

# BOS:311

Four ways to report non-emergency issues:



Call 311



Download the App



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Use this site

# Why do Boston 311 requests get delayed?

# Location - Blandford St. T Station





# The Problem



# What is Boston 311?

- A citizen hotline - by City of Boston
- Non-emergency requests

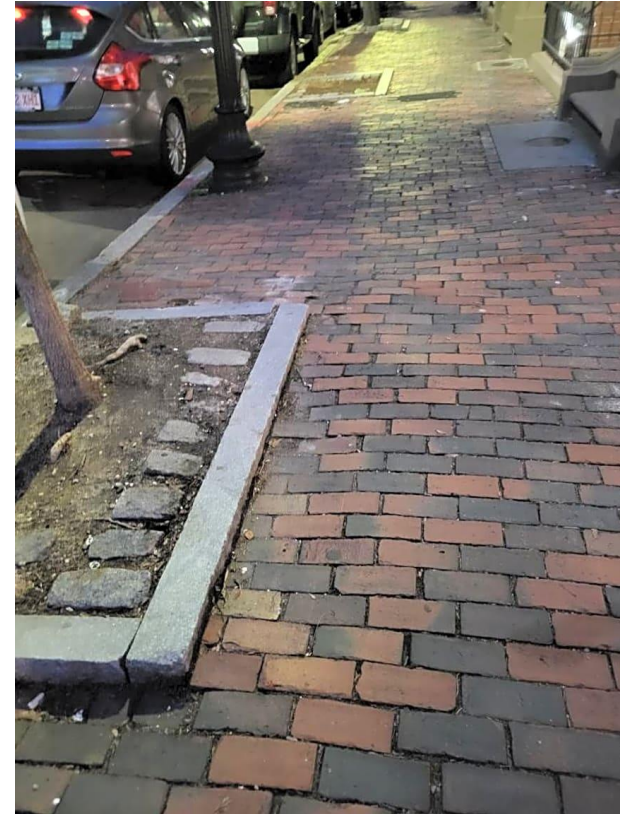
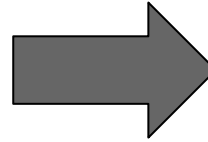


# Use Case - Trash Pickup





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**BOS  
: 311**

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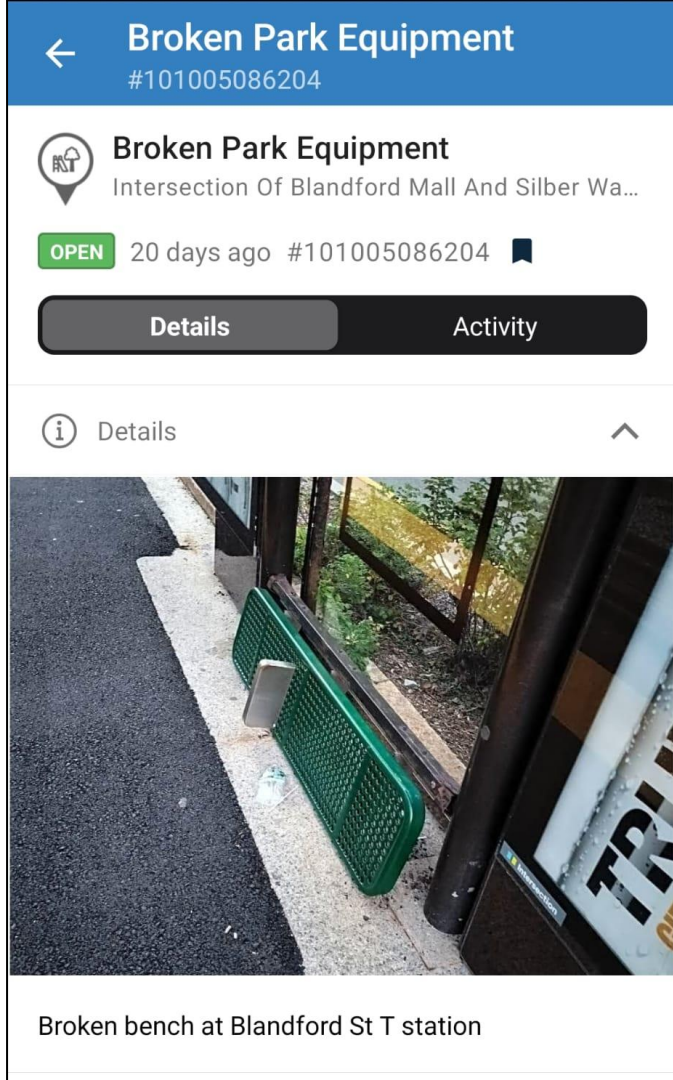
## Public Sector CRM

Citizens ← 311 → Govt. Representatives

(Multi-Channel - Phone, App, Website...)

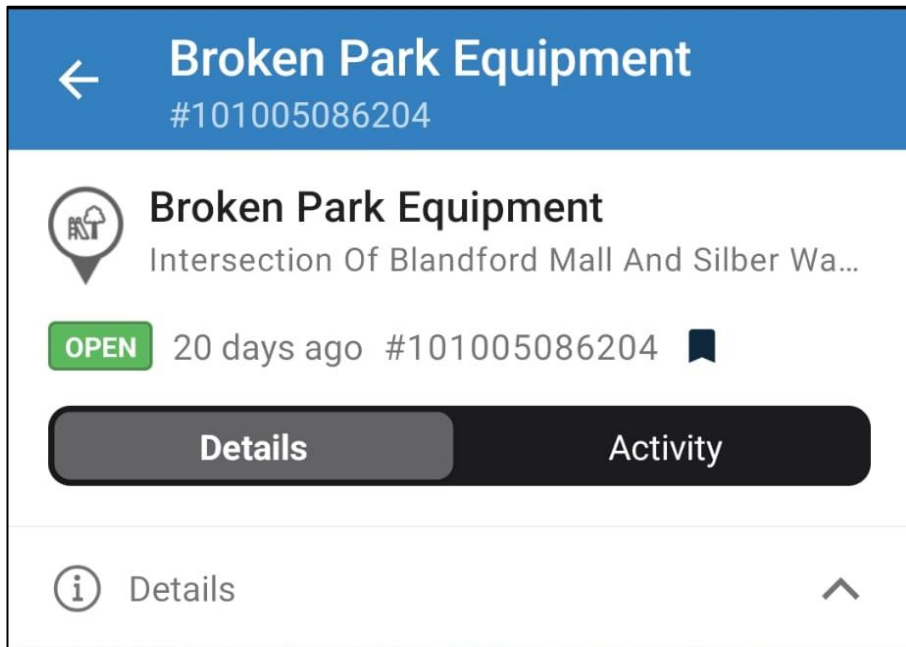
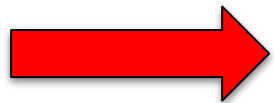
If **911** can't handle it, **311** is the place to go.

# It's that simple





# It's not that simple

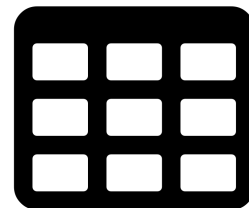


58% of  
requests are  
unresolved  
or overdue

# Objectives:

- Identify **factors** behind poor request response
- Create a **metric** that quantifies probability of request failure

# Overview of Dataset



- **Data Source** - City of Boston - City Constituent Relationship Management (CRM) system
- **Rows** - 245,214 requests (October 18, 2023)
- **Columns** - 30 variables - time, location, nature of request...

## DateTime

- `open_dt`
- `closed_dt`
- `sla_target_dt`

## String

- `closure_reason`
- `location`

## Category

- `on_time`
- `subject`
- `neighborhood`



# Data Preparation

## Step 1: Incorrect Data Types

- Convert columns to **categorical** type
- Convert date strings to **datetime** type
- Convert floats to **integer**



## Step 2: Handle Missing Values

- Check **ID's** uniqueness
- Check **missing values** -
  - impute or drop
- Drop cases without **closed\_dt**
  - on-going cases



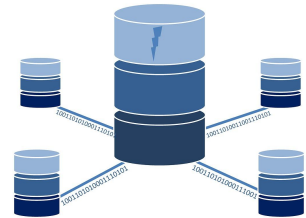
# Data Derivation & Enrichment

## Derived Columns

- **Time To Closure** - Open and Close
- **Closure Category** - Resolved, Noted, Unresolved...
- **Region** - Based on Neighborhood

## Data Enrichment

**Census data** - Population, Age, Poverty & Income



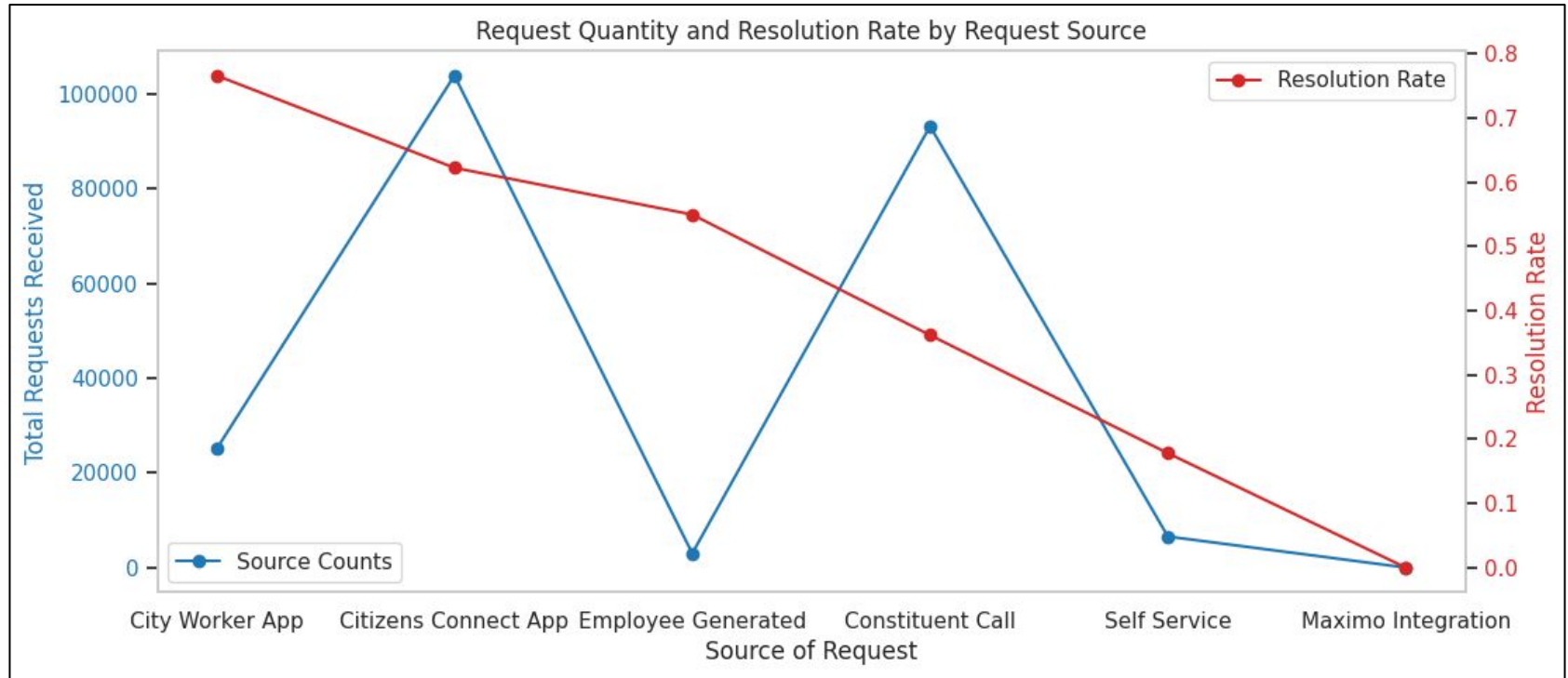
# Data Exploration

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Uncovering the reasons  
behind 311 failures

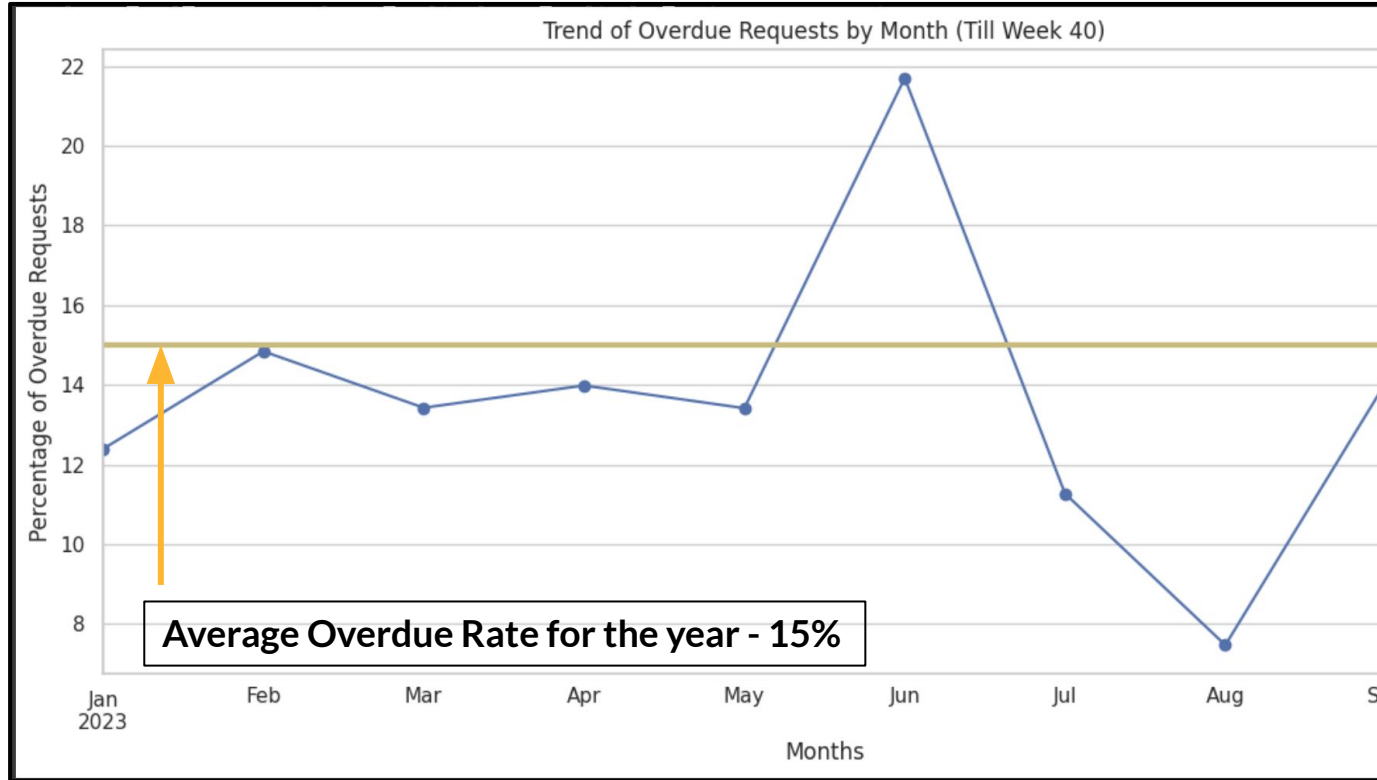


# Source of requests



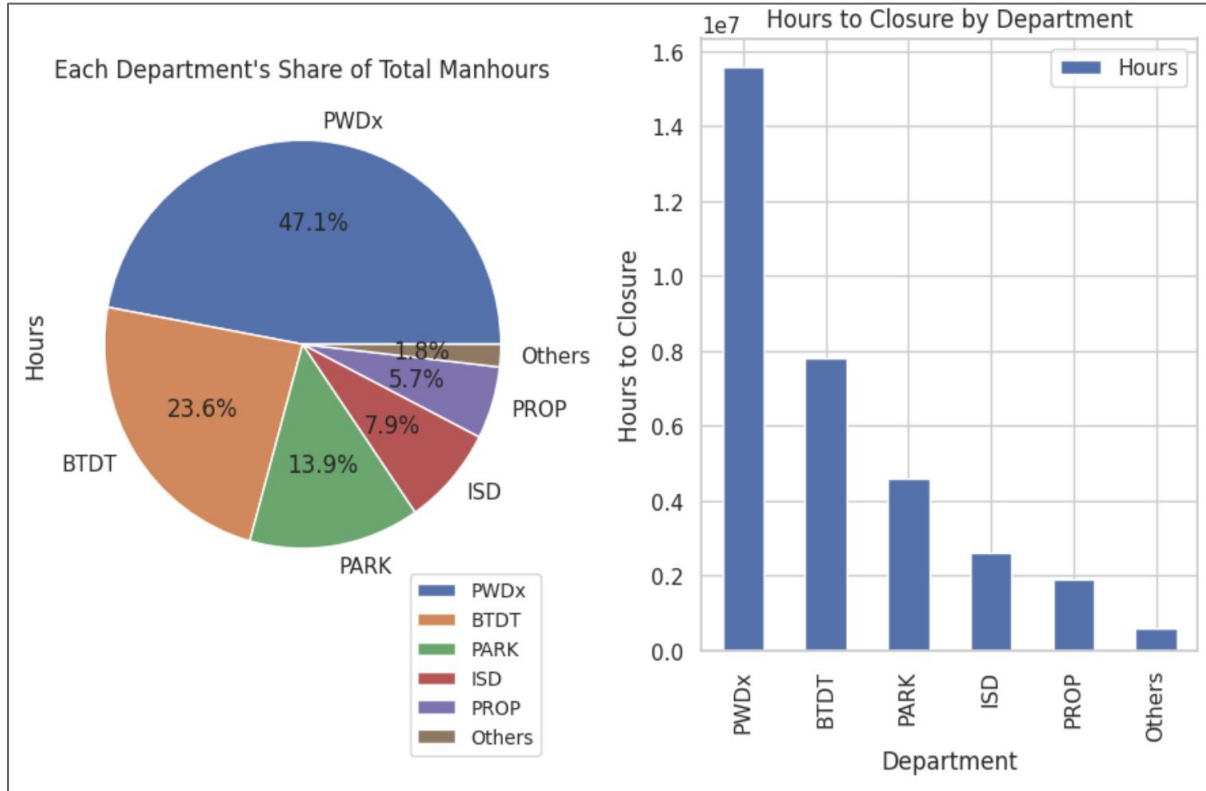
**Recommendation:** City can **promote adoption of the 311 app** due to its effectiveness

# Time of Year



**Recommendation**: Increase request handling capacity in **May & June** (peak season)

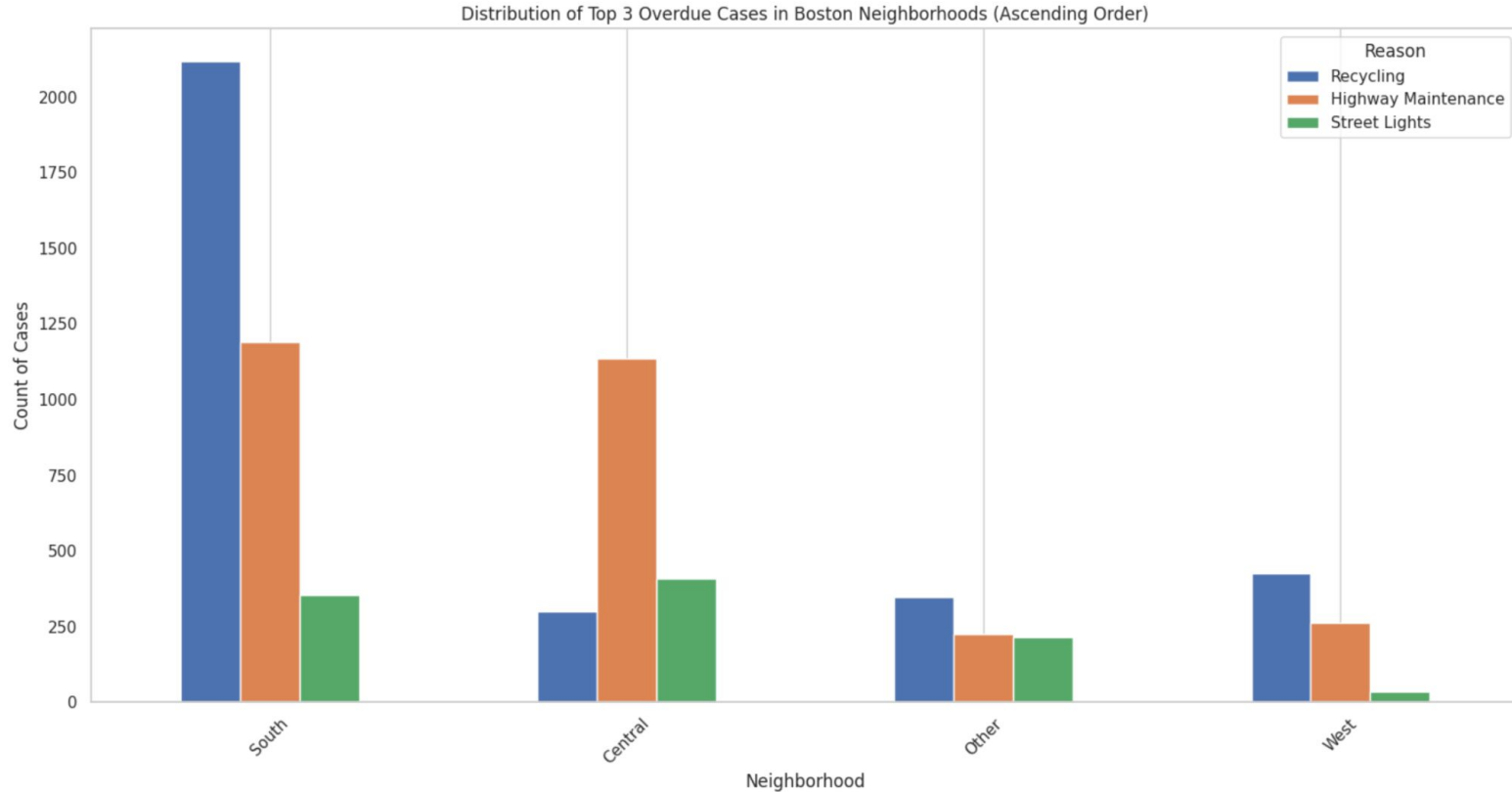
# Workload & Efficiency



**Recommendation:** Allocate more **workers & stations** to Public Works - quicker response times



# Overdue?



**Recycling:** Revamp procurement/delivery SOP for recycling carts to reduce delivery times

**Highway:** Reassess deadlines and increase investment (budget)

# There's more

- Time of Year (Seasonality)
- Photo submitted
- Poverty Level
- Age Demographics
- Level of Diversity
- Mean Household Income

# Modeling

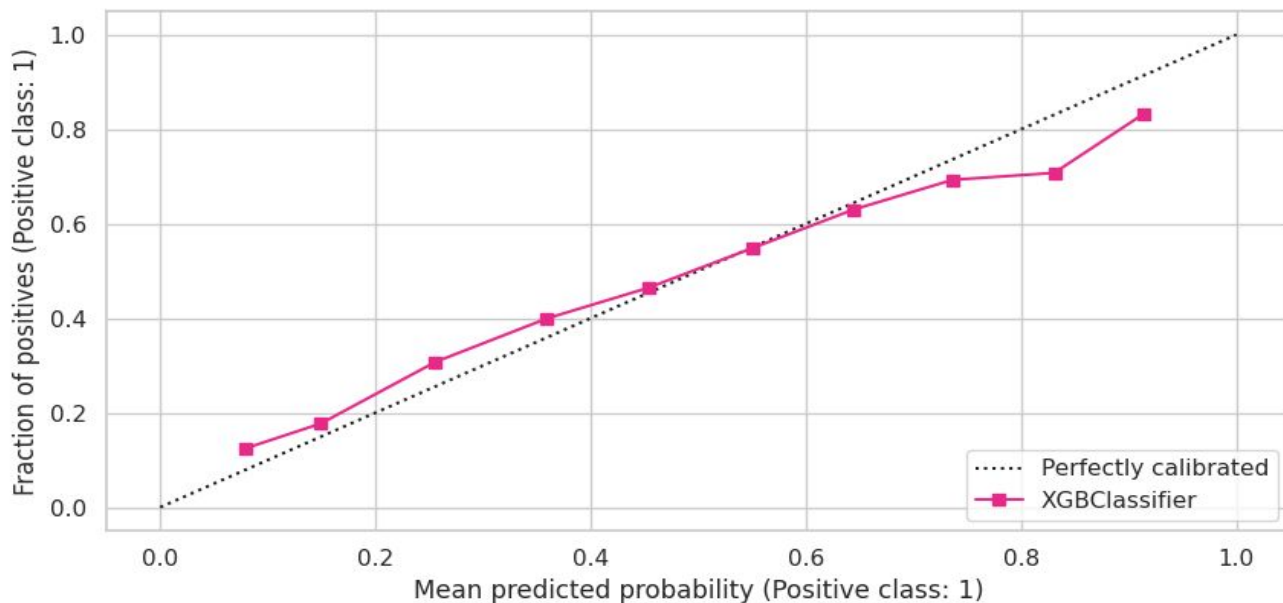
- **What** - Prediction of **probability** of case being resolved on time
  - ◆ **Risk Score** - how likely is the request to failure
- **Why** - To improve request **allocation** and **prioritization**
- **How** -
  - Training** - 80/20 train-test split
  - PCA** - 350 to 30 variables (0.99 variance retained)
  - Key Metric** - Model Calibration
  - Models** - Logistic Regression, Random Forest & XGBoost

# Model Results




AUC = 0.66

Accuracy = 59.6 %  
(baseline = 52.3%)

Mean Average Deviation: ~4%



# Use Case - Task Prioritization

<u>Aa</u> Task	▼ Effort	▼ Complexity	Σ Risk Score
<u>Task 5</u>	Low	High	
<u>Task 3</u>	Low	Medium	
<u>Task 4</u>	Medium	Medium	
<u>Task 1</u>	Medium	Low	
<u>Task 2</u>	High	Low	



# Key Takeaways

BOS:311 is a  
**powerful, but  
inefficient** tool for  
citizen services

Our analysis and  
model have  
uncovered **problem  
areas** and **methods**  
to tackle them

**Data-driven request  
management**  
can help the city  
make better  
decisions



**Q&As**