

Who's in and who's out: Tackling how Baltimore City Government can retain its best talent

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In our business analysis, we examined the performance of each city government department to identify the worst-performing departments, enabling city government to best prioritize limited resources towards improving employee retention in that area. Our findings determined the top worst performing departments by turnover, unique people per position, and vacancy rates, and identified a correlation between frequent leadership changes and overhaul of staff.

Our recommendation is to focus leader retention and developing a culture of dedication in these departments, especially in the Office of Criminal Justice, Office of Inspector General, and the Office of Civil Rights. Not only are these departments consistently low performing, but also often work directly with the mayor or have an extensive impact on the rest of city government and the community.

Problem Statement & Background

Our team worked with the Bureau of the Budget and Management Research to address the challenge of employing and retaining highly qualified people for city government. Position vacancies and employee turnover reduce the productivity of city government because continually hiring new employees requires committing resources towards recruitment and training.

The ability for Baltimore City Government to provide quality service to its citizens depends on recruiting and retaining the right employees to perform crucial government functions. Hence, identifying the worst-performing departments in vacancies and turnover will:

- help the government *prioritize its limited resources and budget* towards improving employee retention;
- *reduce loss-of-productivity costs* due to vacancies by concentrating efforts on departments with high vacancy rates;
- maximize retention of employees in departments with high turnover rates, which *reduces costs associated with recruiting and training*;
- directly address where brain drain and loss of talent hits city government agencies the hardest and consequently *raise the quality of service* that it delivers to Baltimore residents by retaining top talent and 'know-how'.

Consequently, this analysis identified the worst performing departments and allows Baltimore city government to prioritize resources for these departments accordingly. After examining which departments are most at risk for high employee turnover and vacancies, we discuss why these departments may face difficulty retaining employees.

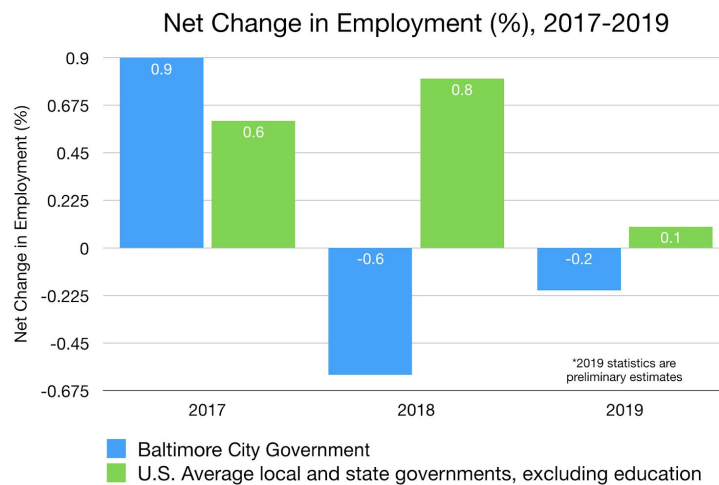
Background

To understand how Baltimore city government compares with other local governments, we looked up the annual hire and separations rates for state and local governments from the Bureau of Labor Statistics ([BLS](#)). The annual separation rate is defined as the ratio of employees that leave their employer within a given year to the total number of employees at the start of the year. Subtracting the separations rate from the hire rate provides an approximation for the net change in employment (i.e. turnover rate).

For United States state and local governments, excluding education, the annual turnover rate was 0.6% in 2017 and 0.8% in 2018, and 0.1% in 2019 (preliminary estimate) reflecting a net gain in employment each year ([BLS](#)). In comparison, the turnover rates for

Baltimore City Government were 0.9% in 2017, -0.6% in 2018, and -0.2% in 2019, reflecting a net loss.

Comparison of Net Change in Employment (2017-2019)



Why Turnover Matters

Turnover is costly:

- Direct replacement costs can reach as high as 50%-60% of an employee's annual salary, with total costs associated with turnover ranging from 90% to 200% of annual salary ([Society for HR Management](#)).
- Training new employees can cost up to \$1,075 per employee hired ([2017 Training Industry Report](#)).

High turnover rates correlates to shortfalls in organization performance:

- High turnover of employees with high social capital can be detrimental to performance ([Society for HR Management](#)).
- Reducing turnover rates have been shown to improve workforce morale ([Society for HR Management](#)).

Turnover is harder on smaller departments:

- Those leaving are more likely to be the only experts in a particular skill or knowledge.
- The community culture of a small department takes a hit when an important person leaves.

- There are less people to choose from to replace the former employee's work ([Society for HR Management](#)).
- Losing even one person in the span of the year can greatly affect efficiency, decrease morale, and increase total costs to hire ([Society for HR Management](#)).

Data Findings and Interpretations

Data Analysis Process

We were provided employee data ([private link to repository](#), request for access required) from the fiscal years of 2017, 2018, and 2019, with each fiscal year starting in July and ending in June. This data included measures such as budgeted salary, whether the position was funded or unfunded, the department, and employee position.

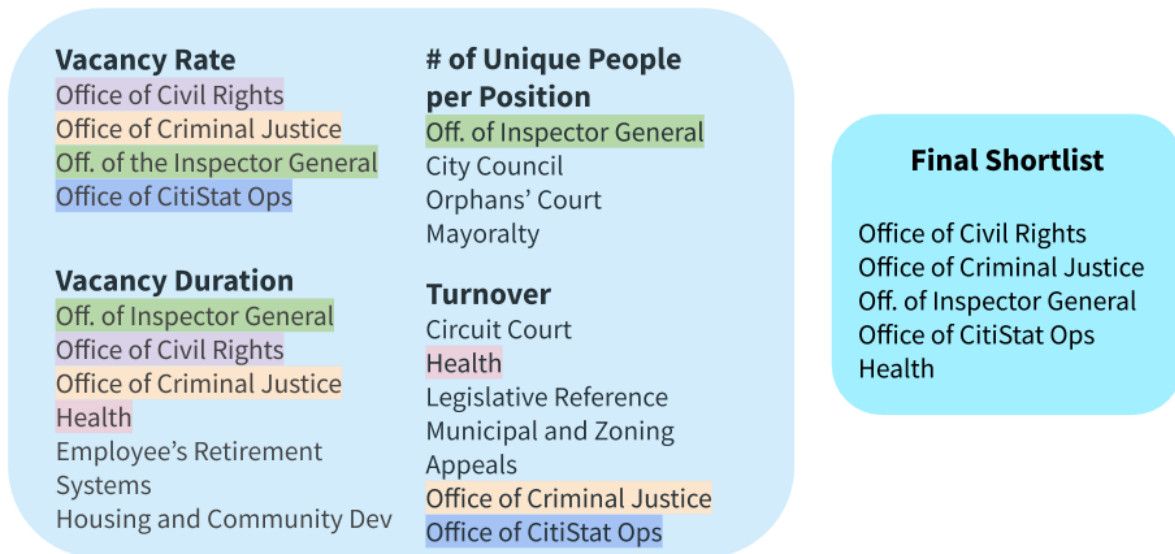
We identified important metrics to define for each agency and to compare across agencies. We then looked at the departments that were worst performing across multiple metrics*. We only analyzed funded positions. To do this analysis, we utilized excel first and then python. The metrics we looked at are defined as:

- Estimated number of people moving within or across departments (by using their name as a unique identifier)**
- Estimated percentage of people moving within or across departments**
- If there was a vacancy at any time in the year
- Total Vacancies
- Vacancies per month
- Vacancies per quarter (divided by July-Sep, Oct-Dec, Jan-March, April-June)
- If there was more than one unique person per position
- Number of unique people per position
- Turnover rate for the year

*The Office of Neighborhoods was closed after 2017, so while it has the highest average vacancies, it only had 1 year's worth of data so we excluded it from analysis. The Office of City Statistics closed in 2018, so it was also excluded.

It is important to note that the original dataset includes people moving within and across agencies, people who have departed from the government, and people who were laid off or quit. While we've provided a rudimentary estimate of the number of moves, it is hard to define for the other workers, who might have been laid off or quit.

Worst Performing Department Shortlists



The highlighted departments refer to those which occurred multiple times in the shortlists.

The Full List

Average vacancies:

1. Office of Criminal Justice
2. Office of Inspector General
3. Office of Civil Rights

Percentage of months vacant:

1. Office of Criminal Justice
2. Employee Retirement Systems
3. Office of Inspector General
4. Housing and Community
5. Health

Turnovers:

1. Circuit Court
2. Health
3. Legislative Reference
4. Office of Criminal Justice
5. CitiStat

Unique people (Percent of more than one):

1. City Council
2. Courts: Orphans' Court
3. Mayoralty
4. Office of Civil Rights
5. Office of Inspector General

Average unique people per department

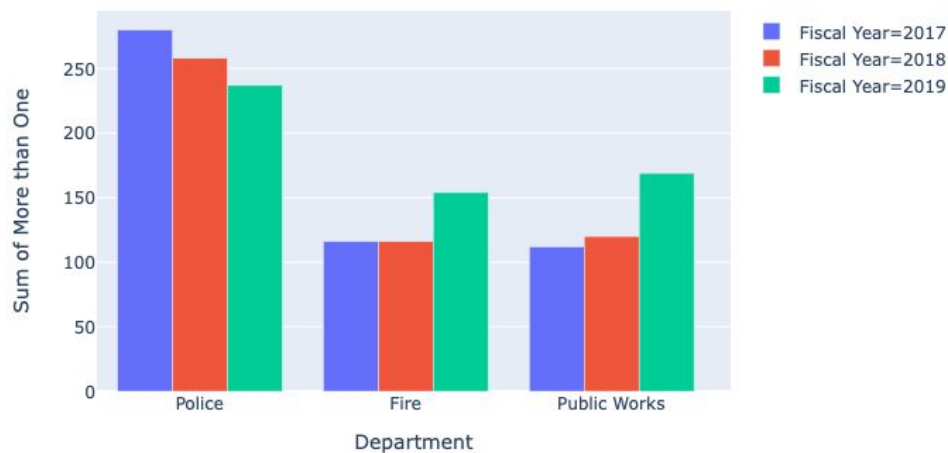
1. Office of Inspector General
2. City Council
3. Mayoralty
4. Courts: Orphan's Court
5. Office of Civil Rights

Total unique people per department per year

1. Police
2. Fire
3. Public Works

Because averages and percentages don't always give the most accurate picture, we also looked at absolute numbers. The Police Department was not one of the top worst performing departments under averaged/percentage metrics, which contradicts the historically bad press it has endured. However, looking at the total number of jobs within each department that had more than one person per job, we found that the Police, Fire, and Public Works departments had the highest number of jobs with more than one person occupying it for all three years.

Number of Jobs with More than One Employee in Each Department in Baltimo

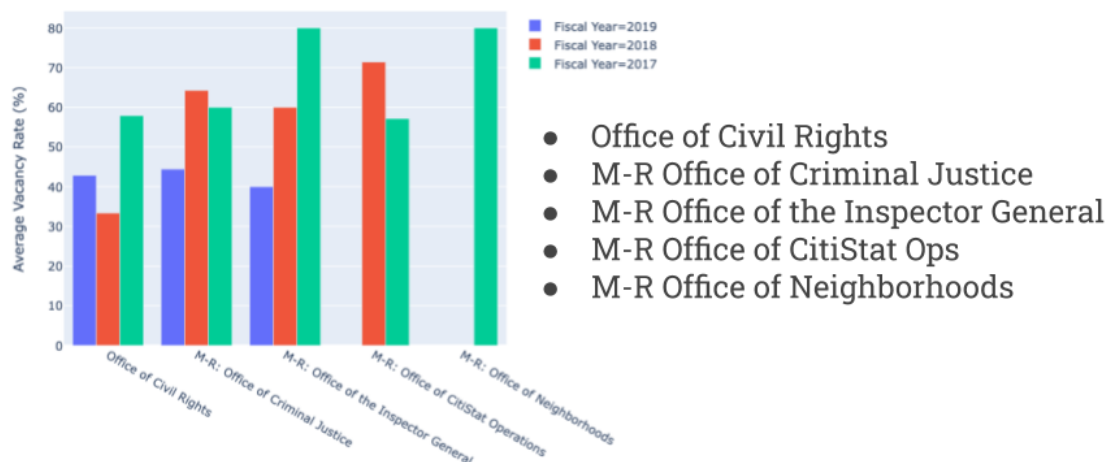


Given that these are the largest departments, it is not surprising. However, the average for the police department is 250; that means on average **at least 250 people had to be replaced** per year and those jobs retrained. For the fire department, it is 130, and the public works department 134. This raises the issue of high costs of training, inefficient allocation of time and effort, loss of seasoned experts, and low morale or community culture. To understand further why these departments have such a high number of people leaving, further data analysis could examine how long the departing people had been with the department and if there are certain positions which people leave frequently.

Looking more closely at some metrics, we have the following findings:

Appendix: Departments with Highest Vacancy Rates

Top Vacancy Rates (%) per Department in Baltimore City Government



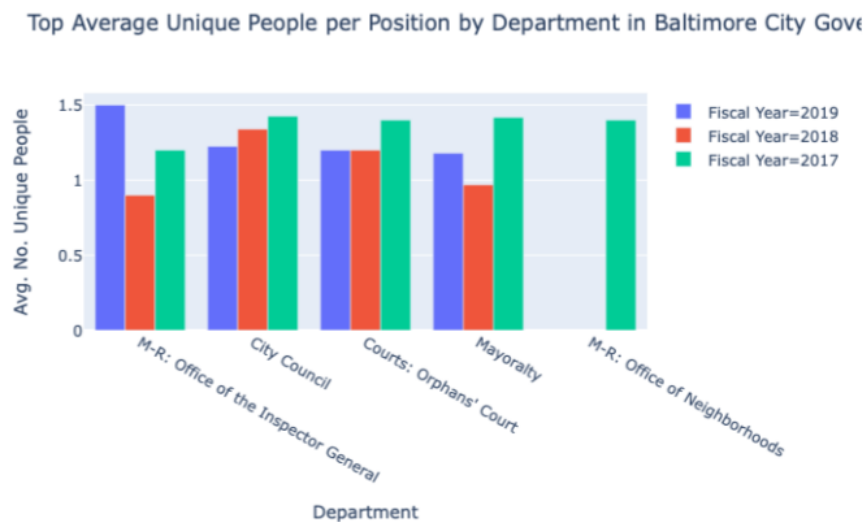
For the Office of Civil Rights, the director's job had been vacant since May 2018. Mayor Catherine Pugh had chosen Darnell Ingram as the new director, and one of his first jobs was to hire new staff ([Baltimore Sun](#)).

Similarly, the Office of the Inspector General had lacked a permanent director for 18 months prior to Isabel Mercedes Cumming's appointment. Since Cumming became Baltimore's Inspector General in February of 2018, she hired 9 new investigators ([Baltimore Beat](#)).

Citistat is now a part of the Mayor's Office of Performance and Innovation, which could have affected the way its data was categorized. Again, we see the same trend of

leadership changes. In January to March 2015, Director Mark Grimes was under fire for “failing to hold regular meetings and produce reports, even as the department’s budget has doubled to \$1 million” ([Baltimore Sun](#)). In Oct 2015, Sameer Sidh is appointed director of CitiStat. In 2017, Kendra Parlock was introduced as the new person in charge of CitiStat ([Technical.ly](#)).

Appendix: Departments with Highest No. Unique People per Position



The departments with an average number of unique people per position above 1 are the OIG, City Council, Orphans’ Court, and Mayoralty. Considering how these offices are often appointing and electing new individuals, this is not surprising. The mayor position has changed since 2019 when former mayor Catherine Pugh resigned, and replaced by Jack Young. Similarly for City Council, Brandon Scott was assigned in May 2019 to become president, while Danielle McCray was appointed in 2019 as well ([Baltimore Sun](#)).

The OIG has also had several leadership changes and staff overhauls. Due to the nature of these departments, we would conclude that this metric isn’t as significant to our recommendations as turnover or vacancy rate, but still helps explain certain trends.

Appendix: Departments with Highest No. Unique People per Position



This graph shows the average percent of positions with more than 1 person by department. The same departments performed poorly in average number of unique people as shown in the previous graph. Again, we can most likely attribute City Council and Mayoralty to the nature of the offices having high ranking leadership positions that often change hands due to elections and appointments.

For the OIG, new leadership brought changes to the department with absent leadership for over 18 months. Once Cumming became Baltimore's Inspector General in February of 2018, she hired 9 new investigators and "seemed to have gotten at least two agency directors canned" ([Baltimore Beat](#)).

Appendix: Departments with Highest Turnover



Zooming in on the top worst performing departments, several M-R departments have over 10% turnover rates. If we look at the Office of CitiStat, while they lost almost 50% of workers in 2017, they increased in size over 2018 by 50%.

Similarly, the Office of Criminal Justice has a turnover rate of 50% in 2017, but doubled in size by the end of 2018. With only 18 employees on average, as well as high skill positions often working directly with the mayor, the turnover rate for Office of Criminal Justice is extremely volatile. We believe the main reason for this inconsistency is the frequently changing leadership. Each year from 2017 to 2019, three different individuals held the director position, with the latest being Tamika Gauvin appointed from within the Innovation Team ([Biz Journals](#)).

While overall rates are helpful to quickly define departmental performance, as mentioned, we also need to take into account the scale/size of the department when looking at turnover because a high turnover rate in a small department is less significant than a high turnover rate in a larger department.

Departments by size



There was no clear trend for size and high vacancy rates; both large and small departments experience high turnover rates. While CitiStat, Mayoralty, and City Council have around 70 - 100 people, the Office of Criminal Justice, Office of Inspector General, and the Office of Civil Rights averages 10 - 20 filled positions per year.

In terms of absolute number of jobs with more than one person occupying it throughout the year, Police, Fire, and Public Works were the worst performing. This is highly correlated with the fact that they are the largest departments. On the other hand, the Orphans' Court has one of the highest percentage of average percentage of jobs with more than one person. However, this is largely explained by the fact that it only has five positions.

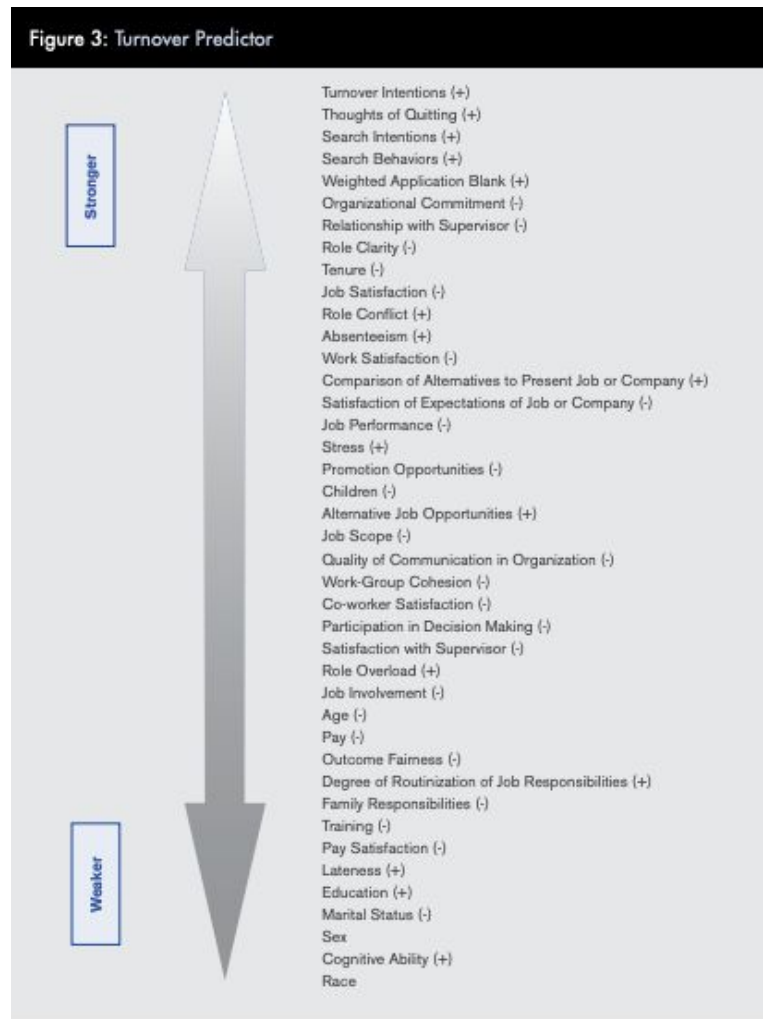
High turnover rates tended to correlate with larger departments, with the exception of the Office of Criminal Justice. CitiStat and Mayoralty have at least 100 filled positions each year, and Health has almost 800. In the case of the Office of Criminal Justice, we suspect it is due to staff overhauls during three leadership changes.

Why Employees Leave

Often leaving an organization isn't a compulsory decision but rather an extensive process. Before making the leap, employees compare their current job against possible alternatives, evaluate their feelings toward the organization, and determine how easily they can exit ([Society for HR Management](#)).

Along with the factors listed in the turnover predictors, key motivators include:

- Feelings of organizational commitment and job satisfaction
- The quality of the relationship between an employee and his or her immediate supervisor
- Role clarity (including definition, communication, and reinforcing of performance expectations)
- Job design (including job scope, promotion opportunities, and opportunities to participate in decision-making)
- Team cohesion and culture



Conclusions

Across the departments that consistently performed poorly across these metrics, we noticed the persistent correlation between high turnover and vacancy rates, and frequent leadership changes. Consequently, deliberate staff overhauls or employees voluntarily departing due to culture changes may be possible reasons for high turnover rates.

While we need more social and individual data on why individuals are leaving, the importance of leadership and culture cannot be ignored. With crucial leaders such as the

mayor taking a leave of absence in 2019, and the police commissioner being laid off in 2016 and his four successors also leaving, it is clear that the priority should be on retaining leaders.

Some notes on data cleaning and manipulation

- In FY2017's Month 3-12 Position files, the August column for employee status and name is empty. We took the August data from the Month 2_August Position file (which had some duplicated names and blank rows where they should not have been), cleaned it, and inserted it into the blank columns in the Month 12_June Position file.
- We also noticed a naming inconsistency between the Office of Information Technology, which was named the "Office of Information & Technology" in some years (2019), whereas it was named "Office of Information Technology" in others (2017, 2018)
- Some departments only showed up in certain years' datasets. For example, the Baltimore Economic Recovery Team, Office of Housing and Neighborhoods, and Office of Citistat Operations only showed up in 1 or 2 of the fiscal years' datasets.

Concrete Recommendations & Impact

Problem Area #1: Leadership Transitions

There is a correlation between frequent leadership changes and high vacancy and turnover rates. Addressing leadership transitions involves both a long-term and short-term strategy:

Short-term:

- To prepare for the inevitable departure of employees following the resignation of a department head, departments should **prepare transition processes** to retain knowledge, decrease training costs, and reduce the learning curve for future hires.
 - Employees can be tasked with documenting essential tasks and compiling the key resources required for their day-to-day functions so that successors have a knowledge base to refer to.
 - For employees who notify their supervisor sufficiently well in-advance of their departure, they can oversee the new hire during a training period and transfer knowledge to their replacement during their last weeks in the position.

- Opening up mentoring programs or internships can help with succession planning and knowledge retention.
- Oftentimes, after a leader departs the agency, their position remains unfilled for several months to years, which impacts departmental productivity during that time frame. To avoid these long vacancies, departments should be encouraged to have a successor/back-up in mind who works within the department. This person will already be familiar with the departmental functions and can serve as an interim leader before they or someone else are formally appointed to the role.

Long-term:

- Once a leader is hired, conditional incentives (such as wage bonuses, broader jurisdiction/responsibilities, or other forms of promotions) that increment based on the length of their stay should be offered to encourage leaders to stay longer.
- New leaders might replace the original employees with their own connections as a method of enforcing departmental loyalties/allegiance. However, this results in loss of institutional knowledge and creates an employee base that is more loyal to the departmental head rather than the department itself. Thus, there needs to be more departmental oversight/a system of checks and balances so any hiring or firing decisions that the departmental head makes are balanced by input from other management-level employees in the department.

Problem Area #2: Younger workers have a ‘career’ mindset and value agency culture. Millennial workers seek employment that offers them career advancement opportunities and a sense of fulfillment/satisfaction. Tying future career pathways with incentives to stay and centering departmental culture around employee satisfaction will improve retention.

Short-term:

- Encourage more routine and informal meetings between employees and their career advisors or managers to discuss concerns regarding job satisfaction or career growth opportunities.
- Use smaller but more frequent promotions (or bonuses) to incentivize employees to stay longer. These promotions should be clearly set up within the framework of a larger career advancement pathway.
- Match new employees with other employees who have more experience in the department in a “mentorship” program so that new hires can seek advice and develop relationships within the department.
- Make sure employees know how and where they can submit anonymous feedback about their concerns in the workplace.

- Integrate providing positive feedback to employees into the performance evaluation process.
- Ask departing employees to review and suggest edits or additions for their job postings so that HR can better inform new recruits about what the position entails. If possible, encourage the departing employee to sit in on interviews for their replacement and discuss their feedback with HR.
- Conduct exit interviews to hear from departing employees to understand their experience in the department and why they are leaving ([Harvard BR](#))
 - Often times, the drawback of exit interviews is the data quality and lack of consensus on best practices.
 - We recommend taking three steps to exit interviews:
 - Interviewer: have second or third-line managers conduct interviews
 - Those more removed from the employee can draw the most honest answers, and are more likely to use the information immediately to give feedback.
 - Interviewee: make EIs mandatory for certain employees
 - Concentrating the effort of high potential employees brings the highest ROI, because they are usually the most knowledgeable and valuable, and as managers are more likely to take action with their feedback.
 - Timing: the specific time varies but experts recommend up to 90 minutes after the employee departs
 - By setting it after the departure but before the employee disengages, they are more likely to be honest.
 - Allow the individual to choose the setting and timing.
 - Exit interviews could be outsourced to ensure the best privacy for the employee; however, this would be an additional cost.

Improvements to data collection and analysis recommendations:

- Tag entries with leadership or department head to detect if leadership changes influence staff departure.
- Each entry should be tagged with the department leader and their supervisor at the time in order to investigate a possible correlation between leaders and staff departures, and the timeframe during which vacancies begin to peak.
 - With M-R departments, one could analyze if turnover correlates with changes in mayors, or examine the trend of vacancies in the months immediately before and after the end of the mayor's term.
 - With recent changes in mayors and council presidents in the past five years, one could investigate:

- Do employees usually stay with the mayor up until they are removed/resign from office?
 - Is there a trend of increasing vacancies leading up to the mayor leaving office?
 - Is there a trend of people moving into the council president's office leading up to a mayor leaving office?
- A vacancy rate, turnover rate, and a unique people analysis should be done yearly in order to track progress and problem departments.
- Specify granular job title data
 - Further analysis could be conducted on a more granular level based on job title and skill level as opposed to on a macro department scale.
 - More information about the skill level required for the job may facilitate analysis on why specific positions are harder to recruit for. A proxy measure for skill level could be entry-level salary bracket.
- Track reason for departure
 - The data should include whether the worker was laid off, quit/voluntarily left, or promoted within the department or to another department.
 - The BLS defines categorizes employee departures into Quits, Layoffs and Discharges, Other (retirements, deaths, location transfer, etc)
 - Baltimore City should track where people work after they leave in order to better understand talent competition.
- Leaving vs. Moving
 - The data should include whether someone has moved within a department or to another department, as well as if it is temporary or permanent.
 - Analyze those who leave compared to those who move across departments.
 - This would parallel the BLS's "total separation rate" metric, which determines the ratio of employees who leave an employer to the total number of employees they have.
- Consider how to factor size of department into metrics
 - Weigh metrics by department size to increase the accuracy of rates and measures.
- Reformat the data
 - Rather than a wide format (many columns), reorganize or transpose the data to condense into a more readable format.

Appendix

Initial Excel Analysis

Although this procedure is a bit tedious, due to time constraints, limitations in knowledge of Excel and Python, and format of given data, this method worked best to analyze the data.

PART 1: CREATE NEW FILE & IMPORT DATA

1. Open up the file with the last month of the fiscal year which contains all information from all previous months (ex. if you're looking at fiscal year 2018, use the "*Month 12_June Position*" file).
2. Create a new Excel file named "*FY##*" (replace ## with the last two digits of the fiscal year, ex. 2017's sheet should be named "*FY17*")
3. To more easily view the data, copy the data from the following columns (including headers) from "*Month 12_June Position*" into the new file in the following order:
 - a. Column A: "*Job Number*"; B: "*Funding*", C: "*Agency Description*", followed by D-O: all "*Employee (Month/1)*" columns
4. Title the sheet "*Refined*"
5. Select the data and name the table "*RefineTable*" using the Name Box in the top left hand corner

PART 2: CALCULATE VACANCY METRICS

6. In the new Excel file, create a new sheet titled "*Vacancies*"
 - a. Copy columns A-C's data and headers from "*Refined*" sheet into "*Vacancies*" sheet in the order as follows:
 - i. Column A: "*Job Number*", B: "*Funding*", C: "*Agency Description*"
 - b. In row 1 of "*Vacancies*", starting from column D and going across, title the columns with the month names starting with "*July*" (the first month of fiscal year), and ending with "*June*" in column O.
7. For each position and each month, use the following formula to determine whether the position was vacant or not. Paste the following formula under the header "*July*" in the row corresponding to the first job number (cell D2):
 - a. = IF(Refined!D2= "", 1, 0). Essentially, this means that if there is no name in the employee column for July in sheet "*Refined*", output 1, else output 0.
 - b. Drag this formula across columns D to O and down the rows to the end of the job numbers. Double check against the data in "*Refined*" to make sure you are receiving correct results.
8. To calculate total vacant months:

- a. In column P, title the column “*Total Vacant Months*” and paste the following formula into cell P2:
 - i. =SUM(D2:O2). Essentially, you are just summing the row, which sums the total number of months with vacancies.
 - ii. Apply the formula down the column. Check to make sure you are receiving correct results.
9. To calculate whether there was a vacancy at all within the year in each position:
 - a. In column Q, title the column “*Vacant*”. Paste the following formula into cell Q2.
 - i. =IF(P2>0,1,0)
 - ii. Essentially, this means that if the total vacant months is greater than 0, output 1 (for “yes”) and output 0 (for “no”).
10. To calculate total vacancies for each quarter (Q-TV):
 - a. We are dividing quarters by Q1: July-Sep, Q2: Oct-Dec, Q3: Jan-March, Q4: April-June. Title columns R-U as “Q1-TV”, “Q2-TV”, etc.
 - b. Use the following formula for “Q1-TV”, and drag across for the remaining “Q#-TV” columns
 - i. =SUM(D2:F2)
 - ii. Essentially, this adds up the vacancies from the months in each quarter.
 - c. To determine whether there were vacancies at all in each quarter:
 - i. Make a column for each quarter for this, similar to above. Use the following formula for Q1-V and drag down the rows and across the 4 columns
 1. =IF(Q2>0, 1, 0)

PART 3: CALCULATE UNIQUE PEOPLE METRICS

11. Calculating the number of Unique people in each position
 - a. Create a new sheet titled “Unique People”
 - b. Copy the Job Number, the Funding, and Agency Description column as previously done
 - c. Create a column entitled No. Unique People
 - i. Use the formula:
=SUMPRODUCT((Refined!D2:O2<>”)/COUNTIF(Refined!D2:O2,Refined!D2:O2&”))
 - ii. Determine whether there was more than one person working in that position in the year using the formula
 1. =IF(D2>1, 1, 0)
12. Calculating an estimate of moves

- a. Create a new sheet titled “Estimate of Moves”
- b. Copy all columns from “Unique People” into this worksheet
- c. Create new columns as shown below:
- d. Name the whole table RefineTable
 - i. Input the following formula into July-Aug, in the first position:
 1. =IF(Refined!D2=Refined!E2,0,IF(Refined!D2="",0,IF(COUNTIF(Refined!\$D2:\$O2,Refined!D2)=COUNTIF(RefineTable,Refined!D2),0,1)))
 - ii. Essentially, if the employee in July is the same employee in August, there was no move, so display 0. Else, if the employee field in July is blank, the employee did not move because there was no employee. Else, if the number of times the employee name is found in that row is less than the number of times the employee name is found in the whole table, this would indicate that the name appears in more than one job.
- e. In a new column titled “Move”, use the following formula (and apply to whole column) to indicate whether there was likely of a person in that position.
 - i. =IF(SUM(F2:P2)>0, 1, 0)
- f. To calculate an estimate amount of moves, total the Move column and then divide this number by 2. This is because if a person moves once, they would be counted twice. This is obviously an estimate as some people may move more than once and some people may have the same exact name.
- g. To find the percentage of positions that there may have been an employee who moved, divide the estimate of moves by the total number of positions and multiply by 100.

PART 4: CALCULATE TURNOVER

13. To calculate turnover

- a. Create a new sheet titled Turnover
- b. Copy the first three columns from the Vacancies sheet, and then the July column and the June column.
- c. Create two new columns, July-Filled and June-Filled. These will essentially be the opposite of the July and June columns.
 - i. =IF(D2=0, 1, 0)
 - ii. =IF(E3=0, 1, 0)

PART 5: USE PIVOT TABLES TO ANALYZE METRICS

14. To create PivotTables to better visualize this data and calculate values

- a. Create a new sheet with a PivotTable for Unique People, Vacancies and Turnover.
- b. For the “Unique People Pivot” sheet, use the following pivot specifications, and filter by only Funded positions.
 - i. Copy the table information twice on the side in order to do calculations.
 - ii. Calculate the percent of positions that have had more than one person by dividing the sum of more than one by the count of job numbers and multiplying by 100. Sort this table from largest to smallest. Indicate the top 10, which are the worst performing departments for this measure.
 1. In the other table you have copied, sort this from largest to smallest based on the average no. of unique people. Indicate the top 10, which are the worst performing departments for this measure.
- c. For the “Vacancies Pivot”, use the following pivot specifications and filter by Funded Positions
 - i. Copy the table information twice on the side in order to do calculations.
 - ii. Sort this table from largest to smallest based on the average of vacant, which is the percentage of positions in each department that had a vacancy in that year. Indicate the top 10, which are the worst performing departments for this measure.
 - iii. In the next table you have copied, calculate the percentage of total months that had a vacancy in that department. To do this, divide the total vacant months by (12*count of job number-which is just the number of jobs). Indicate the top 10, which are the worst performing departments for this measure.
- d. For the “Turnover Pivot”
 - i. Use the following Pivot specifications and filter by funded positions
 - ii. Copy the table information on the side in order to do the turnover calculation:
 1. $=(\text{Sum of July-Filled} - \text{Sum of June-Filled})/\text{Sum of July Filled}$
 2. Indicate the top 10, which are the worst performing departments for this measure.

15. Repeat the above procedure for all fiscal years

PART 6: CREATE AGGREGATED DATASETS FOR ALL FISCAL YEARS

16. Now, create a new Excel file and name it Turnover

- a. Copy the department, July-Filled, June-Filled, and turnover columns from the "Turnover" sheet onto the new sheet.
- b. Add a new fiscal year column and populate it with the year that the pasted data came from.
- c. Repeat step 16a for the remaining years, each time inserting the data below the existing data and labeling it with the correct year.

17. Create a new Excel file and name it Unique

- a. Copy the department, count of job number, sum of more than one, and sum of No. unique people, average unique people, and percent of more than one columns from the "Unique People Pivot" sheet onto the new sheet.
- b. Add a new fiscal year column and populate it with the year that the pasted data came from.
- c. Repeat step 16a for the remaining years, each time inserting the data below the existing data and labeling it with the correct year.

18. Create a new Excel file and name it Vacancies

- a. Copy the department, count of job number,, sum of total vacant months, sum of vacant, average of vacant, and percent of total months vacant columns from the "Vacancies Pivot" sheet onto the new sheet.
- b. Add a new fiscal year column and populate it with the year that the pasted data came from.
- c. Repeat step 16a for the remaining years, each time inserting the data below the existing data and labeling it with the correct year.

Python Documents

In order to visualize the worst performing departments to understand any trends, python analyses were done. These python notebooks are titled VacanciesPlotly, UniquePlotly, and TurnoverPlotly and can also be found in our GitHub repository:

<https://github.com/rsilve22/Business-Analytics-Final-Project>

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