



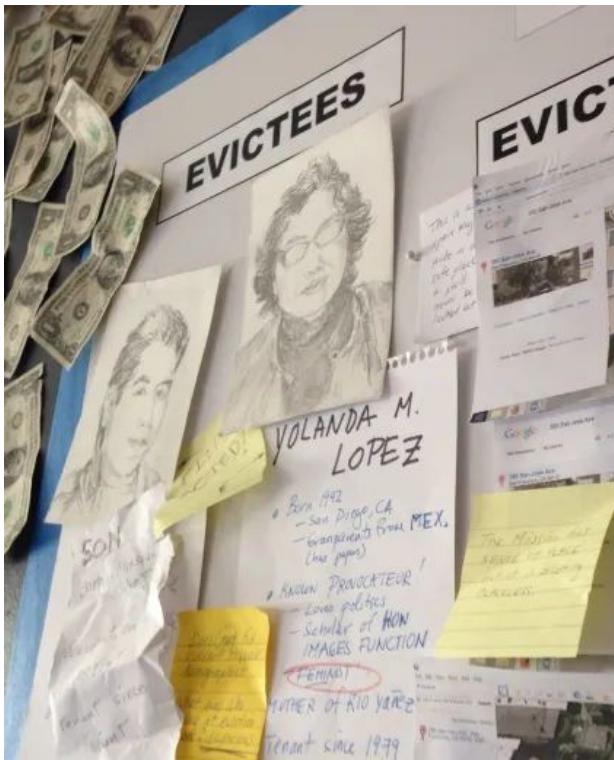
DWBI PROJECT REPORT

Under the guidance of Prof. Daniel Lee

Abstract

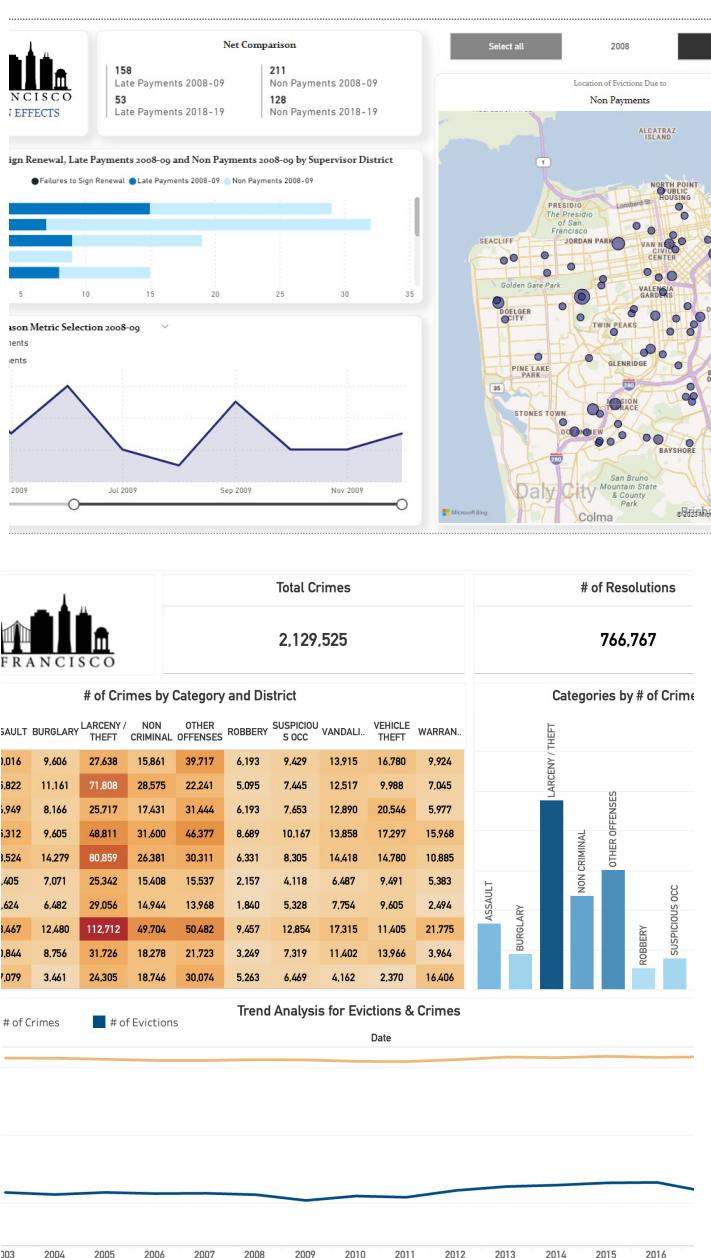
This project report presents a comprehensive analysis of eviction and crime data in San Francisco, utilizing advanced data visualization tools such as Power BI and Tableau. The dashboards offer a detailed exploration of the patterns and trends in evictions and crimes across various districts from 2008 to 2019. The visualizations are designed to provide insights into the correlation between eviction reasons, such as late payments and non-payments, and the distribution of different types of crimes. The report aims to facilitate better understanding and decision-making for urban development and social policy reforms.

Introduction



The city of San Francisco has long been a focal point for discussions on urban dynamics, especially concerning housing stability and public safety. The intricate relationship between housing evictions and crime rates provides a lens through which the socio-economic fabric of the city can be examined. In this report, we dissect the complex data on evictions and crimes in San Francisco, captured between 2008 and 2019, through a series of interactive dashboards created with Power BI and Tableau.

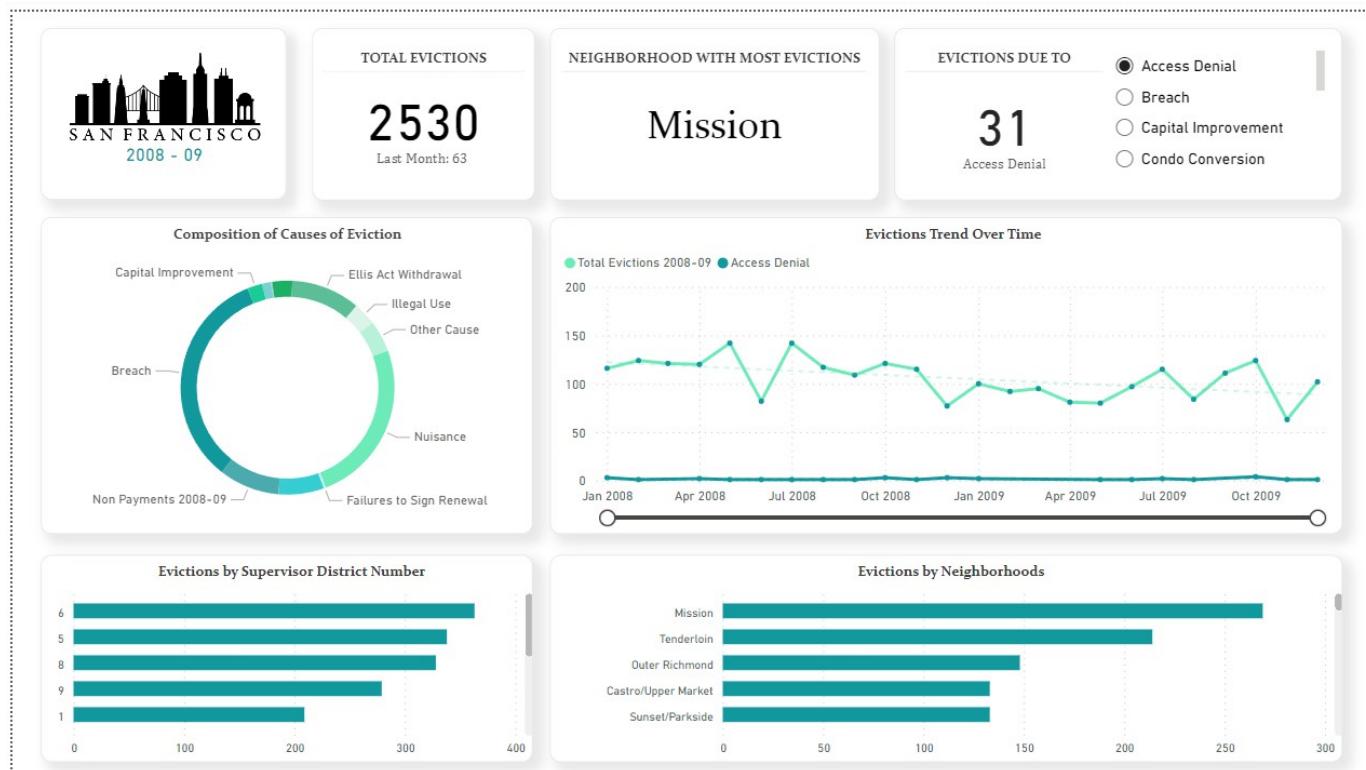
These dashboards enable stakeholders to visualize the data in a structured manner, identifying key trends and outliers in eviction causes and crime categories. By analyzing eviction metrics such as failures to sign renewals, late payments, and non-payments, juxtaposed with crime statistics including burglary, larceny, and assault, we aim to unearth patterns that could inform policy decisions. This report not only sheds light on the historical context of housing and crime in San Francisco but also serves as a tool for policymakers, city planners, and community organizations seeking to address these issues more effectively.



We used two datasets for San Francisco, one for housing evictions and the other for crimes reported on a daily basis from 2003-2018. We combined the two datasets through a many to many relationship based upon the supervisor district id date of the default reported. After establishing this relationship we could visualize crimes and evictions on a district level in the city of San Francisco.

Dashboard 1

https://app.powerbi.com/links/OY56k696OV?cid=44467e6f-462c-4ea2-823f-7800de5434e3&pbi_source=linkShare&bookmarkGuid=cc936b82-b65e-48a7-b9f5-131e2f9b2dc7

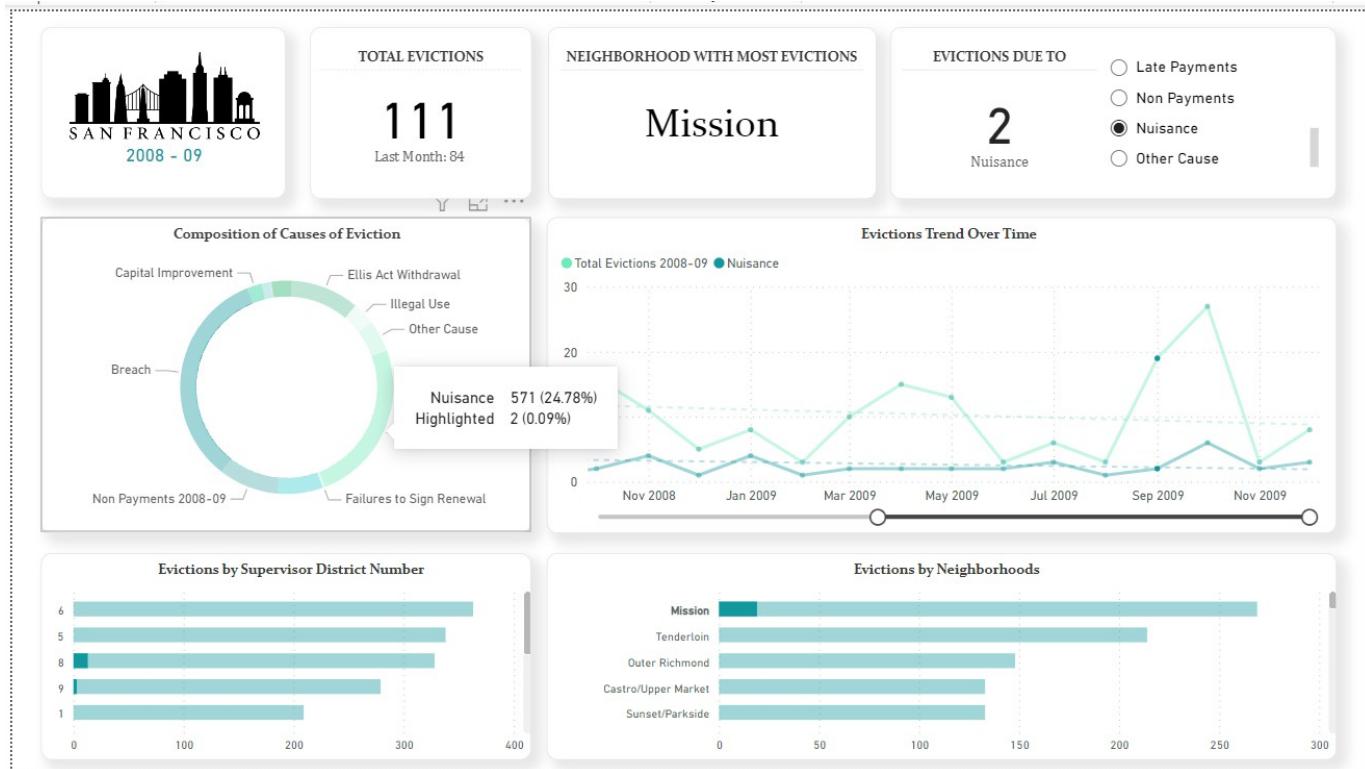


This comprehensive dashboard presents an in-depth overview of eviction trends in San Francisco for the period 2008-2009. The visualizations encapsulate various dimensions of the eviction process, providing valuable insights into the total number of evictions, the distribution of evictions by cause, neighborhood impact, and temporal patterns. This dashboard serves as a crucial tool for policymakers, social workers, and community activists aiming to understand and address the complex landscape of housing instability in San Francisco.

Total Evictions KPI:

The dashboard we have presented is a sophisticated tool designed to provide a comprehensive analysis of eviction data in San Francisco over the fiscal year 2008-09. Each component serves both individual and collective purposes, offering a multifaceted view of the eviction landscape.

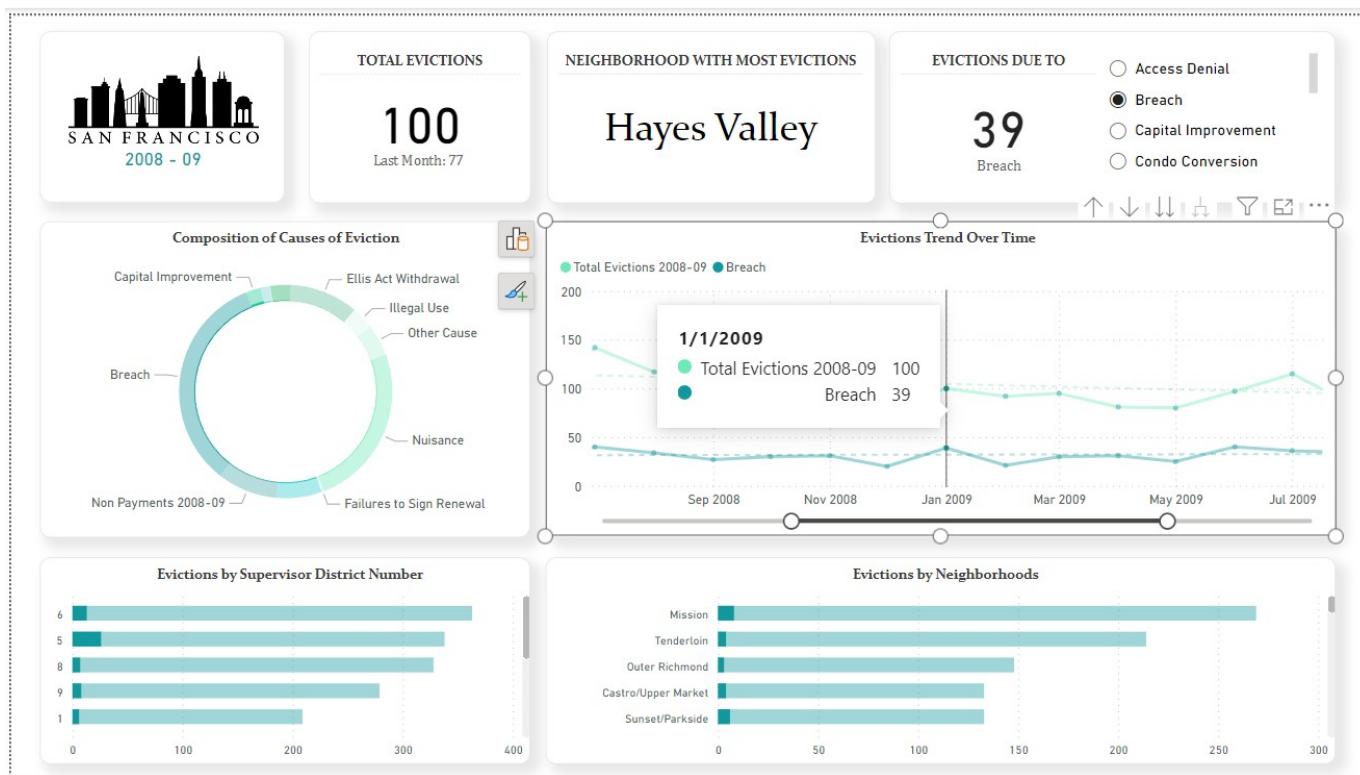
The "Total Evictions" metric stands front and center, providing immediate insight into the scale of evictions across the city with updates on the most recent month. Its significance lies in offering a quick, digestible snapshot of the eviction situation, which is essential for a broad understanding. This prominent metric displays the total number of evictions that occurred in the fiscal year, with an update on the last month's evictions. When drilled to a specific time, it shows the number of evictions in that month as well as the previous month.



Additionally, the color of the number displayed in the KPI changes depending on its comparison with the evictions in the previous month. A green-colored number signifies that the number of evictions in that month is less than the number of evictions last month. The large font and central placement make this a focal point, emphasizing the overall impact of evictions within the city.

Significance: Offers a snapshot of the eviction landscape for quick understanding.

Features/Functionality: Updates automatically with the latest data and interactions with the timeline.



Eviction Trend Over Time Line Chart:

A line chart showing eviction trends across months. It elucidates patterns, such as an increase or decrease in evictions due to seasonal changes or economic shifts. Clicking on a point in the trend graph displays the number of evictions on that day and the reasons for them. Selecting a metric from the 'Evictions Due To' KPI adds a new line for analyzing eviction trends over time because of that reason.

Significance: reveals seasonal patterns or the effects of new laws and economic changes.

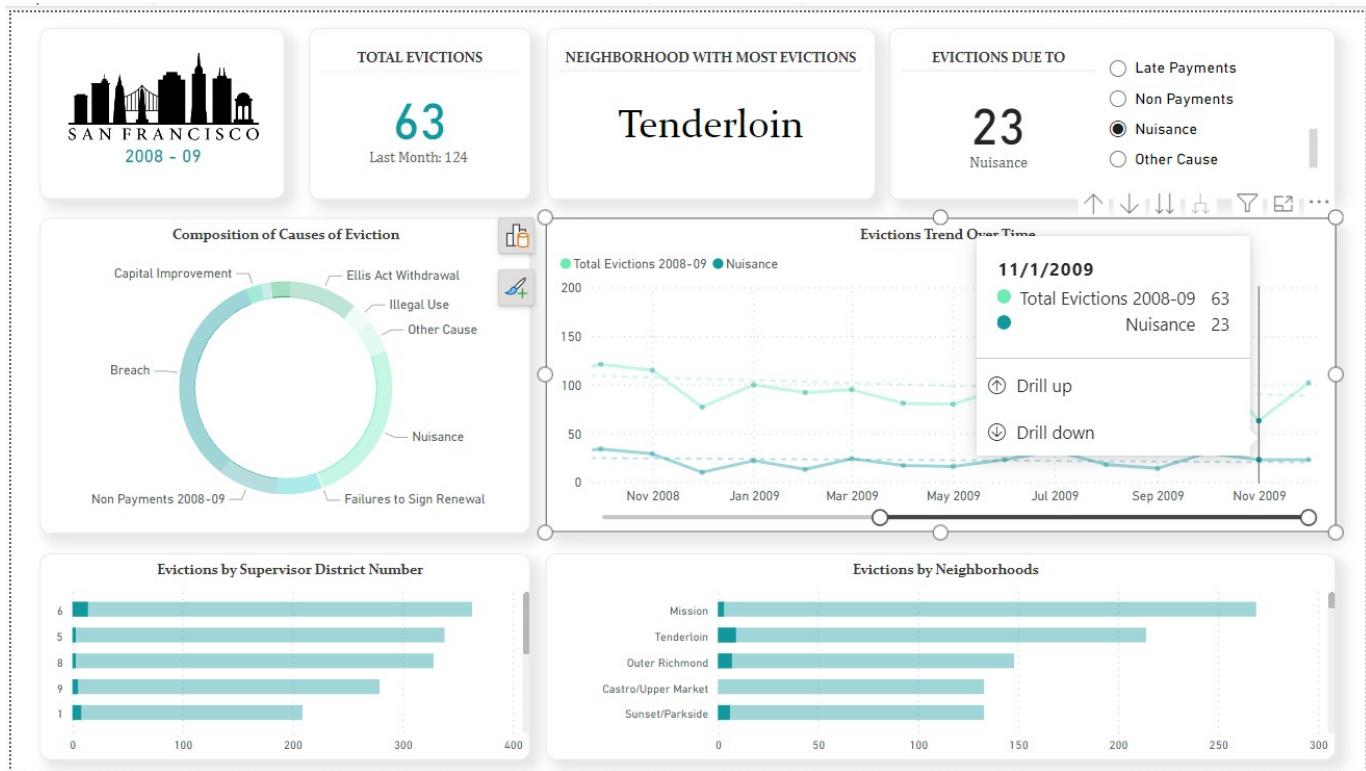
Features/Functionality: Interactive elements like "Drill up" and "Drill down" show the ability to view the data at different levels of granularity.

Evictions by Supervisor District Number:

A horizontal bar chart that shows evictions by district number. It provides geographical context to the data. These are crucial for identifying areas that require attention and are likely interactive, offering a detailed view of each district when selected.

Significance: Highlights political districts that might be experiencing higher eviction rates, which could be of interest to district supervisors and constituents.

Features/Functionality: Selection reveals district-specific data, potentially also integrating demographic data for a more nuanced understanding.



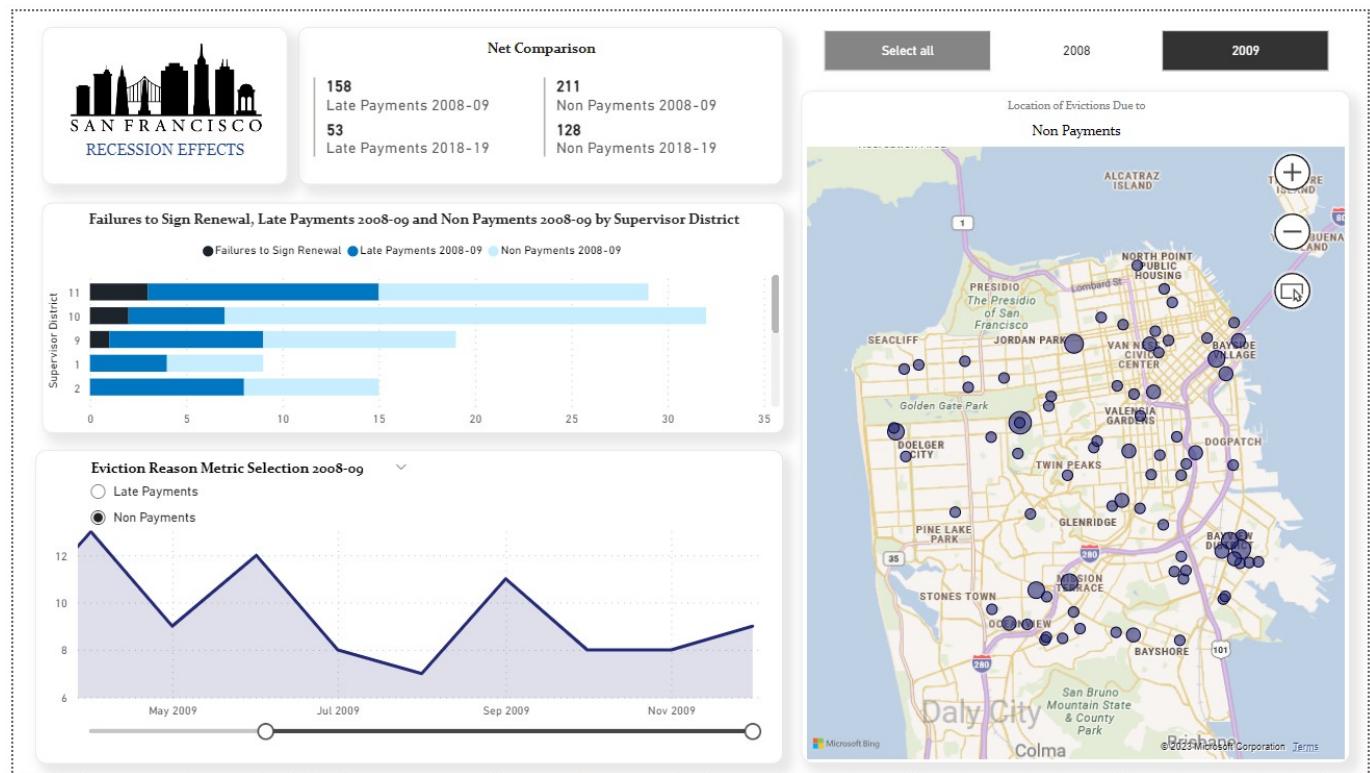
Interactive controls such as filtering options and date sliders allow users to customize the view of the data, enhancing engagement and personalization of the analysis. The inclusion of such functionalities promotes an interactive experience where the adjustment of one filter could change the displayed information across all other components, essentially creating a dynamic and user-driven narrative of the eviction data.

Lastly, the dashboard includes features for data refresh and download, ensuring users access up-to-date information and can conduct offline analysis. This is significant for maintaining the relevance of the data presented and enabling detailed external analysis. These functionalities suggest a user-centric design, allowing for continuous interaction and exploration of the data set.

Dashboard 2

The "San Francisco Evictions During Recession" dashboard presents an in-depth analysis of housing instability issues that surged during the economic downturn, primarily focusing on financial hardships leading to evictions. This period witnessed a considerable number of residents struggling with late payments or complete non-payment of rent or property dues, reflecting the broader impact of

the recession on individual financial stability. The dashboard is designed to dissect this phenomenon through various lenses, offering a comprehensive view of how different San Francisco districts were affected.



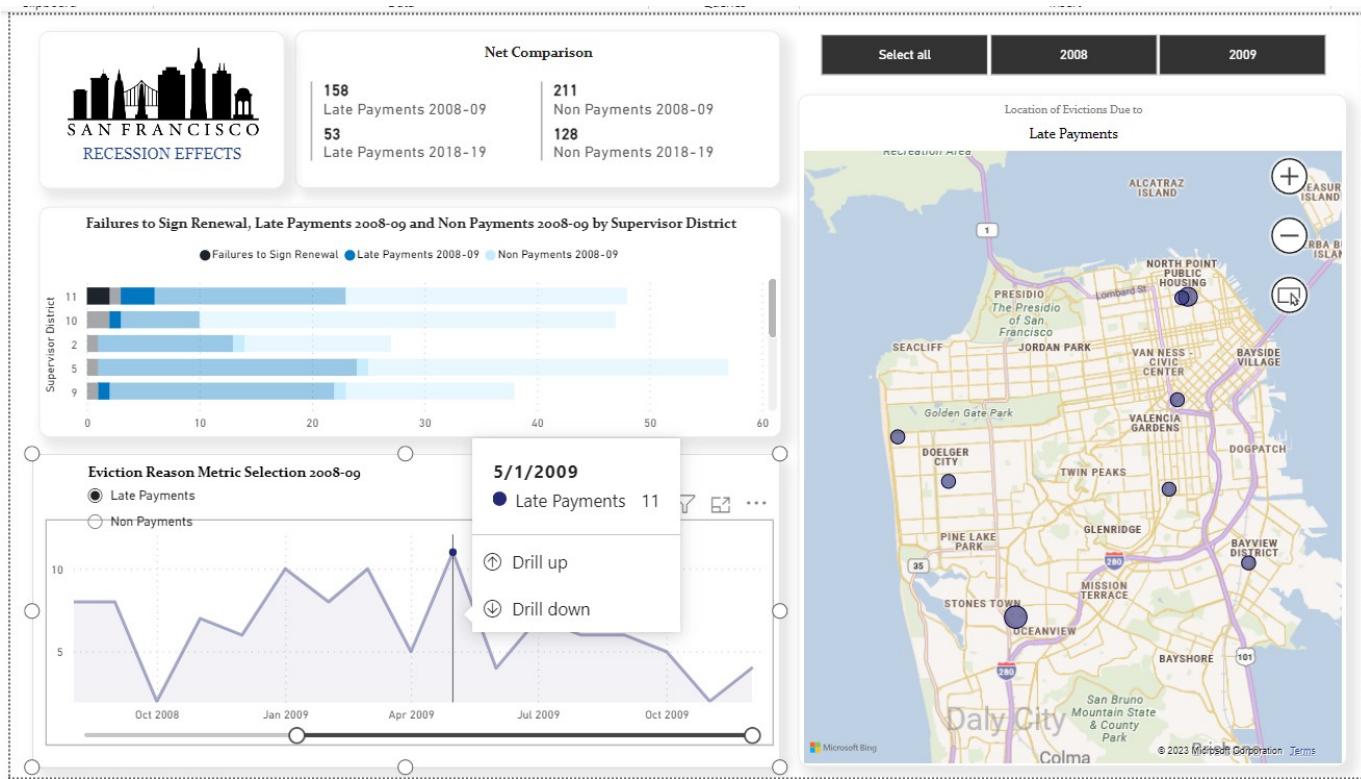
Through its interactive components, the dashboard allows users to visualize the scope and scale of evictions attributed to late and non-payments, drawing a clear picture of the recession's direct consequences on tenancy. The data provided not only reflects the immediate repercussions of the financial crisis but also serves as a crucial tool for policymakers, housing advocates, and researchers to understand the patterns and potential areas that require focused interventions. By examining the trends of eviction over the critical recession years, the dashboard lays bare the economic vulnerabilities of neighborhoods and offers a foundation for developing strategies to mitigate such challenges in the future.

Bar Charts - Failures to Sign Renewal, Late Payments, and Non-Payments by Supervisor District:

These charts show the number of evictions for different reasons by district. We can hover or click over specific bars to see precise dates or click on a district number to possibly filter other components of the dashboard to show data for just that district.

Significance: They offer insights into which districts are most affected by certain types of eviction causes, which can inform targeted local policies or assistance programs.

Functionality: Enables viewing and comparing eviction reasons across different districts.



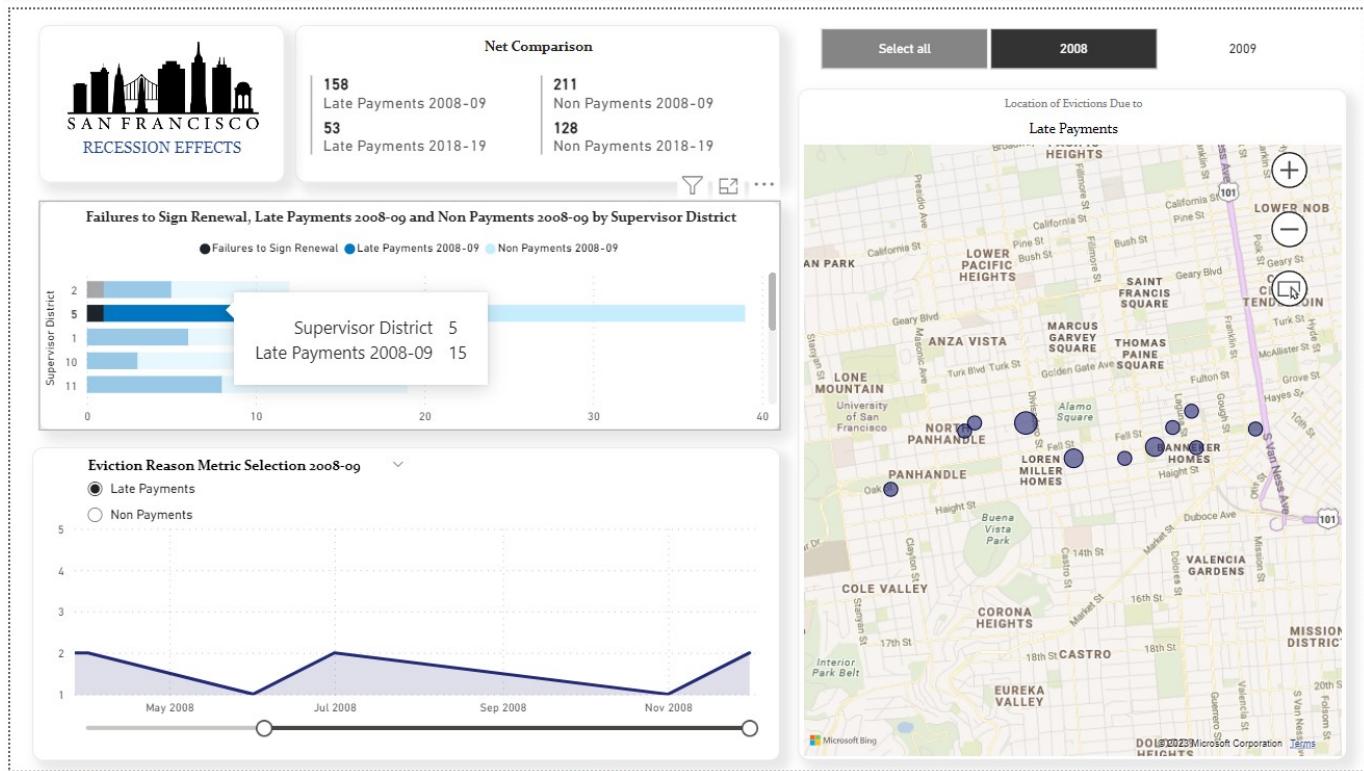
Interactive Maps - Location of Evictions Due to Late Payments/Non-Payments:

The maps indicate the locations of evictions. Users can interact with the data by toggling between the years 2008 and 2009 to observe changes in the geographic distribution of evictions due to late payments or non-payments across San Francisco. The map also features zoom and pan controls, allowing for a closer examination of specific areas or districts. Clicking on the eviction markers displays details about the specific incident.

Moreover, the map is linked to other interactive elements on the dashboard; for instance, selecting a supervisor district from the bar chart or choosing an eviction reason via the metric selection dynamically updates the map to reflect just those data points, thereby offering a focused geographical analysis of eviction trends during the recession period.

Significance: Provide a spatial analysis of eviction trends, which is vital for understanding neighborhood-level impacts and for planning community resources or interventions.

Functionality: Show geographic locations of evictions and allow for year comparison and also compare the financial reasons for evictions.



Time Series Line Graph:

This graph plots evictions over time. You can interact with this by clicking and dragging along the timeline, hovering over data points to view details, or perhaps selecting a specific range of months to zoom in on that period. The slider provided allows us to change the granularity of the time data being displayed. For example, you could drill down to see data by month or drill up to see it by quarter or year.

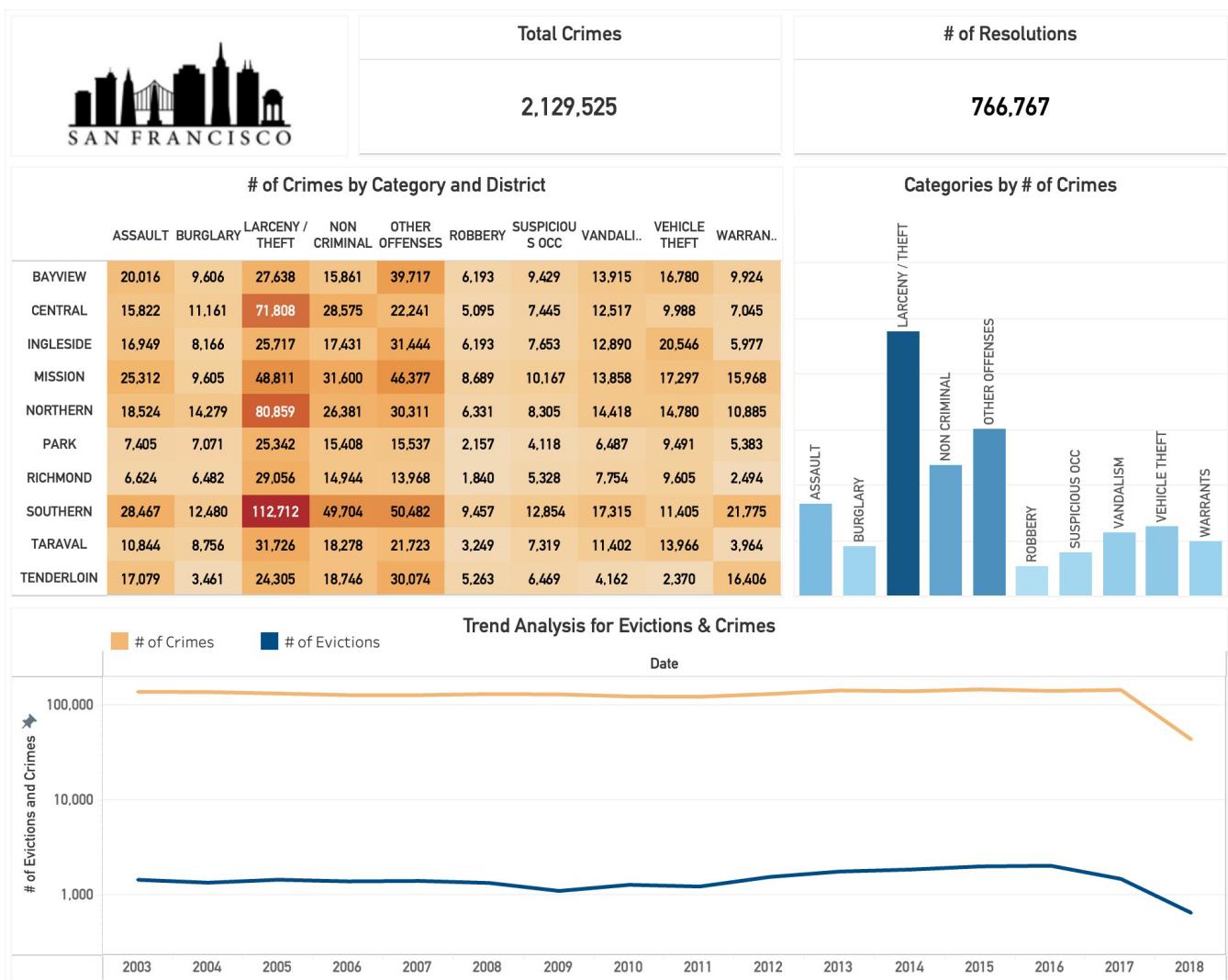
The selector allows you to choose the metric for which you want to see data (late payments or non-payments). Changing the selection would dynamically update the bar charts, the map, and the line graph to reflect the chosen metric.

Significance: Important for spotting patterns, seasonal trends, or the effects of specific events (like policy changes or economic shifts) on eviction rates.

Functionality: Displays eviction trends over a period, with interactive points for detailed monthly data.

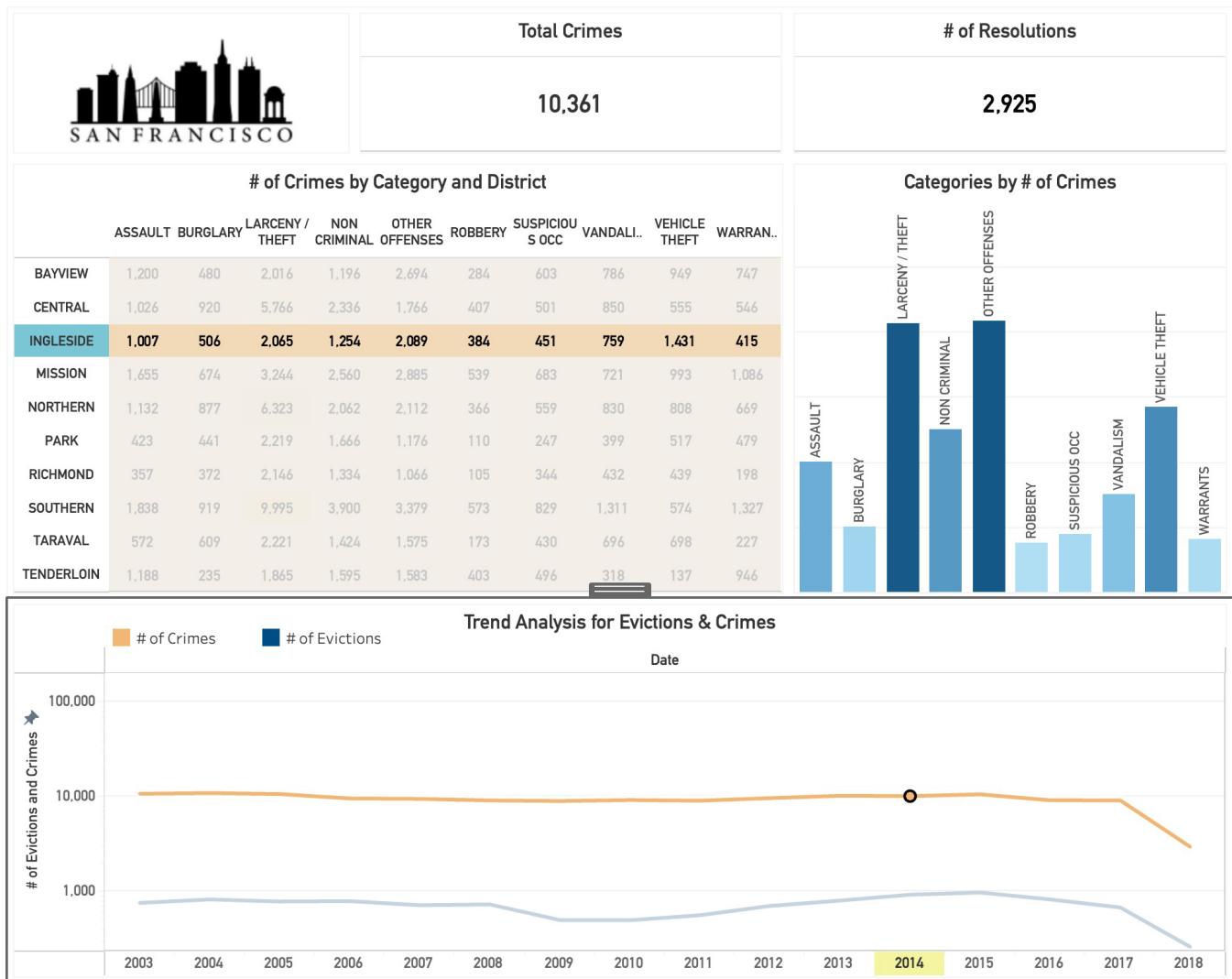
Dashboard 3

The dashboard presented is a comprehensive visualization summarizing the relationship between crimes across various categories of crimes in San Francisco's districts. The upper section details the total number of crimes alongside the count of resolutions, providing a stark contrast between reported incidents and their outcomes. A breakdown by crime category by number of crimes committed by district offers a granular view of where specific crimes are more prevalent and how they correspond to most occurred types of crime in a district.



Functionality: The dashboard is capable of not only giving a holistic view of the city of San Francisco but also helps drill down to a district level to understand patterns in crime committed.

- On selecting a district in the matrix, it filters data for that district in the scorecards as well as in comparing evictions and crimes. The bar chart will also help compare different types of crime committed in that particular district.
- If we select a particular year by clicking on the trend analysis the dashboard will only visualize data for that particular year in all the charts.

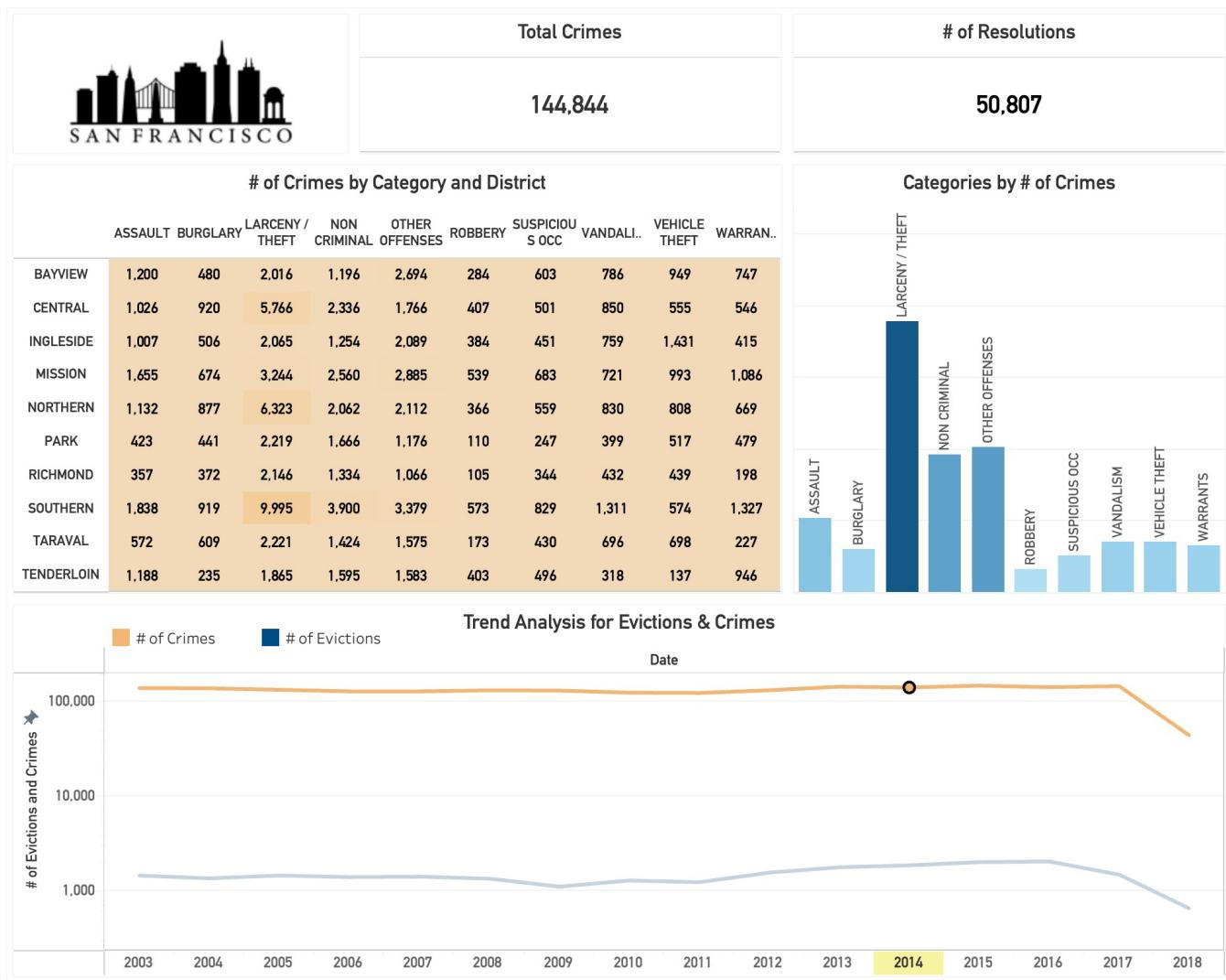


Trend Chart Analysis For Eviction and Crimes

The bottommost chart is a trend analysis plotting two variables over time: the count of evictions (left y-axis) and the count of reported crimes (right y-axis). This dual-axis trend line chart is significant as it allows for the comparison of trends in evictions and crimes from 2003 to 2018. The left y-axis represents the count of evictions on a logarithmic scale, which adjusts the scale to accommodate a

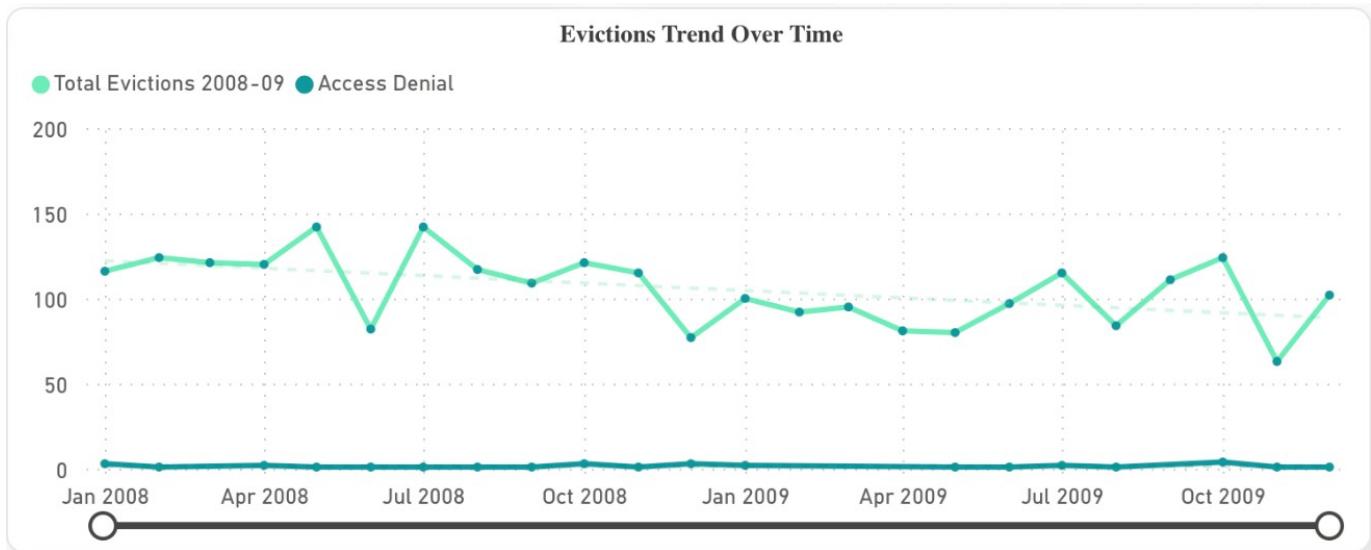
wide range of values, making it easier to observe trends in data that vary exponentially. The right y-axis shows the count of reported crimes on a linear scale.

Observing both trends on a single chart provides insights into the correlation between crime rates and eviction numbers over time, which could have implications for urban planning, law enforcement strategies, and social services. The decline in both evictions and crimes towards the end of the timeline might suggest the effectiveness of interventions or changes in policy, although this would require further investigation to confirm causation.



Problems and Issues Faced:

1. Discontinuity of data on daily level making it unfit for trend analysis



We wanted to show a trend analysis of the number of evictions and access denials for the year 2008 and give a functionality to drill down from monthly to a day level trends as well. However, we found cases where there were days when no evictions happened leading to skipping those days instead of showing zero evictions.

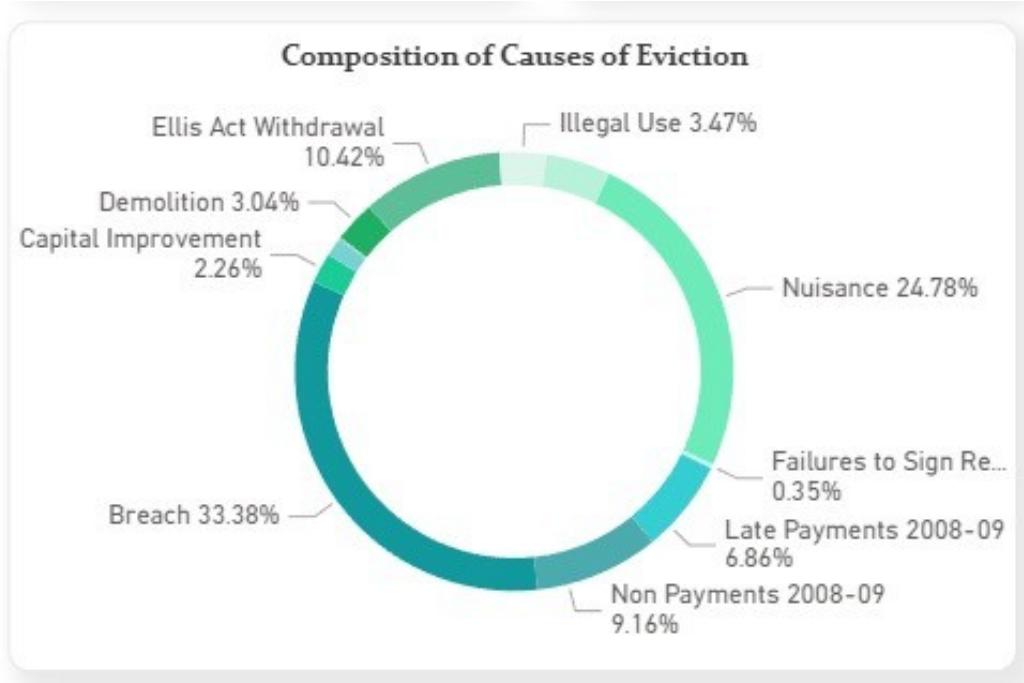
Solution: We implemented a rolling calendar. In Power BI, a rolling calendar is a dynamic date range that automatically adjusts to show a set period of time relative to the current date, such as the past seven days, the next 30 days, or the previous six months. This can be achieved by creating calculated columns using DAX formulas that define the time periods of interest.

Post implementing the calendar days on which we had evictions showed the correct number and on days of no evictions we got zero instead of skipping those days

2. Decluttering chart labels for better interpretation

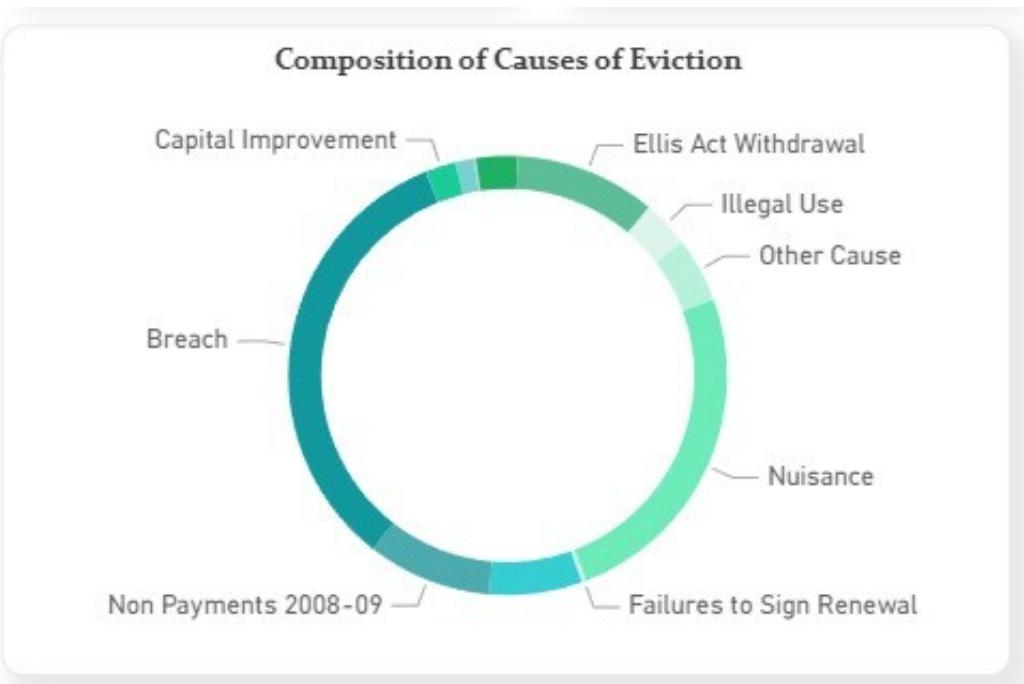
Before

The given ring chart is difficult to read as it not only shows Causes of evictions but also it's percent contribution. Interpreting two types of information can be visually unappealing; that's a feedback we interpreted.



Solution:

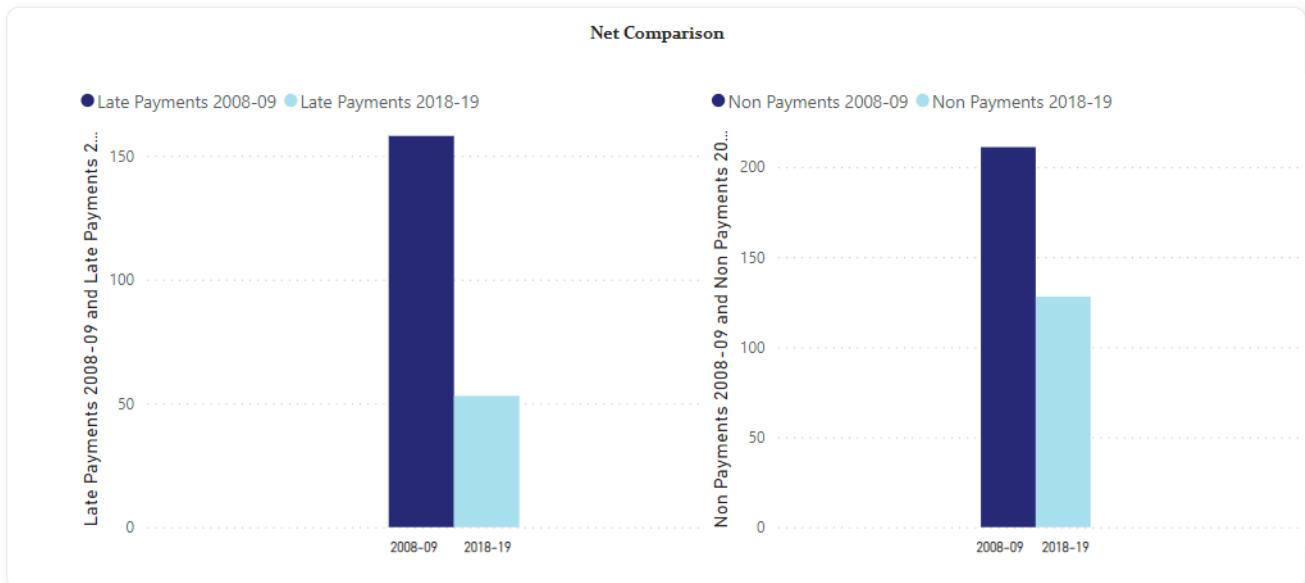
After



We retrained the causes of eviction as labels and added tooltips for the percent contribution of each cause. This interpretation was not only visually better but conveyed our message even more efficiently.

3. Finding the best fit for type of chart to interpret our message

We wanted to visualize late payments and non payments for 2008-2009 and 2018-2019 in a single grouped bar chart. The closest we could make was two bar charts one with late payments and one with non-payments. We were unable to compare them in a single bar chart.



Solution

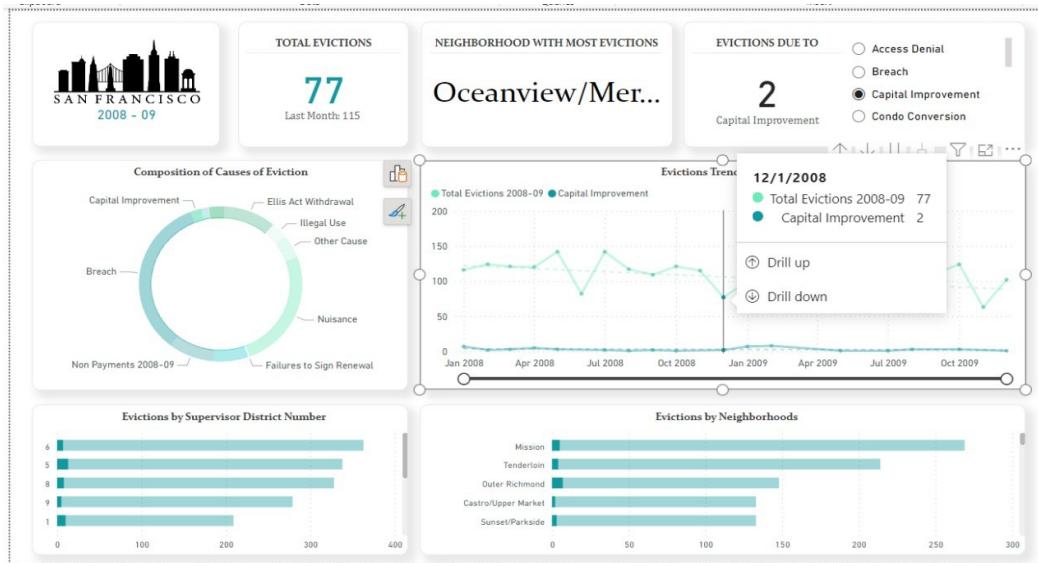
We found that bar-chart was not the best fit chart for the problem we were trying to visualize. After much deliberation we found KPI was a better way to represent it.



In the above KPI or Score Card we can easily compare the late payments and Non-Payments in the year 2008-09 and 2018-19.

4. Truncation of long text strings within the Key Performance Indicators (KPIs)

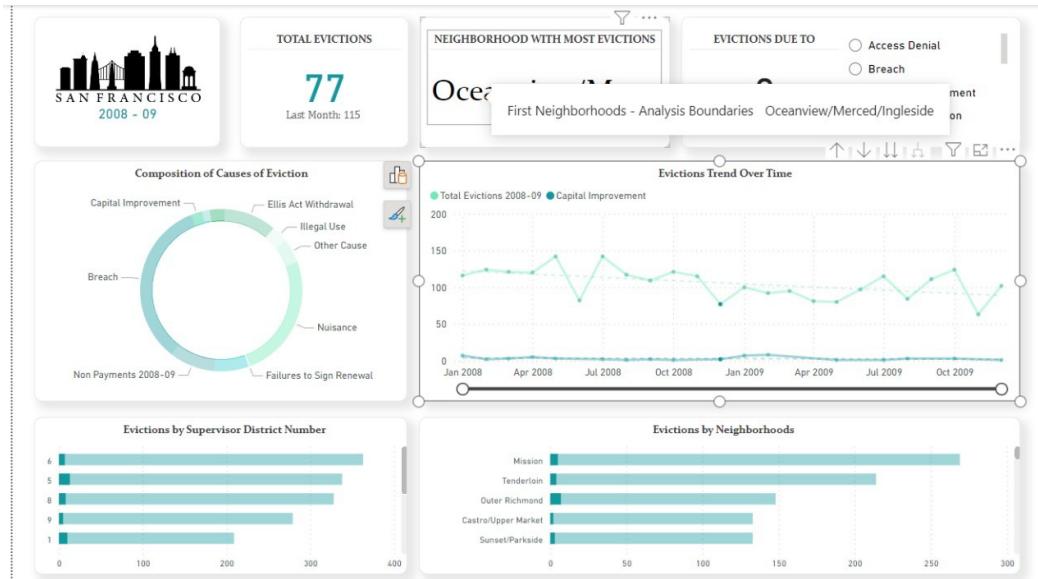
Before



In the chart representing Neighborhood with most evictions, for very long names the string was getting truncated. We didn't want to reduce the font-size as it will decrease the focus on the neighborhood in question here. The above neighborhood was the only one giving a problem. We could either give it an abbreviation or add a tooltip.

Solution:

After

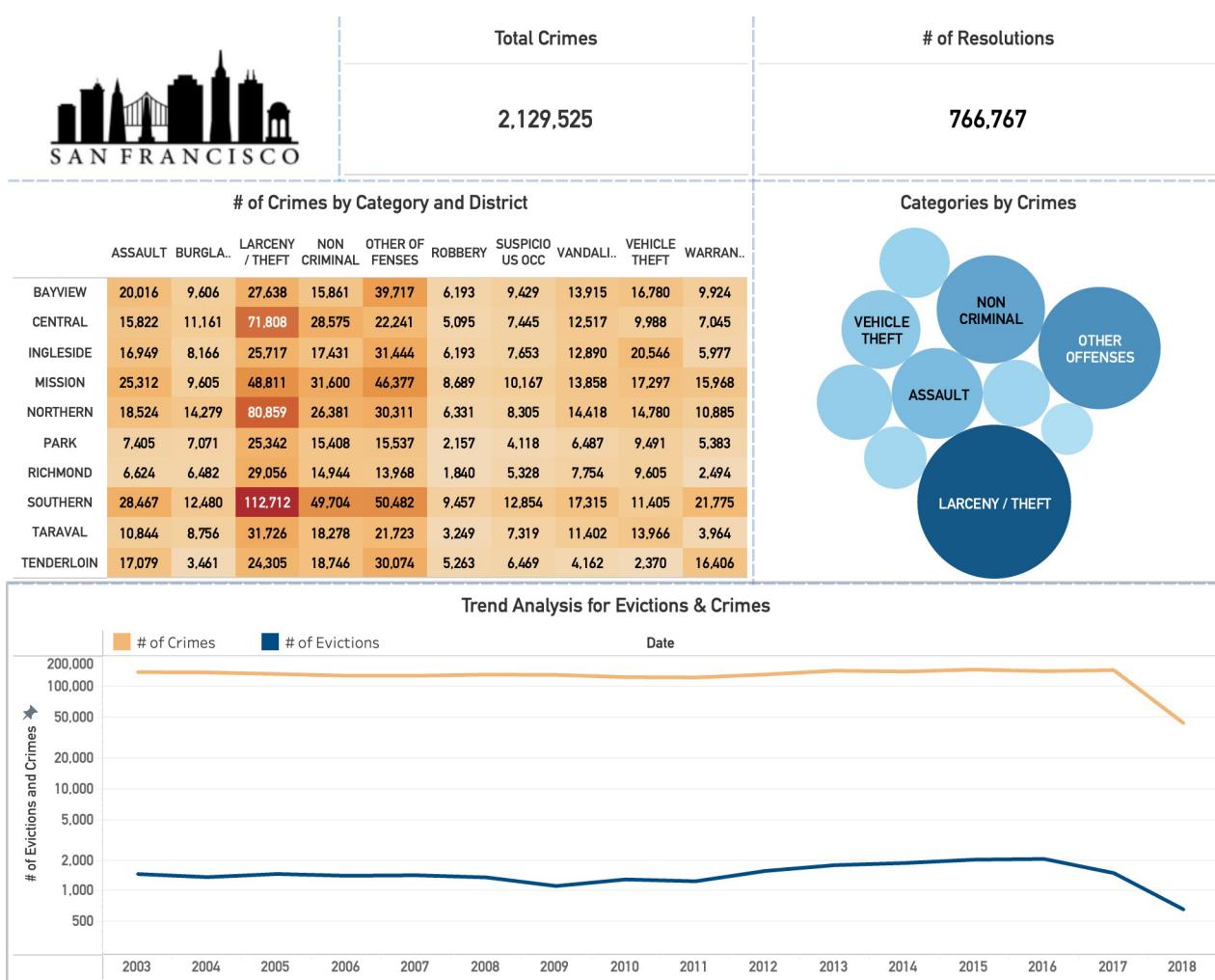


We added a tool tip for this KPI which doesn't come up by default. So, if the users want to see the complete name, they could just hover over the chart and the full name would pop up.

5. Identifying the optimal type of visualization that enhances the dashboard's clarity and effectiveness

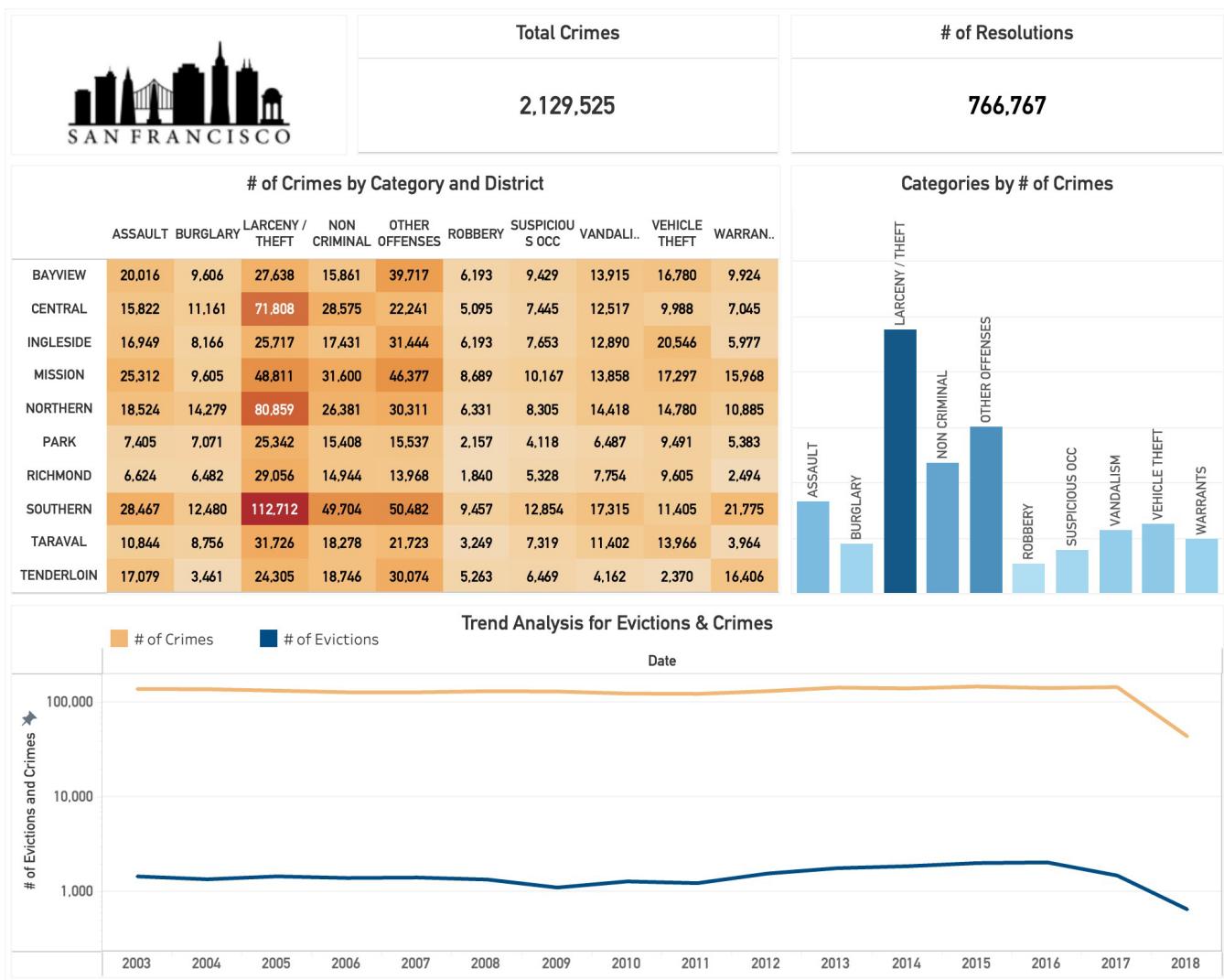
We wanted a visual representation for the categories of crimes committed through a bubble chart. So when any district is not selected, teh bubble chart will depict types of crimes committed in San Francisco and on selecting districts data will be shown for that particular district. The size and color represents the number of crimes. Hence, the bigger and darker the sphere is the more are the crimes corresponding to that category. However we found that bar-chart was a better fit for visualizing the problem at hand.

Before



Solution:

After



We found the bar chart to be a better fit for the space we had. Comparing number of crimes is easier in a bar chart than to a bubble chart where we not only need to look for the size but also the color if the bubble making it too complex to interpret.