Interdisciplinary Collaboration and Visualizations using Tableau

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POLS 4701 Senior Capstone
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Northeastern University
NULab for Texts, Maps, and Networks

Feel free to ask questions at any point during the presentation!

Workshop Agenda

This hands-on tutorial introduces Tableau for mapping and data visualization. Students will:

- Discuss best practices for collaboration
- Learn about Tableau
- Understand how to import and modify data in the Tableau environment
- Plot coordinate points onto a basemap
- Filter data in a variety of ways to produce custom visualizations

To follow along, visit **http://bit.ly/diti-spring2020-bormann**

Feel free to ask questions at any point during the presentation!

Collaboration Discussion

- What are some of the issues and obstacles you have encountered during group work or collaboration?
- What would make collaboration and group work easier?
- Have you used any digital tools/software during group work and collaboration?
  - If so, which tools?
  - If not, why not?

Feel free to ask questions at any point during the presentation!

Best Practices for Collaboration

Create a Work Plan: Before the work begins, create a collaborative work plan together

- **Determine Roles**: Determine roles and who will be doing what. Designate one person to act as "project manager" to make sure everyone is meeting deadlines
- **Deadlines**: Establish deadlines early on for when specific work needs to get done. Write these deadlines down and communicate clearly about expectations

Respect: Respect different perspectives and points of view. Give space for everyone to talk.

Accountability: Hold yourself and others accountable for meeting deadlines, attending any group meetings, etc. However, mistakes happen, so...

Be Flexible: Be flexible, compassionate, and understanding when this happens. Set up new deadlines or come up with a new work plan. Sometimes we dream bigger than what we can actually accomplish, and that is okay!

Providing Feedback: If you and your group decide to provide feedback, be constructive and positive.

Feel free to ask questions at any point during the presentation!

Collaborative Tools

Collaboration is easier with modern tools and software. Why?

- Many digital tools facilitate communication between members of a group outside of traditional email and face-to-face channels.
- Tools can make collaboration visible. Visibility:
  - Makes people aware of tasks and priorities.
  - Helps make people accountable.
  - Opens new avenues of communication and idea creation.

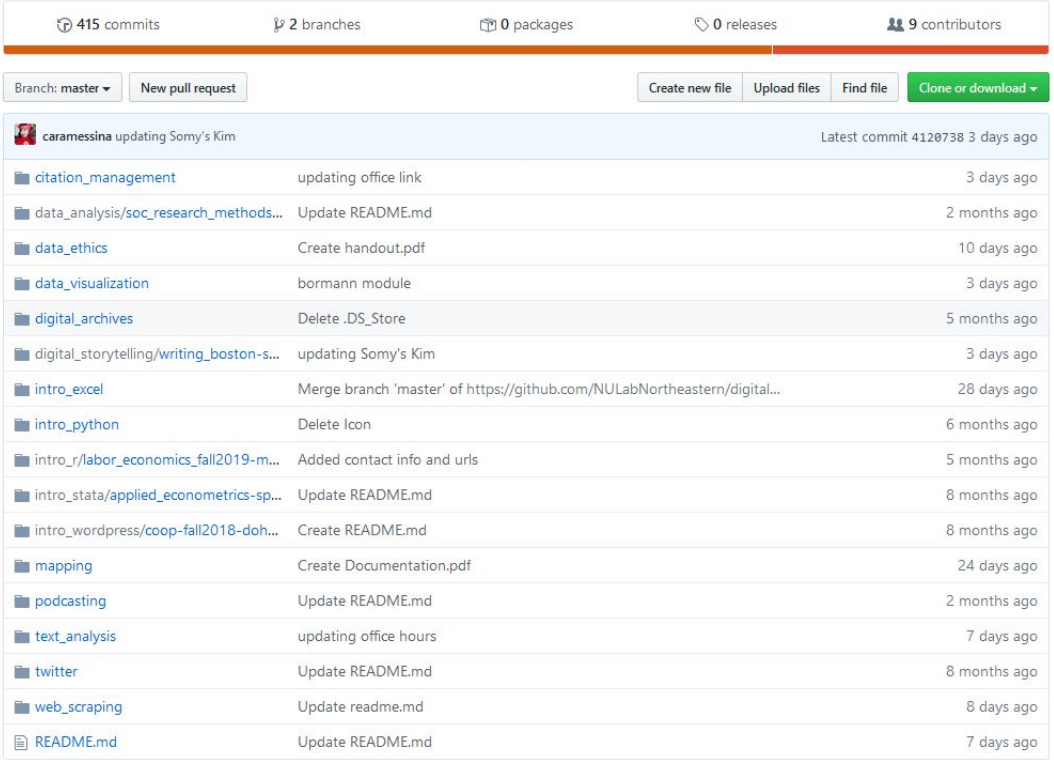
Feel free to ask questions at any point during the presentation!

Digital Tools for Collaboration - GitHub

GitHub - Primarily used by computer and data scientists for sharing code, but can be used for other collaborative projects.

Useful for version control and cloud sharing/publishing and storage.

DITI uses GitHub for storing and distributing modules.



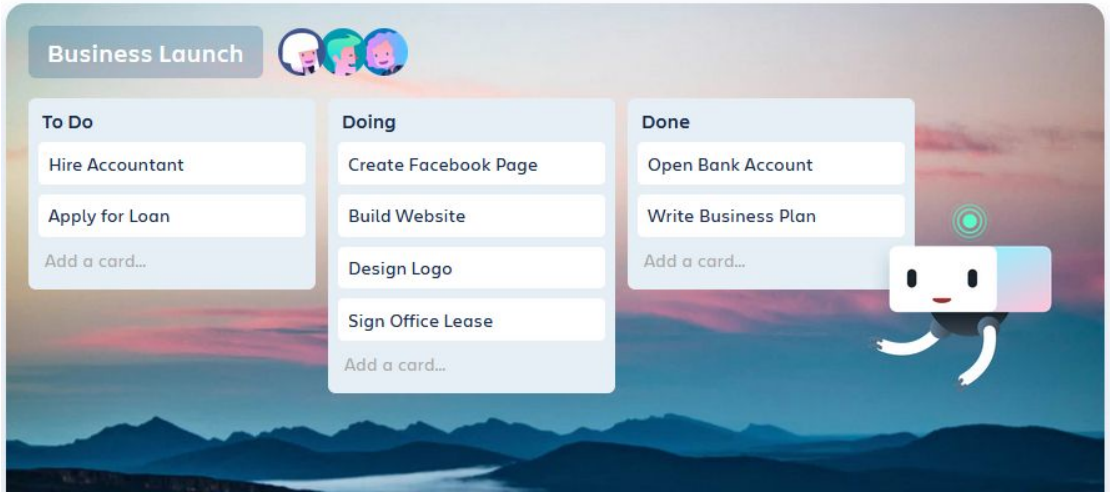
Feel free to ask questions at any point during the presentation!

Digital Tools for Collaboration - Trello

Trello - Used by many different groups and companies to **track goals and assign tasks**.

Useful for communication, accountability, task-tracking.

Available in browser, desktop, and mobile app forms.



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Digital Tools for Collaboration - Toggl

Toggl - A simple time tracking application that is useful for cataloguing **time spent on specific tasks**.

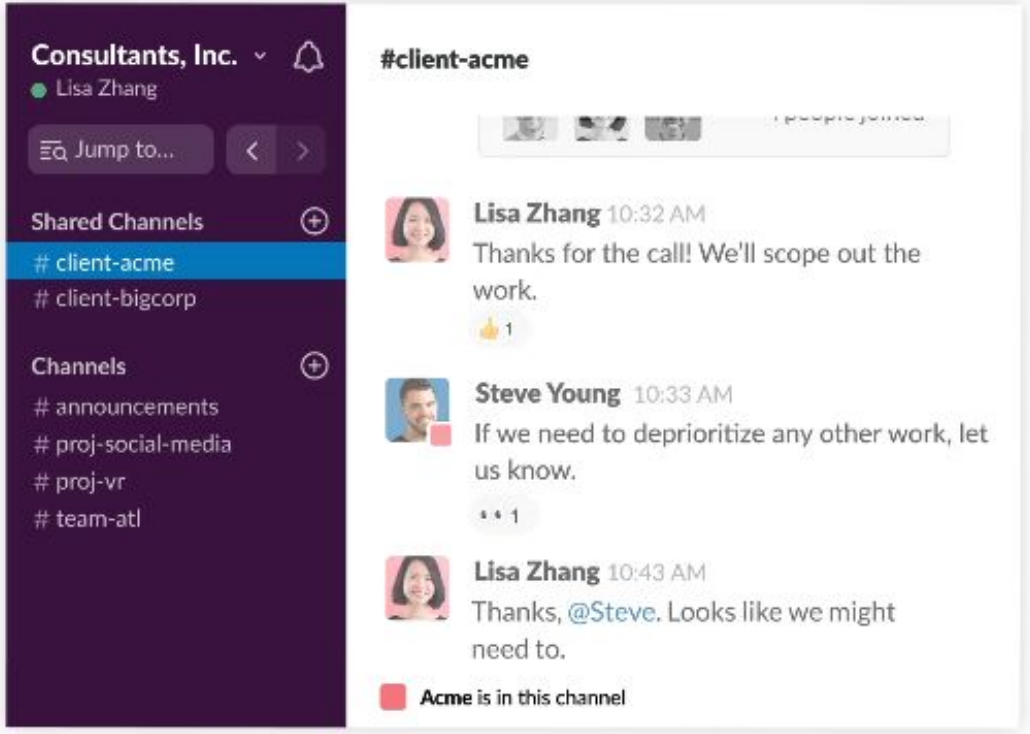
This can be useful for task equity and spreading the work across collaborators.

Feel free to ask questions at any point during the presentation!

Digital Tools for Collaboration - Slack

Slack - A **communication platform** that allows for sub-channels and document sharing. Integrates nicely with Google Suite.

DITI uses Slack for communication, coordination, and collaboration on projects and modules.



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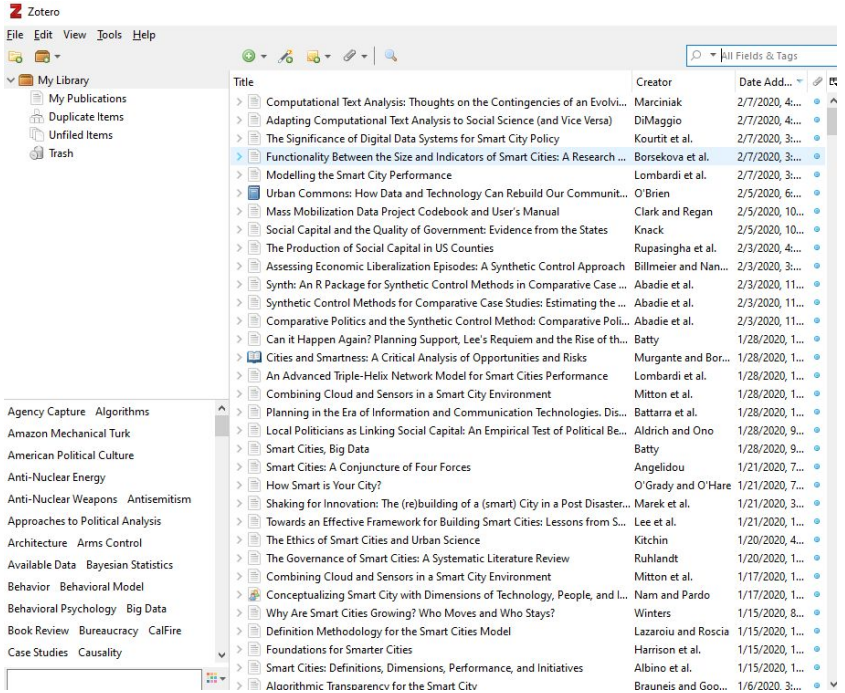
Digital Tools for Collaboration - Citation Management

Zotero, **RefWorks**, **EndNote**, **Mendeley** - Citation management software can be used for sharing sources and data through the use of **shared folders/groups/libraries**.



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Digital Tools for Collaboration - Google

What are some of the best ways to use Google suite apps for collaboration?

- Create a workflow document using Google Docs to create and document steps that needs to be taken in a task
- Create a spreadsheet of tasks using Google Sheets to track goals and accountability.
- Create documentation for any data uploaded and files created. Version control and naming conventions are key!

Feel free to ask questions at any point during the presentation!

Tableau Basics

Tableau is a powerful visualizations tool. It can produce a variety of beautiful charts and graphs that look much nicer than Excel visualizations.

Tableau can also do basic mapping!

A Tableau license is available for free to students with a .edu email address. You can use the key on two different devices.

Link to Tableau for students:
https://www.tableau.com/academic/students

Feel free to ask questions at any point during the presentation!

Key Terminology

- **X/Y Coordinates**: Numerical values that allow every location on earth to be pinpointed.
    - **Latitude/Longitude:** Latitude is the north/south coordinate of a location based upon its distance from the equator. Longitude is the west/east coordinate of a location based upon its distance from the standard meridian.
- **Dimension:** Qualitative values (such as names, dates, or geographical data). You can use dimensions to categorize or segment your data.
- **Measure:** Numeric, quantitative values that you can measure. Measures can be aggregated. When you drag a measure into the view, Tableau applies an aggregation to that measure (by default).

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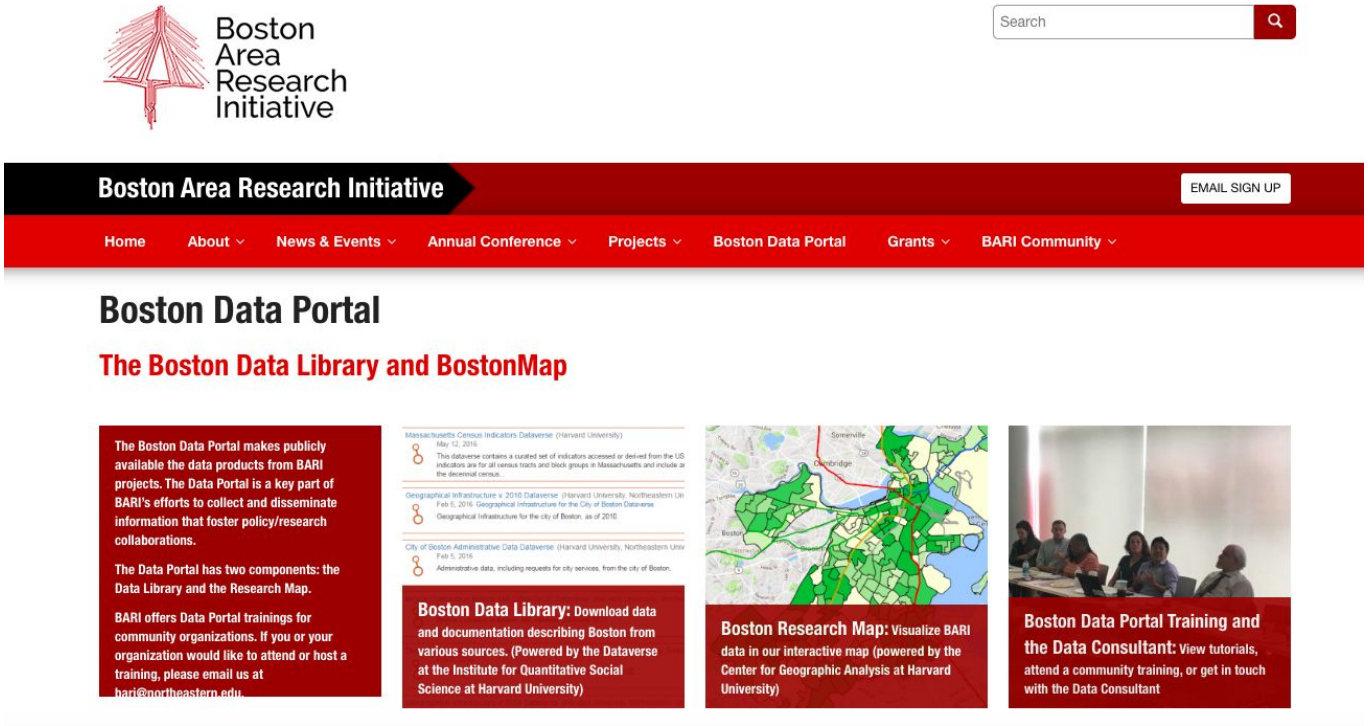
Where did the data come from?



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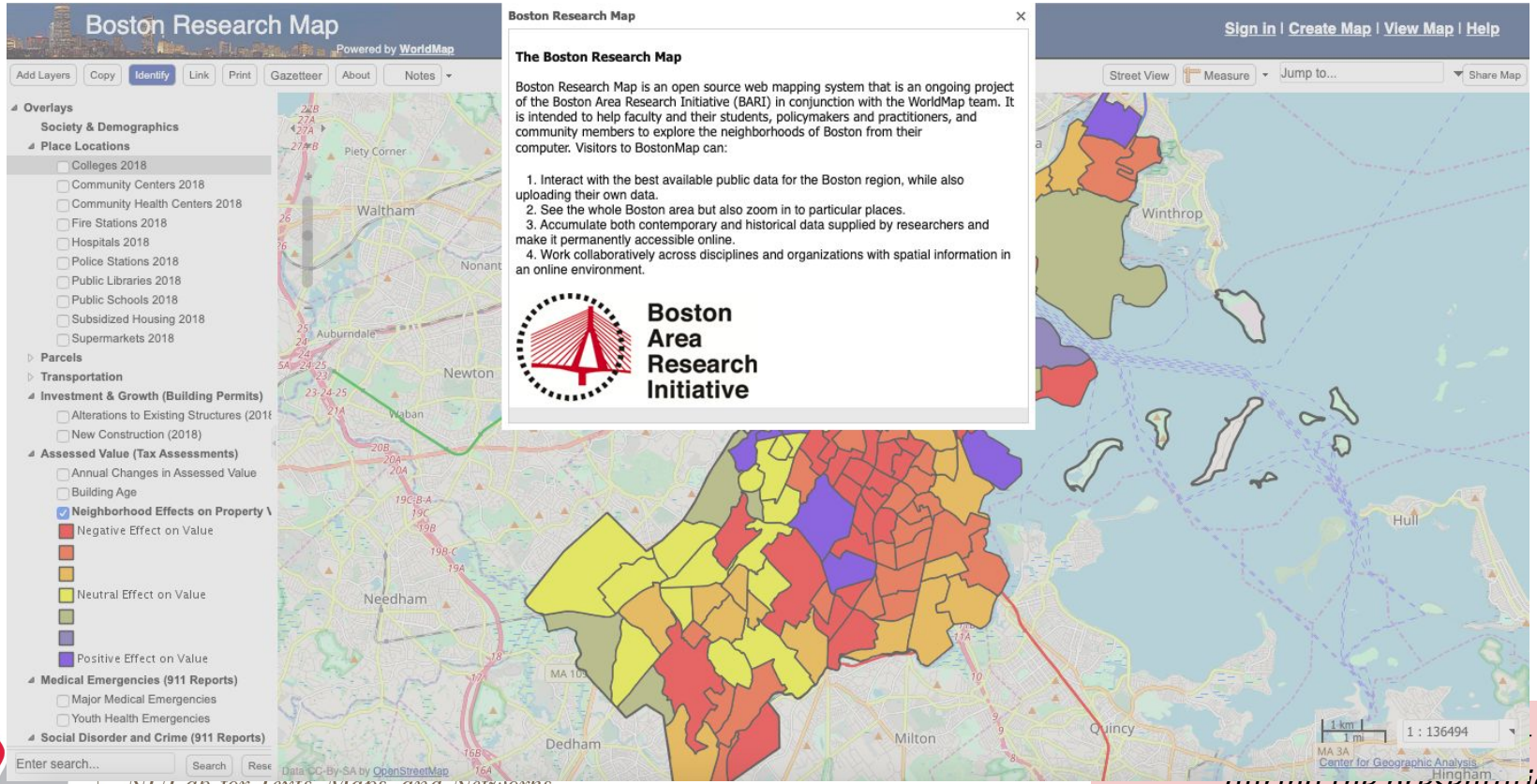
Boston Research Map



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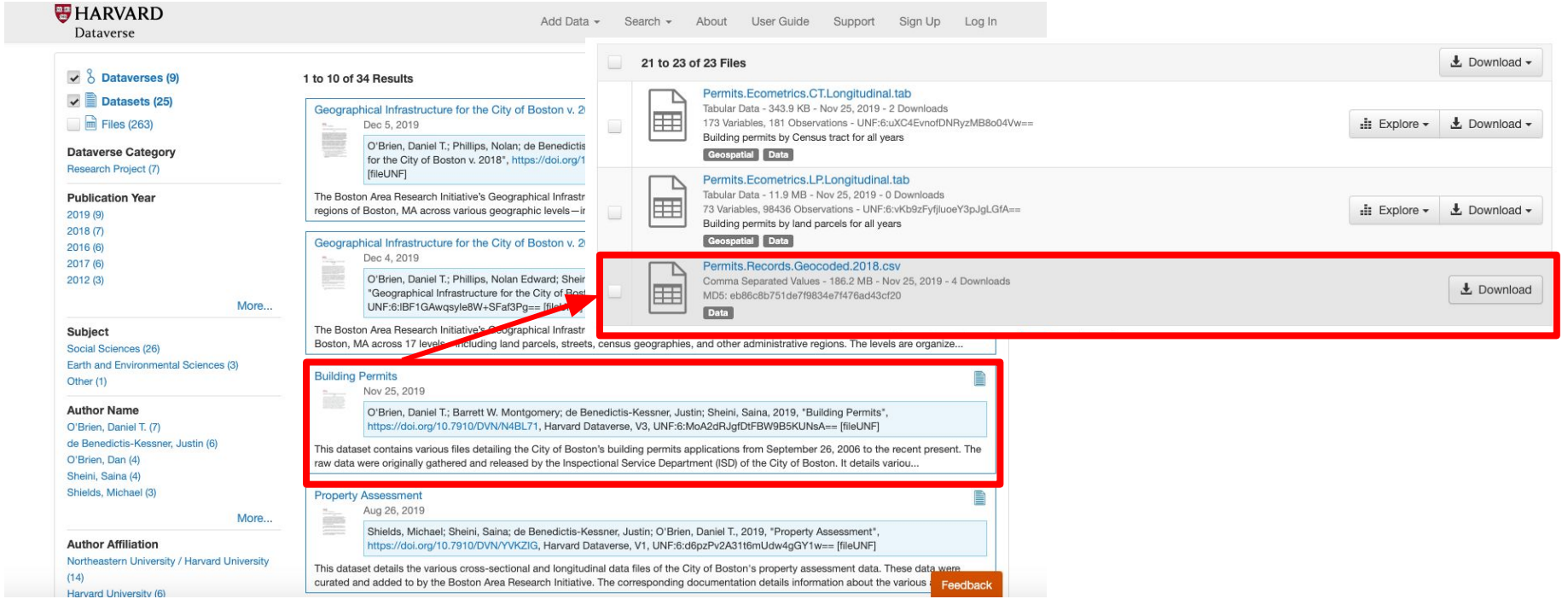
Boston Area Research Initiative Dataverse



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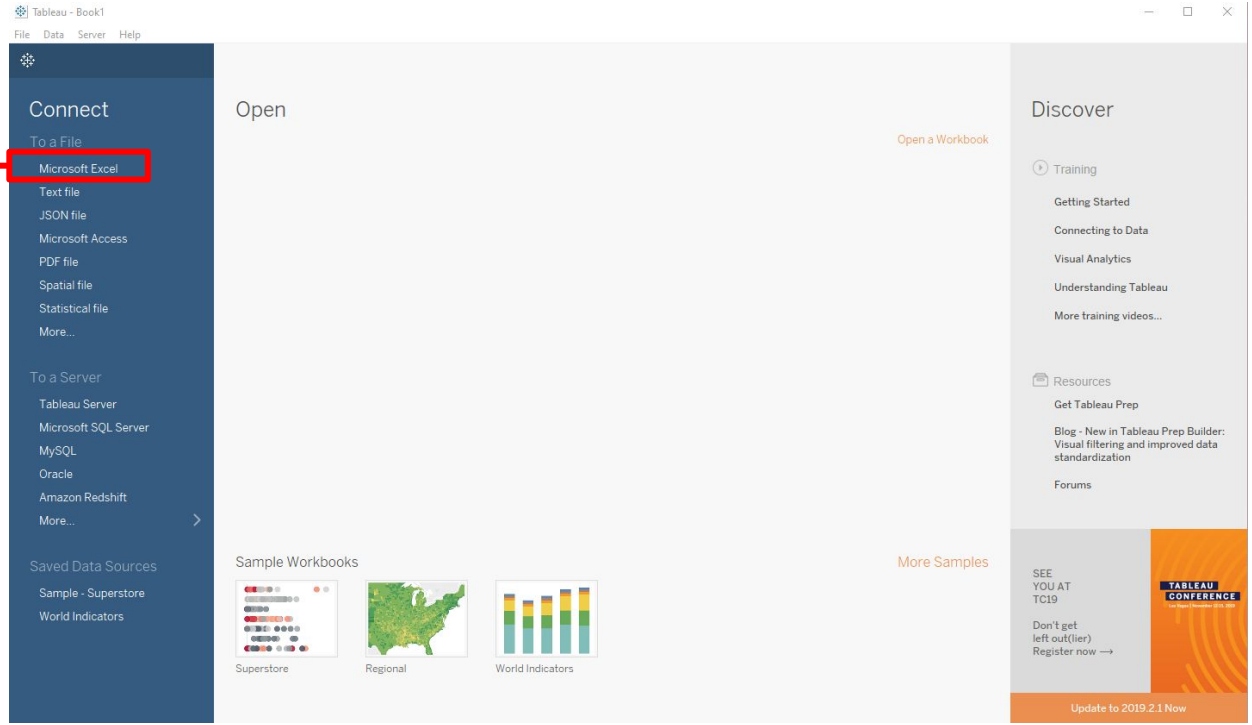
Using Tableau
Step One: Connecting to Data

First, we need to connect to our data.

For the purposes of this exercise, we will be using building permit data for the City of Boston in csv format.

Select ‘Microsoft Excel’ and navigate to the data file that was sent via email.



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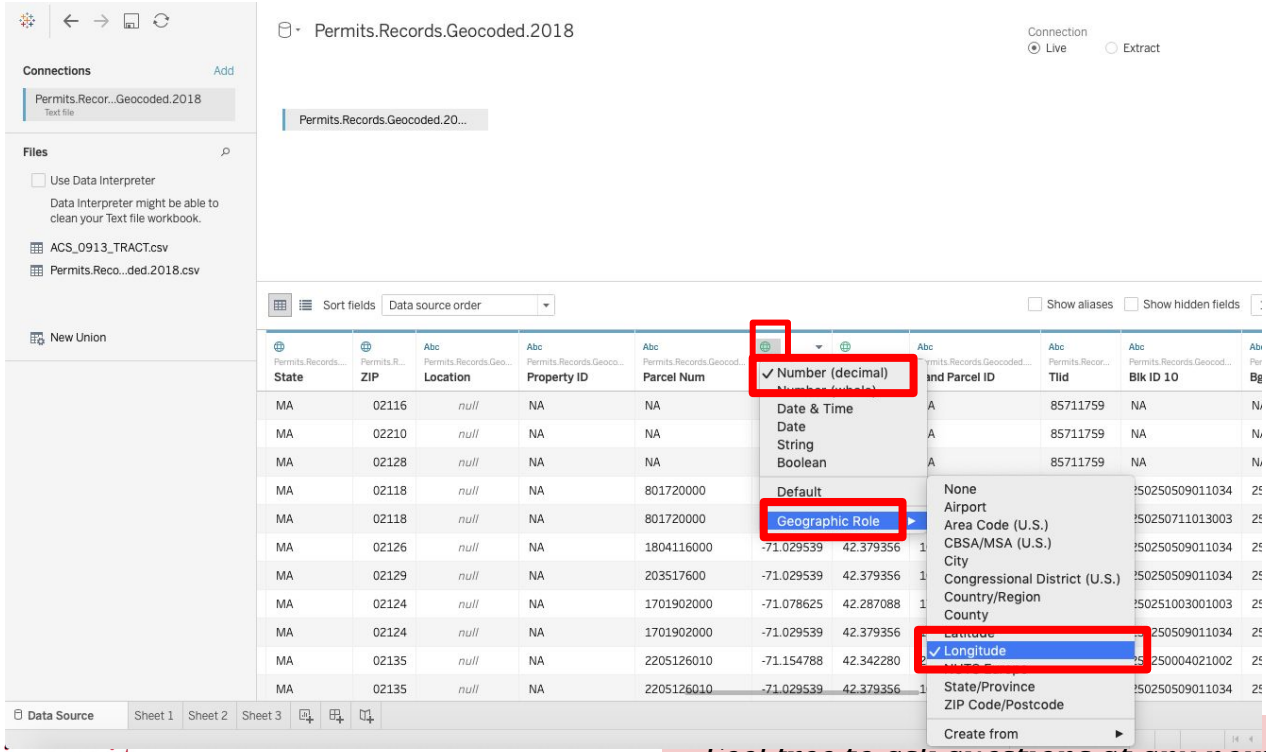
Using Tableau, Step Two: Convert Coordinate Column to Geo Data

We can change the data type of our columns by clicking on the # or abc at the top of the column display.

In order to map our data, we have to first convert the X/Y data into a coordinate class.

We can do this by clicking on the abc, and changing the data type from String to Number (decimal), then clicking on the # and hovering over 'Geographic Role,' and clicking on Latitude or Longitude. Convert:

X -> Longitude
Y -> Latitude



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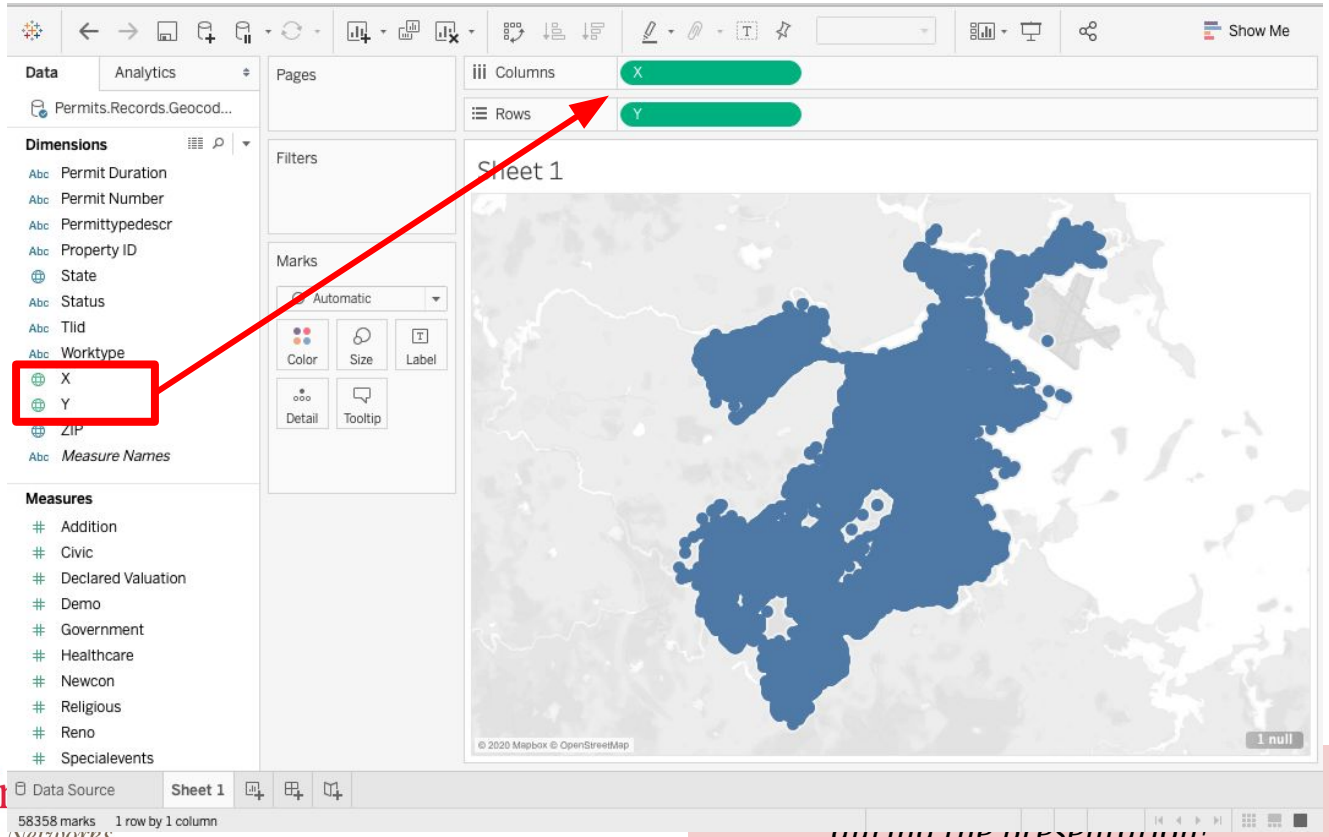
Using Tableau
Step Three: Plot our Points

To map our data points, we drag our Y data into the ‘columns’ area, and our X data in the ‘rows’ area.

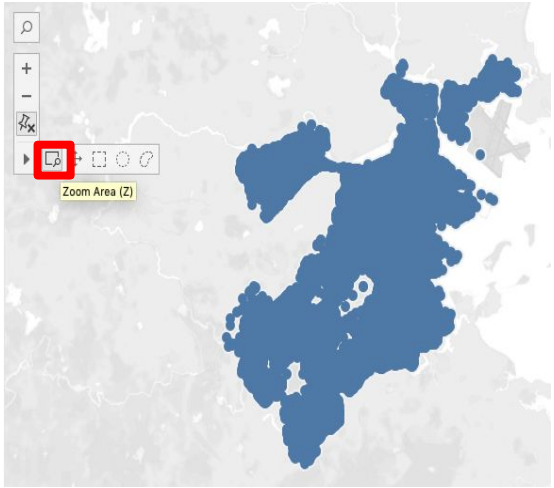
Tableau will automatically plot our points based upon the X/Y coordinates.



Using Tableau
Step Four: Zoom Controls

The navigation and zoom controls are in the top left of the plot area. We can use the zooming and panning tools to navigate to our area of interest.

We have zoomed into the Downtown Boston, Fenway/Kenmore, Jamaica Plain, Roxbury areas.



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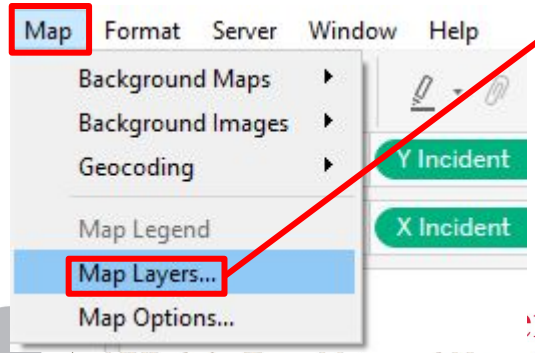
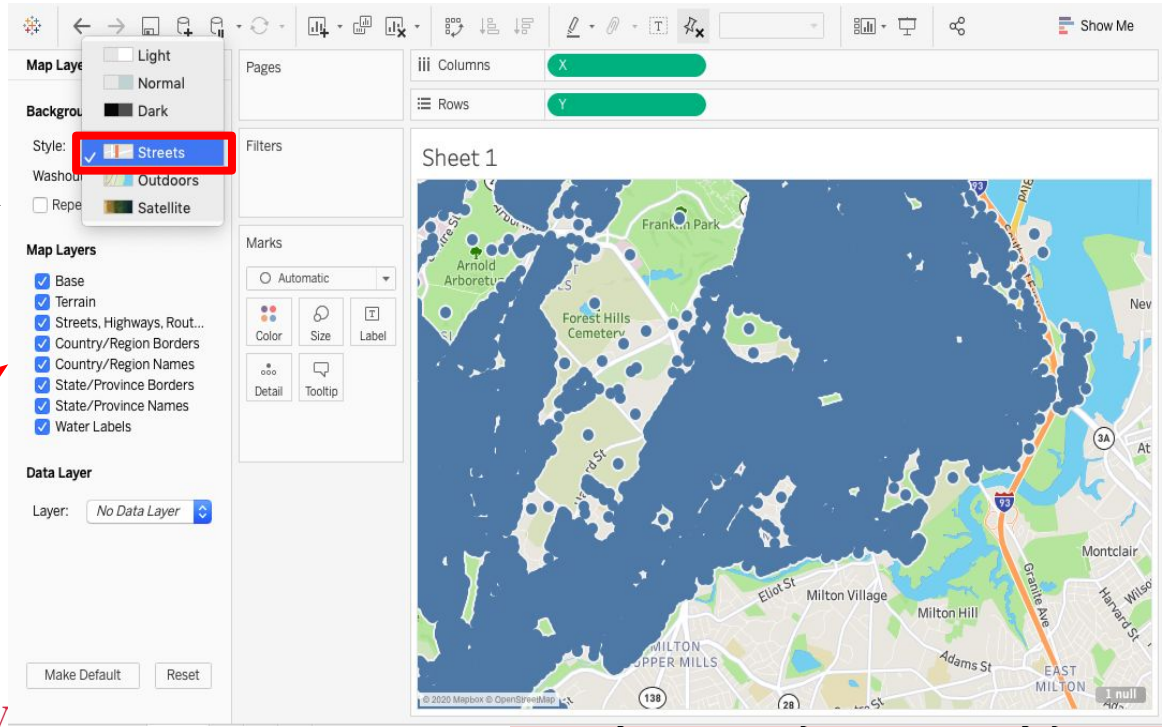
Using Tableau
Step Five: Modify Basemap

We can use the 'Map' > 'Map Layers…' option from the toolbar to modify our basemap.

We have changed our Style to 'street.' You may also want to toggle other Map Layers like 'Streets, Highways, Routes.'
When you are done, click the X at the top of the map layers sidebar.





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Hypothesis: **Gentrification will look different in each neighborhood of study.**

Operationalization: **Gentrification can be tracked by filtering out Addition, Erection, New Construction, and Removal of Structure building permits**

Feel free to ask questions at any point during the presentation!

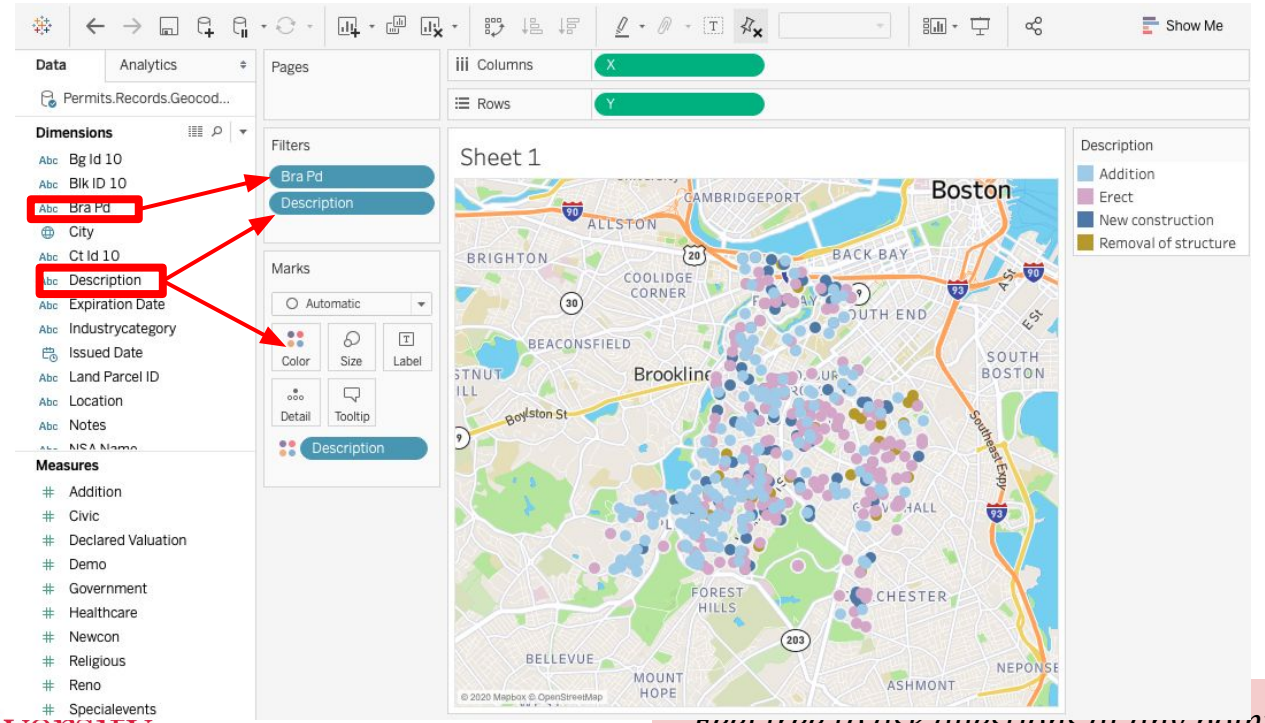
Using Tableau

Step Six: Create Filters

To create different filters and visualization parameters, drag a dimension or measure into the ‘marks’ box. Change marks to “Map” in dropdown option.

To specify a type of visualization, drag the parameter of choice onto ‘color,’ ‘size,’ etc.

For this exercise, we have mapped Description of Permit Type as a color, and filtered by neighborhood and description of permit type (which will appear as a tooltip).



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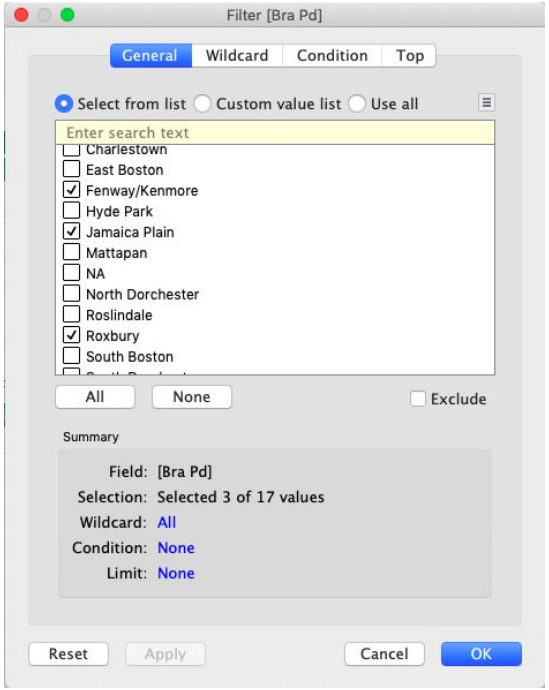
Using Tableau
Step Seven: Create Filters Continued

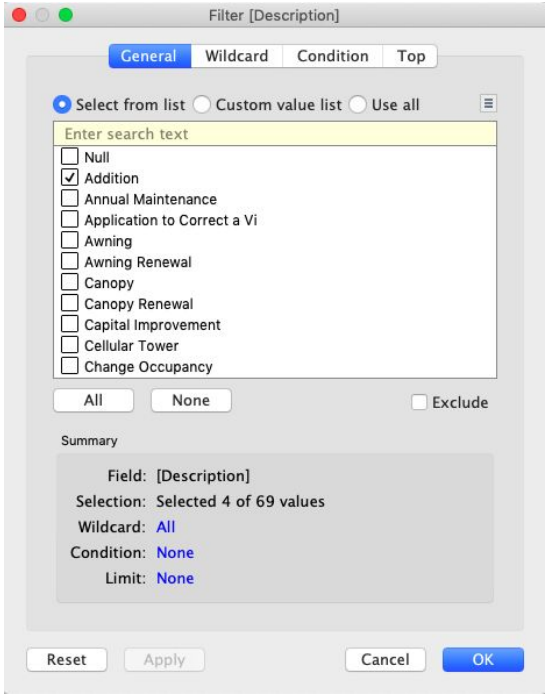
For this exercise, we want to filter our neighborhood data parameter to only display Fenway/Kenmore, Jamaica Plain and Roxbury.

We click on 'Filter…' This will bring up the filter box.

Now we will deselect all and then check the boxes for Fenway/Kenmore, Jamaica Plain and Roxbury.

We do the same thing for permit description type, selecting the boxes for Addition, Erect, New Construction, and Removal of Structure.





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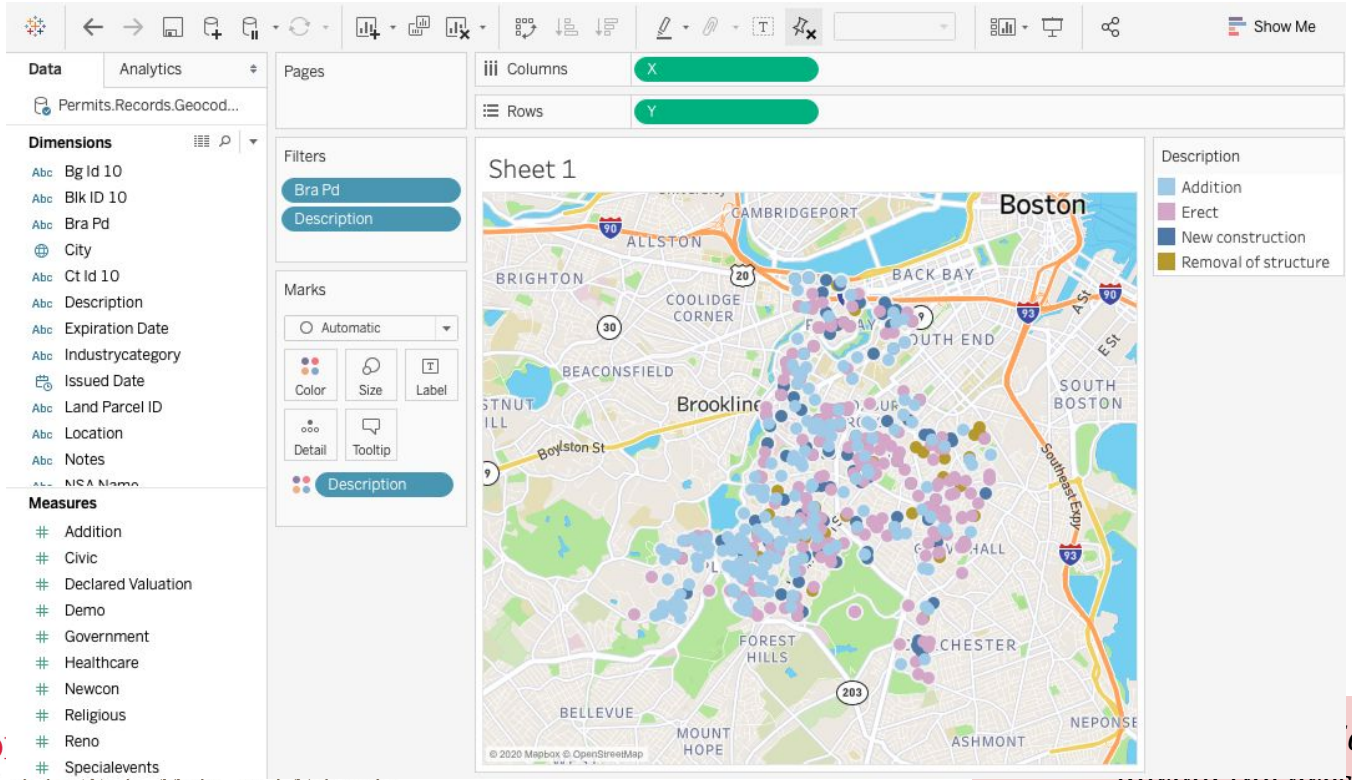
Using Tableau
Step Seven: Create Filters Results



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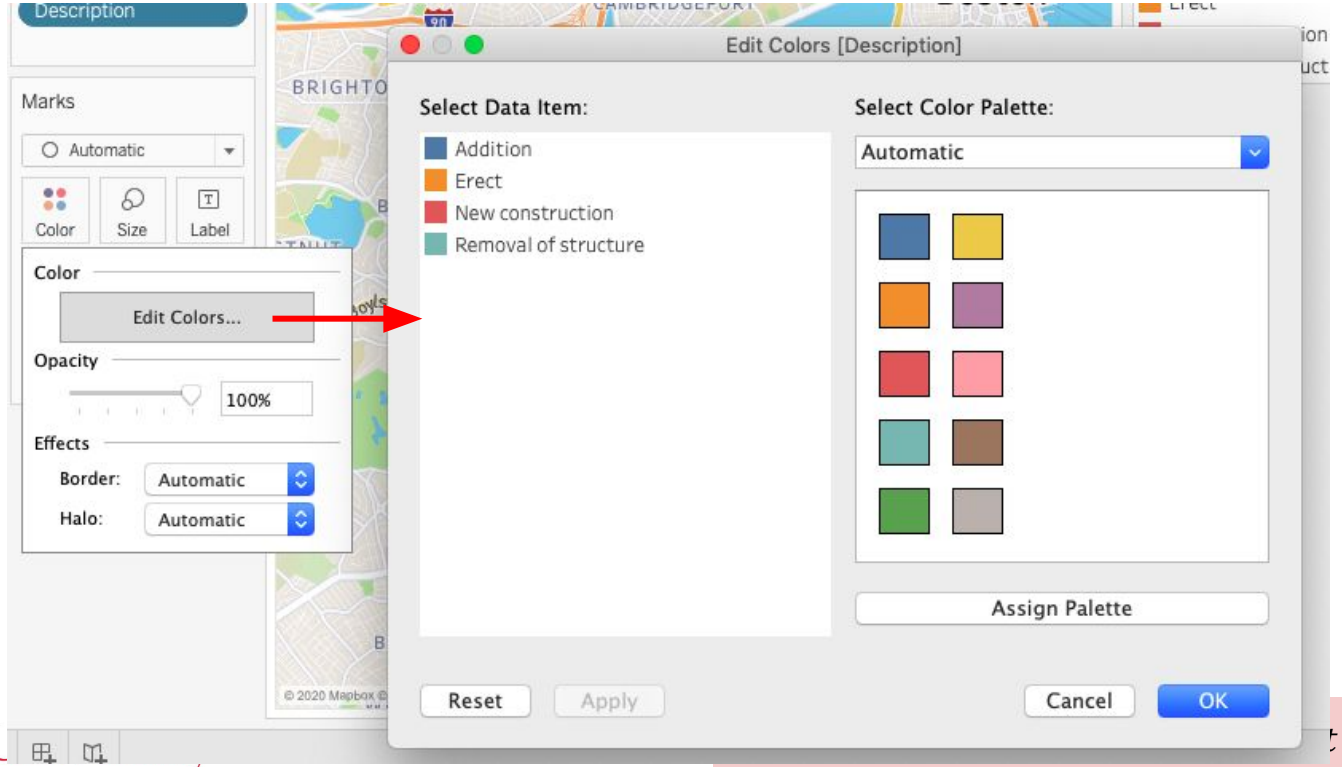
Using Tableau
Step Eight: Modify Colors

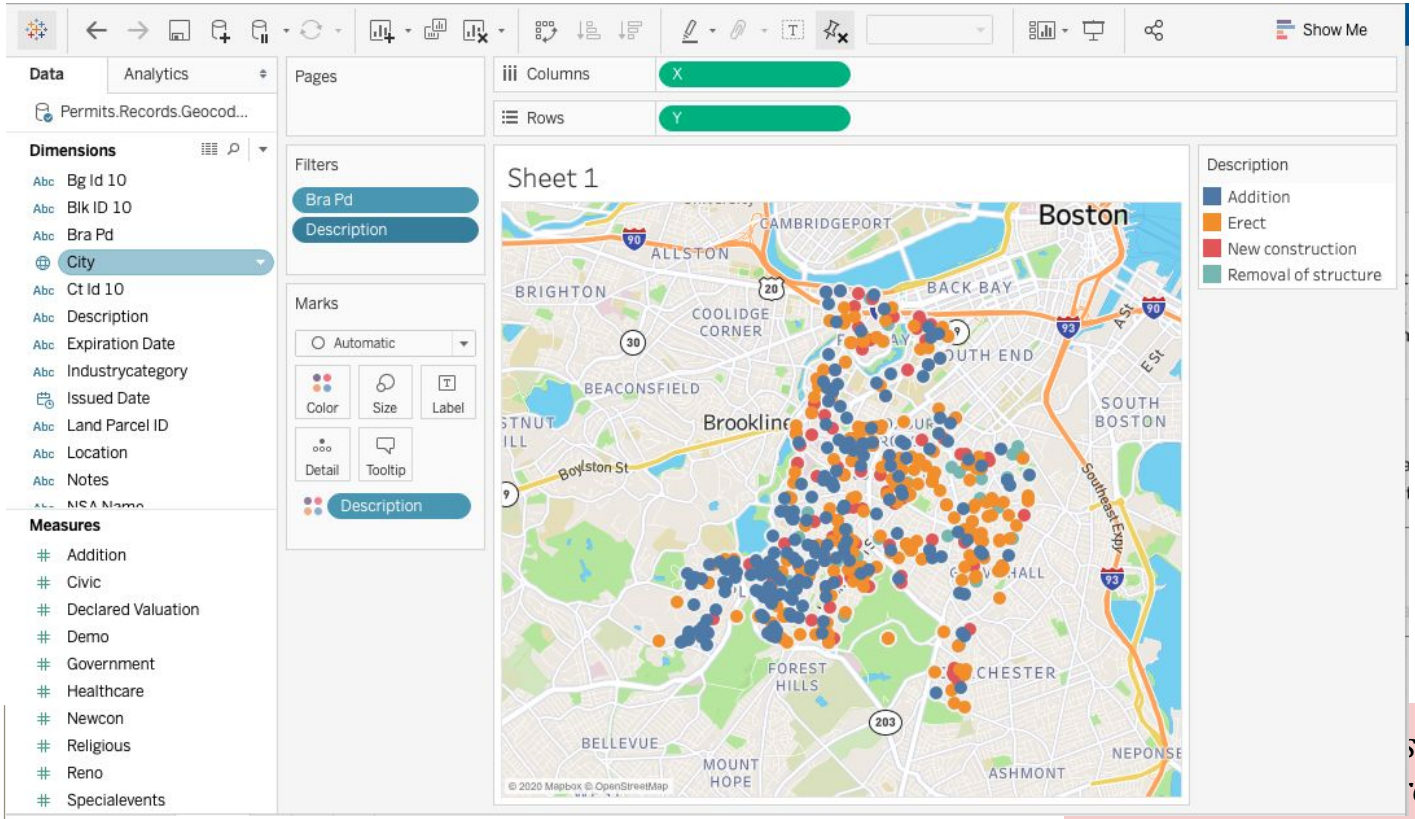
The light pink and blue for Addition and Erection do not contrast very well, so we will now change the colors.

On the Bra Pd (neighborhoods) sidebar, click the drop down arrow, then click on ‘edit colors…’

On the edit colors box we can now change our colors to contrast more for better visualization.



Using Tableau
Step Eight: Modify Colors Results



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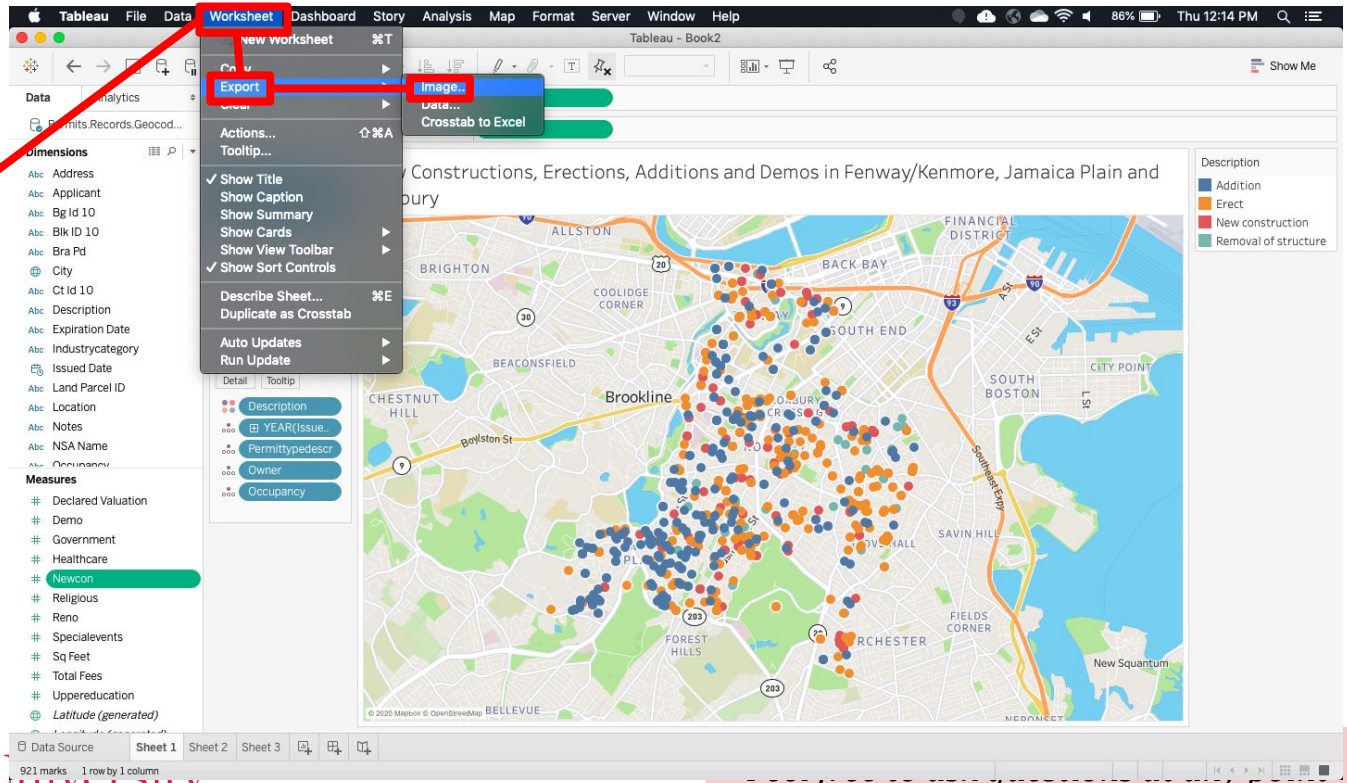
Using Tableau
Step Nine: Exporting Images

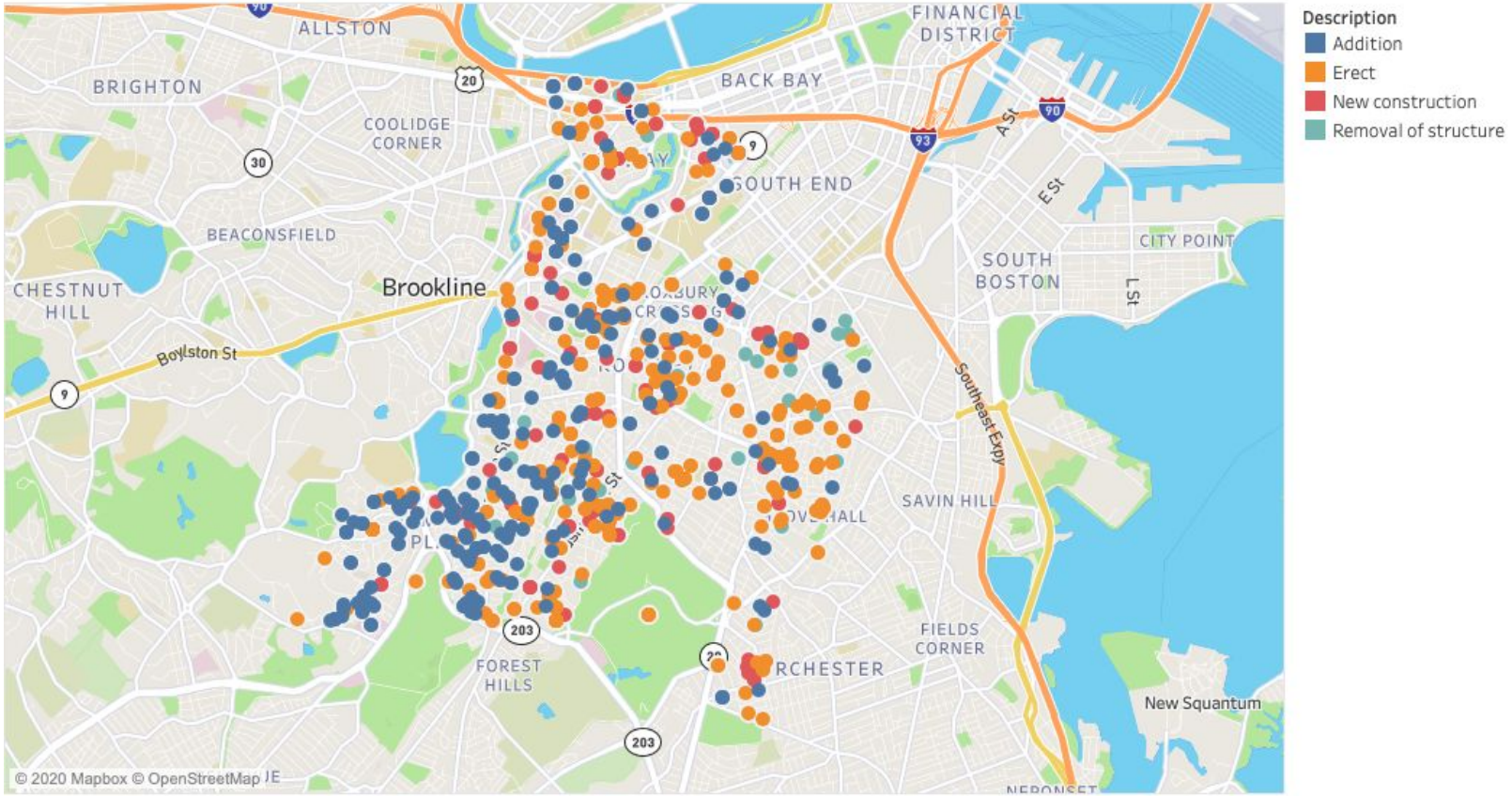
Once we are happy with our map after filtering for different data points, we can export our image.

From the ‘Worksheet’ drop-drop down menu, hover over ‘Export,’ then click on ‘Image…’ You can select the type of export then click ‘save.’

Navigate to where you would like to save the image, name it, and change the file type if you would like - then click ‘save.’



New Constructions, Erections, Additions and Demos in Fenway/Kenmore, Jamaica Plain and Roxbury



Map based on X and Y. Color shows details about Description. Details are shown for various dimensions. The data is filtered on Bra Pd and Worktype. The Bra Pd filter keeps Fenway/Kenmore, Jamaica Plain and Roxbury. The Worktype filter keeps ADDITION, ERECT, NEWCON and RAZE.

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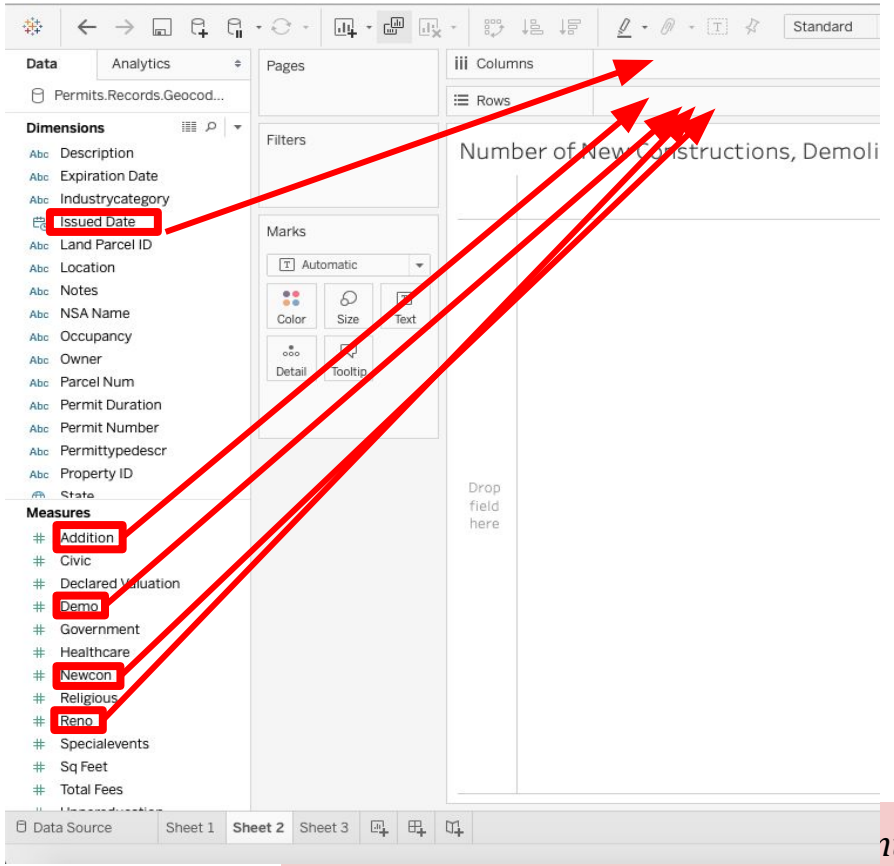
Graphs with Tableau: Drag & Drop

Similar to mapping, creating a graph is as simple as dragging and dropping our dimensions and measures.

In this demonstration, we will map the number of records over time according to permit type.

First, create a new sheet (click the + sign next to Sheet 1 at the bottom)

Next, we will drag and drop our 'Issued Date' dimension to the columns, and the 'Addition, Demo, Newcon and Reno' measures to the rows.



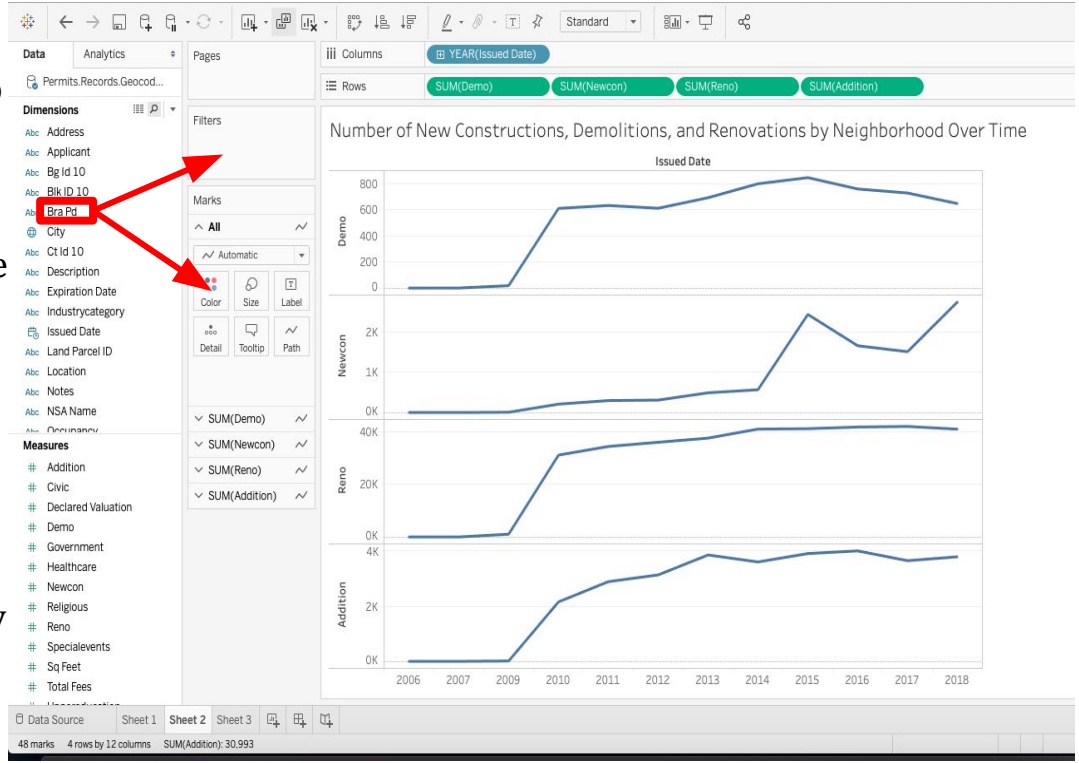
Graphs with Tableau: Drag & Drop

We now have a graph of different building permit records over time, but we still need to show their prevalence in specific neighborhoods.

Next, we drag and drop our “Bra pd” measure onto both the filter box and the colors in the marks box to the left of our new graph. Filter your neighborhoods to include only Fenway/Kenmore, Jamaica Plain and Roxbury.

Tableau will automatically set each neighborhood to a different color and redraw our graph.

We can then export the same way.



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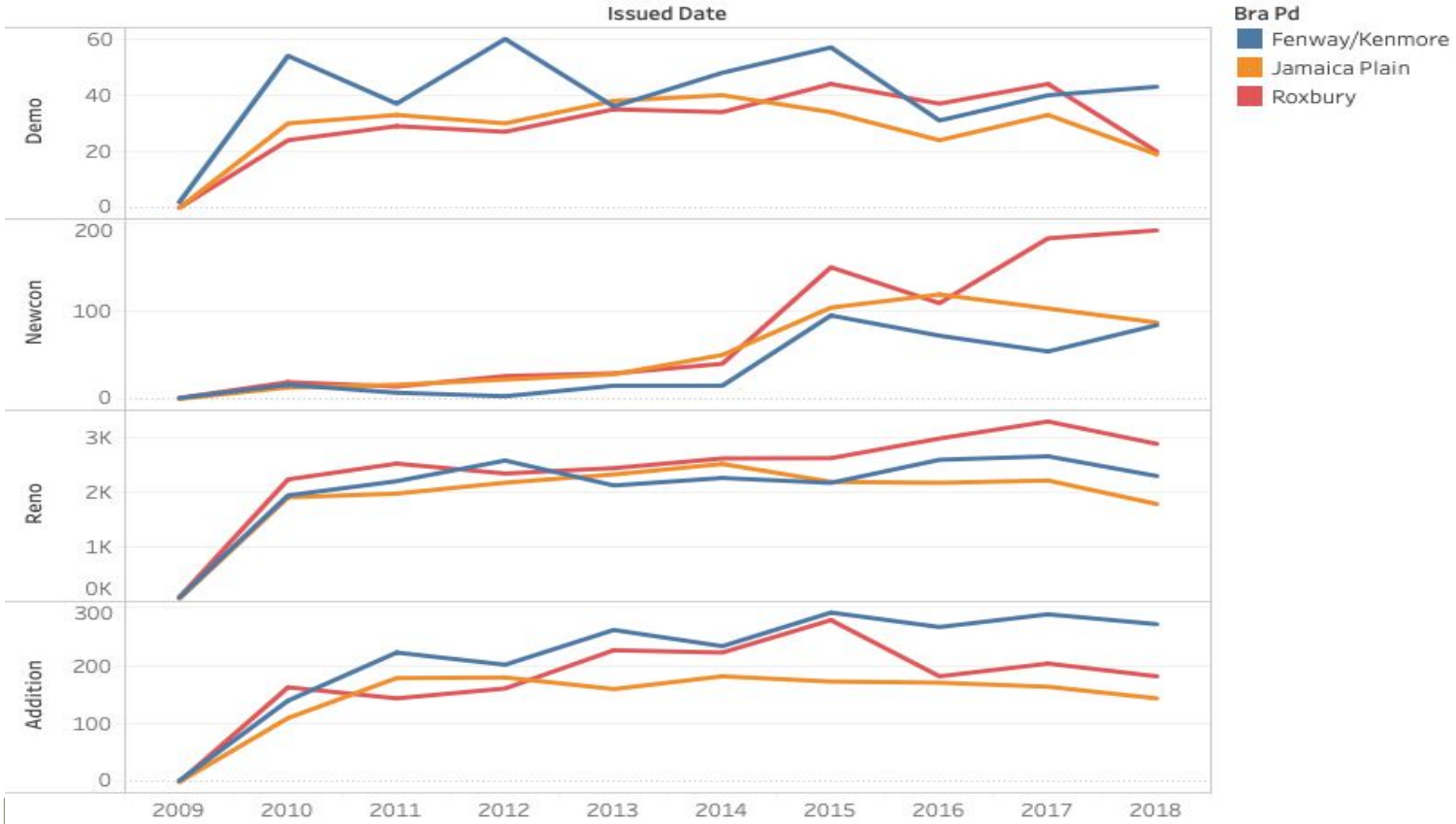
Number of New Constructions, Demolitions, and Renovations by Neighborhood Over Time



The trends of sum of Demo, sum of Newcon, sum of Reno and sum of Addition for Issued Date Year. Color shows details about Bra Pd. The view is filtered on Bra Pd, which keeps Fenway/Kenmore, Jamaica Plain and Roxbury.

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Example Research Questions

- How much value are new constructions and renovations adding to their neighborhood over time?
- How much value does each type of construction add to each neighborhood's overall valuation?
- What different types of industry are building in these neighborhoods?
- Who owns the buildings that are being renovated and constructed?
- What different building types are being constructed and renovated?

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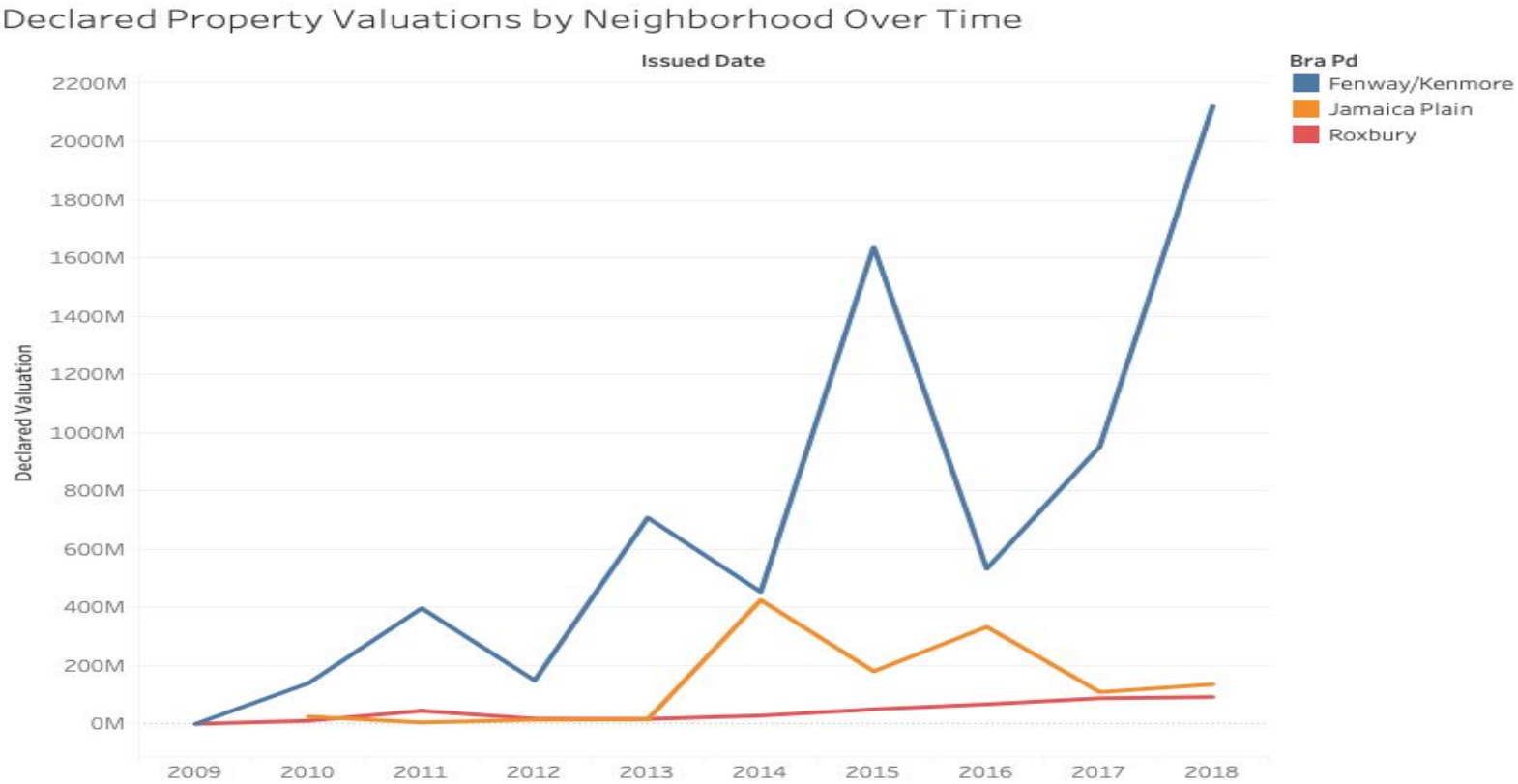
How Much Value are New Constructions and Renovations adding to their Neighborhoods over Time?



The trend of sum of Declared Valuation for Issued Date Year. Color shows details about Bra Pd. The data is filtered on Worktype, which keeps ADDITION, ERECT and NEWCON. The view is filtered on Bra Pd, which keeps Fenway/Kenmore, Jamaica Plain and Roxbury.

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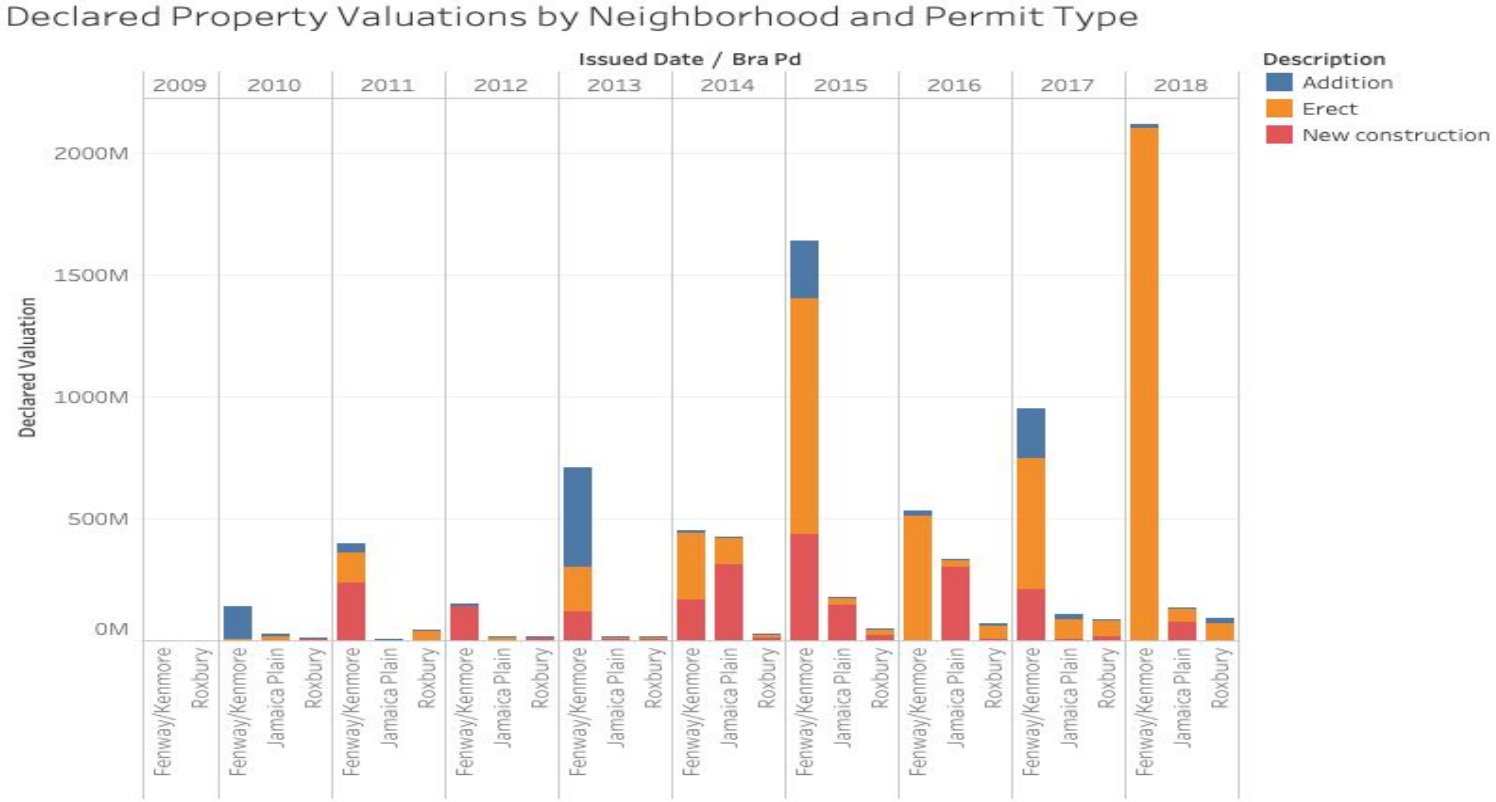
How much value does each type of construction add to each Neighborhood's Overall Valuation?



Sum of Declared Valuation for each Bra Pd broken down by Issued Date Year. Color shows details about Description. The data is filtered on Worktype, which keeps ADDITION, ERECT and NEWCON. The view is filtered on Bra Pd, which keeps Fenway/Kenmore, Jamaica Plain and Roxbury.

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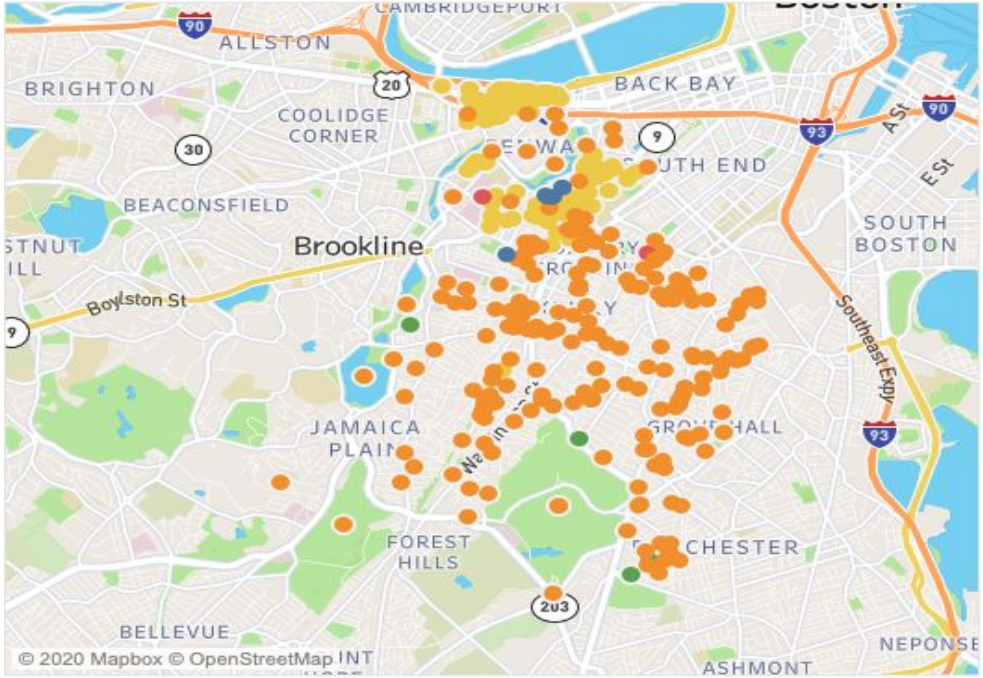
What different types of industry are building in these neighborhoods?

Permits by Industry Type for Fenway/Kenmore, Jamaica Plain and Roxbury



Industrycategory
- Civic
- Government
- HealthCare
- Religious
- UpperEd

Map based on X and Y. Color shows details about Industrycategory. The data is filtered on Bra Pd, which keeps Fenway/Kenmore, Jamaica Plain and Roxbury. The view is filtered on Industrycategory, which keeps Civic, Government, HealthCare, Religious and UpperEd.

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Your Turn!

Using the construction permit dataset:

- Think of a research question or use one of the examples.
- Create the visualization in Tableau.
- Experiment with different filters and basemaps.

Feel free to ask questions at any point during the presentation!

Collaboration with Tableau

Tableau does have a “Tableau Server/Online” service, but our academic licenses do not have access. What can we do instead? Options:

- Compress data & workbook as .zip and email.
- Create a shared google drive folder and upload
- Use other cloud/sharing services like Onedrive, Azure, or GitHub

Be sure to pay attention to version control!

Feel free to ask questions at any point during the presentation!

Conclusion

Tableau is a powerful tool for quickly mapping coordinate points onto a simple map. Experiment with the many different options available for filtering and displaying data in different ways.

Tableau is also very powerful at creating a variety of charts and graphs, this can easily be done by dragging non-coordinates to the ‘column’ and ‘row’ areas.

Research questions can include a number of different dimensions and measures—do not be afraid of experimenting with different visualizations

For more powerful mapping software, see ArcGIS, QGIS, or CartoDB.

Feel free to ask questions at any point during the presentation!

SAIL

- Login to SAIL
- Click the + at the bottom of their title and add a “Moment”
- Fill out all the information.
    - Take a few minutes to reflect on what you learned today, what you all did, and how you may use it in the future.
- When you click “Next,” it will ask you to connect to a “Learning Opportunity”
- Connect it to both the course “**POLS 4701**” and the module “**POLS 4701: Digital Proficiency Module**”

Feel free to ask questions at any point during the presentation!

Thank you!

If you have any questions, contact us at:

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Slides, handouts, and data available at

http://bit.ly/diti-spring2020-bormann

Schedule an appointment with us! **http://bit.ly/diti-office-hours**

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