DSO 545

Final Project

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Part0: Introduction

1. Goal:

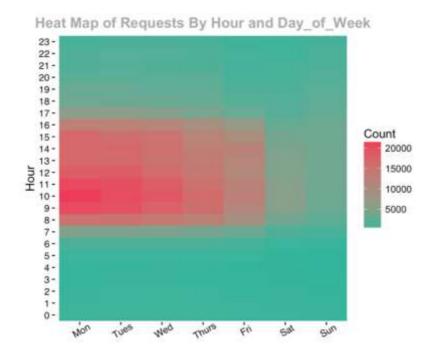
To explore the MyLA311 data, identify areas of opportunity, and develop
actionable business insights to help the city of Los Angeles streamline
processes, optimize the resource allocation and improve outcomes for
residents.

2. Methodology:

- Broadly reviewed all available data at outset of the project
- Identified areas with high volumes that could provide highest ROI for efforts
- Honed analysis in on the most promising high volume categories and supplemented data with additional census data
- Created various visualizations in order to examine the data by different slices and tried to glean new insights from different approaches
- Developed business recommendations in three different buckets (Resource Allocation, Bulky Item Pickup and Graffiti Removal, and Processing Time Efficiencies)

Part1: Requests Through Department

- 1. HeatMap of Request on Time of Day and Day of Week
 - (1) All Requests





(2) Call HeatMap

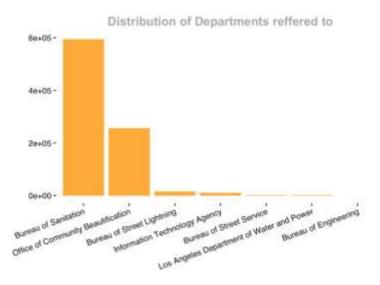
From request HeatMap divided by Hour and Day of Week, we can obviously
see that requests are mainly concentrated during daytime(8am - 5pm) on
weekdays, especially in the morning from Monday to Wednesday.

Day of Week

• If we focus the HeatMap only on call request source, it still has the similar trend as the whole request HeatMap. However, there're still some slight difference. Like the requests through call are most frequent on Monday.

• Therefore, City of LA can reallocate the people to deal with call depends on different time of the day and different day of week to save the finiancials.

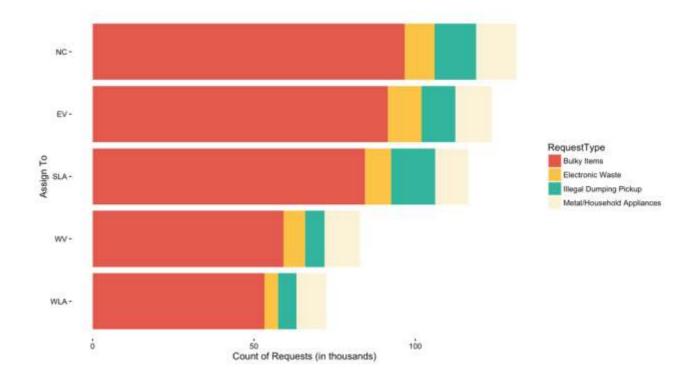
2. General Request Distribution Through Departments



- The Bureau of Sanitation and Office of Community Beautification own overwhelming percentages of incoming request volume
- We used **Pareto Principle (80/20 rule)** to help us hone our analysis to focus on the two owners with the highest number of requests
- Reducing or preventing future requests for these owners may have dramatic
 impact on 311 service for things like financials and service efficiency

3. Detailed Departments of Requests Assigned To

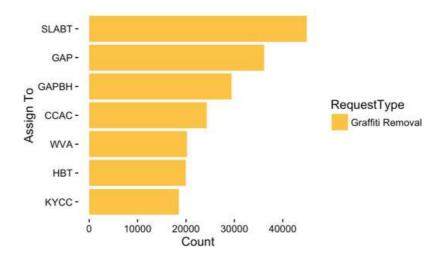
(1) Bureau of Sanitation



- Looking at requests assigned to different departs at Bureau of Sanitation (BOS),
 most are heavily distributed to just a few end owners
- NC (Neighborhood Councils), EV, and SLA handle the majority of requests for BOS
- Proportion of Request Types are fairly similar for each Assign To departments.

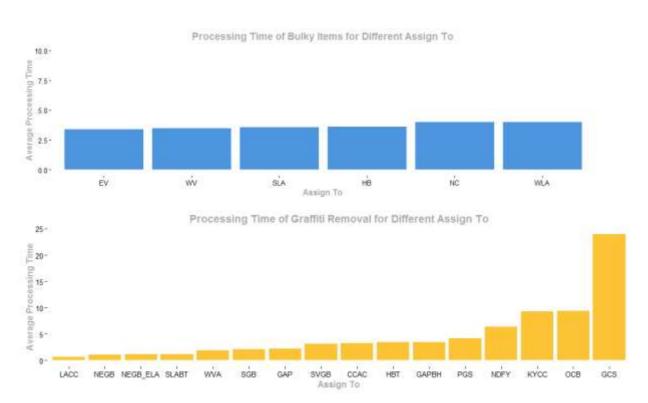
 For each department requests assigned to, the majority request type is **Bulky**Items

(2) Office of Community Beautification



- Office of Community Beautification handles mostly **Graffiti Removal** requests
- The requests are mainly distributed to 7 major departments, which are SLABT,
 GAP, GAPBH, CCAC, WVA, HBT and KYCC.

4. Processing time of Departments of Requests Assigned To

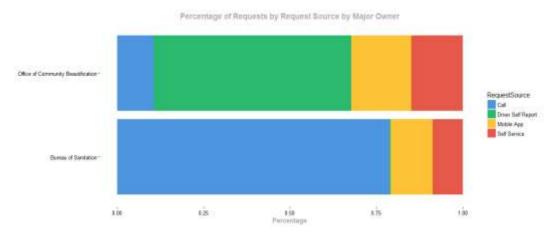


 For Bulky Items, the average processing time among different departments are almost the same. On average, they used 4 days to deal with bulky items requests.

- For (NC)Neighborhood Councils, it has the largest volume of requests and also
 the longest processing time among the departments. Maybe we can reallocate
 more Bulky Items requests to other departments and increase the total
 efficiency.
- For Graffiti Removal requests, the processing time among departments varies
 a lot and ranges from less than 1 day to 25 days. GCS doesn't receive high
 requests volumes but has the longest processing time. SLABT, WVA, GAP and
 CCAC all have higher request but use less time to process the requests.

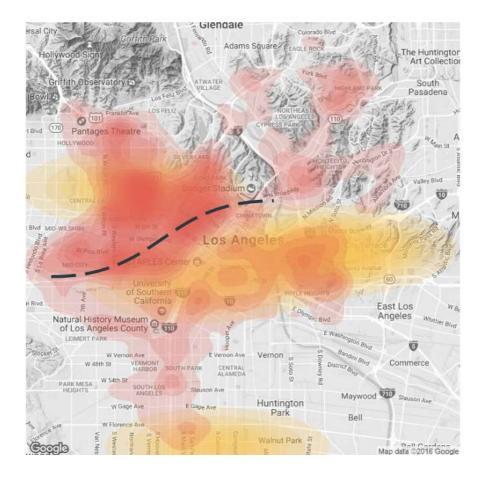
5. Request Source Through BOS and OCB

(1) Request Type of BOS and OCB



- Office of Community Beautification requests come primarily from Driver Self
 Report and Mobile App
- Conversely, Bureau of Sanitations has more than 75% of requests originating
 via Call

(2) Driver Report vs Other Request Source of OCB



- The yellow areas are the distribution of requests to OCB though Driver Self
 Report and red areas are the distribution of other request types.
- Koreatown, Hollywood and Terrace are where both Drive Self-report and
 other sources overlapped. Areas like Echo Park, West Lake, Pico-Union, Mid
 City, Little Amenia, South Park, and South Los Angeles generated most
 requests by call, mobile app and self-service but haven't covered by driver
 self-report frequently.
- We can allocate more drivers to those areas to reduce request volume and enhance processing efficient

6. Recommendations – Resource Allocation

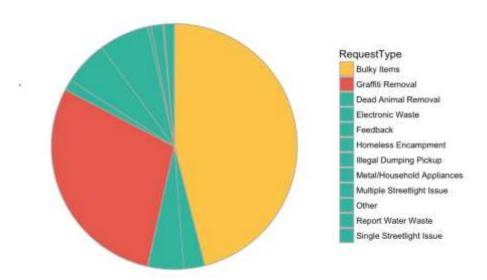
Caveat - without additional info on the staff and current internal process and resources available, the recommendations are a general guideline based on the data provided

- Reallocate more resources (financial and human) to departments handling majority requests like Bureau of Sanitation and Office of Community Beautification.
- Investigate the discrepancies in processing time between different assign to groups with same request type. Reallocate more requests to groups with higher efficiency.
- Optimize the driver self report transportation route depend on the HeatMap,
 especially the areas where more requests come from but driver report did not cover a lot.

Part2: Bulky Items Pick-up & Graffiti Removal

In this part of our analysis, our team mainly focusing on the trend of these two service types in terms of time, geographic positions (using latitude and longitude), as well as request source (call, mobile app, self service). And we provide insights on how the City of Los Angeles could set up appropriate bulky items pickup schedules, optimize pickup routes and how graffiti can be reduced.

Distribution of RequestType

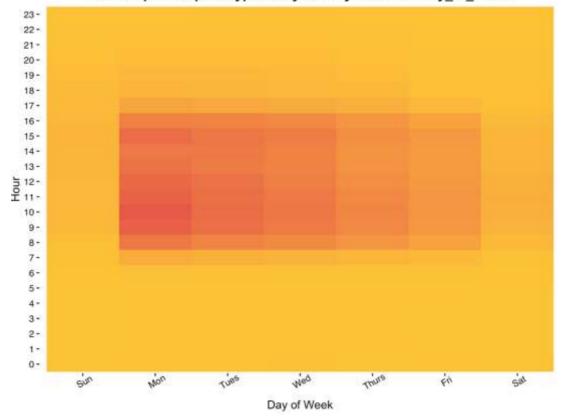


The service type of Bulky Items pickup and Graffiti Removal take the highest two
portions, and the other service types only take about 1/3 of the whole service
requests. Thus, our team decided to work on these two parts of the request type.

In the next steps, we analyze Bulky Items and Graffiti Removal in terms of time, geographic, as well as the request source (call, mobile app, self-service etc.).

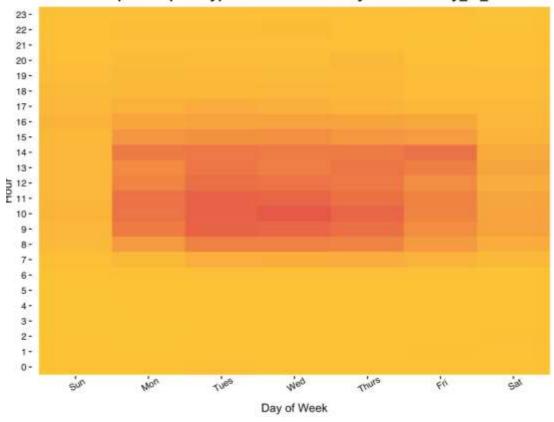
1. Heat map of the distribution of Bulky Items and Graffiti Removal by hour and day of week.

Heat Map of RequestType Bulky Item by Hour and Day_of_Week



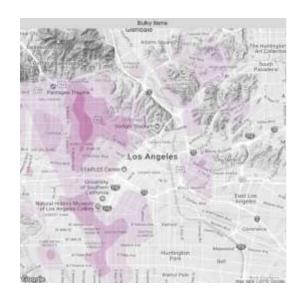
- The amount of requests reaches peak on Monday, from 9 to 10 the amount of requests is the highest during Monday. Slight decline after the peak, and starts to decline significantly from Friday. Reaches the lowest point on Sunday.
- Similar trend in terms of the hour of the day for the amount of requests from Monday to Friday.

Heat Map of RequestType Graffiti Removal by Hour and Day_of_Week



The amount of requests reaches peak at Wednesday from 10~11 AM, Significant
amounts of requests from 9~11 Tuesday to Thursday. The amount of requests
starts to decline from Friday and reaches lowest on Sunday

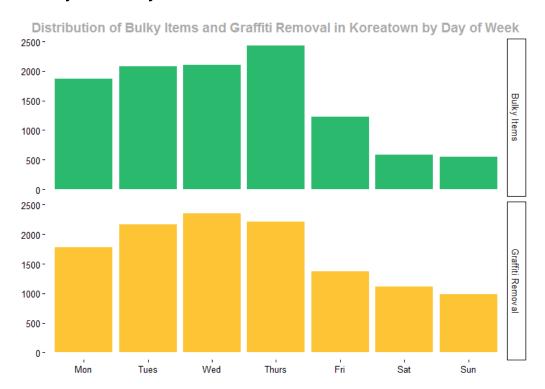
2.Geographic distribution of Bulky Items and Graffiti Removal





- Bulky Item pickup is concentrated in Little Armenia, Hollywood, Koreatown, and Central LA.
- Graffiti Removal in concentrated in Koreatown, Westlake, and Mid City.
- Koreatown has the most significant amount of Bulky Items and Graffiti Removal, we decided to mainly focusing on the distribution of Bulky Items and Graffiti Removal in Koreatown area.

2. Detailed analysis for Bulky Items and Graffiti Removal in Koreatown area



 Bulky Items requests reach highest on Thursday and drop significant until Sunday, and the amount of requests is considerably high among Monday to Wednesday.

According to these information, we can suggest the City of Los Angeles, Bureau of Sanitation to delivery their Bulky Items pick-up service in the Monday afternoon and Thursday Afternoon.

- However, since there are different categories of bulky items, and there are handled differently, we suggest the City of Los Angeles to all the category of bulky items under the service request of Bulky Items both in Web portal and Mobile App.
- Graffiti Removal requests reaches its peak on Wednesday and starts to decline significantly from Thursday till Sunday.

We can suggest the City of Los Angeles, Office of Beautification to delivery their service during Monday afternoon and Thursday afternoon.

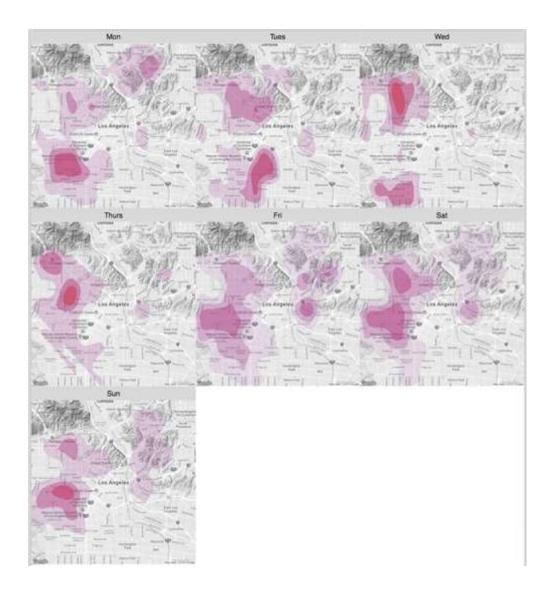
Geographic distribution of Bulky Items and Graffiti Removal in the Koreatown area



- Bulky Items and Graffiti Removal requests are distributed evenly under different trends.
- Bulky items are mostly distributed by pathways (not main streets).

- Graffiti removal requests are mainly distributed among main streets, sporadically among other area.
- With the location information, we can put in algorithms to optimize the traffic route for drivers.

3. Geographic distribution of Bulky Items by Day of Week



Requests are more widespread on Friday and Saturday

- Potential recommendation could be shifting pickup schedule to nighttime in order to avoid
 making multiple trips to the same area in the span of a few days (ex. Pickup on Saturday
 nights in order to avoid missing requests that come in throughout the day on Saturday)
- Requests tend to come in mostly during the 8 am to 5 pm window, so picking up after that could ensure optimization of transportation schedule

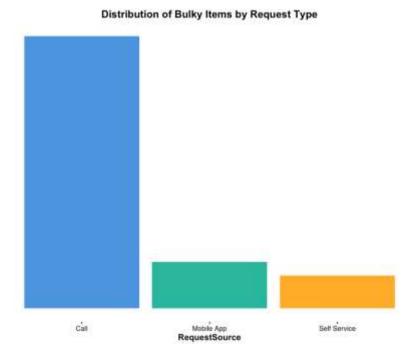
4. Geographic distribution of Graffiti Removal by Day of Week



• Wednesdays, Saturdays, and Sundays have highest concentration of Graffiti Removal requests

- Unlike Bulky Items, Graffiti Removal requests are heavily concentrated in recurring areas
- Based on the concentrated nature of requests, there seems to be an opportunity available to try
 to reduce requests by preventing repeat graffiti offenses:
 - o More streetlights in high request areas like Koreatown and Westlake
 - o Greater police presence on Saturday and Sunday
 - Surveillance cameras installed in graffiti-prone areas of Koreatown, Westlake, and Mid-City

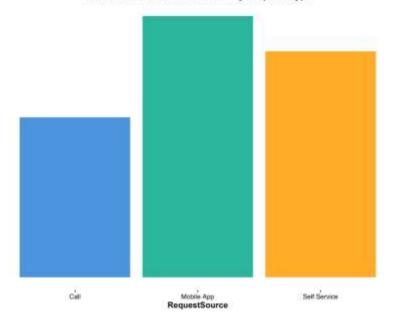
5. Analysis of Bulky Items and Graffiti Removal by RequestSource



- For bulky items, the request source is distributed significantly unevenly.
- Call has the most amount of the requests.

However, when we try out request a bulky item pickup service from LA311, we found that Mobile App has all the functions that are needed filling out a request, and since it only requires the user drop a pin to the location, it saves a lot of time.

Distribution of Graffiti Removal by Request Type



 For graffiti removal service, unlike the bulky items pickup service, it has the highest amount of requests under Mobile App, and lowest under call.

Fun facts comparing with the previous graph: although both of the service type can be 100% conveniently requested by Mobile App and Self Service, Graffiti Removal has a lot more percentage of Mobile and Self Service in terms of request source. And when we search how a service like Bulky Items and Graffiti Removal on the website of LA311, it shows "call 3-1-1" for Bulky Items and "Please download LA311 App".

6. Recommendations for Bulky Items Pickup

- Caveat without additional info on the staff and current internal process and resources available, the recommendations are a general guideline based on the data provided
- Shift pickup schedules to latter part of day/night in order to avoid missing requests that
 come in later in the day

- Schedule all bulky item pickups on the trash pickup day for the neighborhood in order to cut down on multiple trips to the same areas
- Offer citizens an opportunity to pay for early pickup if they would prefer bulky items be
 picked up prior to trash day
- Structure routes based on heat maps of historical request data in order to optimize transportation routes and minimize unnecessary transportation costs

7. Recommendations for Graffiti Removal

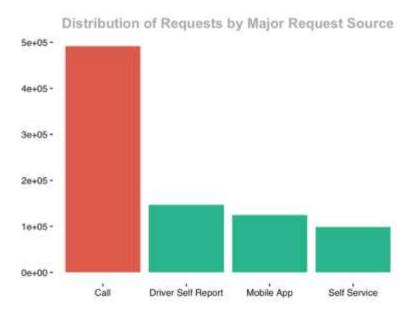
- Install more lights in high request areas to help discourage graffiti during nighttime hours,
 thus potentially decreasing requests
- Install surveillance cameras at graffiti hotspots in areas like Koreatown to try to catch repeat offenders and dissuade new tagging
- Attempt to coordinate with appropriate council districts in identified neighborhoods to develop anti-graffiti protocols

Part3: Proccess Analysis

1. General Request Distribution

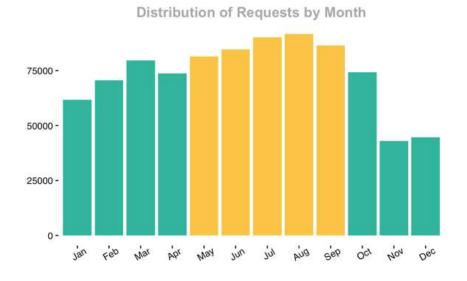
(1) Major Request Sources

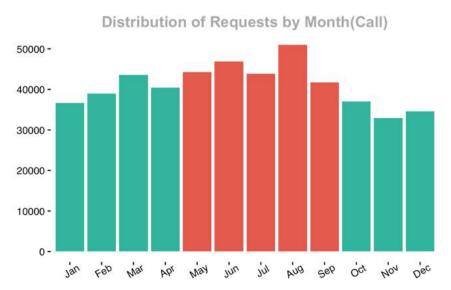
- By comparing the request volumn for 4 major request sources, requests generated by Call overwhelmingly outweight those generated by other sources.
- Since dealing with Call requests requires the most manual operations, we believe changes in Call volumn can provide largest impact on cost efficiency and time reduction.
- Next, we will discuss more detailed information provided by our data and find out how we can realize improvements.



(2)Distribution by Months

- From the distribution of total requests by month and the distribution of requests from Call
 by month, it is obvious that summer time (May-September) is the peak period in terms of
 either total request volumn or Call volume.
- This period is also when college students are on their summer vacation and actively looking
 for summer interns, so hiring interns to deal with Call requests during peak period can help
 save labor costs.

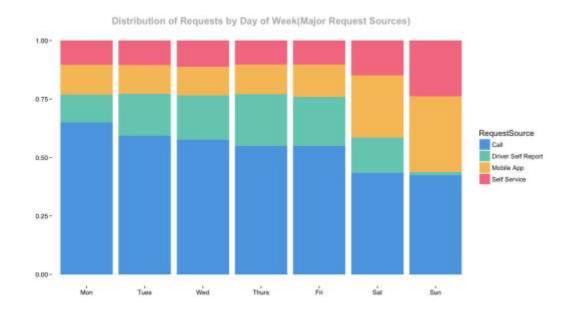




(3) Distribution by Day of Week for Major Sources

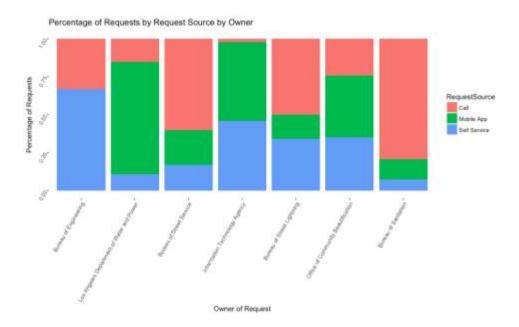
- When further observing the distribution of requests from each source by day of week, Call is still the main request source for each day. However, the proportion of Call decreases largely on weekend, and Mobile App and Self Service have significant higher proportion instead.
- One potential reason might be that some services don't take call requests on weekend,
 which leads to the shift from Call to Mobile App and Self Service.
- Hiring people to work on weekend is normally more expensive, so we suggest that City of LA can futher reduce Call service on weekends and create more marketing campaigns to

promote its Mobile App and Self Service platform. By doing this, City of LA can not only save labor costs, but also develop people's habit of using Mobile App and Self Service platform.



(4) Distribution by Departments

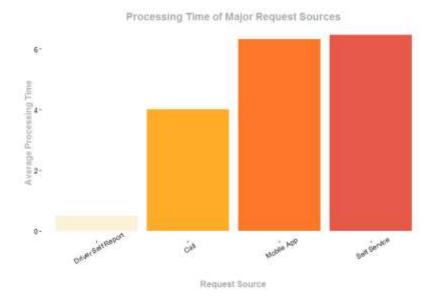
- When we compare the distribution of requests by request sources among owners, we found that there exist significant discrepancies.
- Bureau of Sanitation fields more than 75% of requests via Call. Other owners have higher percentages of Mobile App and Self Service requests.
- If other owners have successfully made the shift from Call to Mobile App and Self Service, it is also possible for Bureau of Sanitation to complete the shift by, for example, introducing the use the App on the top of its official website and reduce call services. Because Mobile App and Self Service can probably automatically assign tasks to whom should take charge if programmers can give commands into the systems, it can save a lot time by not taking calls and assign tasks manually.



2. Processing Time Analysis

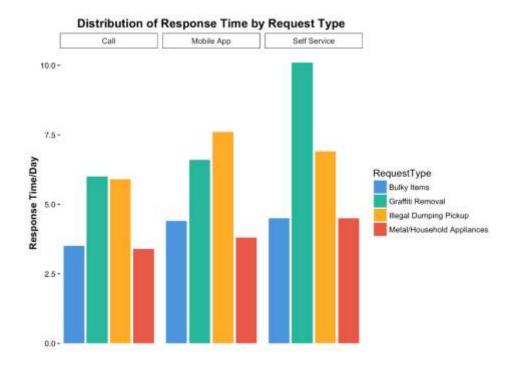
(1) Processing Time of Major Request Sources

- We also want to focus on the response time of City of LA. Driver Self Report has the quickest average processing time. Call requests have a much faster process time than Mobile App and Self Service requests.
- There are two possible reasons for our observation. First, the timeliness and easiness for
 City of LA employees to process Mobile App and Self Service might be different from those
 to process Call requests. Second, City of LA is putting less emphasis on dealing with Mobile
 App and Self Service requests compared to traditional Call requests.
- If customers' requests are handled more slowly by using Mobile App or Self Service, it's unlikely to persuade them to transfer from Call to those two other sources.
- Since larger acceptance of Mobile App or Self Service can reduce human resources, we suggest City of LA work on reducing the response time of Mobile App and Self Service requests.



(2) Processing Time by Major Request Types for Request Sources

- Lastly, we will look at the distribution of response time by request type for each request source. We can see from the graph that, for Bureau of Sanitation, Call response time for major request types are much faster than Mobile App or Self Service requests response time.
- For Bulky Items, a category with extremely high call volumes, the average pickup time is a whole day faster by Call source than by Mobile App.
- Just as mentioned above, customers may have realized this and only use Call now because they can get the items removed faster than they would by using a different request type.
- We recommend investigating this service time discrepancy and trying to improve service times for Mobile App and Self Service in order to shift customers to request types that are less labor intensive.



3. Recommendations - Cost Efficiency and Time Reduction

In conclusion, we recommend:

- Hiring interns to deal with Call requests during peak period to save labor costs.
- Reducing Call service on weekends and create more marketing campaigns to promote
 Mobile App and Self Service platform.
- Investigating the discrepancies in processing time between Calls and Mobile Apps to try to determine if any action can be taken to reduce this processing gap.
- Promoting the Self Service and Mobile App options more prominently on the webpages for these departments.
- Having representatives quickly promote the Mobile App and make callers aware that they
 have other avenues for reporting service requests at the conclusion of calls to call center.