

# Mapping with Tableau

---

**Taught by: Ana Abraham and Chris McNulty**  
SOCL 2358: Current Issues in Cities and Suburbs  
Prof. Gordana Rabrenovic  
Spring 2023



**Northeastern University**  
*NULab for Texts, Maps, and Networks*

# Workshop agenda

- Learn about the Boston Area Research Initiative (BARI) Data Portal.
- Learn about Tableau.
- Understand how to import and modify data in Tableau.
- Filter data in a variety of ways to produce custom visualizations.
- Brainstorm sociological research questions BARI and Tableau could help answer.

All materials are available here:

<http://bit.ly/diti-spring2023-rabrenovic-tableau>



Northeastern University  
*NULab for Texts, Maps, and Networks*

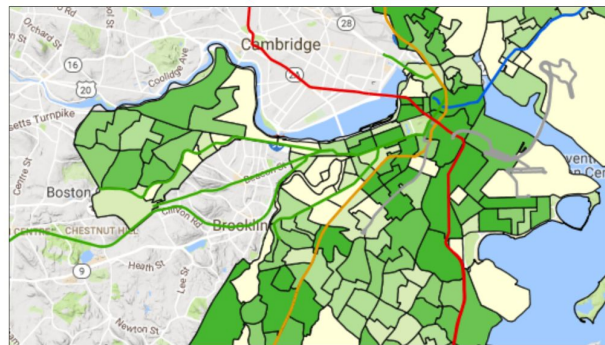
# Datasets and Maps



Northeastern University  
*NULab for Texts, Maps, and Networks*

# BARI Boston Data Portal

## Boston Data Portal



The **Boston Data Portal** makes publicly available the data products from BARI projects. The Data Portal is a key part of BARI's efforts to collect and disseminate information that foster policy/research collaborations.

The Data Portal has two components: the Data Library and the Research Map.

BARI offers Data Portal trainings for community organizations. If you or your organization would like to attend or host a training, please email us at [bari@northeastern.edu](mailto:bari@northeastern.edu).

---

Boston Data Library



---

Boston Area Research Map



<https://cssh.northeastern.edu/bari/boston-data-portal/>



Northeastern University  
*NULab for Texts, Maps, and Networks*

# Boston Area Research Map

## Boston Area Research Map

Welcome to BARI's Boston Area Research Map! This page is a jumping off point for exploring our data resources, and allows you to investigate maps of different topics that we think are central to understanding how cities work and shape the lives of the people who live within them. The links below lead to maps that have been generated in ArcOnline and allow you change and adjust visuals in a way that helps you answer the questions that are important to **you**.

For more information on the datasets represented here, or to download the underlying data to, head on over to the [Boston Data Portal](#) hosted on the Harvard Dataverse.

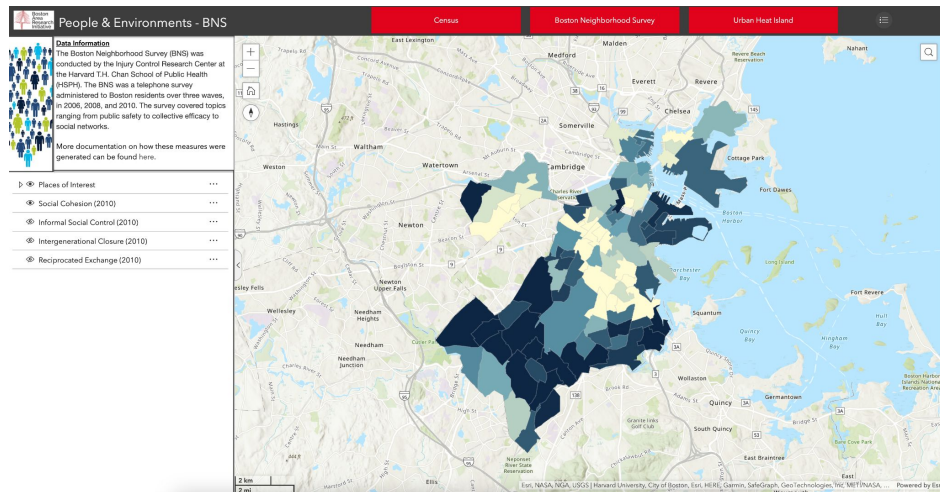
## Data Categories



**Housing & Land Value**



**Commerce & Institutions**




<https://boston-area-research-map-nu.hub.arcgis.com/>




**Northeastern University**  
*NULab for Texts, Maps, and Networks*


# BARI's Boston Data Portal



[Add Data](#) [Search](#) [About](#) [User Guide](#) [Support](#) [Sign Up](#) [Log In](#)



**Boston Area Research Initiative**



**Boston Area Research Initiative's Boston Data Portal** [Home Page](#)  
(Boston Area Research Initiative, Northeastern University)

[Harvard Dataserve](#) >

[Contact](#) [Share](#)

Welcome to the Boston Area Research Initiative's data library. Here you will find data describing the people, places, and events in the greater Boston area that have been made available for research. This includes a variety of data generated by academics, government agencies, and others.

When possible, we have made these data available for immediate download. In other cases, restrictions or sensitivities regarding the data make it necessary for those who want to use them to request permission in order to gain access. This may sometimes entail gaining permission also from your institution's Human Subjects Research Review Committee.

An important part of the BARI network is that researchers and policymakers communicate about their respective work. To this effect, we ask that anyone using the data on this site please report their findings back to those who originally contributed the data. Especially in the case of public agencies or community groups, such insights might be helpful in how they think about their operations or practices. Such communication might also lead to new and fruitful collaborations.

Also, as you work with the data and discover new things, or develop new ways to extract information from it, please use the comments page to share this knowledge with others, furthering the cumulative intelligence we have surrounding these data.

Finally, if you are the owner of data that you would like to include in the BARI library, or would like to request that a certain type of data be added to the library, please contact us at [BARI@northeastern.edu](mailto:BARI@northeastern.edu).

Search this dataserve... [Advanced Search](#)

- ☒ **Dataverses (9)**
- ☒ **Datasets (39)**
- ☐ **Files (401)**

**Dataserve Category**  
[Research Project \(7\)](#)

**Publication Year**  
[2022 \(3\)](#)

1 to 10 of 48 Results

[Sort](#)

 **Geographical Infrastructure for the City of Boston v. 2022**

Dec 23, 2022 - Geographical Infrastructure for the City of Boston Dataserve

Hatten, Dave; Zoorob, Michael; Ristea, Alina; Sheini, Saina; O'Brien, Daniel T., 2022, "Geographical Infrastructure for the City of Boston v. 2022", <https://doi.org/10.7910/DVN/GZCQGW>, Harvard Dataserve, V1, UNF-6:WLMSC8Ru8NCIANIL8yh2w== [fileUNF]

The Boston Area Research Initiative's Geographical Infrastructure for Boston is a database that organizes and links the places and regions of Boston, MA across 17 levels—including land parcels, streets, census geographies, and other administrative regions. The levels are organize...

<https://dataserve.harvard.edu/dataserve/BARI>



**Northeastern University**  
*NULab for Texts, Maps, and Networks*

# Tableau



Northeastern University  
*NULab for Texts, Maps, and Networks*

# Tableau basics

Tableau is a powerful tool for different types of data visualizations. Tableau can also be used for 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>





# Key terminology

- **X/Y Coordinates:** Numerical values that allow every location on earth to be pinpointed.
- **Latitude:** The north/south coordinate of a location based upon its distance from the equator.
- **Longitude:** The west/east coordinate of a location based upon its distance from the standard meridian.



# Key terminology continued

- **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).
- **Basemap:** The type of map that your coordinates are plotted on. Options include streets and satellite images, just like Google Maps.



# Our dataset

The screenshot displays the Harvard Dataverse website. The top navigation bar includes links for 'Add Data', 'Search', 'About', 'User Guide', 'Support', 'Sign Up', and 'Log In'. On the left sidebar, there are filters for 'Dataverses (9)', 'Datasets (25)', and 'Files (263)', along with a 'Dataverse Category' of 'Research Project (7)'. The main content area shows search results for 'Geographical Infrastructure for the City of Boston v. 2'. A red box highlights the 'Building Permits' dataset, which is dated Nov 25, 2019, and includes a description of the dataset's content. Another red box highlights the 'Permits.Records.Geocoded.2018.csv' file in the file list, which is a comma-separated values file of 186.2 MB. The interface also shows a list of files for the selected dataset, including 'Permits.Econometrics.CT.Longitudinal.tab' and 'Permits.Econometrics.LP.Longitudinal.tab'.

**HARVARD**  
Dataverse

Add Data ▾ Search ▾ About User Guide Support Sign Up Log In

☒ **Dataverses (9)**

☒ **Datasets (25)**

☐ **Files (263)**

**Dataverse Category**  
Research Project (7)

**Publication Year**  
2019 (9)  
2018 (7)  
2016 (6)  
2017 (6)  
2012 (3)  
[More...](#)

**Subject**  
Social Sciences (26)  
Earth and Environmental Sciences (3)  
Other (1)

**Author Name**  
O'Brien, Daniel T. (7)  
de Benedictis-Kessner, Justin (6)  
O'Brien, Dan (4)  
Sheini, Saina (4)  
Shields, Michael (3)  
[More...](#)

**Author Affiliation**  
Northeastern University / Harvard University (14)  
Harvard University (6)

**1 to 10 of 34 Results**

**Geographical Infrastructure for the City of Boston v. 2**  
Dec 5, 2019  
O'Brien, Daniel T.; Phillips, Nolan; de Benedictis for the City of Boston v. 2018\*, <https://doi.org/10.7910/DVN/N4BL71> [fileUNF]  
The Boston Area Research Initiative's Geographical Infrastructure of Boston, MA across various geographic levels — it includes land parcels, streets, census geographies, and other administrative regions. The levels are organized into 17 levels of hierarchy.

**Geographical Infrastructure for the City of Boston v. 2**  
Dec 4, 2019  
O'Brien, Daniel T.; Phillips, Nolan Edward; Sheini, Saina; de Benedictis-Kessner, Justin; O'Brien, Dan; Shields, Michael; Sheini, Saina; de Benedictis-Kessner, Justin; O'Brien, Daniel T., 2019, "Geographical Infrastructure for the City of Boston v. 2018\*", <https://doi.org/10.7910/DVN/N4BL71> [fileUNF]  
The Boston Area Research Initiative's Geographical Infrastructure of Boston, MA across 17 levels of hierarchy, including land parcels, streets, census geographies, and other administrative regions. The levels are organized into 17 levels of hierarchy.

**Building Permits**  
Nov 25, 2019  
O'Brien, Daniel T.; Barrett W. Montgomery; de Benedictis-Kessner, Justin; Sheini, Saina, 2019, "Building Permits", <https://doi.org/10.7910/DVN/N4BL71>, Harvard Dataverse, V3, UNF:6:MoA2dRjgDfFBW9B5KUNsA== [fileUNF]  
This dataset contains various files detailing the City of Boston's building permits applications from September 26, 2006 to the recent present. The raw data were originally gathered and released by the Inspectional Service Department (ISD) of the City of Boston. It details various information about the building permits applications.

**Property Assessment**  
Aug 26, 2019  
Shields, Michael; Sheini, Saina; de Benedictis-Kessner, Justin; O'Brien, Daniel T., 2019, "Property Assessment", <https://doi.org/10.7910/DVN/YVKZIG>, Harvard Dataverse, V1, UNF:6:d6pzPv2A3116mUdw4gGY1w== [fileUNF]  
This dataset details the various cross-sectional and longitudinal data files of the City of Boston's property assessment data. These data were curated and added to by the Boston Area Research Initiative. The corresponding documentation details information about the various data files.

**21 to 23 of 23 Files** [Download ▾](#)

**Permits.Econometrics.CT.Longitudinal.tab**  
Tabular Data - 343.9 KB - Nov 25, 2019 - 2 Downloads  
173 Variables, 181 Observations - UNF:6:uXC4EvnoDNryzMB8o04Vw==  
Building permits by Census tract for all years  
[Geospatial](#) [Data](#) [Explore ▾](#) [Download ▾](#)

**Permits.Econometrics.LP.Longitudinal.tab**  
Tabular Data - 11.9 MB - Nov 25, 2019 - 0 Downloads  
73 Variables, 98436 Observations - UNF:6:vKb9zFyfJlueY3pJgLGfA==  
Building permits by land parcels for all years  
[Geospatial](#) [Data](#) [Explore ▾](#) [Download ▾](#)

**Permits.Records.Geocoded.2018.csv**  
Comma Separated Values - 186.2 MB - Nov 25, 2019 - 4 Downloads  
MDS: eb86c8b751de7f9834e7476ad43cf20  
[Data](#) [Download](#)



# Our dataset

- Boston's 2018 Permit and Record Spreadsheet, which tracks construction permits.
- Includes information such as
  - Type of permit (addition, renovation, etc.).
  - Address of permit (including geographic coordinates) and neighborhood name.
  - Permit holder and fee information.



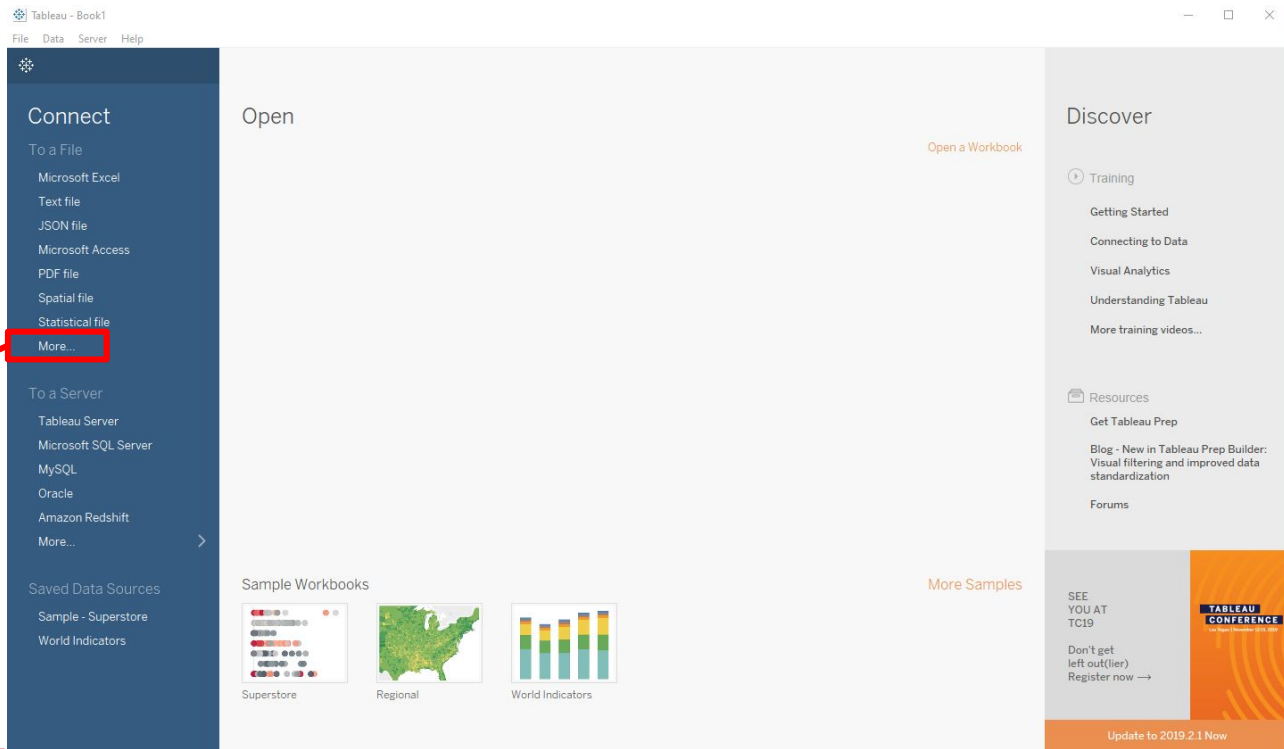
# Tableau Walkthrough



Northeastern University  
*NULab for Texts, Maps, and Networks*

# Step One: Connecting to data

- First, we need to connect to our data.
- We will be using building permit data for the City of Boston in .csv format.
- Select **More...** and navigate to the data file that was sent via email.



# Step Two: Convert coordinate column to geo data

- To map our data, we have to first convert the X/Y data into coordinates.
- Click on the **Abc**, and change the data type from **String** to **Number (decimal)**.
- Click on the **#** and select over **Geographic role**, and then select **Latitude** or **Longitude**. Convert:

X -> Longitude  
Y -> Latitude

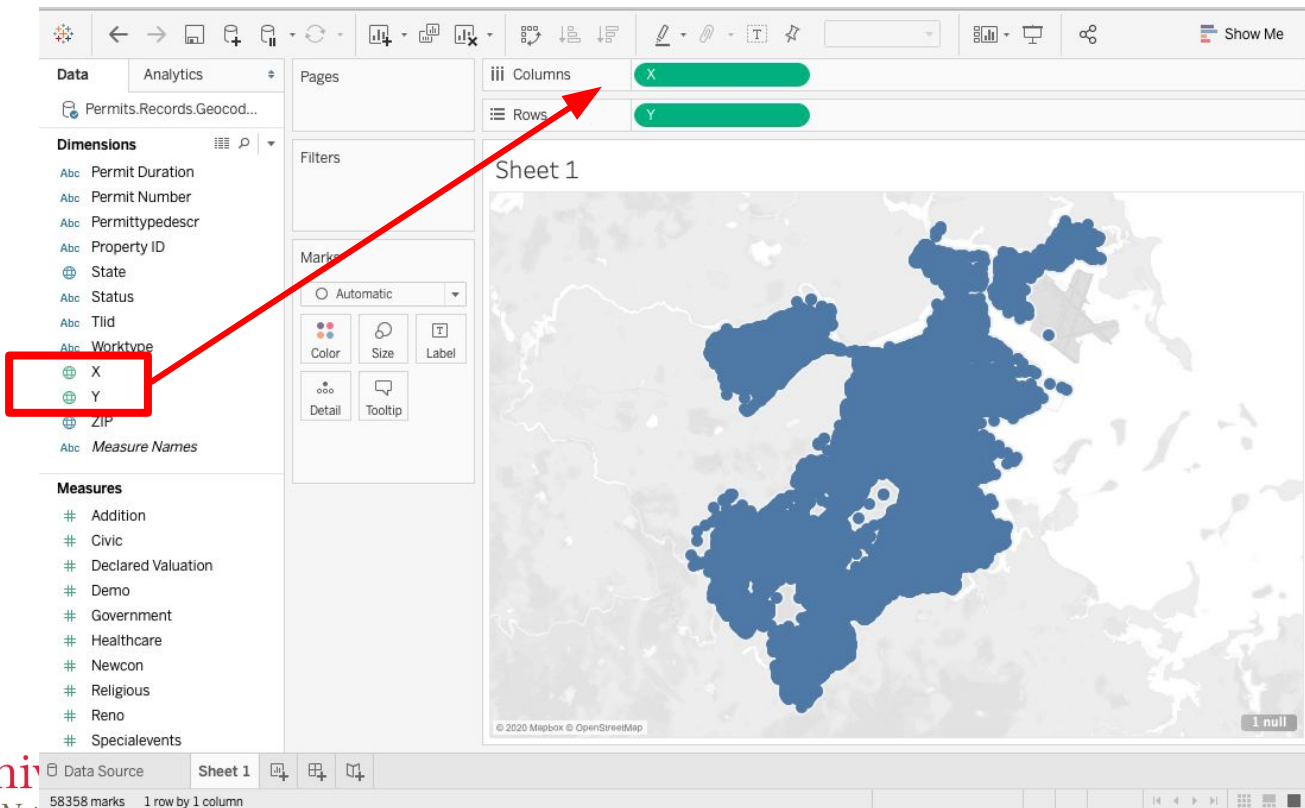
The screenshot displays the Tableau interface for a data source named 'Permits.Records.Geocoded.2018'. The left sidebar shows the 'Connections' and 'Files' panels. The main view is a table with columns: State, ZIP, Location, Property ID, Parcel Num, and Parcel ID. The 'Parcel Num' column is selected, and a context menu is open, showing options to change the data type to 'Number (decimal)' and the geographic role to 'Longitude'. The 'Longitude' option is highlighted in blue. The table data includes rows for various locations in MA, with coordinates for longitude and latitude.

State	ZIP	Location	Property ID	Parcel Num	Longitude	Latitude
MA	02116	null	NA	NA	-71.029539	42.379356
MA	02210	null	NA	NA	-71.029539	42.379356
MA	02128	null	NA	NA	-71.029539	42.379356
MA	02118	null	NA	801720000	-71.029539	42.379356
MA	02118	null	NA	801720000	-71.029539	42.379356
MA	02126	null	NA	1804116000	-71.029539	42.379356
MA	02129	null	NA	203517600	-71.029539	42.379356
MA	02124	null	NA	1701902000	-71.029539	42.379356
MA	02124	null	NA	1701902000	-71.029539	42.379356
MA	02135	null	NA	2205126010	-71.154788	42.342280
MA	02135	null	NA	2205126010	-71.029539	42.379356



# Step Three: Plotting points

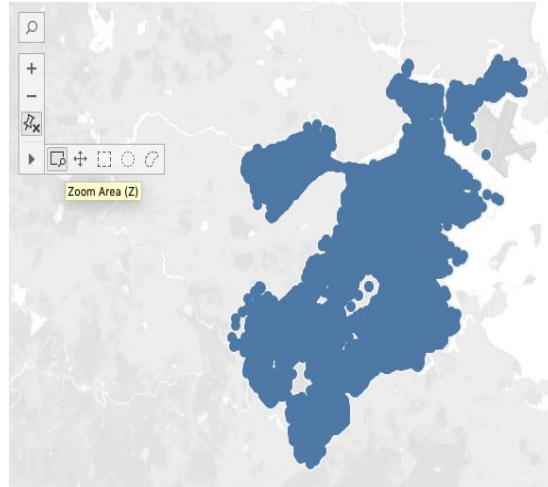
- To map the data points, drag the Y data into the **Columns** area, and the X data into the **Rows** area.
- Tableau will automatically plot points based upon those X/Y coordinates.





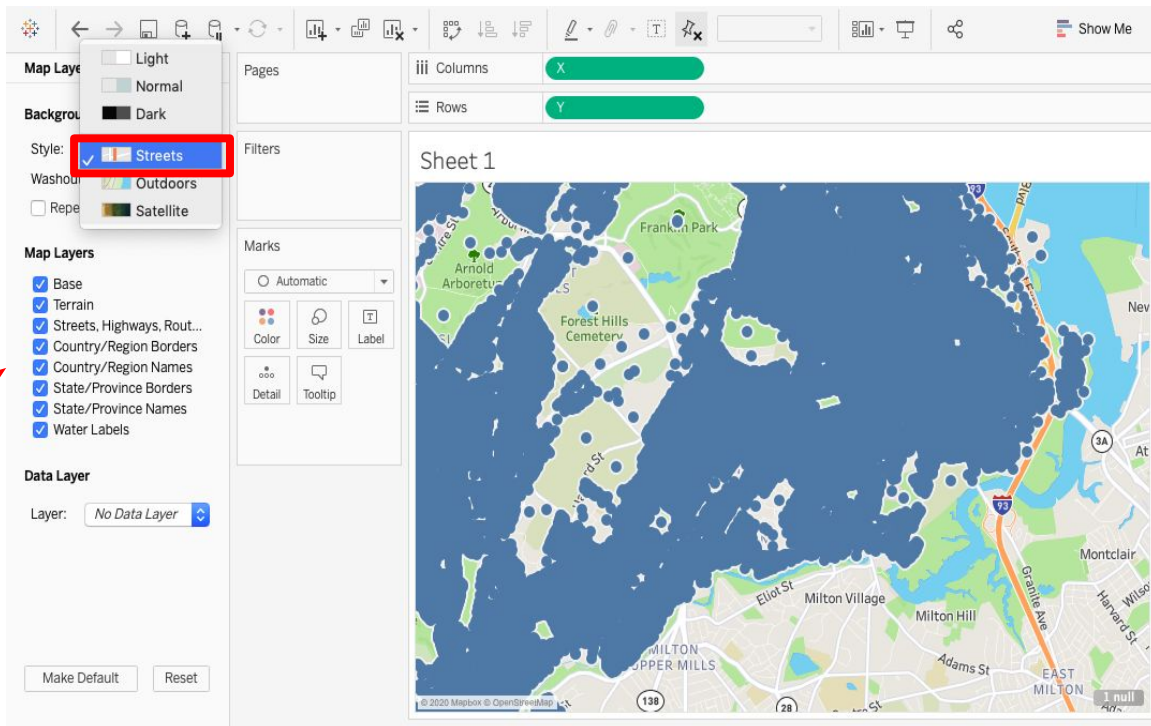
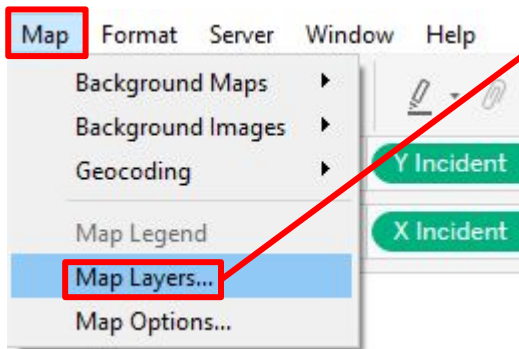
# Step Four: Zoom controls

- The navigation and zoom controls are in the top left of the plot area.
- We have zoomed into the Downtown Boston, Fenway/Kenmore, Jamaica Plain, Roxbury areas.



# Step Five: Modifying the basemap

- Select **Map** on the toolbar and go to **Map Layers...** to modify the basemap.
- Select a new style, e.g. **Streets**.
- When you are happy, click the **X** at the top of the map layers sidebar.



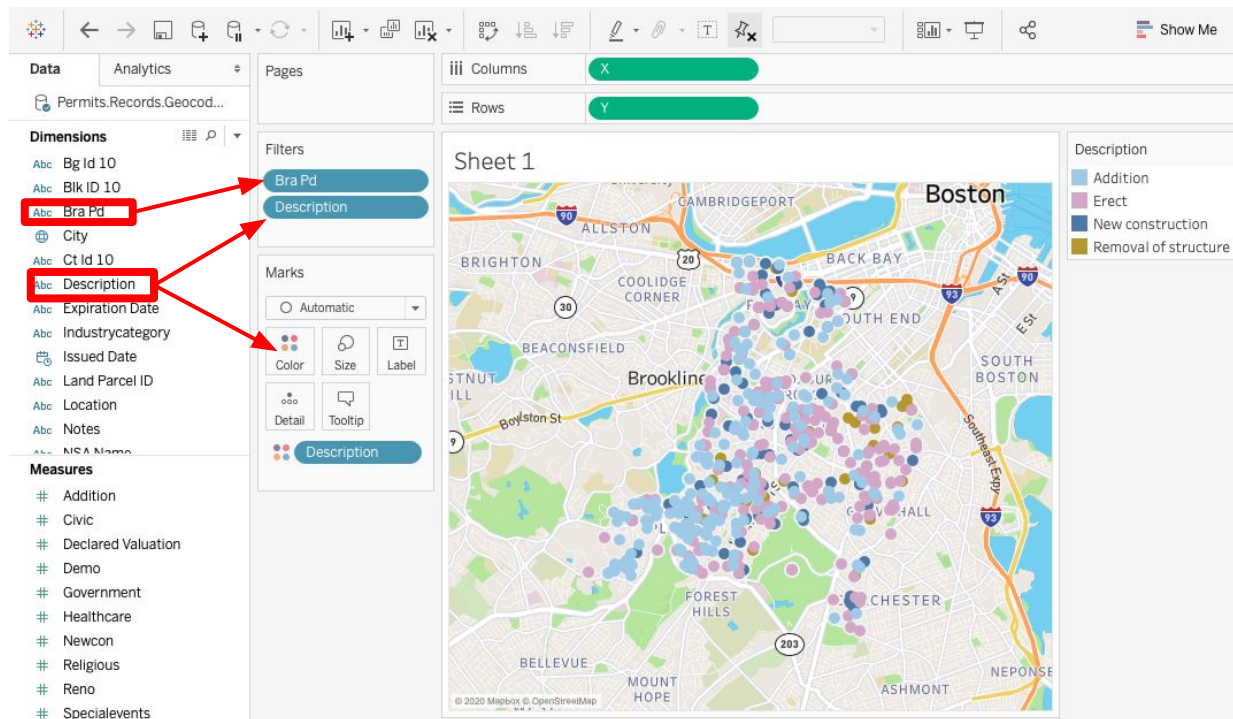
**Hypothesis:** Gentrification will look different in each neighborhood of study.

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



# Step Six: Creating filters

- To create different filters and visualization parameters, drag a dimension or measure into the **Marks** box. Change marks to **Map**.
- To specify a type of visualization, drag the parameter of choice onto **Color, Size, etc.**
- 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).



# Step Seven: Creating filters continued

- We want to filter our neighborhood data parameter to only display Fenway/Kenmore, Jamaica Plain and Roxbury.
- Click on **Filter...** to bring up the filter box.
- Deselect all and then check the boxes for Fenway/Kenmore, Jamaica Plain and Roxbury.
- Do the same thing for permit description type, selecting the boxes for **Addition, Erect, New Construction, and Removal of Structure.**

Filter [Bra Pd]

General Wildcard Condition Top

☒ Select from list ☐ Custom value list ☐ Use all

Enter search text

- ☐ Charlestown
- ☐ East Boston
- ☒ Fenway/Kenmore
- ☐ Hyde Park
- ☒ Jamaica Plain
- ☐ Mattapan
- ☐ NA
- ☐ North Dorchester
- ☐ Roslindale
- ☒ Roxbury
- ☐ South Boston

All None Exclude

Summary

Field: [Bra Pd]  
Selection: Selected 3 of 17 values  
Wildcard: All  
Condition: None  
Limit: None

Reset Apply Cancel OK

Filter [Description]

General Wildcard Condition Top

☒ Select from list ☐ Custom value list ☐ Use all

Enter search text

- ☐ Null
- ☒ Addition
- ☐ Annual Maintenance
- ☐ Application to Correct a Vi
- ☐ Awning
- ☐ Awning Renewal
- ☐ Canopy
- ☐ Canopy Renewal
- ☐ Capital Improvement
- ☐ Cellular Tower
- ☐ Change Occupancy

All None Exclude

Summary

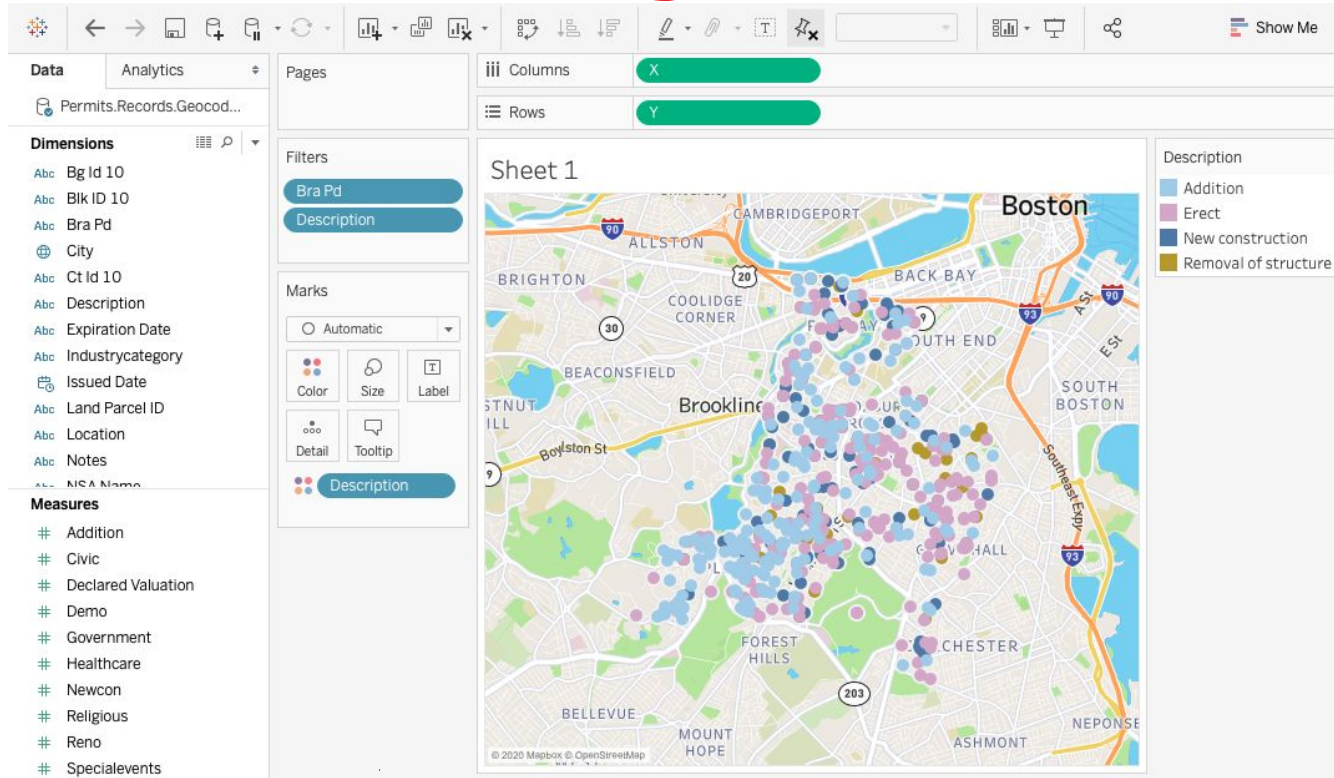
Field: [Description]  
Selection: Selected 4 of 69 values  
Wildcard: All  
Condition: None  
Limit: None

Reset Apply Cancel OK





# Step Seven: Creating filters results



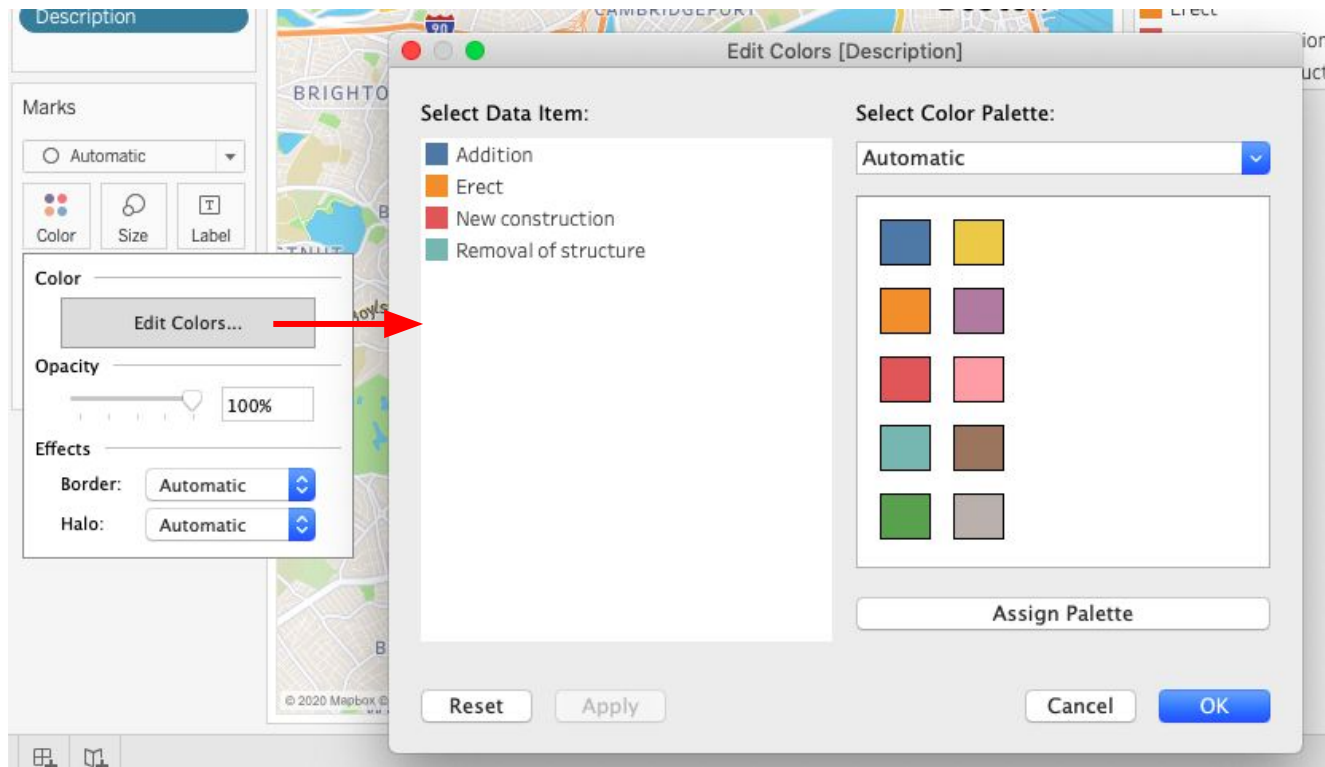
# Tableau and Accessibility

- Tableau lets you *modify* and *customize* how your maps and graphs look.
- Keep accessibility concerns in mind when choosing fonts and colors.
  - Colors with higher contrast from the background are easier to distinguish.
  - Larger, bolder fonts stand out and designate importance.
  - Overcrowding text makes the information harder to read.



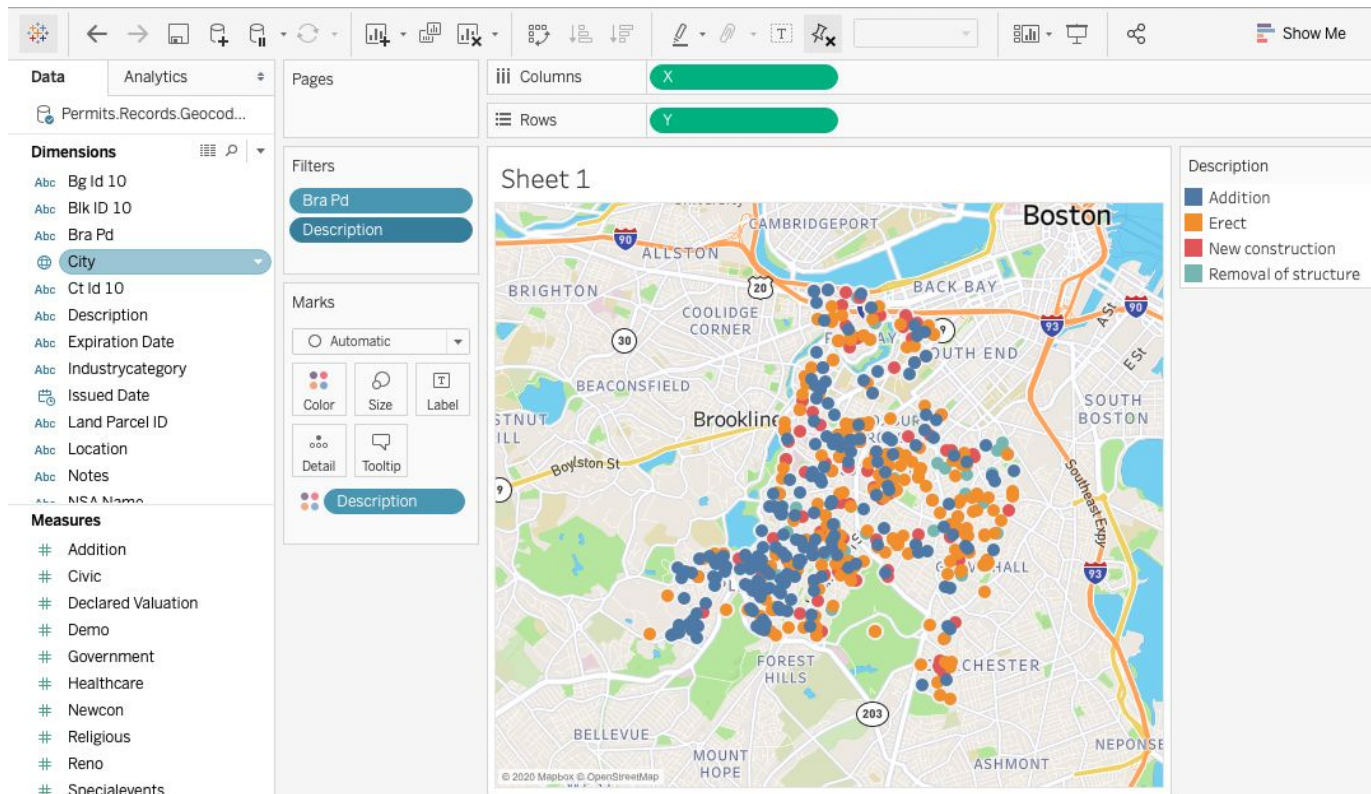
# Step Eight: Modifying colors

- The standard map colors don't contrast very well.
- On the **Bra Pd (neighborhoods)** sidebar, click the dropdown arrow, then click on **Edit Colors....**
- We can now change our colors and improve the contrast.



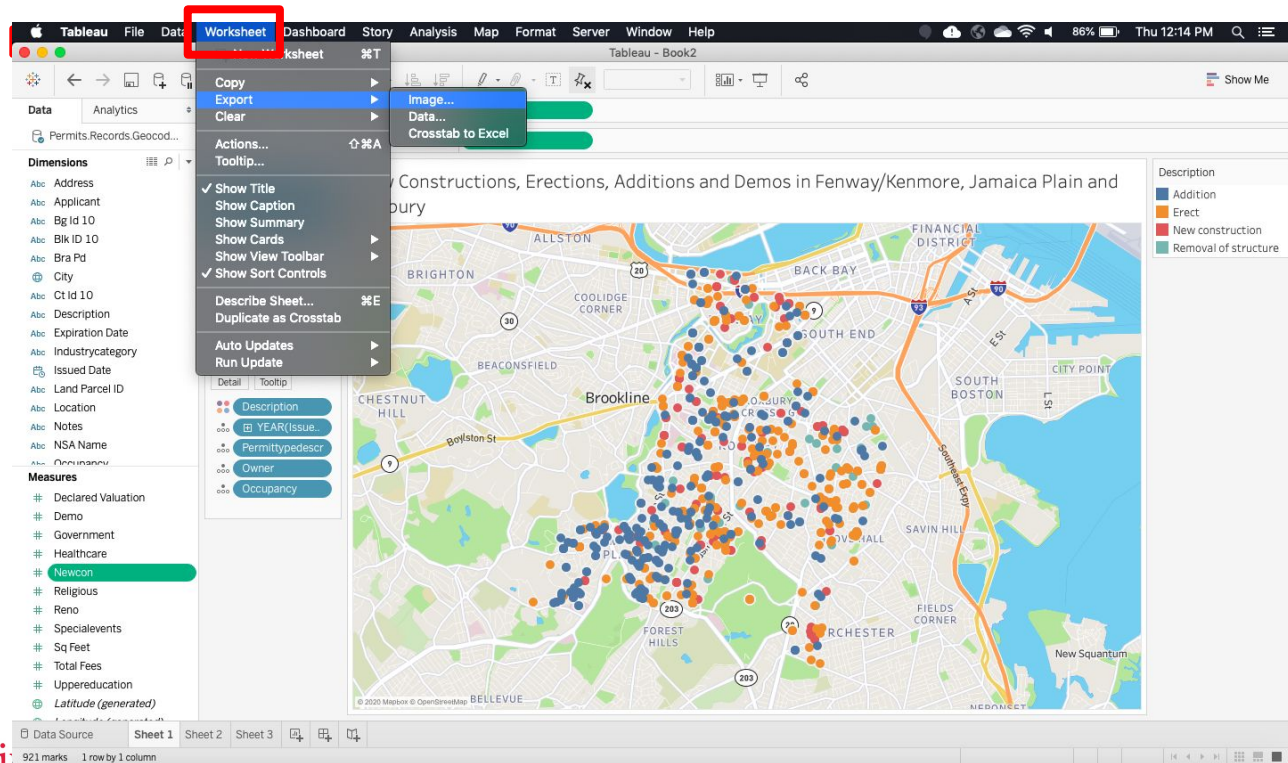


# Step Eight: Modifying colors results



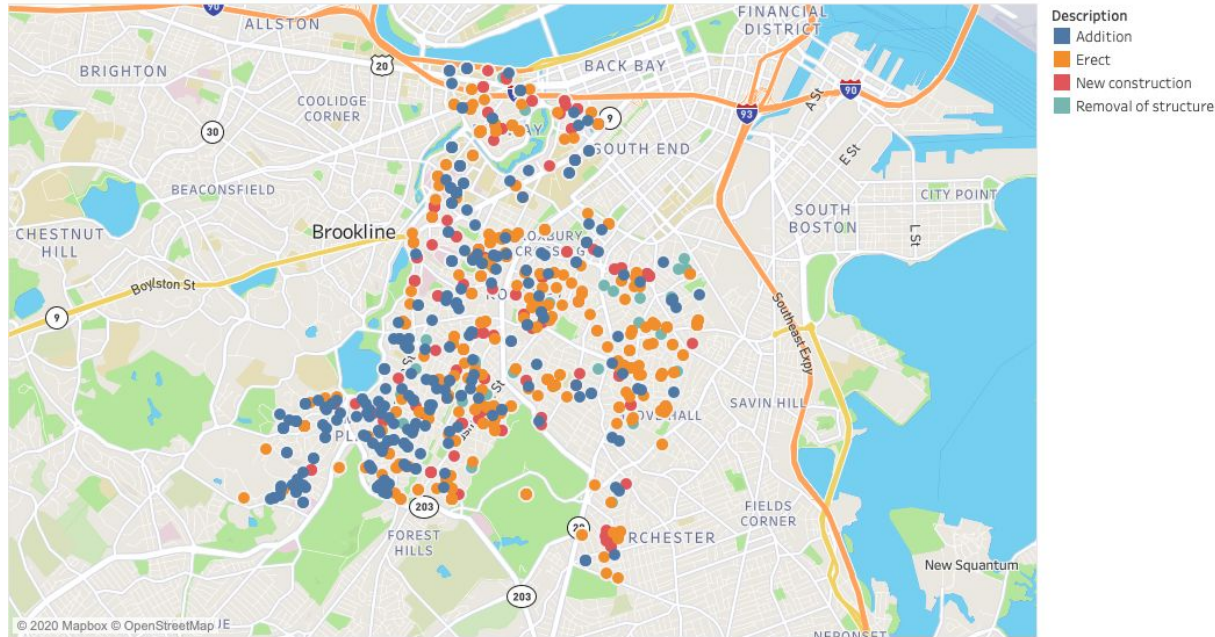
# Step Nine: Exporting images

- From the **Worksheet** drop-down menu, select **Export**, then click on **Image...**
- You can select the type of export then click **Save**.



# Step Nine: Exported image

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

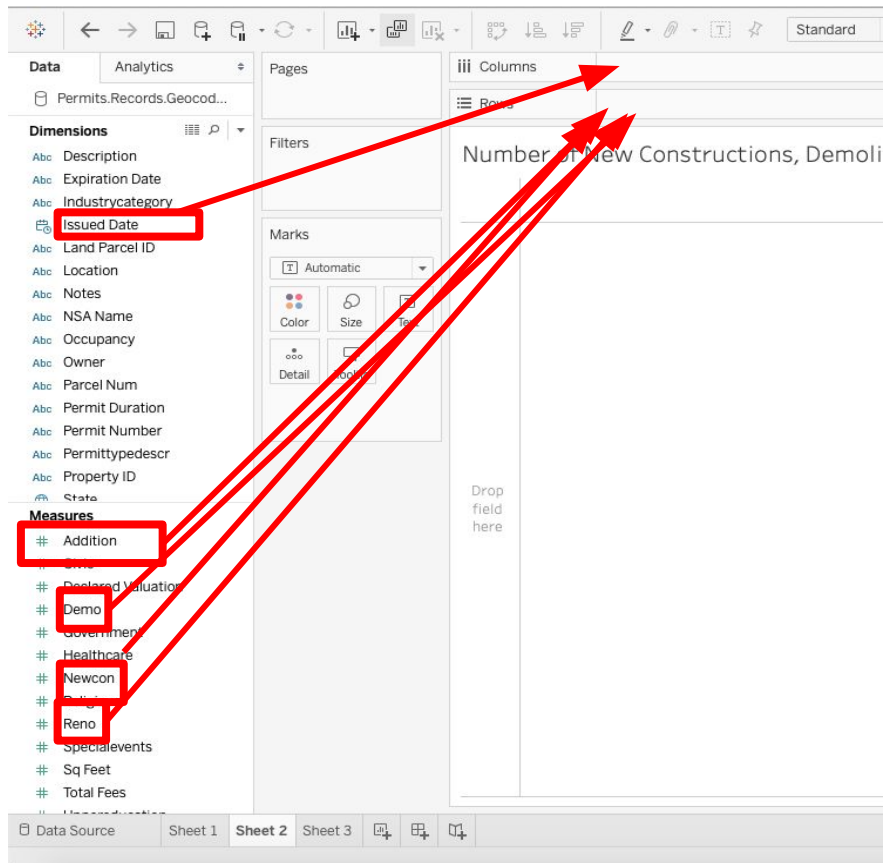


Map based on X and Y. Color shows details about Description. Details are shown for various dimensions. The data is filtered on Bra Pd and Worktype. The Bra Pd filter keeps Fenway/Kenmore, Jamaica Plain and Roxbury. The Worktype filter keeps ADDITION, ERECT, NEWCON and RAZE.



# Graphs with Tableau: Drag & drop

- As with mapping, creating a graph can be accomplished by dragging and dropping our dimensions and measures.
- To 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, drag and drop the **Issued Date** dimension to the columns, and the **Addition, Demo, Newcon** and **Reno** measures to the rows.

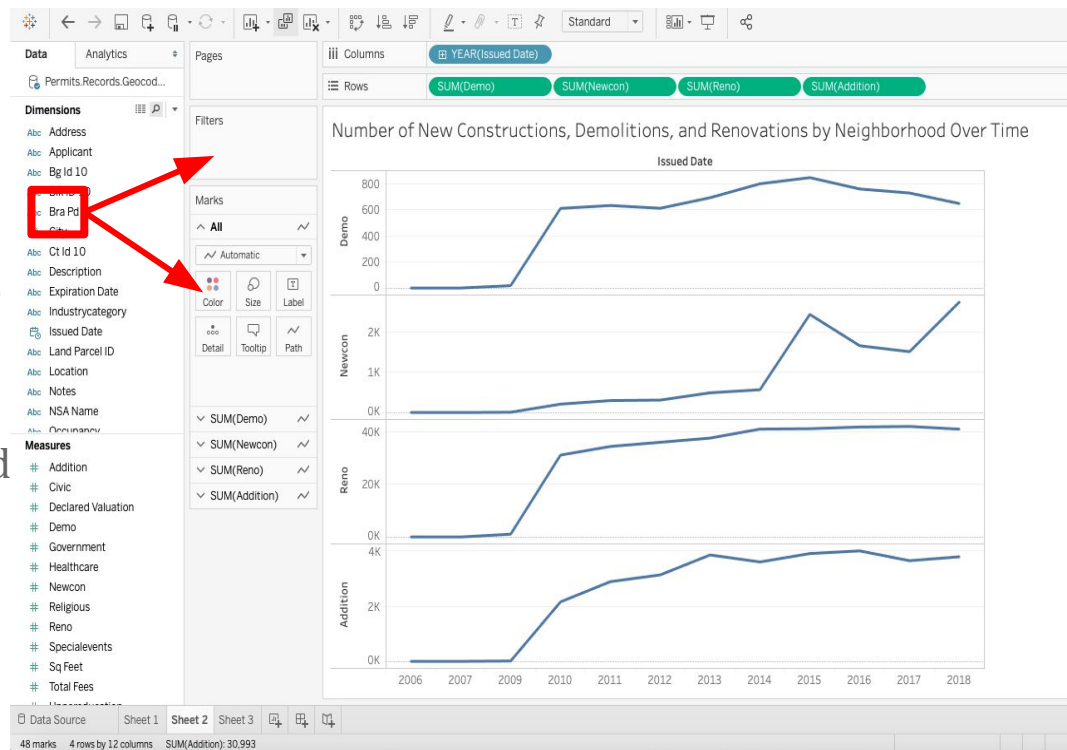




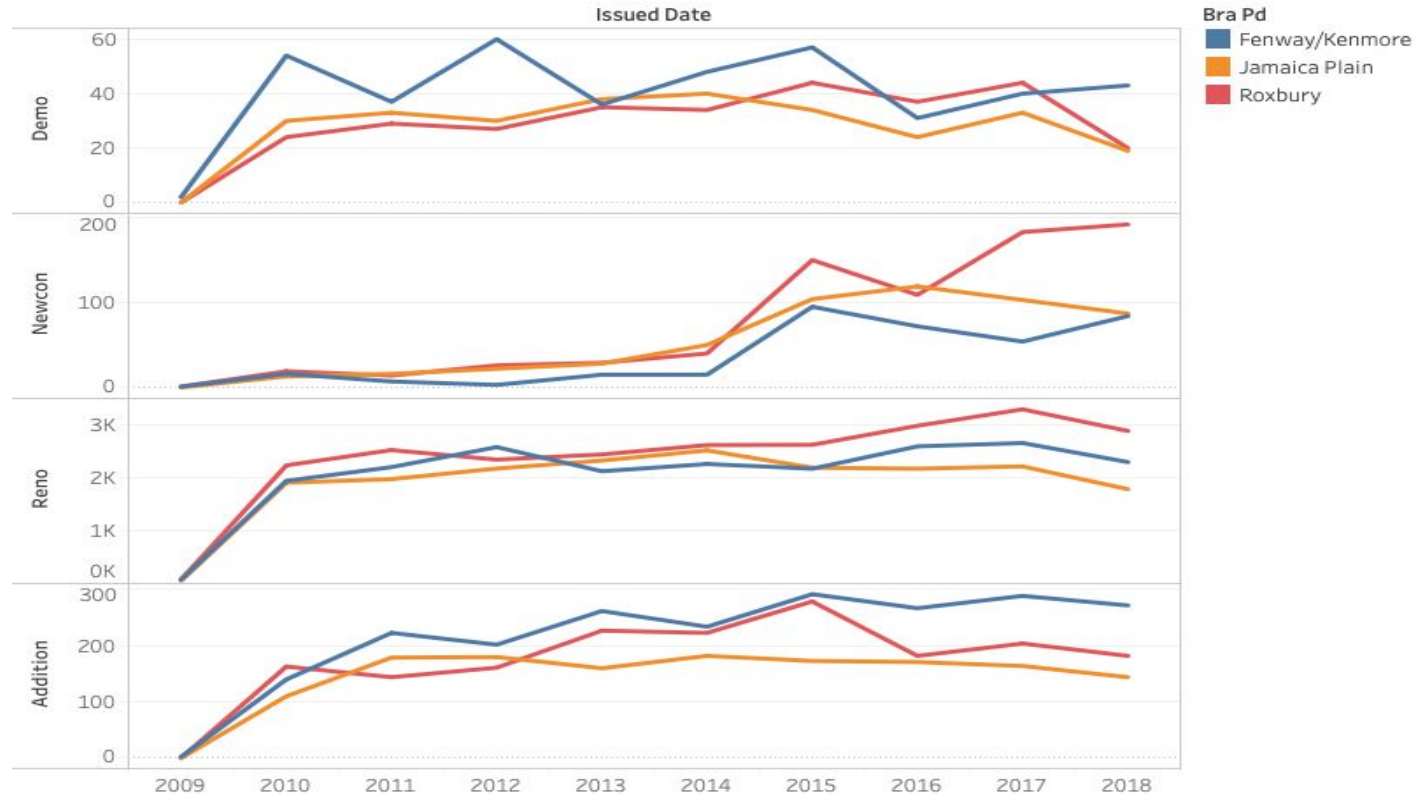
# Graphs with Tableau: Drag & drop

We now have a graph of different building permit records over time. To see specific neighborhoods:

- Drag and drop the **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.



# 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.



# How can Tableau help us to answer sociological questions?



# Example research questions

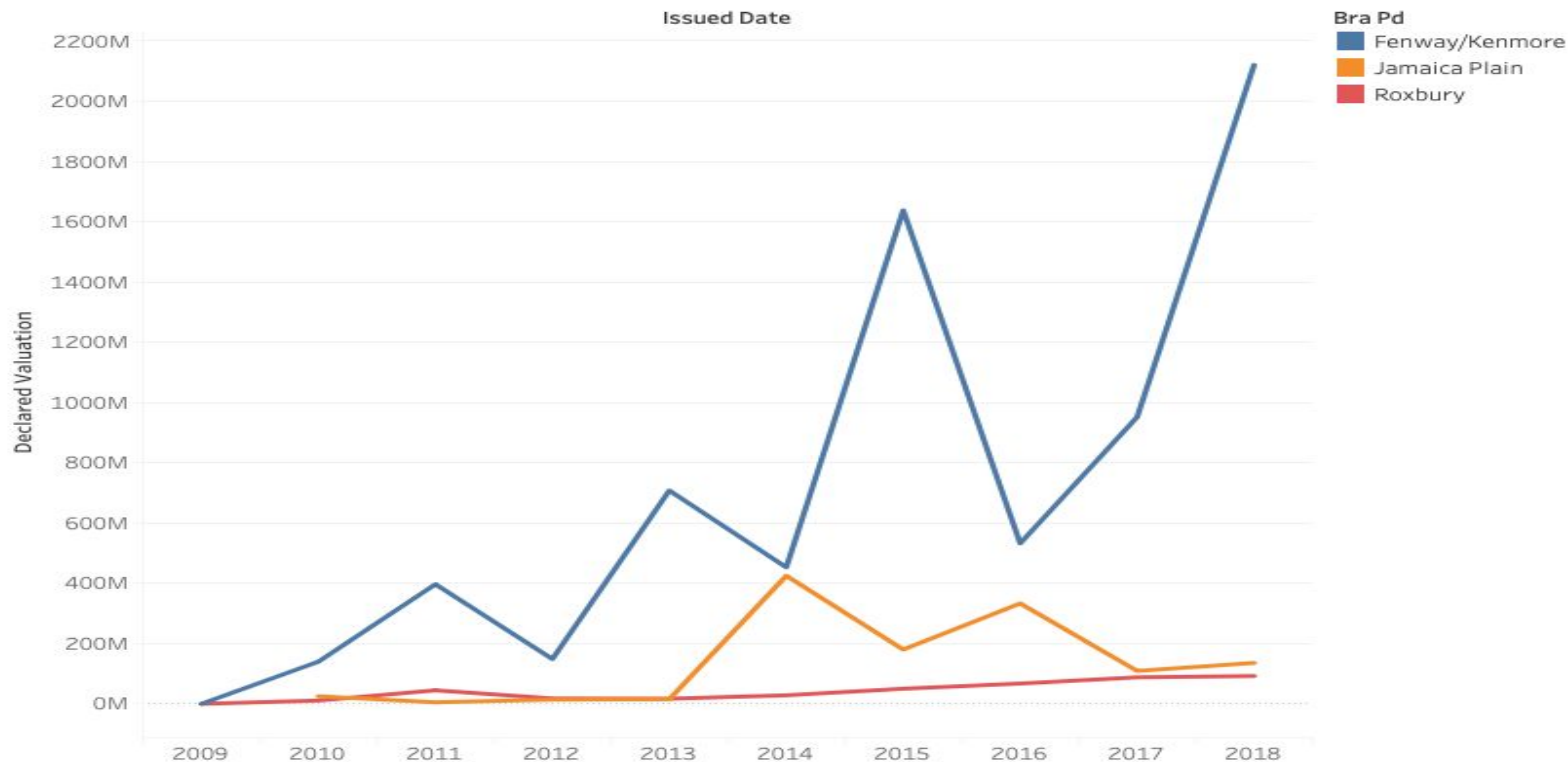
- How much value are new constructions and renovations adding to their neighborhood over time?
- How much value does each type of construction add to each neighborhood's overall valuation?
- What different types of industry are building in these neighborhoods?





# How much value are new constructions and renovations adding to their neighborhoods over time?

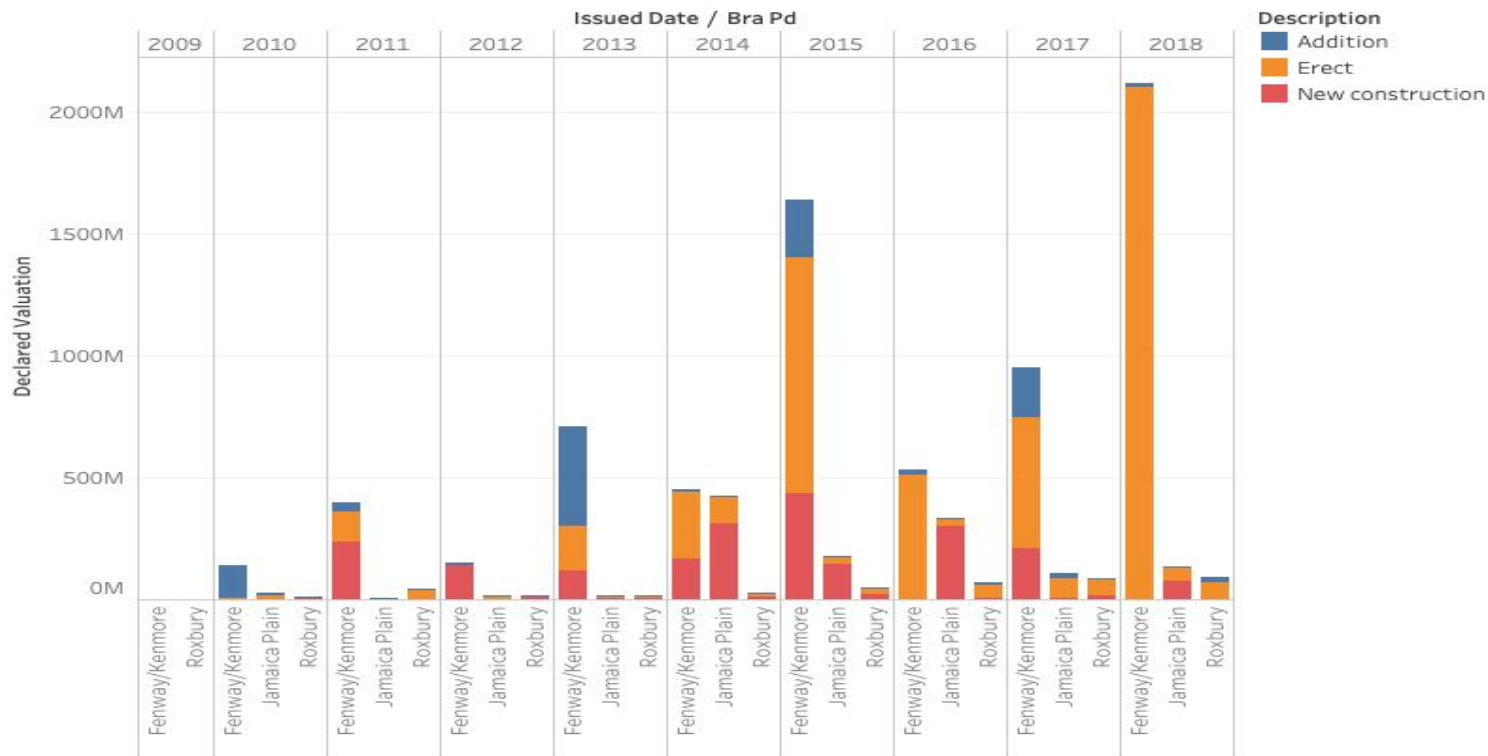
Declared Property Valuations by Neighborhood Over Time



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.

# How much value does each type of construction add to each neighborhood's overall valuation?

Declared Property Valuations by Neighborhood and Permit Type

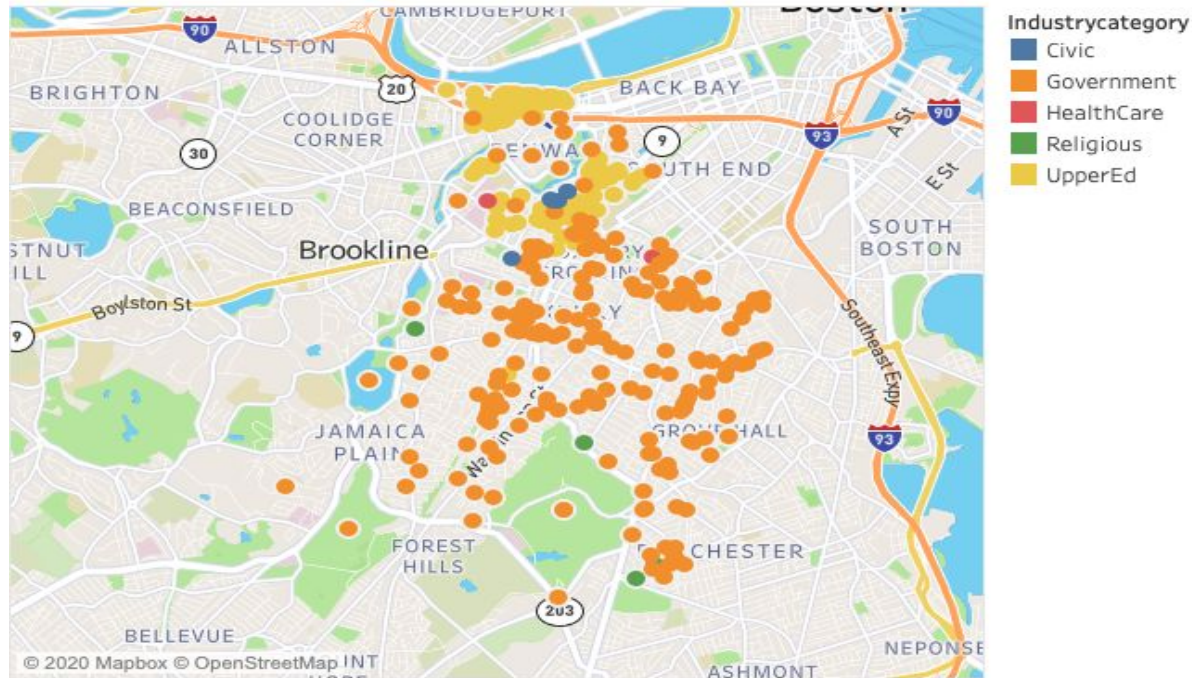


Sum of Declared Valuation for each Bra Pd broken down by Issued Date Year. Color shows details about Description. The data is filtered on Worktype, which keeps ADDITION, ERECT and NEWCON. The view is filtered on Bra Pd, which keeps Fenway/Kenmore, Jamaica Plain and Roxbury.



# What different types of industry are building in these neighborhoods?

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



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.



# Conclusion

- Tableau is a powerful tool for mapping coordinate points onto maps.
- Tableau is also very powerful at creating a variety of charts and graphs 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!



# Thank you!

**Ana Abraham**

Digital Integration Teaching Initiative  
Assistant Director

**Chris McNulty**

Digital Integration Teaching Initiative  
Assistant Director

-----

- If you have any questions, contact us at [nulab.info@gmail.com](mailto:nulab.info@gmail.com)
- Have questions? Schedule an appointment with us!

<https://calendly.com/diti-nu>

- Link to Online Materials:

<http://bit.ly/diti-spring2023-rabrenovic-tableau>

- We'd love your feedback! Please fill out a short survey here:

<https://bit.ly/diti-feedback>



**Northeastern University**  
*NULab for Texts, Maps, and Networks*