



COLUMBIA UNIVERSITY

IN THE CITY OF NEW YORK

RESEARCH, DESIGN & PROTOTYPE

An Analytical Application For New Yorkers

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UX + Design of Analytical Apps

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TLC-only-2 COMMUNITY

Based on 311 Service Requests from 2010 to Present
All 311 Service Requests from 2010 to present. This information is automatically updated daily.

Unique Key	Created Date	Closed Date	Agency	Agency
1	36604512	07/03/2017 11:32:05 PM	TLC	Taxi e
2	36602489	07/03/2017 09:38:04 PM	TLC	Corre
3	36601836	07/03/2017 09:35:12 PM	TLC	Taxi e
4	36609615	07/03/2017 09:34:11 PM	TLC	Taxi e
5	36603731	07/03/2017 09:24:31 PM	TLC	Taxi e
6	36606868	07/03/2017 08:47:25 PM	TLC	Taxi e
7	36604405	07/03/2017 08:44:28 PM	07/03/2017 08:44:49 PM	Taxi e
8	36608431	07/03/2017 08:32:17 PM	TLC	Taxi e
9	36606283	07/03/2017 08:24:07 PM	TLC	Taxi e
10	36606458	07/03/2017 07:22:57 PM	TLC	Taxi e
11	36605796	07/03/2017 07:09:26 PM	TLC	Taxi e
12	36606539	07/03/2017 07:09:11 PM	TLC	Taxi e
13	36608865	07/03/2017 06:00:29 PM	TLC	Taxi e
14	36602969	07/03/2017 05:03:20 PM	TLC	Taxi e
15	36602158	07/03/2017 04:36:00 PM	TLC	Taxi e
16	36607528	07/03/2017 04:32:36 PM	TLC	Taxi e

Filter

- Conditional Formatting
- Sort & Roll-Up
- Filter**

Filter this dataset based on contents.

No conditions defined yet.

With the following base filters

- Agency is TLC

Never created a filter before? Watch a short tutorial video.

NYC OpenData makes open data access and analysis into a civic priority.

The app is for **everyone**.

- anyone interested in New York life from data views
- both non-data professionals and data veterans
- from Job Application data to Driver Application data
- focusing on the ease-of-use to improve usability



I used a persona for
Polly the Policymaker to focus
on workflow and features

““ *I need to know where are the
most complaints in the city
about taxis*



Process

- 1) Analyzing five usability tests
- 2) Initiating revised wireframes
- 3) Iterating wireframe states
- 4) Prototyping and usability test
- 5) Finalizing application

To further the mission of data access for all, I analyzed a usability test with **five participants**, who were given four **analytical tasks** on the site.

USABILITY TEST VIDEOS

[Participant 748682](#) (13:10)

[Participant 748680](#) (13:51)

[Participant 748616](#) (20:50)

[Participant 748701](#) (12:24)

[Participant 748672](#) (22:09)

[Analytical Tasks Given](#)

[Why You Only Need to Test with 5 Users](#)

Usability Test Findings

- **5 of 5 participants could not apply the *Filter* function smoothly**
- **4 of 5 participants didn't notice the selected dataset for *Map* function and clicked *Add Data* by mistake**
- **4 of 5 participants failed to reach a summary table of total call number by zip code**

I sketched some explorations to address:

- the usability issues
- the ability to view aggregate data
- the ability to join tables of data

NYC OpenData

2

Home Data About FARE Contact

- Filter
- Sort
- Group by
- Visualize
- Join Data**
- Export
- More options

Choose a dataset ▼

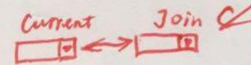
Join data based on...

Choose a column ▼

OK Cancel

Join another data? Yes

What if the name is not the same



- back
- reset
- screenshot
- download

311 Service Data + Population Data

Joined Data

Agent	Zip Code	Population
TLC	10049	570,829
TLC	10025	—
TLC	12540	—
TLC	19400	—
TLC	—	—
—	—	—
—	—	—
—	—	—

Raw Data 1

311 Service

Raw Data 2

Population

NYC OpenData



Home Data About FAQ Contact

- Filter
- Sort
- Group by
- Visualize
- Join Data
- Export
- More Options

Group by

Choose a column ▼

Roll-up by *Calculate by*

Choose a column ▼

Choose a function ▼

OK Cancel

* Default by descending

- back
- reset
- screenshot
- download

311 service request + population

Grouped data (descending order)



	Zipcode	Population
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-

Raw Data 1

311 service request

⏪

Raw Data 2

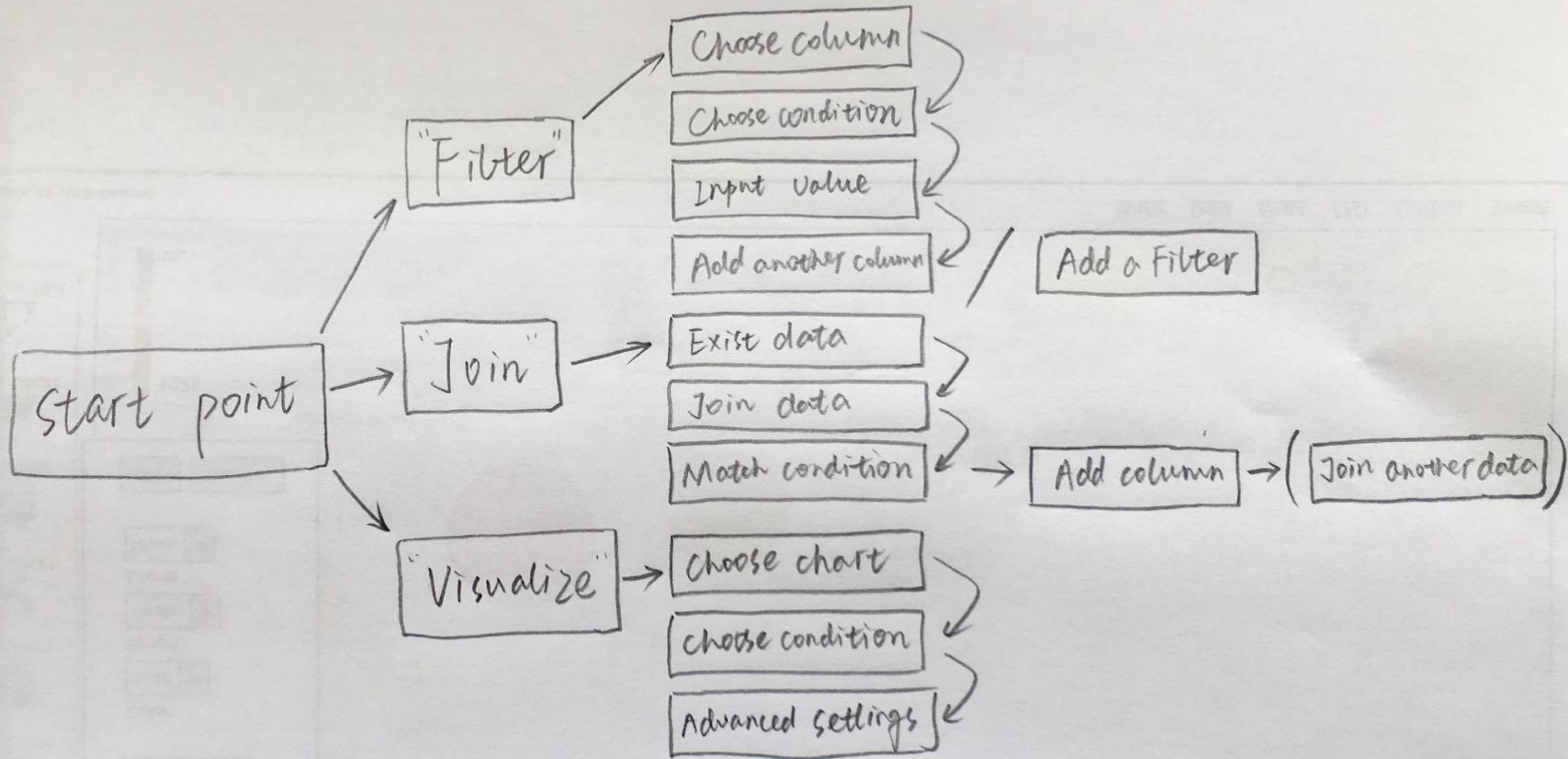
population

⏪

After iterating on the initial idea, I pivoted and **prioritized the functions** and **simplified the data processing steps**.

Final Design

The app uses the **311 Service Requests** dataset for the demo, which supports a use case for Polly to plan an undercover sting operation for the Taxi & Limo Commission (TLC)



The app improves the existing NYC OpenData application

The screenshot shows the NYC OpenData application interface. At the top, the browser address bar displays "https://opendata.cityofnewyork.us/". The page title is "NYC OpenData". On the left side, there is a sidebar with three icons: "Filter" (funnel), "Join" (Venn diagram), and "Visualize" (bar chart). Below these icons is a "Welcome!" message: "Welcome! To start data processing, please choose a function from above." The main content area is titled "311 Service Requests" and shows a "Raw Data View" of a table. The table has columns for "Unique Key", "Created Date", "Closed Date", "Agency", and "Agency Name". The data rows show various service requests, mostly from the Department of Transportation (DOT) and the New York City Police Department (NYPD). At the bottom of the page, there is a footer with the text "©2018 NYC OpenData. All rights reserved." and a navigation menu with links for "Home", "Data", "About", "FAQ", "Contact", and "Search".

Unique Key	Created Date	Closed Date	Agency	Agency Name
39632069	07/04/2018 02:17:43 AM		DOT	Department of Transportation
39633986	07/04/2018 02:13:05 AM		NYPD	New York City Police Department
39636136	07/04/2018 02:12:54 AM		NYPD	New York City Police Department
39636447	07/04/2018 02:12:21 AM		NYPD	New York City Police Department
39638967	07/04/2018 02:12:03 AM		NYPD	New York City Police Department
39637764	07/04/2018 02:11:24 AM		NYPD	New York City Police Department
39636260	07/04/2018 02:11:09 AM		NYPD	New York City Police Department
39630705	07/04/2018 02:10:21 AM		NYPD	New York City Police Department
39634920	07/04/2018 02:09:35 AM		NYPD	New York City Police Department
39630424	07/04/2018 02:09:30 AM		NYPD	New York City Police Department
39636540	07/04/2018 02:09:08 AM		NYPD	New York City Police Department
39635300	07/04/2018 02:08:33 AM		NYPD	New York City Police Department
39638631	07/04/2018 02:08:25 AM		NYPD	New York City Police Department
39634924	07/04/2018 02:07:32 AM		NYPD	New York City Police Department
39639056	07/04/2018 02:07:25 AM		NYPD	New York City Police Department
39636198	07/04/2018 02:06:51 AM	07/04/2018 02:14:50 AM	NYPD	New York City Police Department
39630408	07/04/2018 02:06:41 AM		DOHMH	Department of Health and Mental Hy...
39633249	07/04/2018 02:06:40 AM		NYPD	New York City Police Department

- Prioritized the functions. Three most frequently used functions are emphasized.
- Added welcome lines to encourage a easy start.

- Optimized space arrangement to provide larger view of the dataset.
- Added *Save*, *Download*, and *Full Screen* functions to address potential needs.

For the use case, Polly is able to see an **aggregate view** of the data

NYC OpenData

311 Service Requests

Filtered View Filtered: Agency is TLC X

Click to See Raw Data

Unique Key	Created Date	Closed Date	Agency	Agency Name	Com
39637134	07/04/2018 12:54:34 AM		TLC	Taxi and Limousine Commission	Taxi
39636036	07/04/2018 12:35:22 AM		TLC	Taxi and Limousine Commission	Taxi
39639554	07/03/2018 11:43:22 PM		TLC	Taxi and Limousine Commission	Taxi
39637135	07/03/2018 10:54:31 PM		TLC	Taxi and Limousine Commission	Taxi
39639239	07/03/2018 10:09:53 PM		TLC	Taxi and Limousine Commission	Taxi
39633614	07/03/2018 09:57:21 PM		TLC	Taxi and Limousine Commission	Taxi
39630951	07/03/2018 09:54:16 PM		TLC	Taxi and Limousine Commission	Taxi
39638473	07/03/2018 09:52:17 PM		TLC	Taxi and Limousine Commission	For H
39637258	07/03/2018 09:50:13 PM		TLC	Taxi and Limousine Commission	For H
39637305	07/03/2018 08:32:37 PM		TLC	Taxi and Limousine Commission	Taxi
39634946	07/03/2018 08:07:39 PM		TLC	Taxi and Limousine Commission	Taxi
39636019	07/03/2018 08:00:12 PM		TLC	Taxi and Limousine Commission	Taxi
39636085	07/03/2018 07:48:48 PM		TLC	Taxi and Limousine Commission	For H
39634896	07/03/2018 06:58:34 PM		TLC	Taxi and Limousine Commission	Taxi
39633576	07/03/2018 06:18:43 PM		TLC	Taxi and Limousine Commission	For H

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Home Data About FAQ Contact Search

Filter conditions are hidden to save more space for data view, and can be visible by clicking the Filter icon.

Raw data can be viewed by clicking the See Raw Data button

Aggregate data view for Agency TLC

Polly is able to **join in other datasets** for her task.
It is easy to do for a non-data scientist.

Join data made easy:
Match which column of the current data, with which column of the newly added data, then choose the column in new dataset to join

The screenshot shows the NYC OpenData website interface. A 'Join' dialog box is open on the left, allowing a user to join 'Population Data' to '311 Request-TLC'. The dialog has three options: 'Match' (selected), 'With', and 'Join'. The 'Match' option is set to 'Zip Code' of Current Data. Below the dialog, there is a 'Join another data?' button and 'OK' and 'Cancel' buttons.

The main content area displays a table titled '311 Service Requests' with a 'Filtered View' of 'Agency is TLC'. The table has columns for Unique Key, Created Date, Closed Date, Agency, and Agency Name. The data is filtered to show requests from the TLC agency.

Unique Key	Created Date	Closed Date	Agency	Agency Name
39637134	07/04/2018 12:54:34 AM		TLC	Taxi and Limousi
39636036	07/04/2018 12:35:22 AM		TLC	Taxi and Limousi
39639554	07/03/2018 11:43:22 PM		TLC	Taxi and Limousi
39637135	07/03/2018 10:54:31 PM		TLC	Taxi and Limousi
39639239	07/03/2018 10:09:53 PM		TLC	Taxi and Limousi
39633614	07/03/2018 09:57:21 PM		TLC	Taxi and Limousi
39630951	07/03/2018 09:54:16 PM		TLC	Taxi and Limousi
39638473	07/03/2018 09:52:17 PM		TLC	Taxi and Limousi
39637258	07/03/2018 09:50:13 PM		TLC	Taxi and Limousi
39637305	07/03/2018 08:32:37 PM		TLC	Taxi and Limousi
39634946	07/03/2018 08:07:39 PM		TLC	Taxi and Limousi
39636019	07/03/2018 08:00:12 PM		TLC	Taxi and Limousi
39636085	07/03/2018 07:48:48 PM		TLC	Taxi and Limousi
39634896	07/03/2018 06:58:34 PM		TLC	Taxi and Limousi
39633576	07/03/2018 06:18:43 PM		TLC	Taxi and Limousi

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#1 usability test issue: 5 of 5 participants could not apply the *Filter* function smoothly

Issue solved. Three simplified steps to easily process the filter function.

The screenshot shows the NYC OpenData website interface. A filter dialog box is open on the left side, with a blue border and a white background. It contains the following elements:

- A funnel icon labeled "Filter".
- A dropdown menu labeled "Choose a column" with a downward arrow.
- A dropdown menu labeled "Choose a condition" with a downward arrow.
- An input field labeled "Input value" containing the letter "X".
- A blue link labeled "Add more".
- A button labeled "Join".
- A button labeled "Visualize".
- A button labeled "Add another Filter?" with a plus sign.
- Two buttons labeled "OK" and "Cancel".

The main content area displays a table titled "311 Service Requests" in "Raw Data View". The table has the following columns: Unique Key, Created Date, Closed Date, Agency, and Agency Name. The table contains 20 rows of data, with the first row being: Unique Key: 39632069, Created Date: 07/04/2018 02:17:43 AM, Closed Date: (empty), Agency: DOT, Agency Name: Department of Transportation. The table is scrollable, and a scrollbar is visible on the right side.

At the bottom of the page, there is a footer with the text: "©2018 NYC OpenData. All rights reserved." and a navigation menu with links: Home, Data, About, FAQ, Contact, Search.

#2 usability test issue: 4 of 5 participants didn't notice the selected dataset for *Map* function and added Data by mistake

The screenshot shows the NYC OpenData website interface. The browser address bar displays 'https://opendata.cityofnewyork.us/'. The page title is 'NYC OpenData'. The main content area shows '311 Service Requests' with a 'Grouped Data' view. The data is filtered by 'Agency is TLC' and 'Joined: Population'. A table displays the following data:

Agency	Zip Code	Population
TCL		
TCL		
TCL		
TCL		
TCL		
TCL		
TCL		
TCL		
TCL		
TCL		
TCL	10900	17762
TCL	10072	376
TCL	10087	76
TCL	10221	72
TCL	10022	722
TCL	10311	82
TCL	10062	9
TCL	10032	1872
TCL	10236	35782
TCL	10830	22
TCL	10001	7261

A 'Map View' dialog box is overlaid on the table, asking: 'Would you like to plot a Map View of: Sum of Population Grouped by Zip Code?'. The dialog has 'No' and 'Yes' buttons.

On the left side of the interface, there is a sidebar with various visualization options: Filter, Pivot Table, Join, Map, Pie Chart, Line Chart, Calendar, Area Chart, and Scatter Plot. The 'Map' option is highlighted.

At the bottom of the page, there is a footer with the text: '©2018 NYC OpenData. All rights reserved.' and a navigation menu with links: Home, Data, About, FAQ, Contact, Search.

Issue solved. Efficiently estimate the most possible map view based on current dataset in the first place. Users can also change the settings by clicking *No*.

#3 usability test issue: 4 of 5 participants failed to reach a summary table of total call number by zip code

The screenshot shows the NYC OpenData website interface. A 'Pivot Table' configuration dialog is open, allowing users to select columns for grouping and calculation. The main data table displays call counts by zip code for various agencies, with 'TCL' being the primary agency.

Agency	Zip Code	Population
TCL	10023	31567
TCL	10024	41918
TCL	10025	91362
TCL	10021	1234
TCL	10234	486
TCL	10251	837
TCL	10211	762
TCL	10031	32
TCL	10900	17762
TCL	10072	376
TCL	10087	76
TCL	10221	72
TCL	10022	722
TCL	10311	82
TCL	10062	9
TCL	10032	1872
TCL	10236	35782
TCL	10830	22
TCL	10001	7261

Issue solved. Directly added a *Pivot Table* option under *Visualize* function. Users can quickly get a summary table view by two steps.

I created a **clickable prototype** to be used for executive buy-in, and to hand-off to designers and engineers.

[Launch Prototype](#)

Conclusion

In this case, the improved user interface was largely simplified by prioritizing the most important functions and data processing steps. In addition, by leveraging intelligent estimation, it has the ability to project the desirable visualization to further increase the efficiency.

There are still much space for improvement in this case. User experience iteration has no real end, while continuous improvement makes perfection. I believe the user experience will be largely improved through planned periodical usability test(s) and interface modification(s).