

Introduction To Tableau Public

Digital Media Commons

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Tableau Public Workshop Handout

This handout was developed with Tableau 2018.1 by Jane Zhao,
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Outline

1. Workshop objectives
2. Introduction
3. Preparing Data: Data extraction and transformation
4. Using Tableau Public
 - I. Connect to your data
 - II. Create a chart (i.e. a basic view)
 - III. Use the Marks card to add depth to your chart
 - IV. Drill down into the data
 - V. Filter data from your view
 - VI. Use Dashboard to uncover key insights
 - VII. Use Story to present your analysis
 - VIII. Save and publish your work

Objectives

Participants will be able to

- 1) tell the limitations of Tableau Public
- 2) connect to an Excel file
- 3) create a worksheet, a dashboard, and a story
- 4) know how to create group, hierarchy, and filter
- 5) understand how Tableau manipulate data and how Tableau works
- 6) save work to Tableau Public website
- 7) share the created charts

Introduction

- Tableau is a data visualization tool that can help you understand data and discover insights of data. With Tableau, you can create beautiful charts, graphs, dashboards and share them with other people conveniently.
- Tableau products
 - Tableau Desktop
 - The full version of Tableau.
 - It can connect to a wide array of data sources.
 - It has very strong security for data.

- Download Tableau Public (Desktop) at <https://public.tableau.com/s/download>
 - Tableau Public FAQ <https://community.tableau.com/docs/DOC-9135>
 - Tableau Academic Programs
 - Tableau Desktop and Tableau Prep is free for students and instructors around the world.
Read more at <https://www.tableau.com/academic#8PcZYr0tkUI2ZvFG.99>
 - Tableau for Students
Students (K12 and postsecondary) at accredited academic institutions worldwide are eligible for a free one-year license to activate Tableau Desktop and Tableau Prep. Fill out a form at <https://www.tableau.com/academic/students#form>

Preparing Data: Data Extraction and Transformation

Preparing data can be very time consuming and intimidating! Your data needs to be correctly prepared. If the data is not prepared correctly, it will be hard for Tableau to recognize and utilize for analyses. Fortunately, we don't have to do anything for the data used in this workshop. The DMC equipment circulation data set is ready for use. It was prepared by Mang Sun, Fondren System Librarian. He extracted the data from Sirsi's system log file, and transformed it into an Excel spreadsheet file.

The Tableau Workflow

I. Connect to your data

1) Load a data file

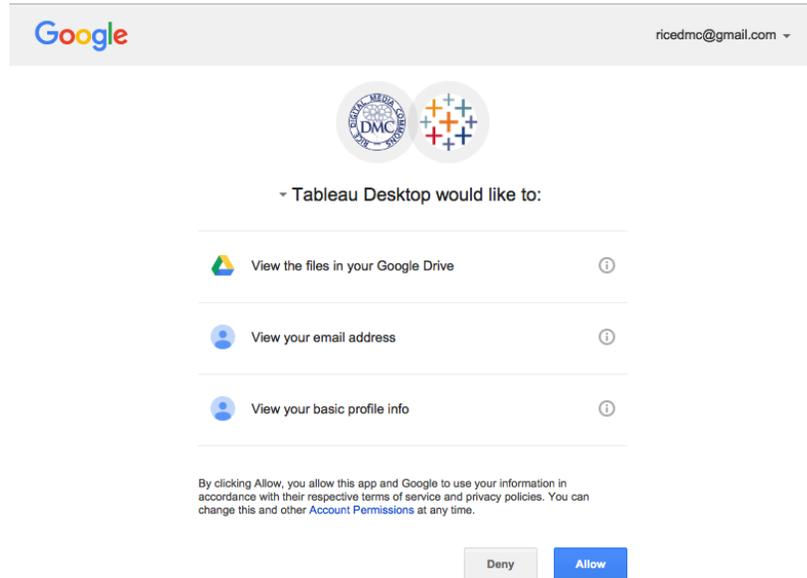
The first step is to connect to the data you want to explore or visualize. Launch Tableau



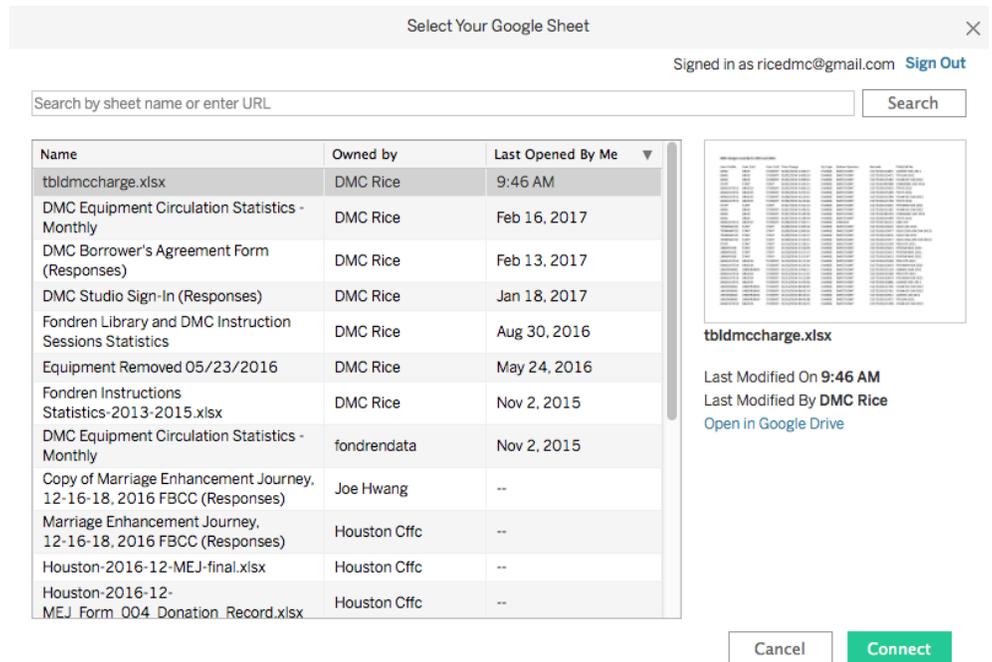
a. Connecting to a data file

- Loading a local Excel file.
 - 1) On the left hand side blue navigation area, **Connect**
 - a. *To a File*
 - b. **Excel** -> , locate the .xls file you want to open
 - 2) Or File -> Open, locate the .xls file you want to open.
- Loading an online Google Sheet
 - *To a Server*
 - More... -> Google Sheets

- Input your Google Account and password
- Tableau will ask to have access to:



- Click **Allow** to continue

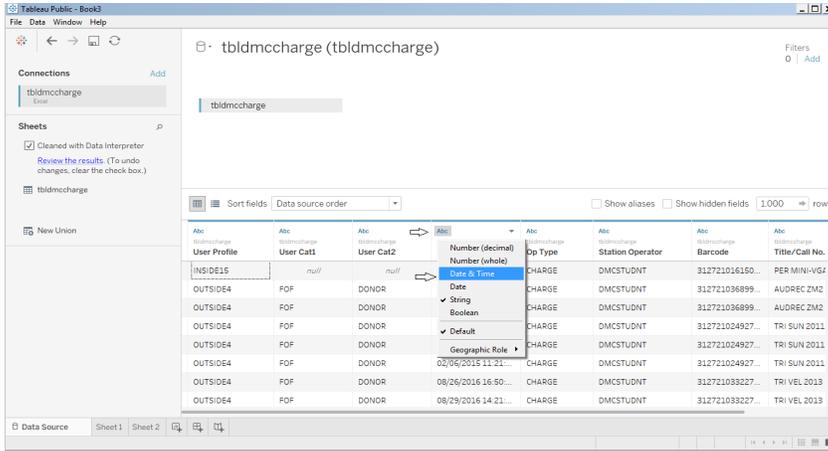


- Then select the Google Sheet you want to connect, click **Connect** to continue.
 - Once the file is connected successfully, you will see Tableau load the first 1000 records for preview.

2) Change data type

After the data is connected, the column headers from your data source are shown as fields. Tableau assigns each field a data type. The data type reflects the kind of information stored in that field, for example, dates (9/18/2017) and strings ("Rice

University”). In this DMC equipment circulation data set, User Profile is set to **String**, User Cat1 is set to **String** too. However, **Time Charge** is set to **String (Abc)**, which is wrong. The wrong default data type needs to be corrected. Click the **Abc** symbol above Time Charge and select **Date and Time**.



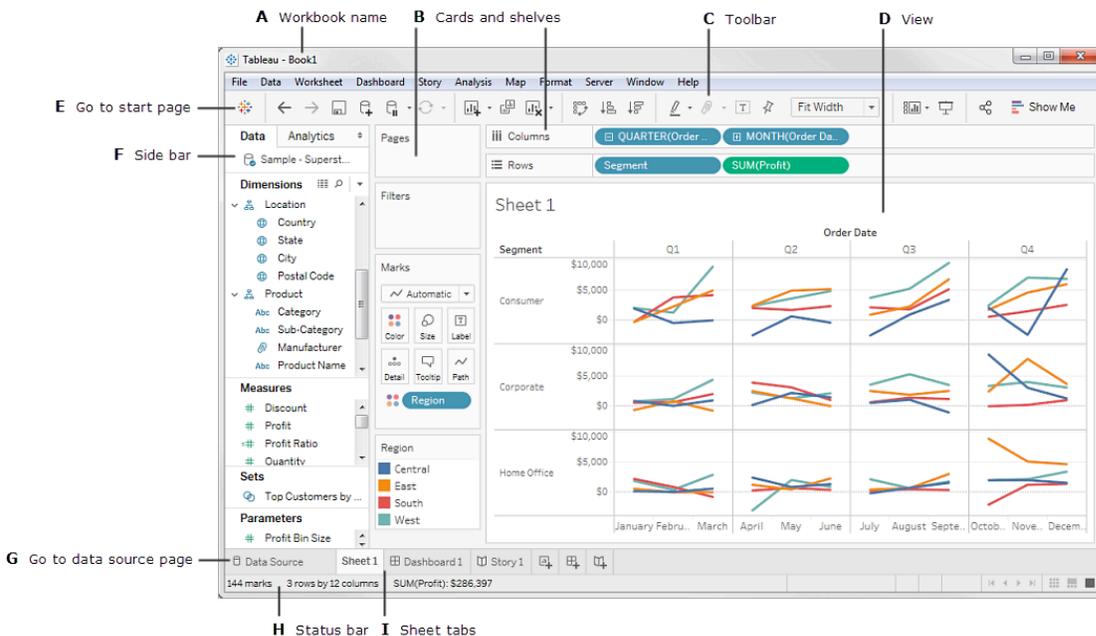
The table below shows the Data Types in Tableau.

Icon	Data type
	Text (string) values
	Date values
	Date & Time values
	Numerical values
	Boolean values (relational only)
	Geographic values (used with maps)

Note: Tableau is only referencing the source data. When you work the data within Tableau, your underlying data won't be affected (i.e. Your original source data remains intact.).

II. Create a Chart (i.e. a basic view)

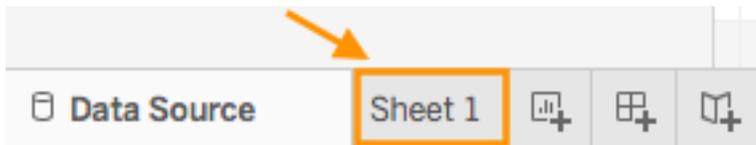
Tableau workspace



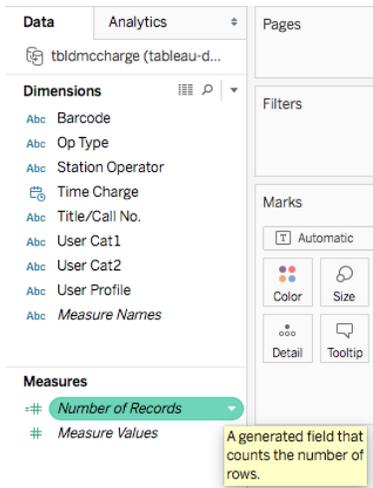
http://onlinehelp.tableau.com/current/pro/desktop/en-us/environment_workspace.html

Activity 2.1 Understanding the Data Pane

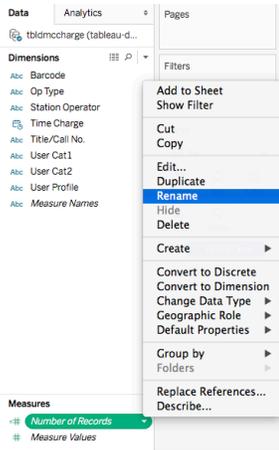
- 1) Click **Sheet 1** at the left bottom next to **Data Source**.



- 2) After the data is loaded, the column headers from your data source are shown as fields on the left side in the **Data** pane.



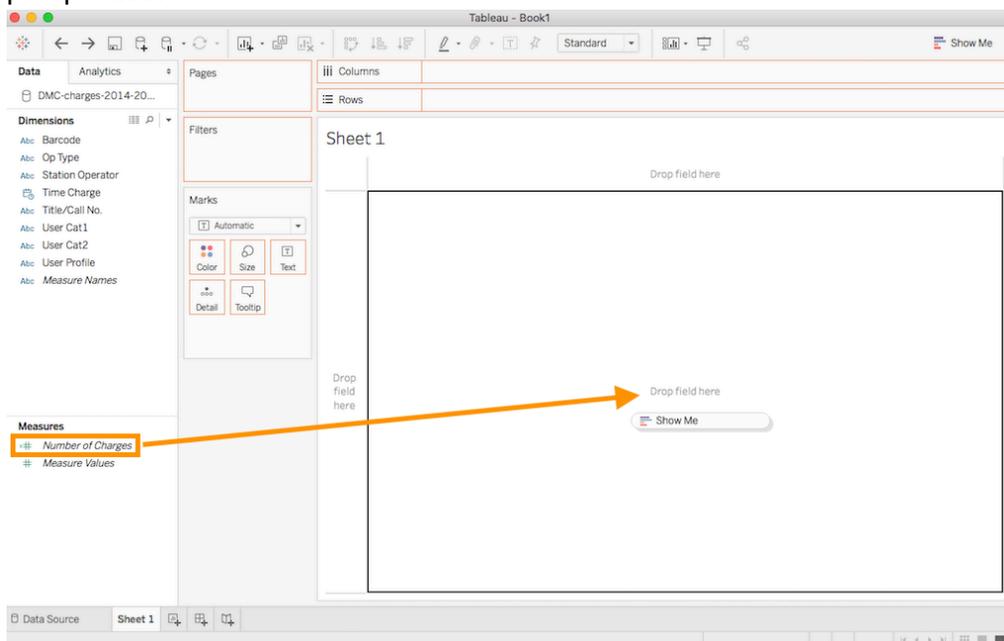
- 3) Tableau puts each field into **Dimensions** or **Measures**.
 - a. **Dimensions** typically hold categorical data that can't be aggregated such as title/call numbers, dates or boolean values. **Dimensions set the granularity, or the level of detail in the view. We typically want to group our data by some combination of categories. What dimensions we use to build the view will determine how many marks we have.**
 - b. **Measures** hold numeric data that can be measured and aggregated such as number of checkouts and sales. **They're aggregated up to the granularity set by the dimensions in the view. The value of a measure therefore depends on the context of the dimensions.**
 - c. **Dimensions come out onto the view as themselves, measures come out onto the view as aggregates, discrete pills are BLUE, continuous pills are GREEN.**
 - d. Dimension fields are generally used for row or column headings. Measures are generally used for plotting or giving values to the sizes of markers.
- 4) Tableau also automatically generates **Number of Records**, a field that counts the number of rows. The table loaded via the Excel sheet doesn't contain any explicit measure. However, each line corresponds to a checkout (charge) event, Tableau automatically generates **Number of Records** that is a measure.
- 5) Now rename **Number of Records** to **Number of Charges** by clicking the Down Arrow to the right of the measure and selecting **Rename**.



Activity 2.2.01 Understand how Tableau manipulates data

Question: How to break down the total number of charges by year by User Profile?

- 1) Drag *Number of Charges* to the view area, you will see a number **13,178** in the view. When we drop a field on the **Drop field here** grid, we are creating a view from a tabular perspective.



- 2) If you right click over the number, choose **View Data...->Full Data**, scroll to the column **Number of Charges**, you will see value 1 in all the rows in that column. What Tableau is doing here is to adding up every single value in this column in this dataset and giving us

a SUM number, which is the count of the rows as well.

Sheet 1

13,178

Time Charge	Title/Call No.	User Cat1	User Cat2	User Profile	Number of Charges
/2/2014 2:09:27 PM	AUDREC ROL 2011	GRAD	STUDENT	GRAD	1
/2/2014 2:09:33 PM	TRI SUN 2011	GRAD	STUDENT	GRAD	1
/2/2014 2:09:42 PM	VCAM-SD CAN 2012	GRAD	STUDENT	GRAD	1
/2/2014 3:45:51 PM	CONSGMIC AZD 2012	STAFF	STAFF	STAFF	1
/3/2014 2:06:13 PM	TRI PS 2012	GRAD15	STUDENT	GRADUATE15	1
/3/2014 2:25:22 PM	TRI PS 2012	GRAD15	STUDENT	GRADUATE15	1
/6/2014 4:23:42 PM	VCAM-SD CAN 2012	GRAD15	STUDENT	GRADUATE15	1
/6/2014 4:23:46 PM	TRI PS 2012	GRAD15	STUDENT	GRADUATE15	1
/7/2014 1:41:23 PM	PER MINI-VGA 2011	STAFF	STAFF	STAFF	1
/7/2014 3:49:55 PM	VCAM-SD CAN 2012	GRAD	STUDENT	GRAD	1
/7/2014 3:49:58 PM	CONSGMIC AZD 2012	GRAD	STUDENT	GRAD	1
/7/2014 3:49:59 PM	TRI PS 2012	GRAD	STUDENT	GRAD	1
/8/2014 5:04:11 PM	DMC KEY	GRAD15	STUDENT	GRADUATE15	1
/9/2014 1:09:18 PM	DSL R CAN 2012	STAFF	STAFF	TERMINATED	1
/9/2014 1:09:26 PM	DSL R Z250-LEN CAN 2013)	STAFF	STAFF	TERMINATED	1
/9/2014 1:10:22 PM	DSL R CAN 2012	STAFF	STAFF	TERMINATED	1

- 3) If we want to see the year in this view, double click on **Time Charge**, which will be added to **Columns** shelf. Now we have broken down our single number into three numbers. Basically we have sliced the aggregated number by year. When we add a dimension to the view, members of that dimension will be added as column or row headers.

Columns	YEAR(Time Charge)
Rows	

Sheet 1

Time Charge		
2014	2015	2016
4,084	4,113	4,981

- 4) If we would rather have row headers, we can drag the YEAR pill to Rows.

Year of Tim..		
2014	4,084	
2015	4,113	
2016	4,981	

Drag YEAR pill back to the Columns shelf.

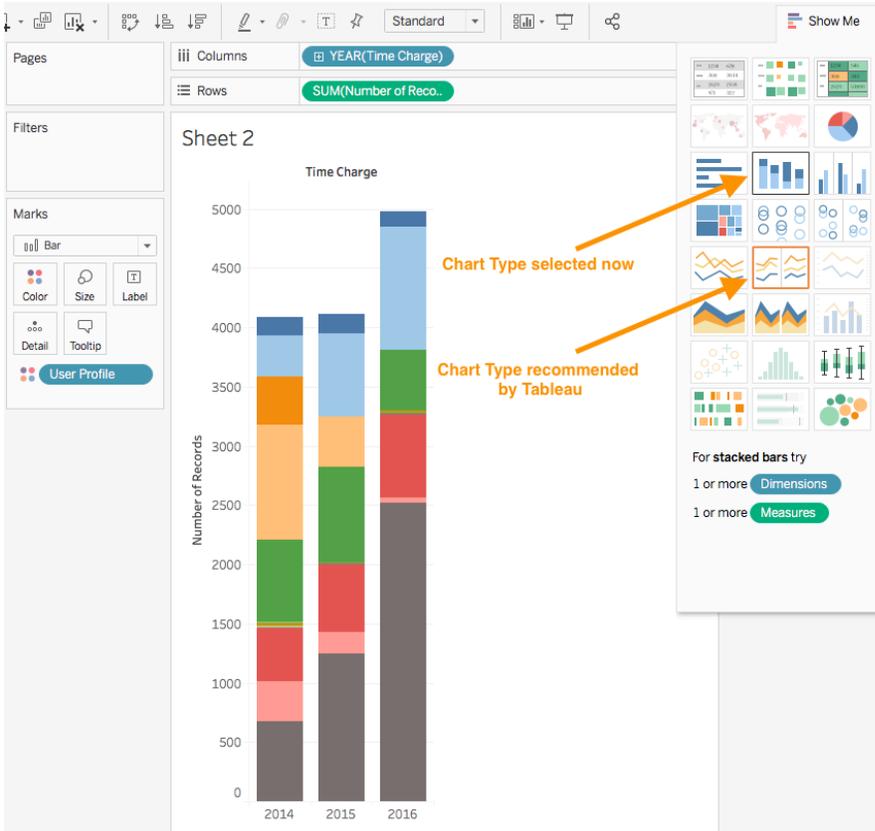
- 5) If we would like to put **User Profile**, we double click it to add it into the view. Now we see we have further broken down the three numbers. We got a table of 13 rows and columns, including 29 numbers and 10 null values.

User Profile	Time Charge		
	2014	2015	2016
FACULTY	154	161	132
GRAD	343	703	1,035
GRADUATE14	411		
GRADUATE15	970	428	
GRADUATE16	692	802	517
INACTIVE	11		
INSIDE15	25	9	20
LIBRARYUSE	3		
OUTSIDE4		6	6
OUTSIDE15	3		
STAFF	462	576	709
TERMINATED	333	178	44
UNDERGRAD	677	1,250	2,518

- 6) At any time, you can right click over a number and choose **View Data...** to view the underlying sliced data.
- 7) You can drag both YEAR pill and User Profile to either Columns shelf or Rows shelf. However, this probably will generate either too long or too high table that you have to scroll to view. That's what you want to avoid.
- 8) Right click over **Sheet 1** and rename it to **DMC-Charges-byYear-byUserProfile-Table**.
- 9) Optional steps
- Click on **Show Me** on the upper right corner.
 - Choose **stacked bars**, you get a stacked bar chart.

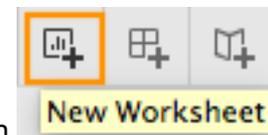
Activity 2.2.02 Understand Show Me menu

- 1) Consider **Show Me** to be your expert helper. Show Me tells you what chart to use and why.
- 2) **Show Me** menu lists 24 common chart types. Some of them will be available. Some of them will be greyed out depending on the context.
Note: It's possible to build an enormous variety of charts in Tableau, Show Me is one-click options, not a comprehensive list of possibilities.
- 3) **Show Me** creates a view based on the fields already used in the view and any fields you've selected in the Data pane.
- 4) Tableau automatically evaluates the selected fields and gives you the option of several types of views that would be appropriate for those fields. **Show Me** also highlights the visualization type with orange color that best matches the data.
- 5) Chart types that are not applicable to your worksheet as it is currently constructed will be grayed out and not selectable until you have the appropriate combination of measures and/or dimensions.
- 6) Any view type that is not greyed out will generate a view of your data. As you hover over each view type, the description at the bottom shows the minimum requirements.
- 7) In this example, because a date dimension and a measure are selected, Tableau suggests you build a line view. A line is often the optimal way to look at how measure values change over time.



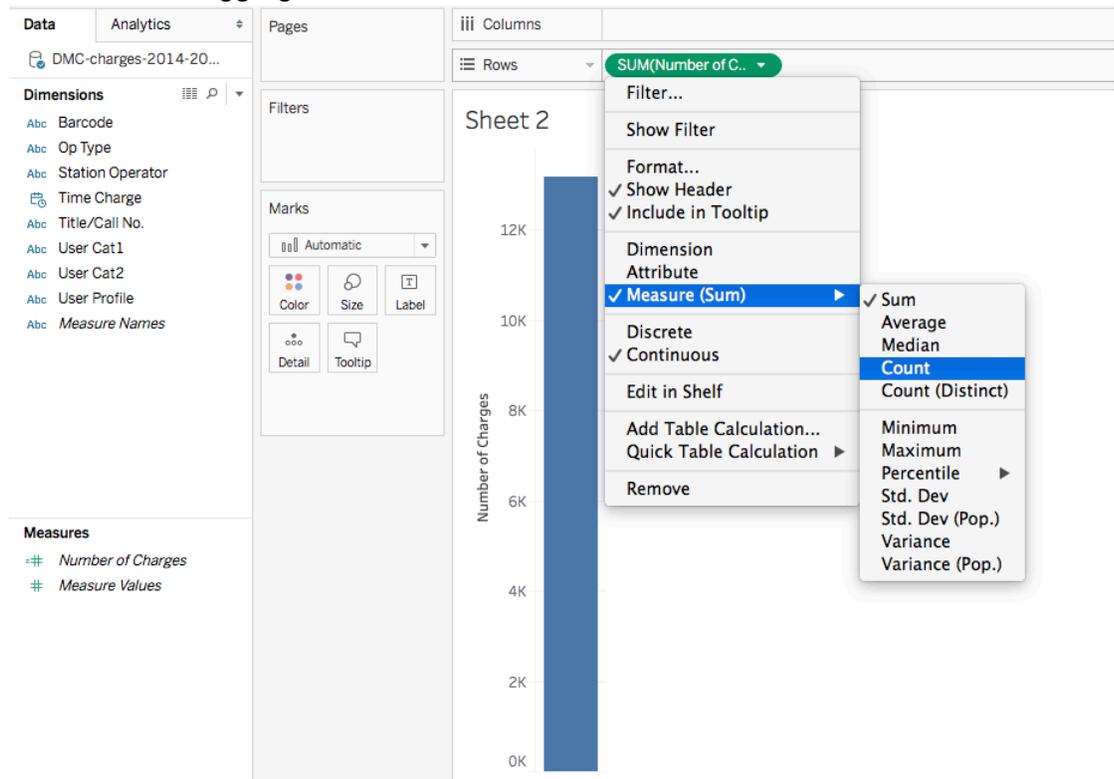
Activity 2.2.1 Visualizing the total number of charges by year via bar chart

Question: There are 13,178 record rows in the Excel spreadsheet file. What is the total number of charges each year? How did one year compare to the other two years?



- 1) Create a new worksheet by clicking on New Worksheet button
- 2) Drag **Number of Charges** from **Measures** to the **Rows** shelf
 - a. When we bring a field into the view from the data pane, Tableau creates a pill.
 - b. The **Number of Charges** field is colored green on the **Rows** shelf, indicating that it is continuous.
 - c. The field name changes to **SUM(Number of Charges)**. That's because measures are automatically aggregated when you add them to the view, and the default aggregation for this measure is SUM.

- d. If you right-click over **SUM(Number of Charges)**, select **Measure (Sum)**, you will see all the Aggregate functions available for this measure.

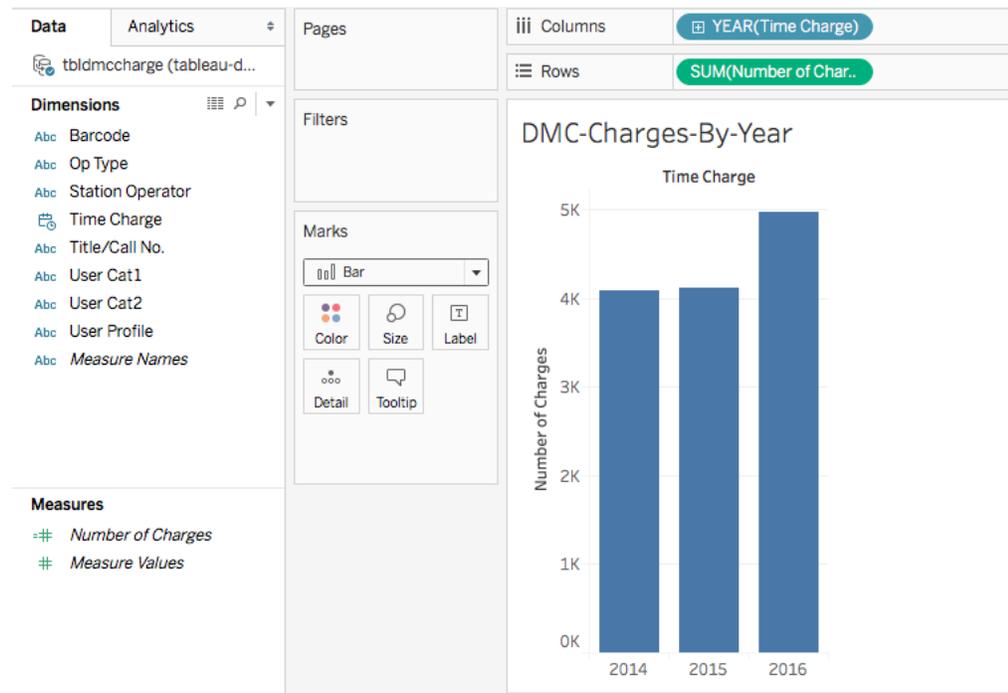


- i. **SUM** - Returns the sum of all values in the expression.
- ii. **AVG** - Returns the average of all the values in the expression (i.e. the sum of a collection of numbers divided by the number of numbers in the collection.). In our example, $SUM(\text{number of charges}) / COUNT(\text{number of charges}) = 1$
- iii. **COUNT** - Returns the number of items in a group. In our example, the count number is the same as the sum number.
- iv. **COUNTD** - Returns the number of distinct items in a group. In our example COUNTD is 1.
- v. Read more at [Aggregate Functions in Tableau](#).

3) Drag **Time Charge** from **Dimensions** to the **Columns** shelf, and change the Marks to from **Automatic** to **Bar**.

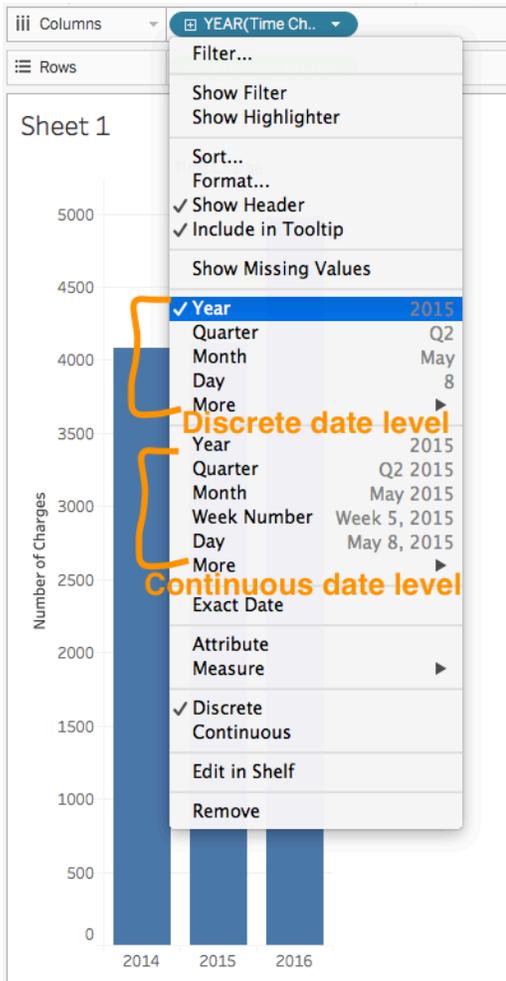
- a. When you drag a field over a shelf, a plus sign indicates that the shelf can accept the field.
- b. Notice that the field is colored blue, which indicates that it is *discrete*.
- c. Dimensions set the granularity, or the level of detail in the view. What dimensions we use to build the view will determine how many marks we have. Here we have 3 years of data, 2014-2016 – and we have 3 marks.
- d. The default date level is determined by the highest level that contains more than one distinct value (for example, multiple years and multiple months). That means that if **[Time Charge]** contained data for only one year but had multiple months, the default level would be month. You can change the date level using the field

menu.



- 4) On the field drop down menu, the first set is for discrete date levels and the second list is for continuous date levels. **Discrete means data is individually separate and distinct. Continuous means data can take any value in a range, forming an unbroken whole, without interruption.** Dates can be brought into the view as either continuous or discrete. Tableau is very smart about creating Date and Time hierarchy automatically. You can conveniently traverse (drill down and scroll up) along Tableau generated Date

and Time Hierarchy and watch change on numbers.



5) Right click over **Sheet 2** and rename it to **DMC-Charges-by-Year**.

6) *Optional steps*

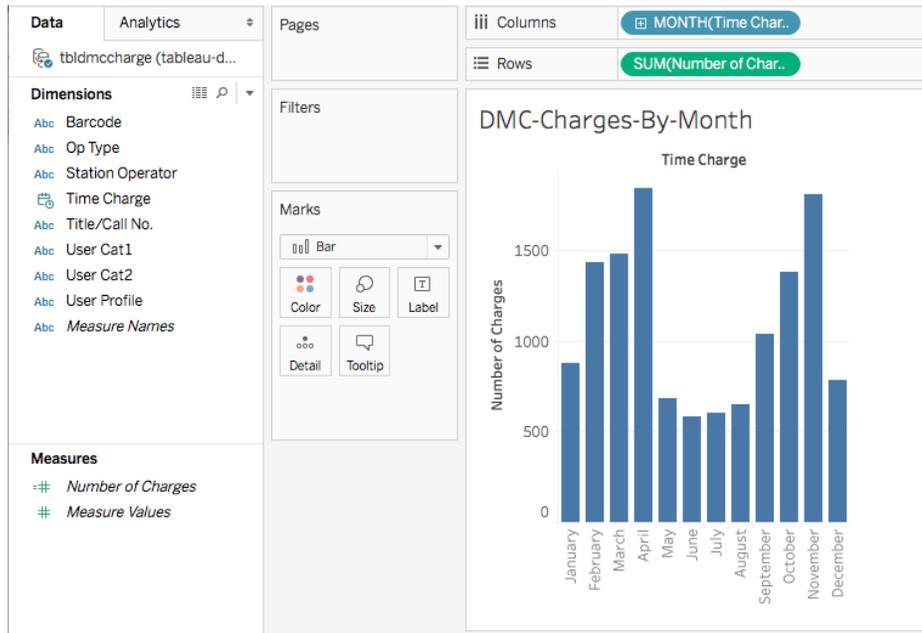
- a. Right click over the sheet name, choose **Duplicate as Crosstab**, you will get a text table(Crosstab) just like the one created in the previous activity. The text table shows the numbers visualized in the view. Right click over the sheet name, choose **Delete** to delete the sheet.
- b. Or click on **Show Me**, choose text tables, you will get the same text table as the action of Duplicate as Crosstab.

Activity 2.2.2 Visualizing the total number of charges by month across years via bar chart (one dimension and one measure)

Question: What is the total number of charges each month across years?

1) Click  to create a new worksheet.

- 2) Drag **Number of Charges** from **Measures** to the **Rows** shelf and **Time Charge** from **Dimensions** to the **Columns** shelf, and make sure **Bar** is selected in the **Marks Pull-down menu**.
- 3) Click the **Down** arrow in the **YEAR(Time Charge)** pill on the **Columns** shelf and select **Month** (the first one, the Discrete one)
- 4) You will get checkout numbers by month across all the years (2014 - 2016)



- 5) Rename the sheet to **DMC-Charges-by-Month**.

DIY Activity: Visualizing the total number of charges by weekday across years via bar chart



- 1) Click  to create a new worksheet.
- 2) Drag **Number of Charges** from **Measures** to the **Rows** shelf and **Time Charge** from **Dimensions** to the **Columns** shelf, and make sure **Bar** is selected in the **Marks Pull-down menu**.
- 3) Choose **Weekday** this time.
- 4) You will get checkout numbers by Weekday across all the years (2014 -2016).
- 5) Rename the sheet to **DMC-Charges-by-Weekday**.

DIY Activity: Visualizing the total number of charges by hour across years via bar chart

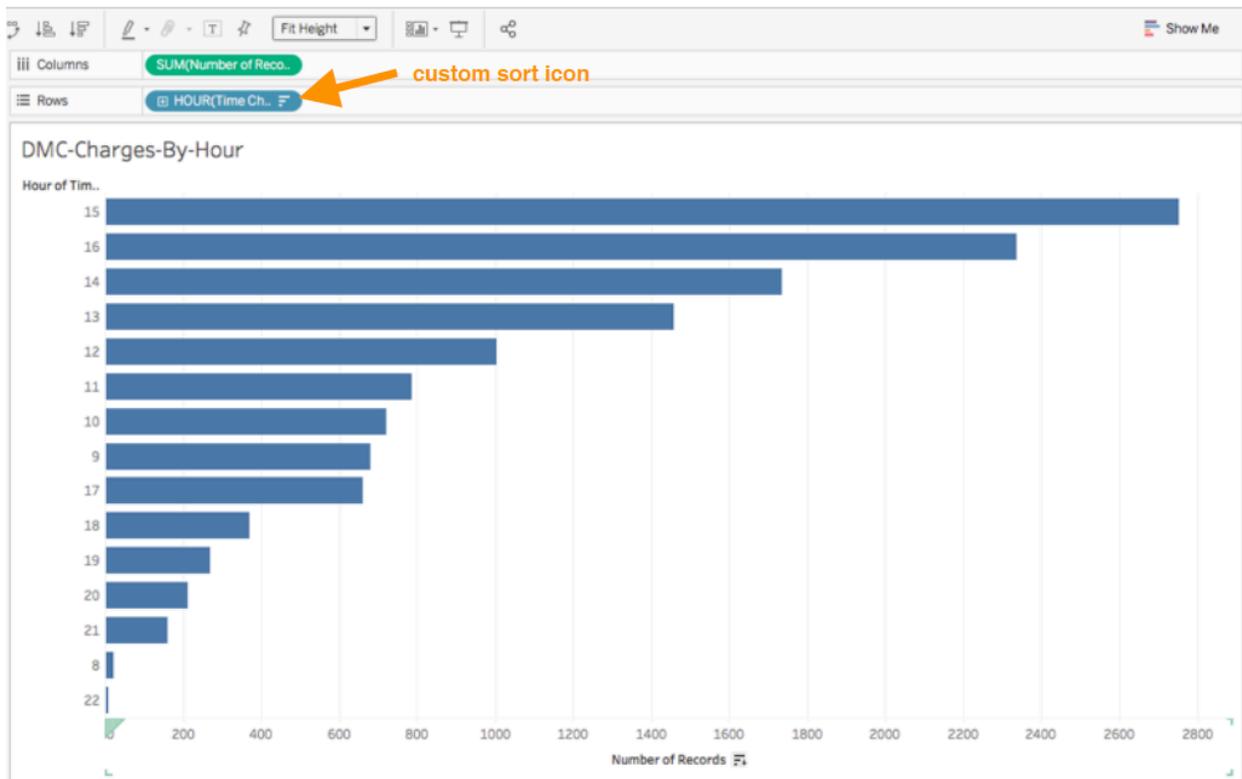
- 1) Right click over the sheet of **DMC-Charges-by-Weekday**
- 2) Select **Duplicate**
- 3) Click the **Down** arrow in the **Year(Time Charge)** pill on the Columns shelf, select **More** and click **Hour**

- 4) You will get checkout numbers by Hour across all the years (2014 -2016).
- 5) Rename the sheet to **DMC-Charges-by-Hour**.

Activity 2.2.5 Sorting data

- In the DMC-Charges-By-Hour, click  Swap Rows and Columns button on the toolbar to make the bars horizontal.
- Hover over the mouse over the sort icon  **Number of Charges**. **One** click sorts the data in ascending order. **Two** clicks sorts it in descending order. **Three** clicks clear the custom sort, setting it back to the default sort method.
- Or on the toolbar, click the Descending sort icon  to sort data from highest/most to lowest/least, or the Ascending icon  to do the other way around.
- Or select an hour in a header and drag it up or down, the viz updates with the new sort.

In any way, Tableau provides a visual indication that a customized sort is applied. A sort icon appears on the HOUR(Time Charge) (on rows).



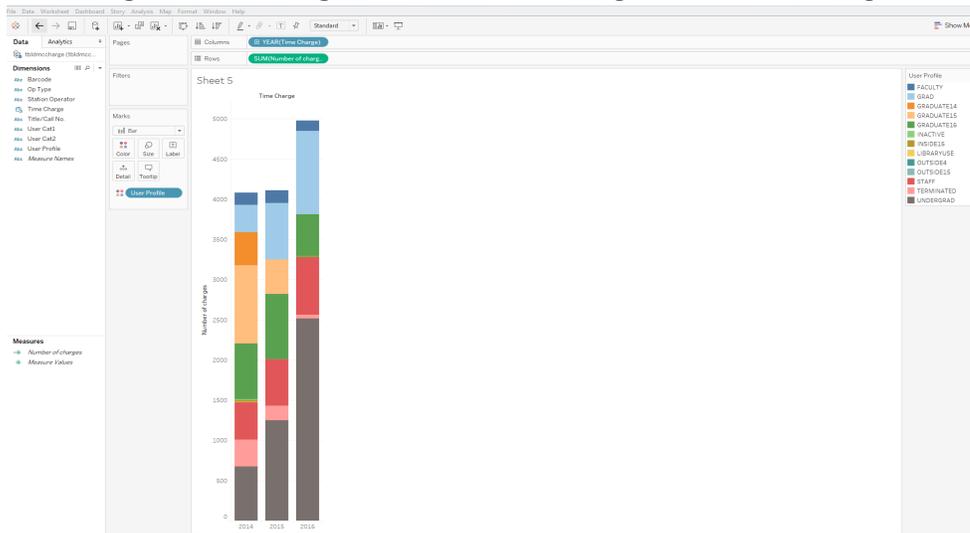
III. Use Marks card to add depth to your chart

Activity 3.1 Visualizing the total number of charges by year and by user profile via bar chart (*two dimensions and one measure*)

Question: What is the total charges each year and how had different user groups checked out equipment?



- 1) Click  to create a new worksheet.
- 2) Drag **Number of Charges** from **Measures** to the **Rows** shelf and **Time Charge** from **Dimensions** to the **Columns** shelf, and make sure **Bar** is selected in the **Marks Pull-down menu**.
- 3) Drag and drop **User Profile** from **Dimensions** on to the **Color** card in the **Marks pane**.
Note: The Marks card is where you drag fields to control mark properties such as type, color, size, shape, and so on.
- 4) You can get the following screen. The Color legend is on the far right side.



- 5) Placing a dimension on **Color** separates the marks according to the members in the dimension, and assigns a unique color to each member. The color legend displays each member name and its associated color.
- 6) Rename the sheet to **DMC-Charges-by-Year-and-UserProfile**.

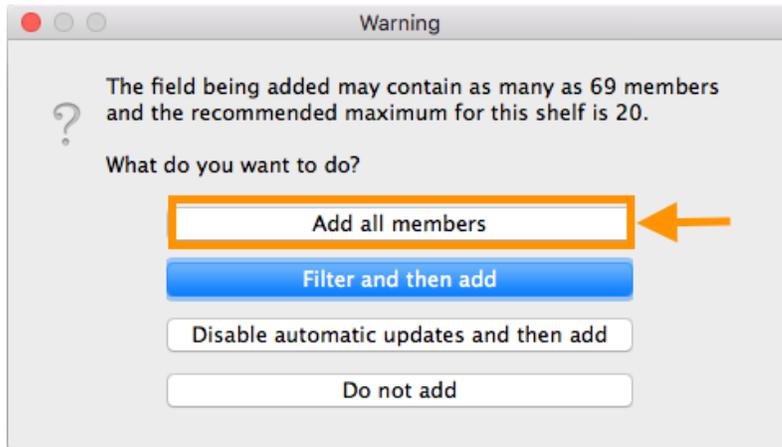
DIY Activity: Visualizing the total number of charges by year and by device name via circle chart

Question: What is the total charges each year and how had different devices been checked out?

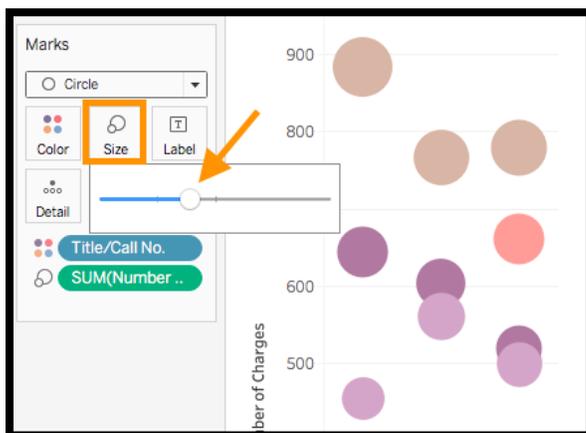


- 1) Click  to create a new worksheet.
- 2) Drag **Number of Charges** from **Measures** to the **Rows** shelf and **Time Charge** from **Dimensions** to the **Columns** shelf.

- 3) Select **Circle** in the **Marks Pull-down menu**.
- 4) Drag **Title/Call No.** on to the **Color** card. Then drag **Number of Charges** on to the **Size** card. If you see the following dialog window, please click **Add all members**.



- 5) You can also click the **Size** card to adjust the size of circle via the popped up Size selection slider.



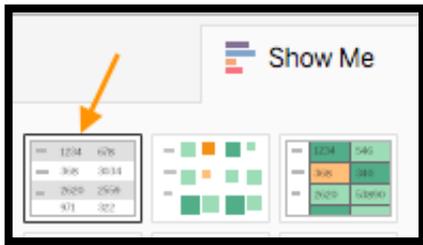
- 6) Rename the sheet to **DMC-Charges-by-Year-by-DeviceName**.

DIY Activity: Creating a Text Table for the total number of charges by year, by device, and user profile



- 1) Click  to create a new worksheet.
- 2) Drag **Number of Charges** from **Measures** to the **Rows** shelf and **Time Charge** from **Dimensions** to the **Columns** shelf.

- 3) Click the **text tables** button on the **Show Me** Tool Bar.



- 4) Now you get statistics for each year in tabular format

Columns: YEAR(Time Charge)

Rows:

Sheet 7

Time Charge		
2014	2015	2016
4,084	4,113	4,981

- 5) Drag **User Profile** and **Title/Call No.** one after each other on to the Rows shelf.

Columns: YEAR(Time Charge)

Rows: User Profile (group), Title/Call No.

Filters: User Profile

Marks: SUM(Number ..)

DMC-Statistics-By-YearUserProfileTitle

User Profile..	Title/Call No.	Time Charge		
		2014	2015	2016
FACULTY	AUDREC ROL 2011	7		
	AUDREC ZM 2012	6	1	3
	AUDREC ZM2 2015		2	7
	CONSGMIC RD			5
	CONSGMIC RD 2014	3	2	
	CONSGMIC SON 2006		1	
	CONSGMIC-NTG2 RD 2015		4	2
	DSL R CAN 2012	9	6	9
	DSL R NIK 2015		1	3
	DSL R P-LEN CAN 2009		1	
	DSL R Z85-LEN CAN 2014			1

- 6) Rename the sheet to **DMC-Statistics-by-YearUserProfileTitle**.

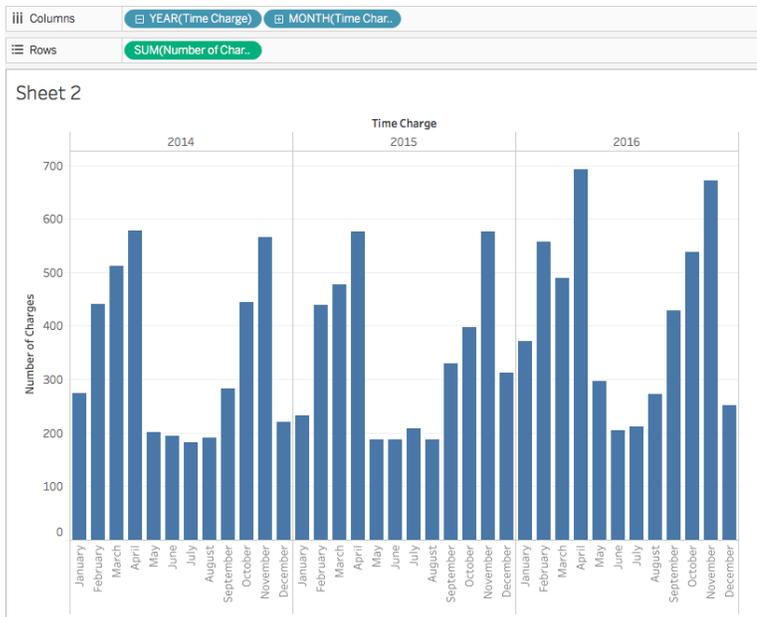
IV. Drill down into the Data

Drilling down usually means expanding out a hierarchy, getting to the next level of detail. When you connect to a data source, Tableau automatically separates date fields into hierarchies so you can easily break down the viz.

Activity 4.1 Drilling down date hierarchy with the DMC-Charges-by-Year chart

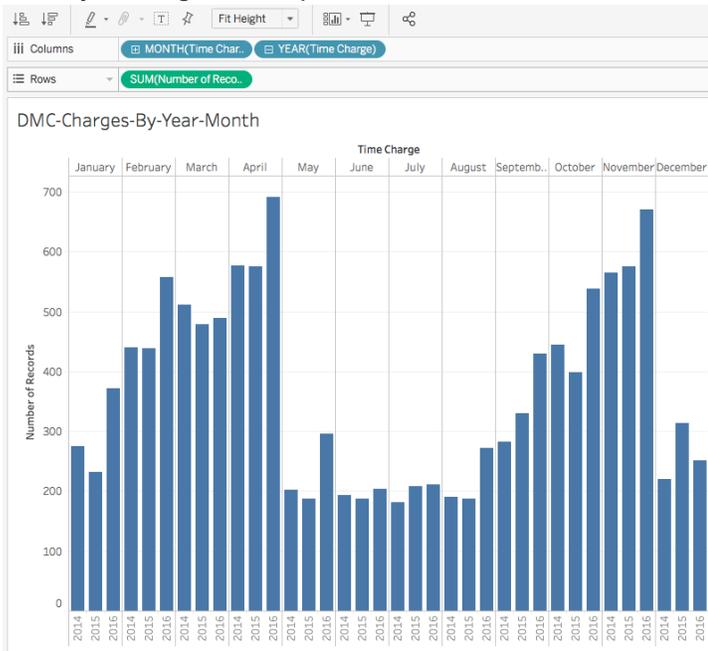
You can modify the view to show quarters, month, etc. in addition to years. As you drill down into the hierarchy, the view changes to become a nested table.

- 1) Right click over the sheet of **DMC-Charges-By-Year**.
- 2) Select **Duplicate**.
- 3) Click the plus button  **YEAR(Time Charge)** on the left side of the field **YEAR(Time Charge)** field on Columns or Drag the **Time Charge** field (again) from the Data pane and drop it on the **Columns** shelf to the right of **Year(Time Charge)**.
- 4) The new dimension divides the view into separate panes for each year.
- 5) You can further drill into months. And delete **QUARTER(Time Charges)** from the Columns shelf.



- 6) Rename the sheet to **DMC-Charges-by-Year-Month**
- 7) Switch **YEAR(Time Charge)** and **MONTH(TIME Charge)** in Rows by dragging **MONTH(TIME Charge)** to the front of **YEAR(Time Charge)**, you will see the nested table is changed to the view below. Tableau generates a view based on where and in what

order you drag and drop fields into the shelf.



8) Click Undo button on the toolbar to undo the change.

Activity 4.2 Creating groups and drillable hierarchy

You can also create your own custom hierarchies. For example, if you have a set of fields named Region, State, and County, you can create a hierarchy from these fields so that you can quickly drill down between levels in the viz.

Activity 4.2.1 Create Groups

In this example of DMC equipment data, we don't have a set of fields that we can create a meaningful hierarchy. We will create a group, then we will create a hierarchy.

Group simplifies large numbers of dimension members by combining them into higher-level categories. The field "User Profile" has too many members. Let's bring it down to 4 groups (i.e. students, faculty, staff, and others.). This creates a higher level category.

- 1) Drag *Time Charge* to **Columns** shelf, *Number of Records* to **Rows** shelf, and *User Profile* to the **Color Marks**.

2) Click **Show Me**, choose **text tables**.

The screenshot shows the Tableau interface. On the right side, the 'Show Me' panel is open, displaying various visualization options. An orange box highlights the 'Text Tables' icon, and an orange arrow points to it. The main view shows a table with columns for 'User Profile' and 'Time Charge' (years 2014-2017).

User Profile	2014	2015	2016	2017
FACULTY	154	161	132	159
GRAD	343	703	1,035	1,115
GRADUATE14	411			
GRADUATE15	970	428		
GRADUATE16	692	802	517	
GRADUATE17				365
INACTIVE	11			
INSIDE15	25	9	20	4
LIBRARYUSE	3			
OUTSIDE4		6	6	4
OUTSIDE15	3			
STAFF	462	576	709	682
TERMINATED	333	178	44	74
UNDERGRAD	677	1,250	2,518	2,478

3) Select *GRAD*, *GRADUATE14*, *GRADUATE15*, *GRADUATE16*, *GRADUATE17*, *UNDERGRAD*, mouse over any selected labels and select the **paperclip icon** to **Group members**.

The screenshot shows the same Tableau interface, but now the rows for GRAD, GRADUATE14, GRADUATE15, GRADUATE16, GRADUATE17, and UNDERGRAD are selected. A context menu is open over the 'UNDERGRAD' label, with the 'Group Members' option highlighted by an orange box and arrow.

User Profile	2014	2015	2016	2017
FACULTY	154	161	132	159
GRAD	343	703	1,035	1,115
GRADUATE14	411			
GRADUATE15	970	428		
GRADUATE16	692	802	517	
GRADUATE17				365
INACTIVE	11			
INSIDE15	25	9	20	4
LIBRARYUSE	3			
OUTSIDE4		6	6	4
OUTSIDE15	3			
STAFF	462	576	709	682
TERMINATED	333	178	44	74
UNDERGRAD	677	1,250	2,518	2,478

- 4) Right click over the label and select **Edit Alias...**, rename it to **STUDENTS**.

User Profile (group)	Time Charge			
	2014	2015	2016	2017
FACULTY	154	161	132	159
GRAD, GRADUATE14, GRA	3,093	3,183	4,070	3,958
INACTIVE				
INSIDE15		9	20	4
LIBRARYUSE				
OUTSIDE4		6	6	4
OUTSIDE15				
STAFF		576	709	682
TERMINATED		178	44	74

- 5) You will see a new dimension *User Profile (group)* is created and put under Dimensions. Right click over its name and rename it to *User Profile Groupings*.

- 6) Create groups within the *Edit Group* dialog.

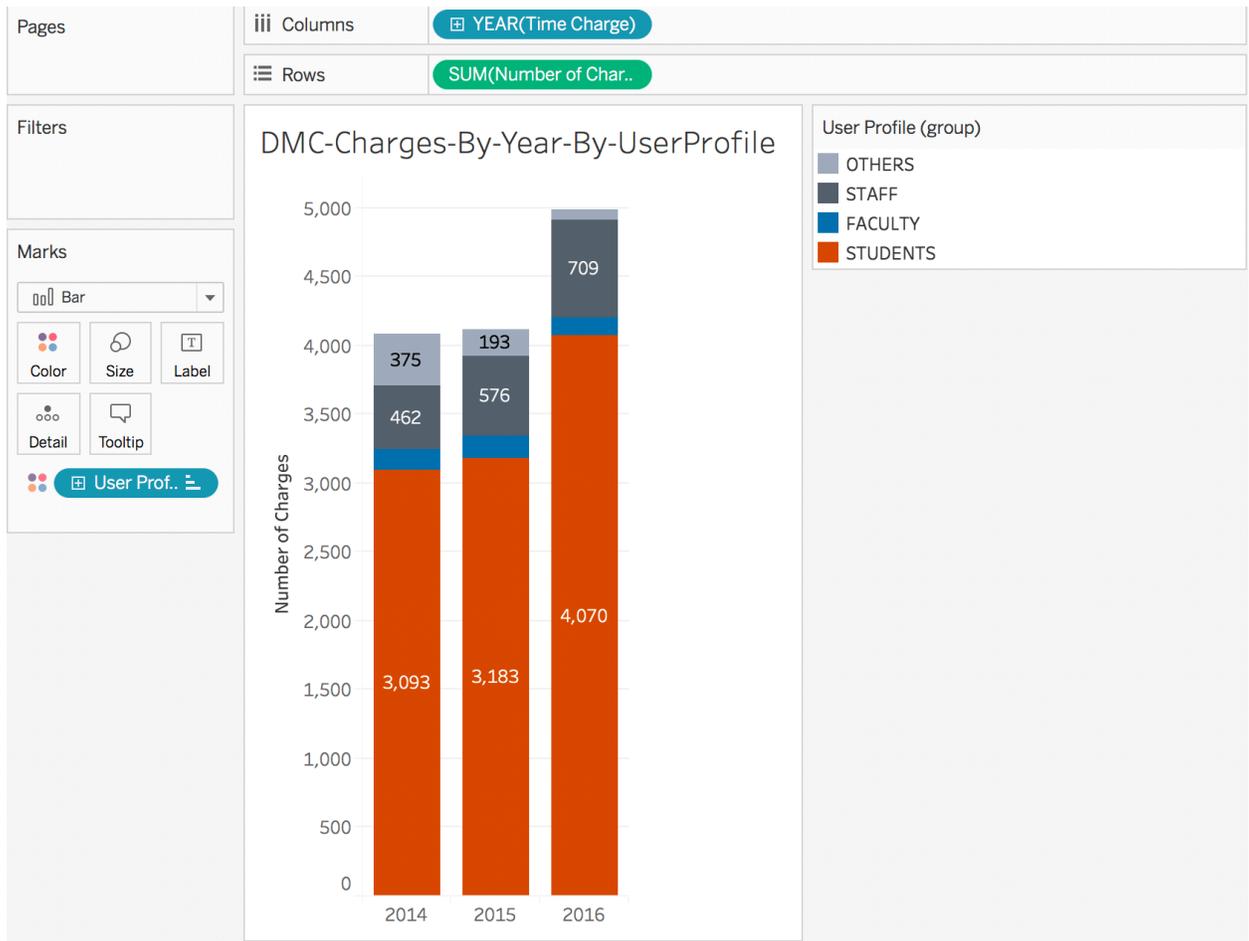
- Right click on *User Profile Groupings* in the **Dimensions**.
- Select *Edit Group...*
- Multi-select INACTIVE, INSIDE15, LIBRARYUSE, OUTSIDE4, OUTSIDE15, TERMINATED
- Click on Group

- Rename the group to OTHERS.
- Click Apply, then click OK.

- You will get a view like below.

Time Charge			
User Profile..	2014	2015	2016
FACULTY	154	161	132
OTHERS	375	193	70
STAFF	462	576	709
STUDENTS	3,093	3,183	4,070

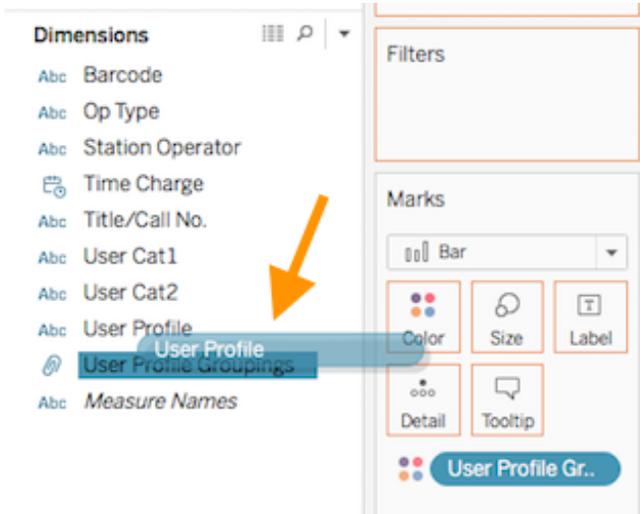
- Click **Show Me**, choose **Stacked bars chart**.
- 7) Rename the sheet to **DMC-Charges-by-Years-by-UserProfileGroupings**.
- 8) Click on the drop-down menu of User Profile Groupings, choose Edit Colors->Color Blind, change the color for the four different groups.



Activity 4.2.2 Form hierarchies

Hierarchies give end users the option to look at data at a high level or drill down into more detailed levels. We will create a hierarchy with *User Profile Groupings* and *User Profile*. Since '*User Profile Groupings*' is a higher level of categorization of '*User Profile*', it makes sense to have this before '*User Profile*', on the top of the hierarchy.

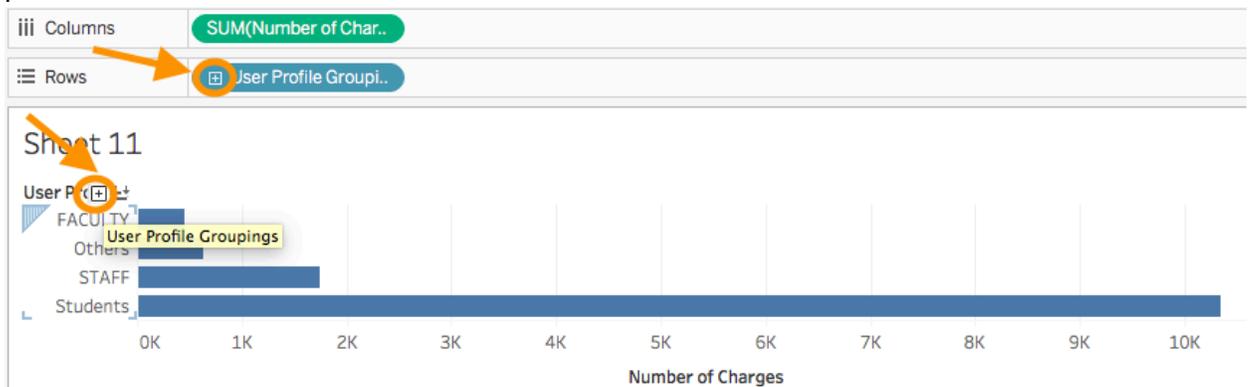
- 1) Under Dimensions, drag *User Profile* on top of *User Profile Groupings*.



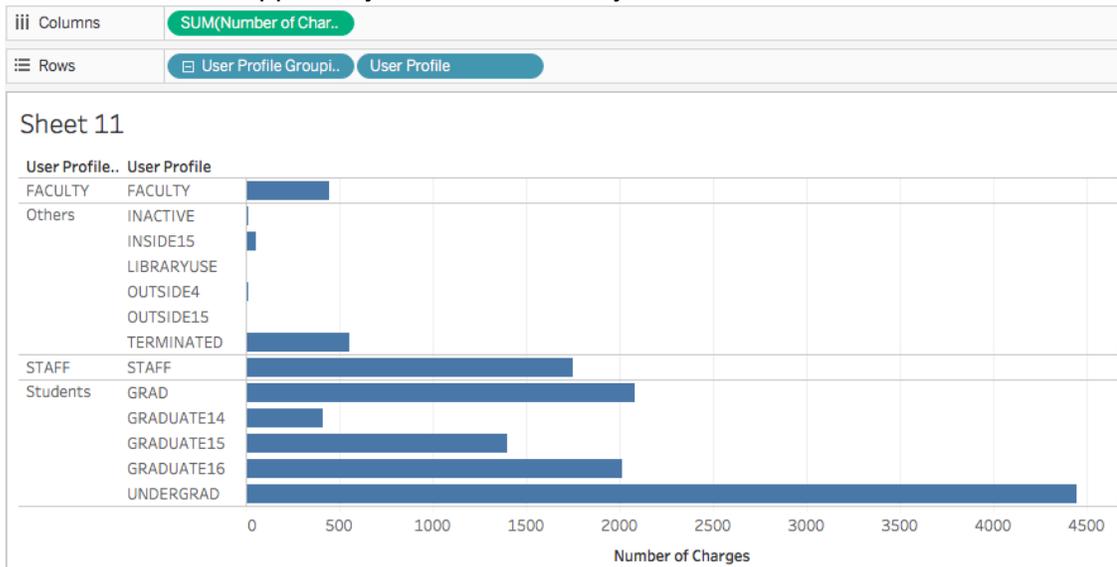
- 2) Change the name of the hierarchy to *User Profile Hierarchy*.



- 3) Build a view by dragging *Number of Records* to **Columns** shelf and *User Profile Groupings* to **Rows** shelf. You will see the + sign in front of the *User Profile Groupings* pill.



- 4) You can now drill down to the next more detailed level by clicking on the + on the pill in Rows or the + will appear if you mouse over any of the labels in the view.



- 5) Rename the sheet to *DMC-Charges-by-Groups*.

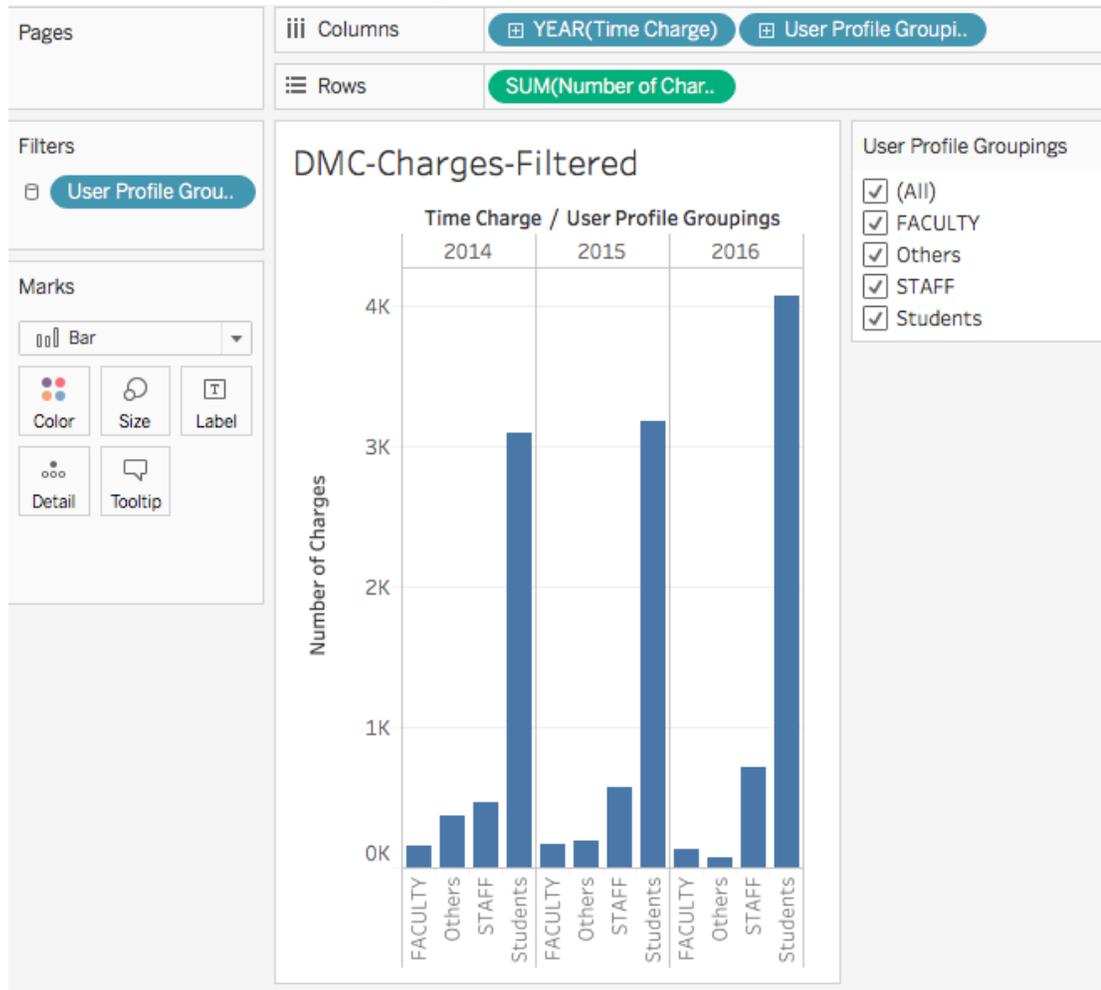
V. Filter data from your view

Filter allows you to show a subset of the data so that you can focus your analysis.

Activity 5.1 Create a filter

- 1) Create a new worksheet.
- 2) Drag *Number of Charges* to the Rows shelf, *Time Charge* and *User Profile Groupings* to the Columns shelf.
- 3) Drag *User Profile Groupings* to Filters shelf.
- 4) Right click over the *User Profile Groupings* in the Filters shelf, choose *Show Filter*.
- 5) Play with the settings and see how the filter changes the view.

6) Rename the sheet DMC-Charges-Filtered.



Activity 5.2 Understanding how Tableau works

Every chart/view that you create in Tableau should start with a question. What do you want to know? Every time you drag a field from the Data pane onto the cards and shelves, you are asking a question about the data and you are forming a Visual Query Language (VizQL) that Tableau generates based on where and in what order you drag and drop fields into the view. Then Tableau translates the VizQL into SQL/MDX/RQL (Structured Query Language/ MultiDimensional eXpressions/Resource Query Language) and issues it as a query to the data, gets back the results, and renders the visualization.

An example of SQL syntax: SUM function when grouping the results by one or more columns is:

```
SELECT expression1, expression2, ... expression_n,
       SUM(aggregate_expression)
FROM tables
[WHERE conditions]
GROUP BY expression1, expression2, ... expression_n;
```

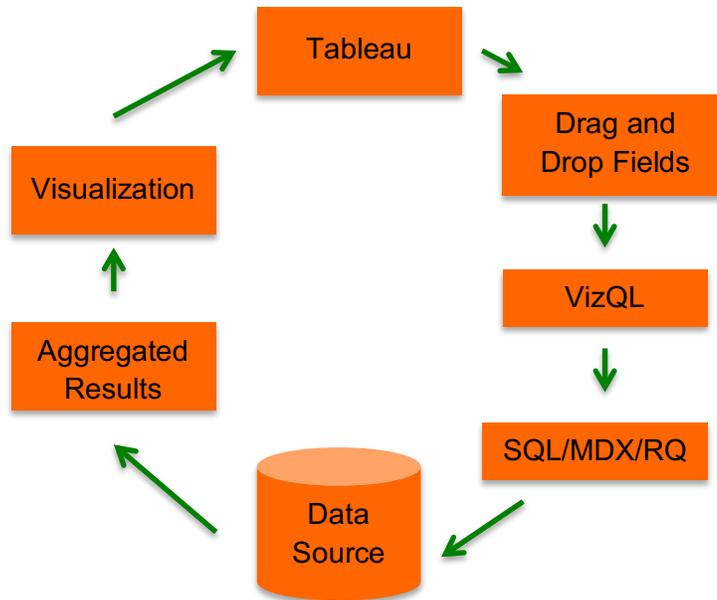


Figure: How Tableau Works

For every question you ask, the view changes to represent the answer visually - with marks (shapes, text, hierarchies, table structures, axes, color).

VI. Use Dashboard to uncover key insights

DIY Activity: Can you create a worksheet to show which user group checked out what type of equipment over years? One measure and three dimensions.

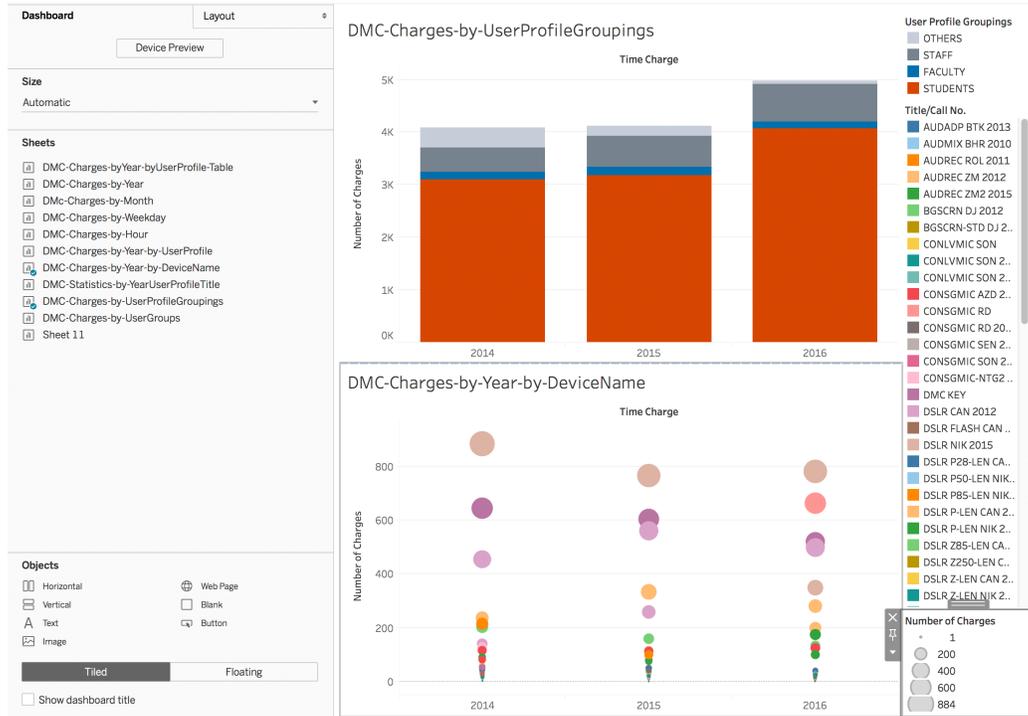
A **dashboard** is a collection of several worksheets in a single place so that you can compare and monitor a variety of data simultaneously. Dashboard is all about interactivity among worksheets.

Activity 6.1 Create a Dashboard

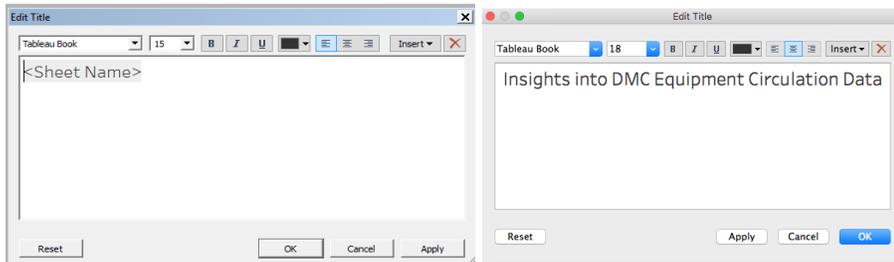


- 1) Click  to create a dashboard.
- 2) Click on Size, from the drop down menu, choose Automatic, the dashboard will resize for any screen it is displayed on.
- 3) Drag Sheet **DMC-Charges-by-Year-by-UserProfileGroupings** and **DMC-Charges-by-Year-by-DeviceName** from the Sheets section and drop them one by one onto the blank

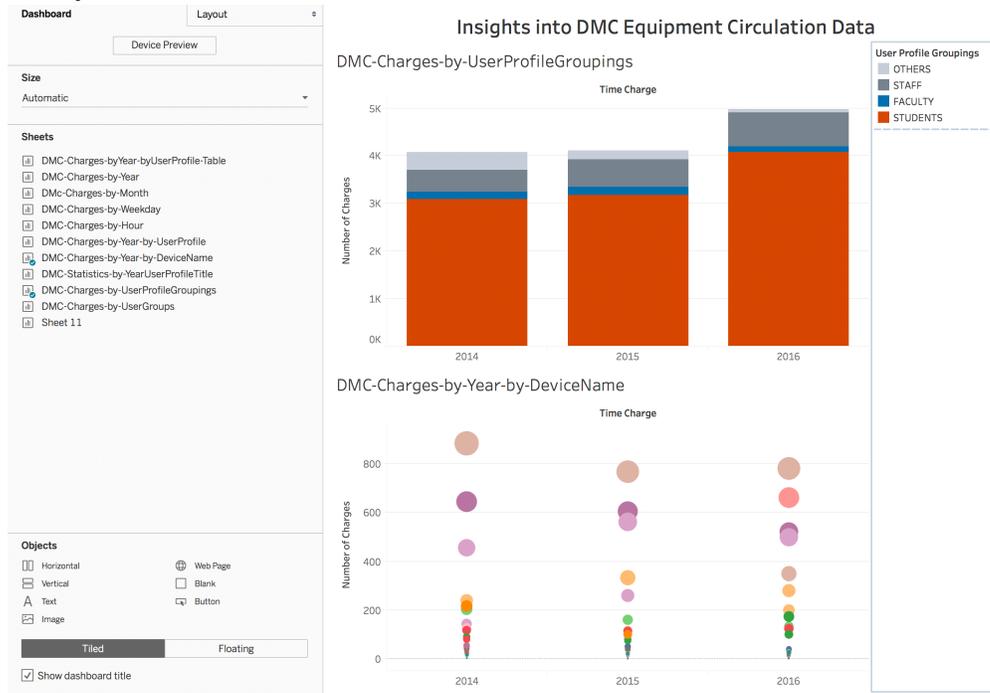
dashboard canvas.



- 4) We can close the window of the **Number of Charges** and **Title/Call No.** by clicking on the Cross button.
- 5) Click **Show dashboard title** in the **Objects** section at the lower left corner.
- 6) Double click the default and change the default title text to **Insights into DMC Equipment Circulation Data** and center the new title in the popped up **Edit Title** rich text editor.



7) Now your dashboard looks like below.



Activity 6.2 Use the top worksheet as a driver to filter the worksheets below

- 1) Click to select the top sheet. Click on **the Funnel icon**  on the upper right corner of the top chart, **the Funnel icon** turns into white . This enables the top chart to filter all the worksheets in the dashboard.
- 2) Click 2015 in the first chart, the second chart will only display 2015 statistics by **Title/Call No**. Click 2015 again will cancel out the selection and return to the previous

view.

Dashboard | Layout

Device Preview

Size
Automatic

Sheets

- DMC-Charges-by-Year-by-UserProfile-Table
- DMC-Charges-by-Year
- DMC-Charges-by-Month
- DMC-Charges-by-Weekday
- DMC-Charges-by-Hour
- DMC-Charges-by-Year-by-UserProfile
- DMC-Charges-by-Year-by-DeviceName
- DMC-Statistics-by-YearUserProfileTitle
- DMC-Charges-by-UserProfileGroupings**
- DMC-Charges-by-UserGroups
- Sheet 11

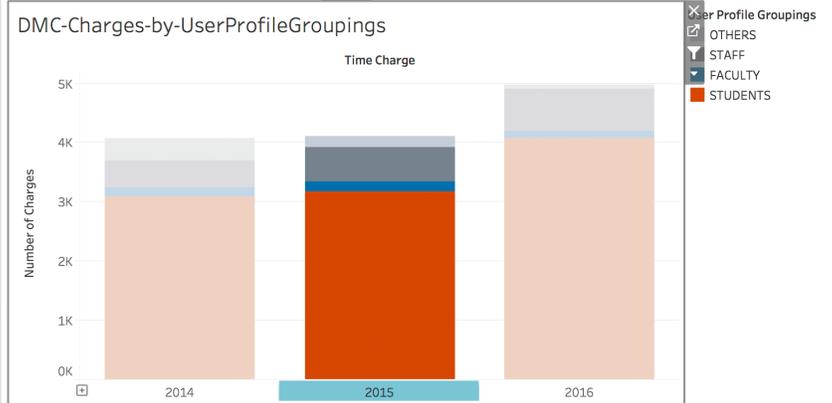
Objects

<input type="checkbox"/> Horizontal	<input type="checkbox"/> Web Page
<input type="checkbox"/> Vertical	<input type="checkbox"/> Blank
<input type="checkbox"/> Text	<input type="checkbox"/> Button
<input type="checkbox"/> Image	

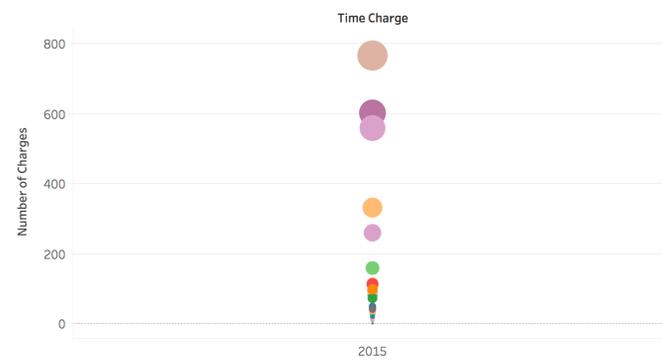
Tiled Floating

Show dashboard title

Insights into DMC Equipment Circulation Data



DMC-Charges-by-Year-by-DeviceName

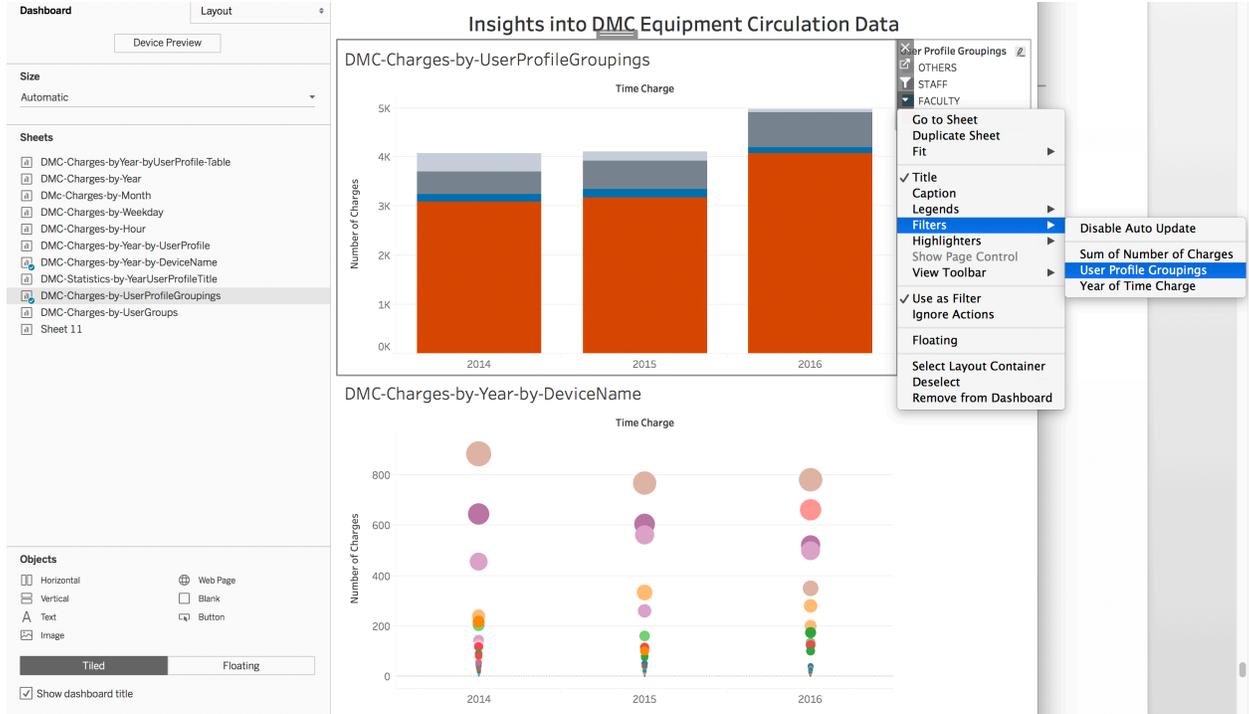


3) Click the Funnel icon  to turn the filter function off .

Activity 6.3 Create a filter to enable interactivities with end users

Goal: We want our end-users to be able to select a value in *User Profile Groupings*.

- 1) Click on **the Down Arrow button** next to the Funnel icon on the top worksheet and select filters and then the *User Profile Groupings*.

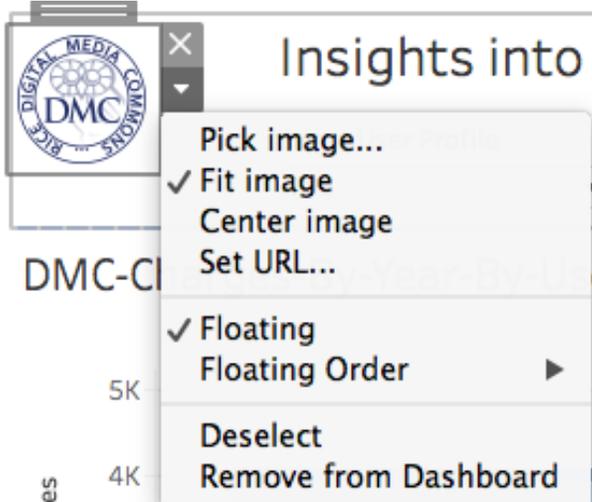


- 2) Now you will see a new checkbox list for *User Profile Groupings*. Click **the Down arrow** on the top border of the checkbox list and select **Single Value** (dropdown) or **Multiple Values**(dropdown).
- 3) Click the same down arrow again and select **Floating** and drag the filter dropbox to the place you like.
- 4) Click the same down arrow again, select **Apply to Worksheets->All Using This Data Source**.
- 5) Change the filter title to **Select a User Group** by double clicking the filter pane and making the change.

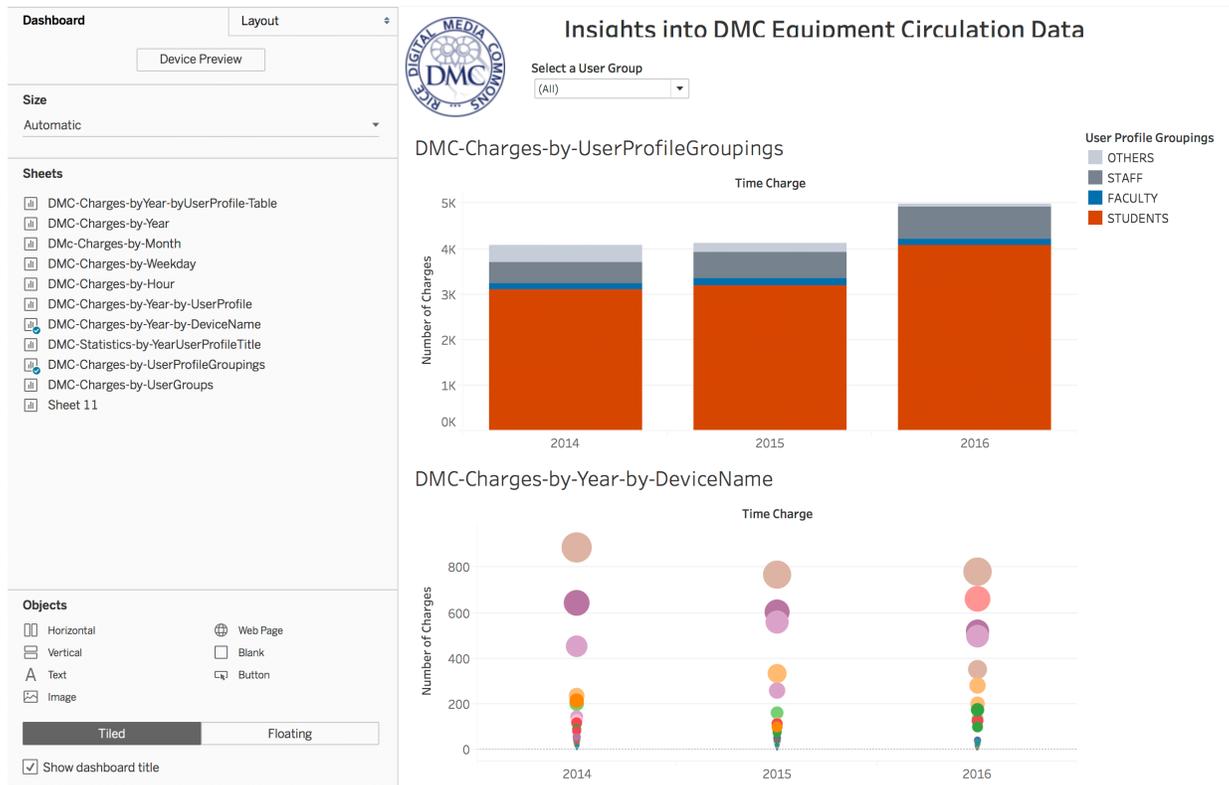
Activity 5.4 Customize the look of the Dashboard

- 1) Drag Image from Objects pane and drop it to the top of the dashboard, this opens a file selection window, choose **DMC logo blue.png** file. Then set it to **Floating** and **Fit**

image.



- 2) Click on **Set URL...**, to set it to <http://library.rice.edu/dmc>
- 3) Drag **Blank** from Objects pane and drop it to the top of the dashboard. Adjust its height.
- 4) Change the setting for the dashboard title to **Floating** and adjust its position.
- 5) The final view of dashboard would look like below



- 6) Starting Tableau version 10, you can change font for the whole workbook in one place. Click **Format** in the Top menu Bar, then select **Workbook...**. Try changing some font settings with the popped up **Format Workbook** menu.
- 7) Rename the Dashboard to **DMC-Equipment-Charges-Dashboard**.

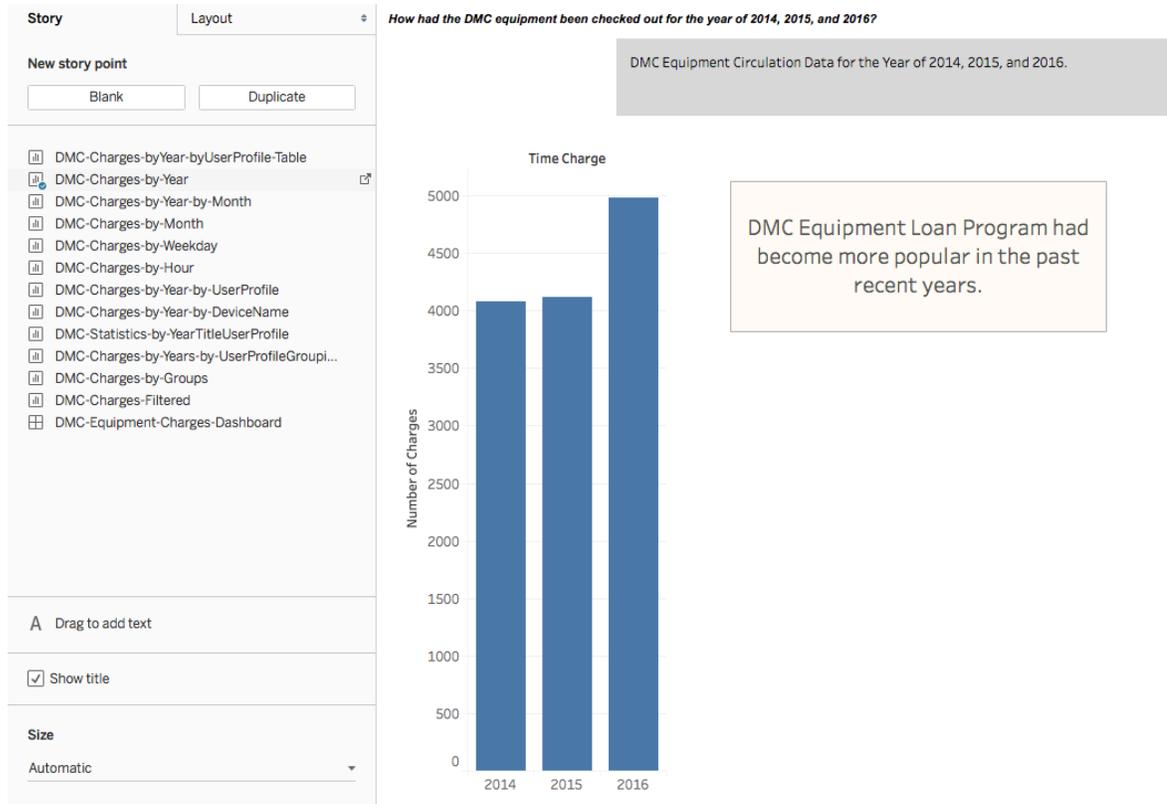
VII. Use Story to present your analysis

You can tell stories with your data using dashboards or using Story function. A **story** is a sheet that contains a sequence of worksheets or dashboards that work together to convey information.

Activity 7.1 Create a Story



- 1) Click the new Story button or **Story -> New Story**
- 2) Click on Size, change it to Automatic.
- 3) You open a new story pane. You may drag your any worksheet or dashboard created earlier into this pane.
- 4) Drag **DMC-Charges-By-Year** into the pane.
- 5) Double click **Add a caption** and add a caption title - **DMC Equipment Circulation Data for the Year of 2014, 2015, and 2016.**
- 6) Double click the default Story title **Story 1** and change it to **How had the DMC equipment been checked out for the year of 2014, 2015, and 2016?** You can add descriptive text to this story pane by clicking the **A Description** and entering your paragraph.
- 7) Now your first Story point may look similar to below.



- 8) Now we can add a new blank story point by clicking **Blank** button on the left pane.

9) Drag the **DMC-Charges-By-Month** sheet onto this 2nd story pane, change caption title to **DMC Equipment Circulation Data by Month across the years of 2014 through 2016**. Add a comment as you like.

10) Following the similar steps, we can add the 3rd and fourth story point pages. Now you



click on Presentation Mode button on the toolbar to play the story. User can browse the story page by clicking through the navigation bar.

11) You can change Story formats like Font, Color and etc. by clicking **Format** in the Top menu bar and then choosing Story...

12) Rename the Story to **DMC-Equipment-Circulation-Story**.

VII. Save and publish your work

Now, so far all the work you have completed in your Tableau desktop is not saved and you need to do it now. You can't save your work locally. With a free account on Tableau Public, you have 10GB storage.

1) **File -> Save to Tableau Public**

2) Enter Tableau Public account and password

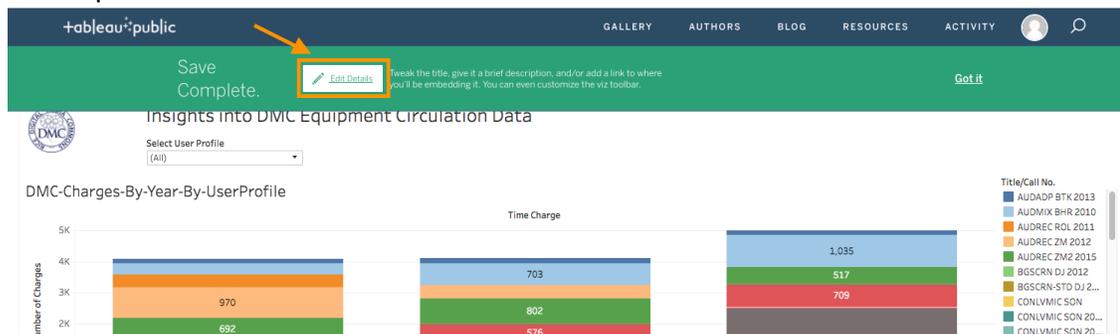
a. DMC Tableau Public training account: erc@rice.edu

b. Password:

3) Type a name for the workbook and click Save

4) Follow the on-screen prompts to save your Tableau Workbook and publish it. This will take a minute or so depending on your project size.

5) Now you should be taken to the confirmation page in your **Tableau Public user profile** in an opened browser.



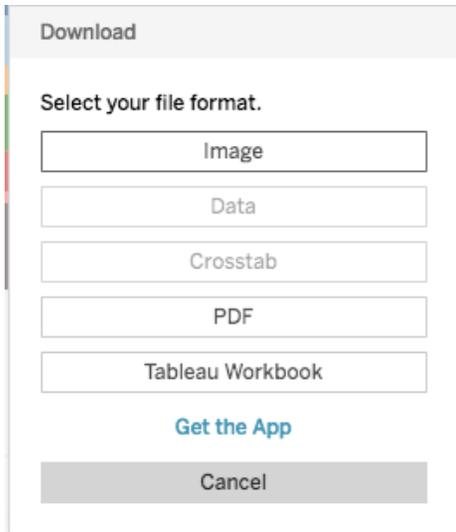
- 6) You can click the Edit Details link shown in the above dialog to change metadata settings for your published Viz.

The screenshot shows the 'Edit Details' dialog for a Tableau visualization. The title is 'DMC Equipment Circulation Data Viz'. The permalink is 'http://dmc.rice.edu'. The description is 'DMC Equipment Circulation Data Viz'. Under 'Toolbar Settings', three options are checked: 'Show view controls Undo, Redo, Revert', 'Show author profile link', and 'Allow workbook and its data to be downloaded by others'. Under 'Google Sheets', 'Keep my data updated with google sheets every day' is checked. Under 'Other Settings', 'Show workbook sheets as tabs' is unchecked. There are 'Cancel' and 'Save' buttons at the bottom right.

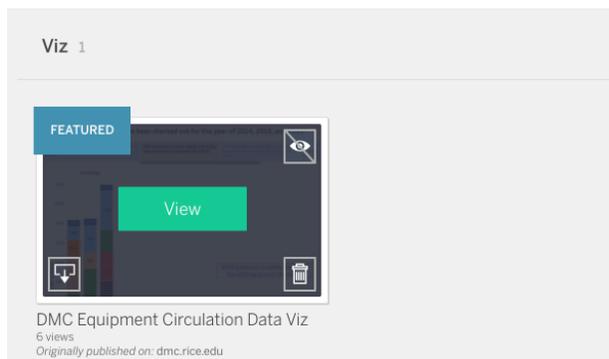
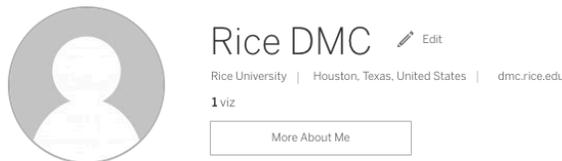
- 7) Note that under Toolbar Settings, if you checked “Allow workbook and its data to be downloaded by others”, when users view worksheet, they will be able to download both workbook and its data.

The screenshot shows the 'Download' dialog in Tableau. It has a title bar 'Download'. Below it, the text 'Select your file format.' is followed by five buttons: 'Image', 'Data', 'Crosstab', 'PDF', and 'Tableau Workbook'. Below these buttons is a blue link 'Get the App' and a grey 'Cancel' button.

However, if users view a Dashboard, they still have Crosstab and Data options greyed out.

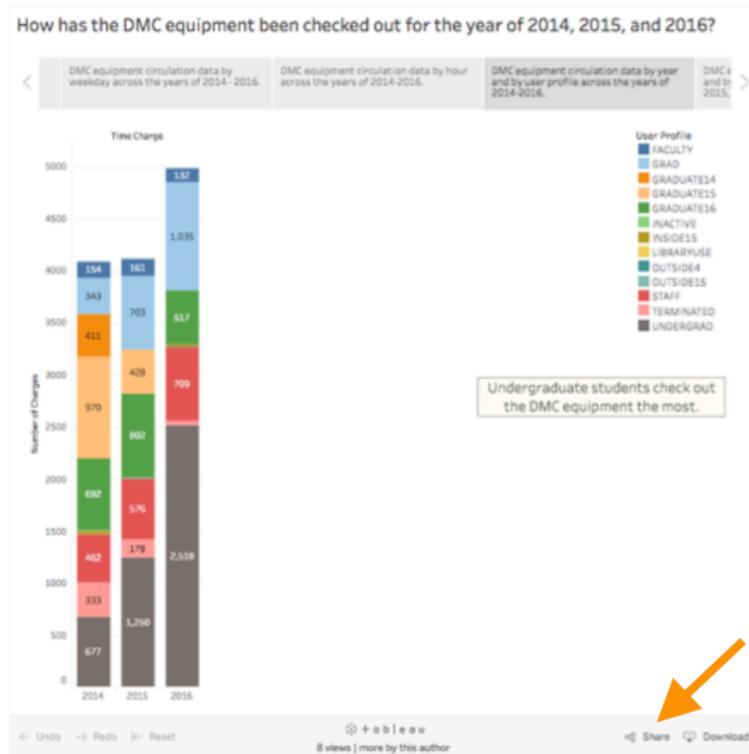


- 8) "Viz" can be a worksheet or dashboard and stories. Workbooks hold one or more worksheets, dashboards and Stories. As soon as a workbook is published to Tableau Public, **the viz and its workbook are accessible by anyone on the internet**, so be sure to only use data that is suitable for a public audience.
- 9) Customize your profile
 - a. Click My Profile



- b. Mouse over a Viz. You can **feature** it, **hide** it, **download** it, or **trash** it.
- c. Select **View** to open the Viz.
 - i. Then you can select Edit Details to customize metadata such as workbook name and description, etc.

- ii. Or click Share button at the lower right corner to get a link to share with others or code to embed in a web page



- iii. Download Workbook button at the upper right corner to download the workbook.
- iv. Download at the lower right corner to download the workbook, data, PDF, or image.

Resources

- 1) Tableau Public How-to-videos
<https://public.tableau.com/en-us/s/resources>
- 2) Get Started with Tableau Desktop
<http://onlinehelp.tableau.com/current/guides/get-started-tutorial/en-us/get-started-tutorial-home.html>
- 3) Knowledge base
<https://www.tableau.com/support/knowledgebase>
- 4) Tableau online help documentation
<http://onlinehelp.tableau.com/current/pro/desktop/en-us/help.html>

- 5) Tableau Sample Data Sets - A changing sample of datasets for use in teaching and learning. [https://public.tableau.com/s/resources?qt-overview_resources=1 - qt-overview_resources](https://public.tableau.com/s/resources?qt-overview_resources=1-qt-overview_resources)
- 6) Datasets in public domain at Inside Airbnb <http://insideairbnb.com/get-the-data.html>
- 7) Datasets for Teaching and Learning http://libguides.rice.edu/data_resources/samples
- 8) Tableau Essentials: Chart Types – Introduction <https://interworks.com/blog/ccapitula/2014/08/04/tableau-essentials-chart-types-introduction/>