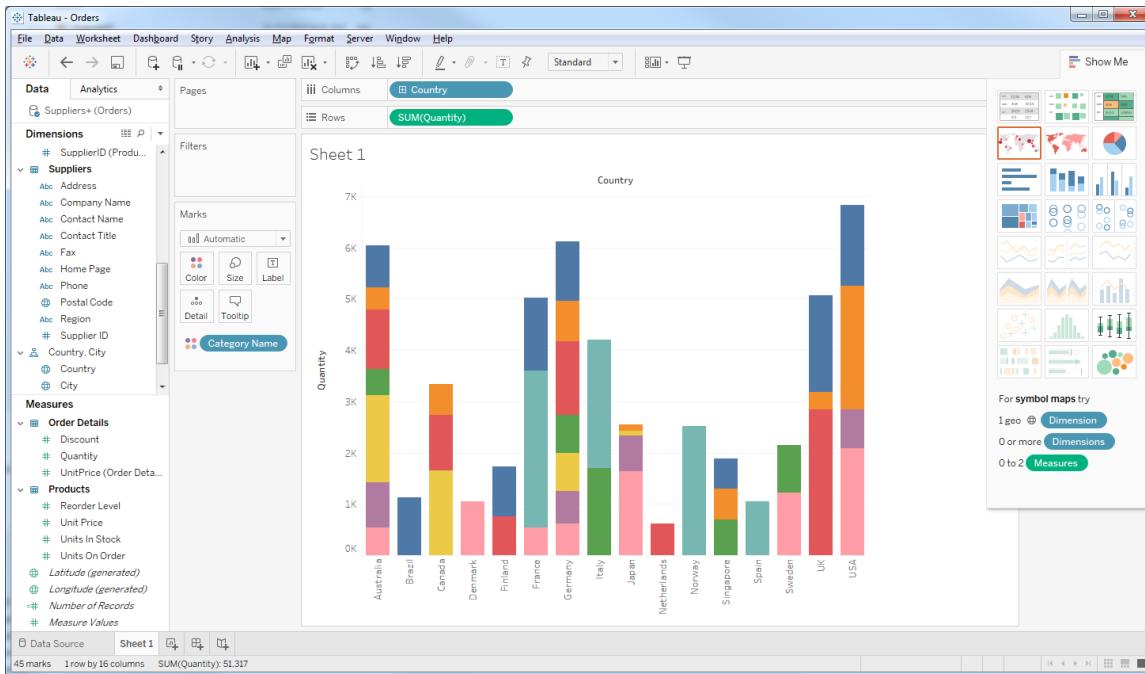
14. The colors can be edited. Under Marks, click on the Color box, Edit Colors, then pick a color using the drop down arrow.  
 15. Next, try the Pie Charts in Show Me. Note that all data is collapsed to a row with a pie chart for each row



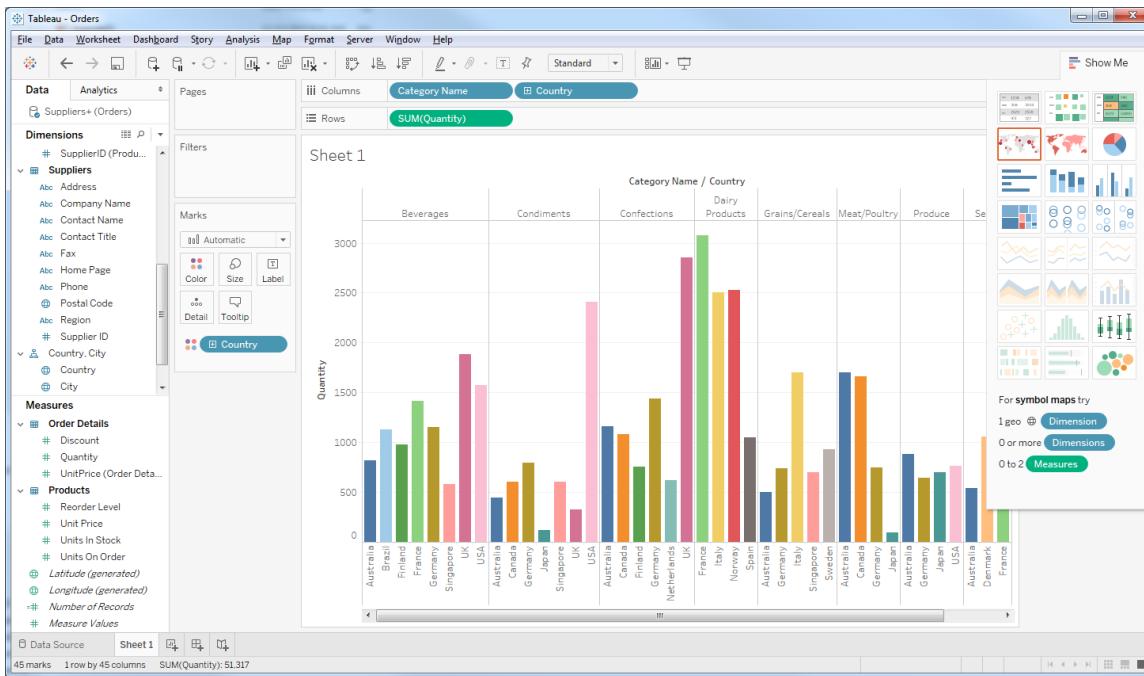
16. Horizontal bar charts: Categories are countries are grouped. Drag Category Name after Country; what happens?



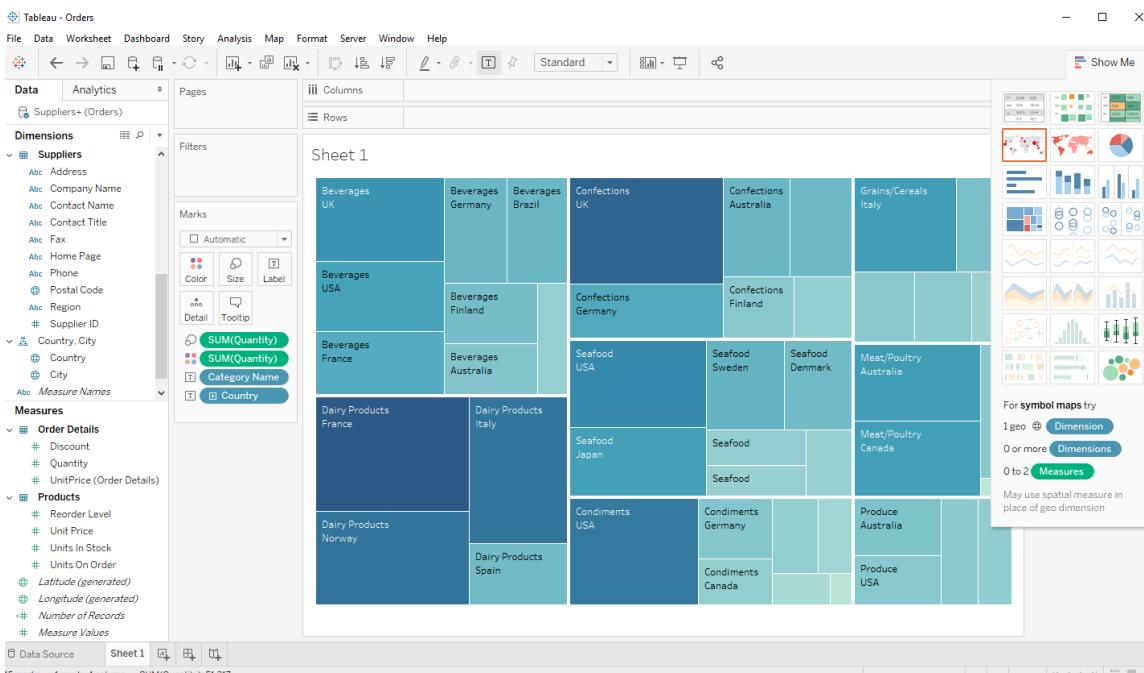
17. Stacked bar charts: Click on Confections in the Legend. What happens? Hold down the control key and click on Beverages, Condiments, and Dairy Products. What happens?



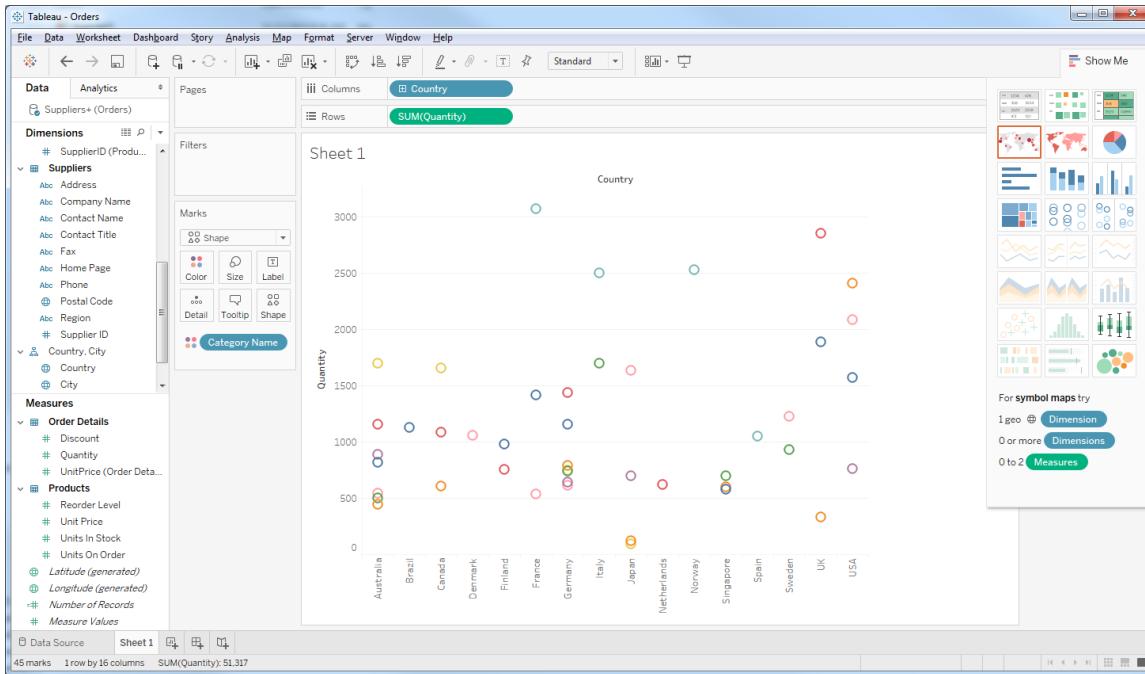
18. Side-by-side bar charts: Click on Beverages at the top of the graph.



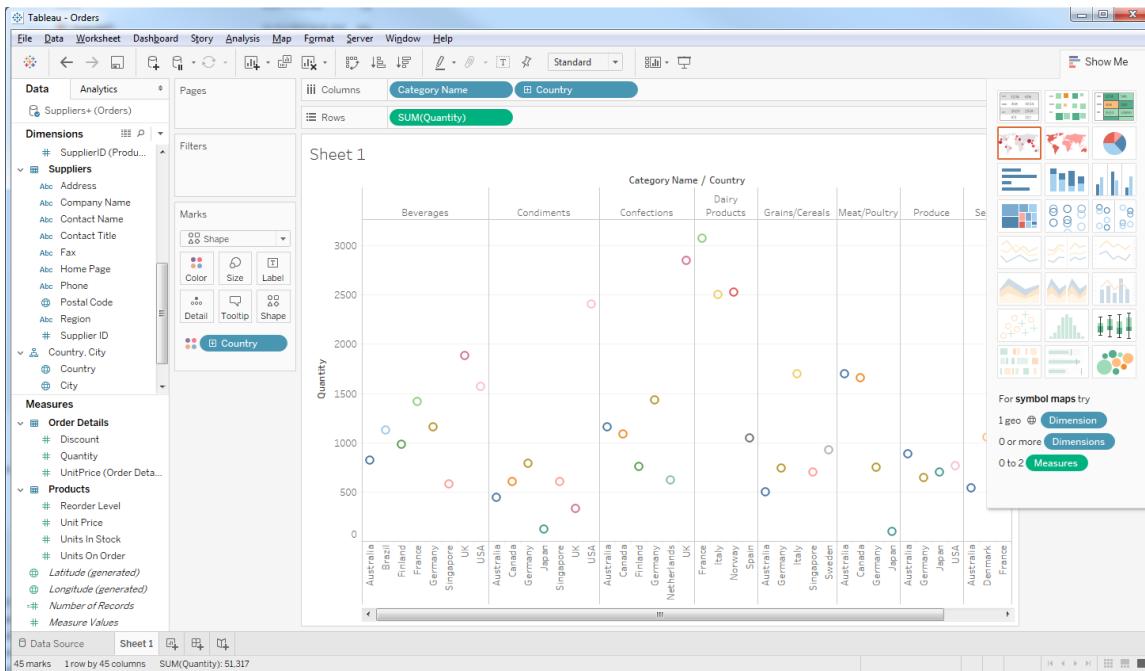
19. Treemaps display data by translating the numeric values into an area.



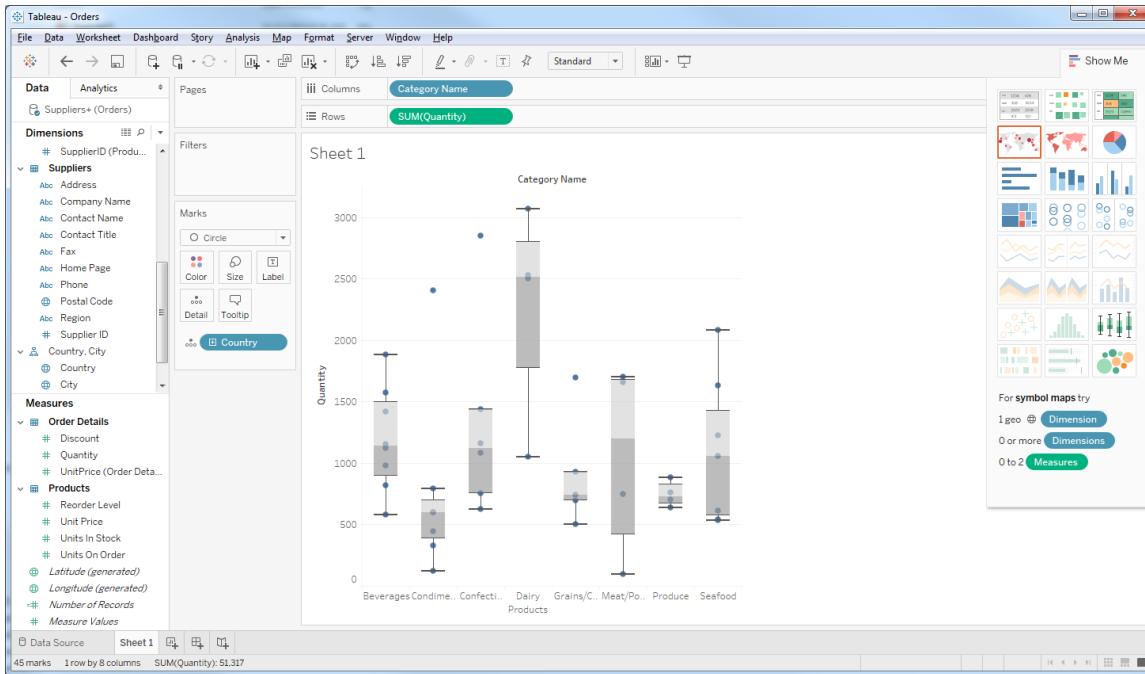
20. Circle views display the quantity of product by country, with the color of circle reflecting the category name.



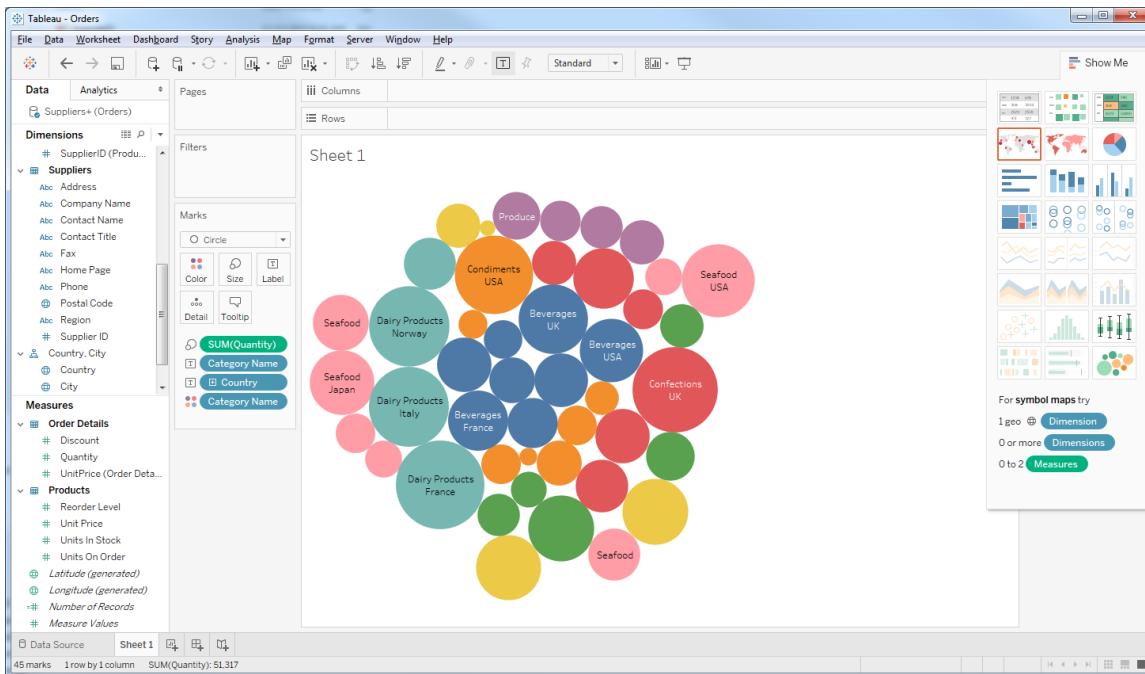
21. Side-by-side circle view swaps the dimensions



22. Box and whisker portray data ranges from minimum, 25%-ile, median, 75%-ile, and maximum.



23. Packed bubbles use the area of a circle (bubble) to reflect the magnitude of the numbers



## Adding Calculations

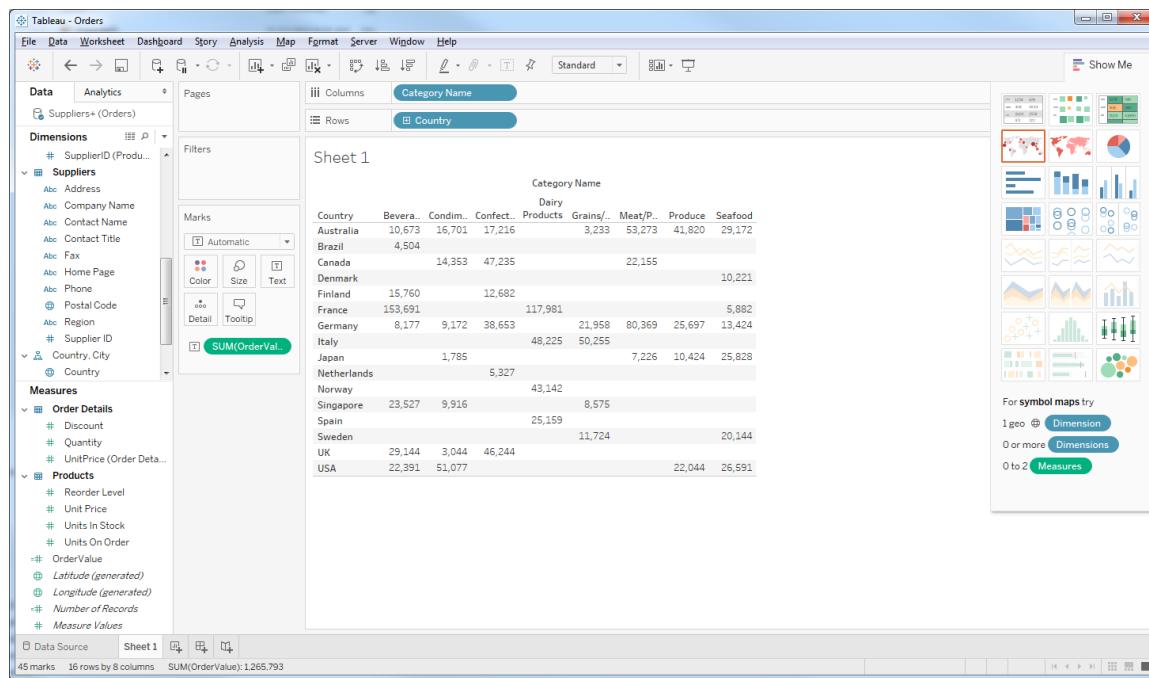
Sometimes you will want to create new values which are calculated from data in the worksheet. For example, let's calculate the value of an order, which is Quantity \* UnitPrice \* (1-Discount) from Measures: Order Details.

1. At the top of the worksheet, click on Analysis, Create Calculated Field.
2. Replace the name Calculation1 with OrderValue
3. Drag Order Details: Quantity in the blank area below the title OrderValue
4. Enter \*
5. Drag Order Details: UnitPrice [Order Details] into the box
6. Enter \*, then (1-
7. Drag Order Details: Discount into the box
8. Enter ), then click OK.
9. Order Value now appears as a calculated field

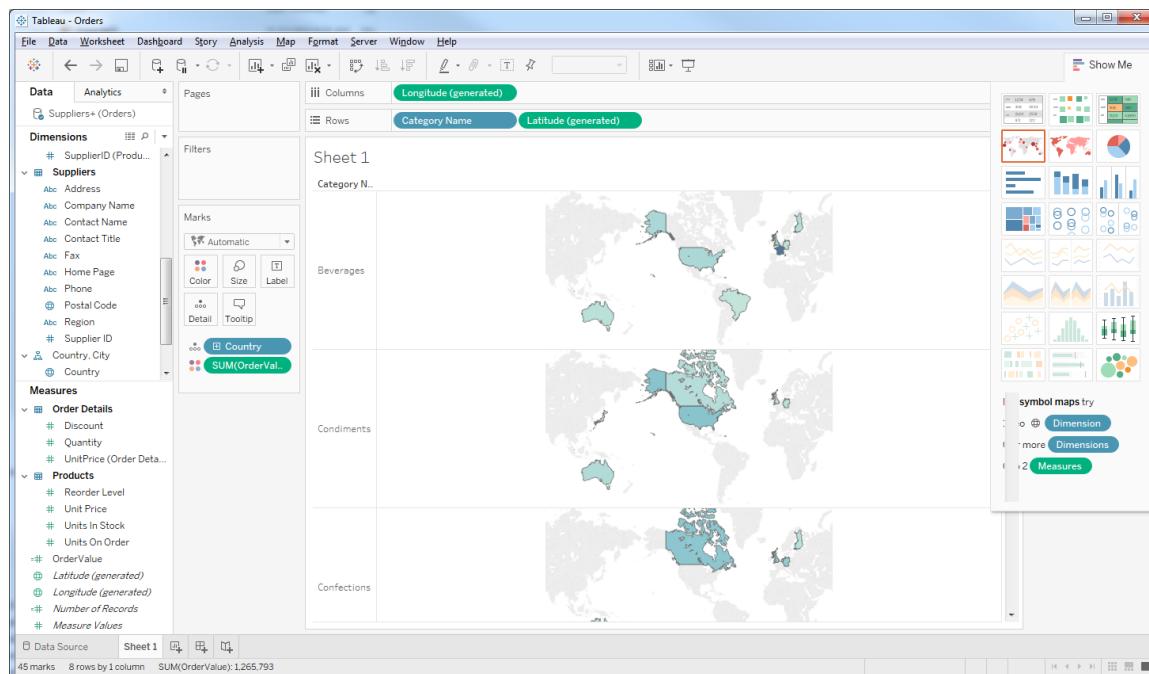


## Modifying a Pivot View

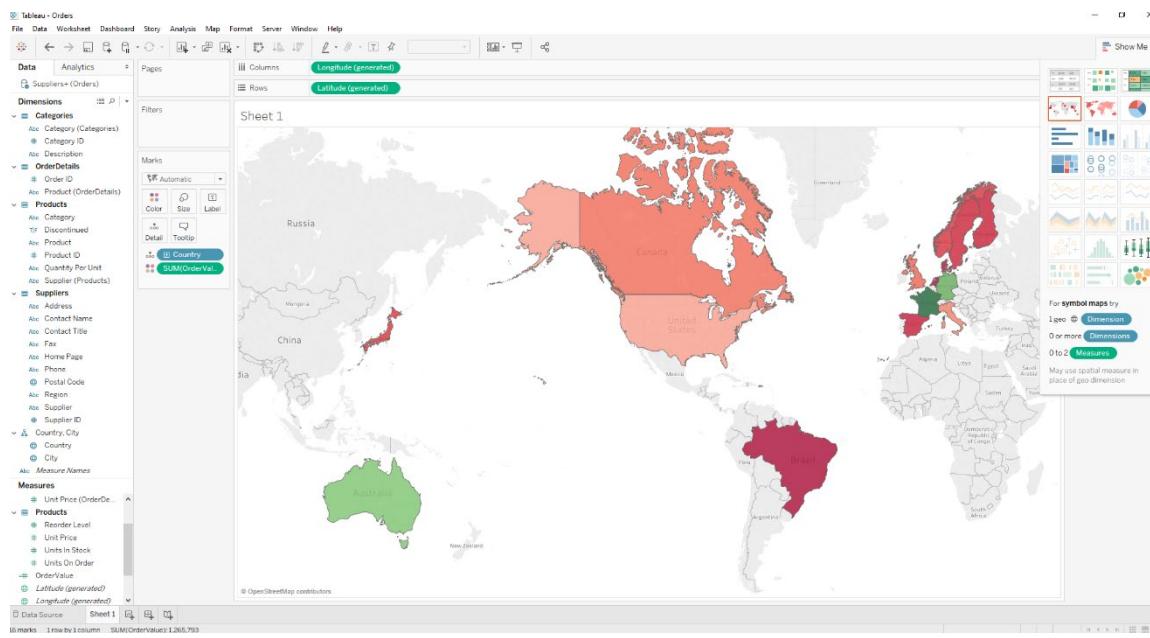
1. Return to the table format in Show Me (upper right corner). Make sure that Category is in Columns, Country is in Rows.
2. Click on SUM(Quantity), drop down to Remove, and click remove.
3. Drag OrderValue to the table.



4. Change to map format (use map icon in the second row, center, in Show Me)



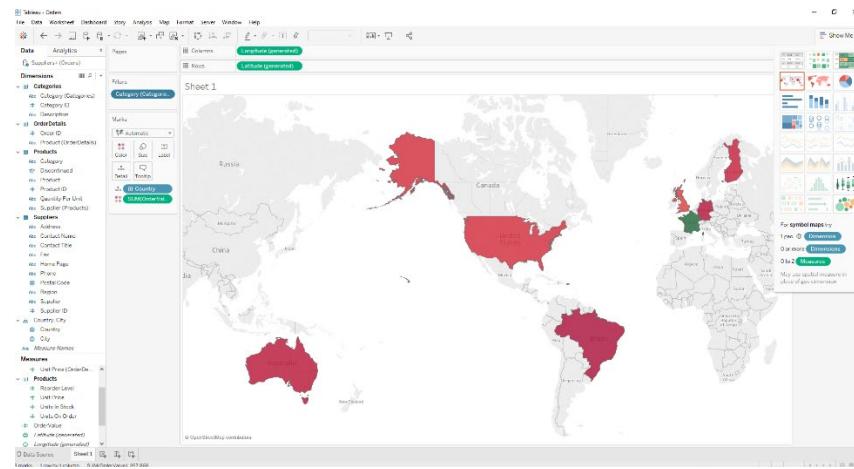
- Drop Category Name by clicking on it and pressing the delete key to consolidate for all categories. To hide the Show Me box, click on the words Show Me.
- Change the colors by clicking Color box under Marks, Edit Colors, drop down arrow under Palette, then Area Red-Green Diverging.



## Filters

Just like Excel, you can add filters to your data. Using the previous map of Order Value, let's add a filter for Category.

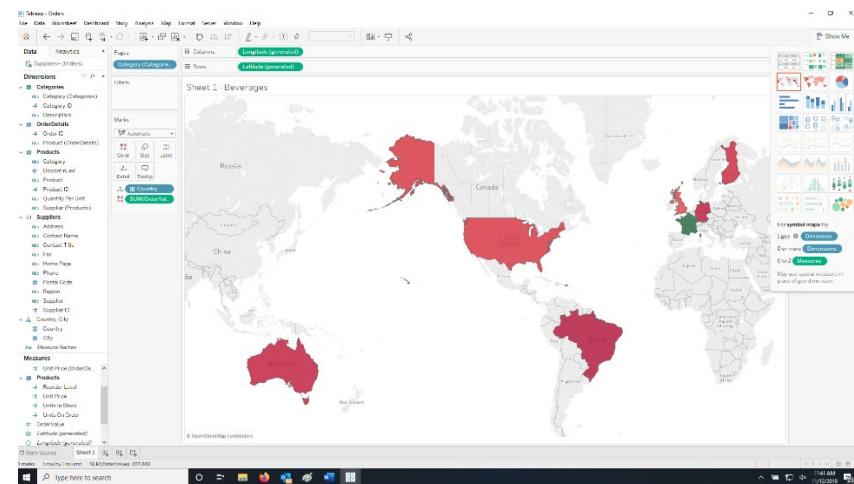
1. Drag Category Name to the Filters box. Click on All, then OK. The map should not change, but Category will remain in the Filters box.
2. In the Filters box, place your cursor over Category Name, click the down arrow, then Edit filter.
3. Uncheck everything except Beverages. (You can click None, then Beverages). Click OK.
4. The new map only reflects Beverages.



## Pages

The Pages feature allows you to perform a filter, with each Category on a different page.

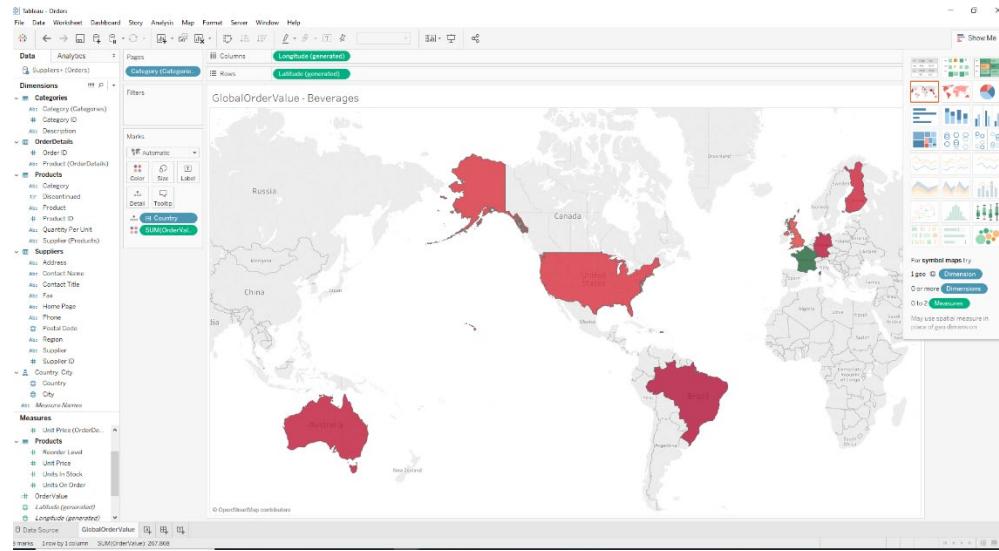
1. Drag Category Name to the Pages box.
2. Click on Show Me to hide the graphics menu
3. The arrows on the right are play buttons. Click on the right arrow to play through the pages.



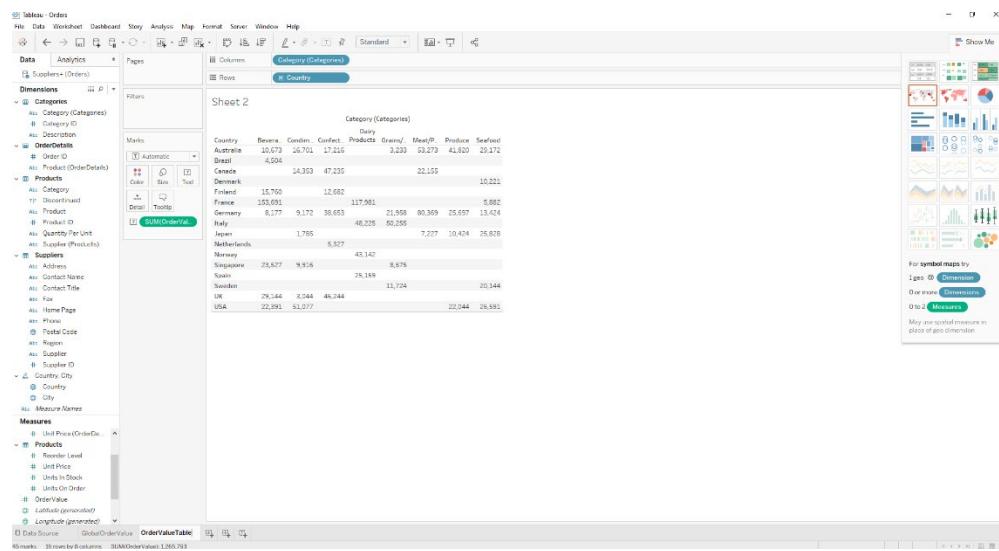
## Building Dashboards

In this section, we will move from building worksheets to building dashboards. A dashboard is simply a collection of worksheets.

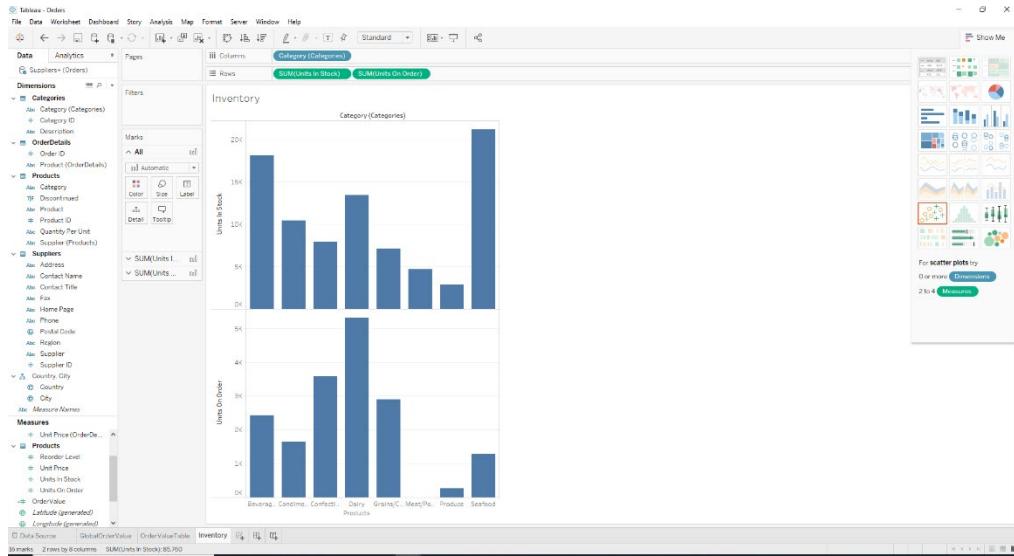
- At the bottom of the screen is the label Sheet 1. Rename this by double clicking on Sheet 1, the renaming it GlobalOrderValue



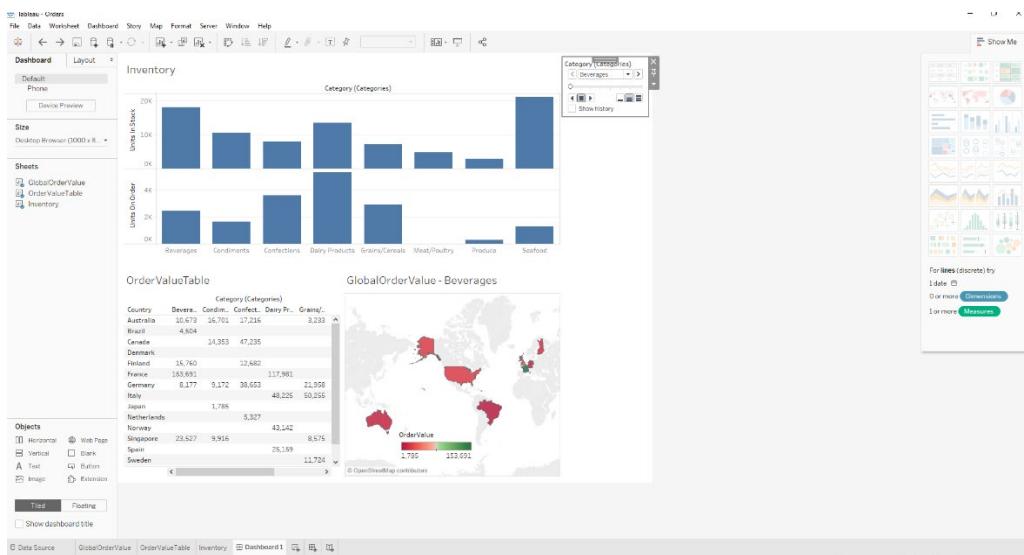
- Next to GlobalOrderValue is an icon for New Worksheet. Click on the icon. Sheet 2 should appear.
- Drag Category Name to Columns, Country to Rows, and Order Value to the center of the table
- Rename Sheet 2 OrderValueTable



5. Click on New Worksheet again. Sheet 3 should appear.
6. Drag Category: Category Name to Columns
7. Drag Products: Units in Stock to Rows
8. Drag Products: Units on Order to Rows
9. Rename Sheet 3 Inventory



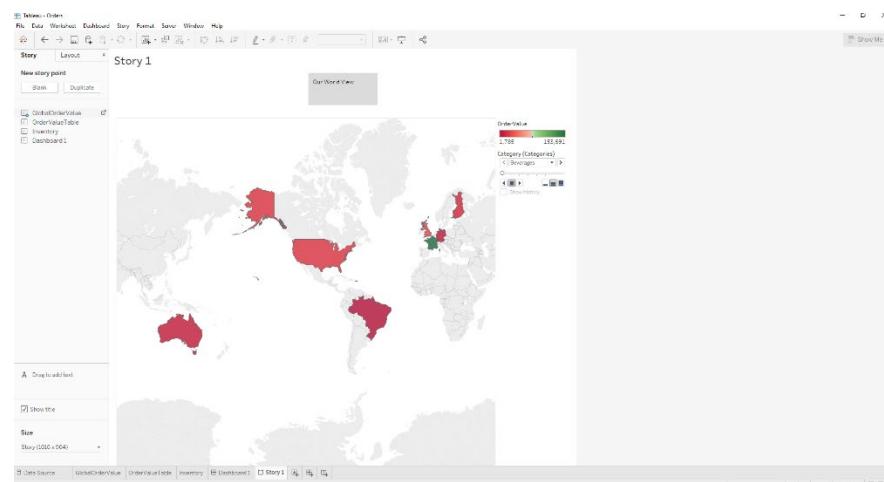
10. To create a dashboard, click on the icon for New Dashboard
11. On the left side of the screen, each of your Worksheets should be listed.
12. Drag the Inventory worksheet to "Drop sheets here"
13. Drag OrderValueTable to the bottom of the screen
14. Drag GlobalOrderValue to the lower right of the screen
15. Notice that OrderValue legend is taking up the entire right side of the screen. Click on the down arrow next to the legend, then click Floating
16. Click on the floating legend and drag it into the map.



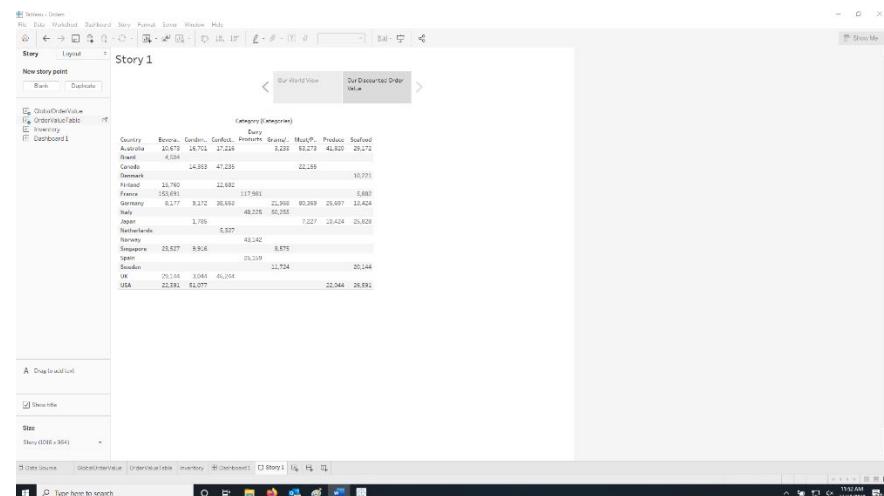
## Building a Story

You can build a story with the worksheets and dashboards.

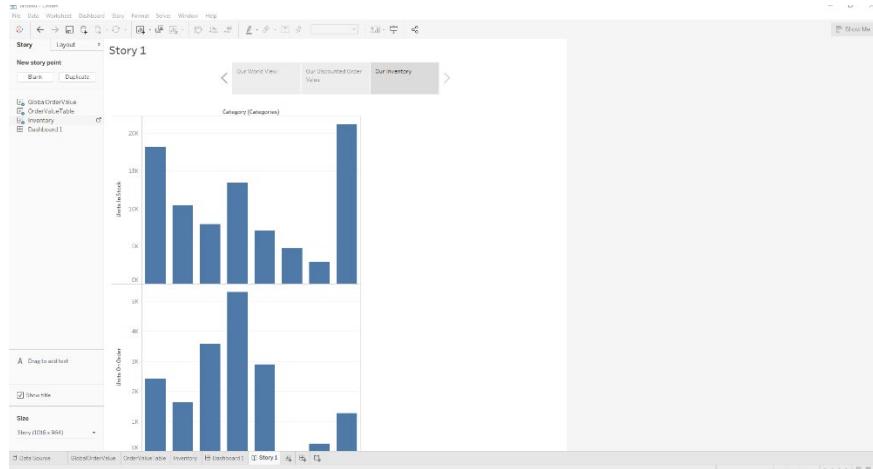
1. Click on the New Story icon at the bottom of the screen
2. Drag GlobalOrderValue to “drag a sheet here” in Story 1
3. In “Add a caption”, enter Our World View



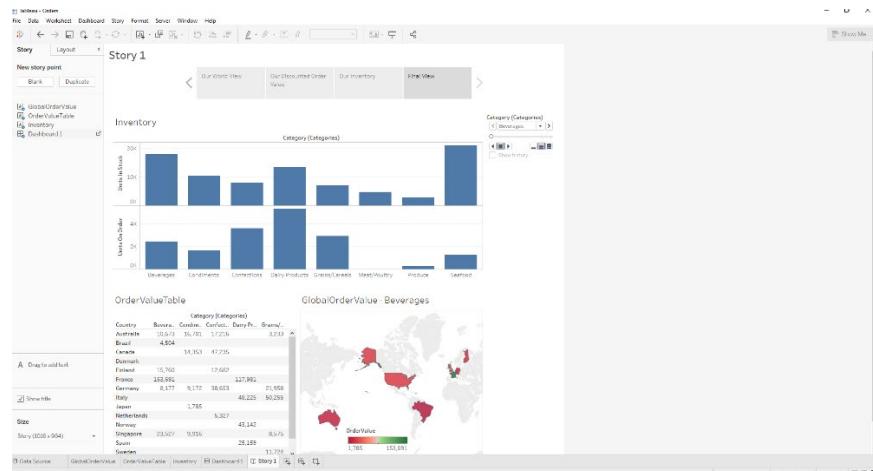
4. Under New story point, click the button Blank for the next slide in the story
5. Drag OrderValueTable to drag a sheet here
6. Add a caption of Our Discounted Order Value



7. Under New story point, click the button Blank for the next slide in the story
8. Drag Inventory to drag a sheet here
9. Add a caption Our Inventory



10. Click Blank for the next slide in the story
11. Drag Dashboard 1 to drag a sheet here
12. Add a caption Final View
13. Double click on Story 1 at the bottom and change to My Story



14. Finally, scroll through your story

## Refresh

Like PowerPivot and PowerQuery, you can refresh the data. Refresh retrieves a new copy of the data.

1. To refresh the data, click on Data Source in the lower left of the screen
2. Click on Data in the upper left, then Refresh Data Source