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NYC311

Joe Morrisroe, executive director for NYC311, had some gut instincts but no definitive answer to the question he was just asked by one of the Mayor's deputies: "Are some communities being underserved by 311? How do we know we are hearing from the right people?" NYC311 was New York City's source of government information and non-emergency services. Founded in 2003 as a phone number for residents to dial (311) from a landline for information on city services and to log complaints, the city launched a 311 website and mobile application (app) in 2009, and social media support in 2011, making it more convenient for residents to interact with the city. It also allowed NYC311 to collect data on how the city could better serve its residents. In 2016, NYC311 received over 35 million requests for services and information, up 5% over 2015. By 2017, all this technological progress had made it considerably easier to hear from NYC residents. Were those gains from innovation being shared equally? Morrisroe wanted to—and now needed to—know.

City agencies and departments processed requests and addressed complaints that were submitted through NYC311, including noise complaints, rodent sightings, and requests for bus and subway information. NYC311 used the data it collected from these interactions to assess real-time conditions and create tickets for work requests to be fulfilled by certain departments. NYC311 provided help for more than 3,600 non-emergency government services. Agencies such as the Department of Health, Department of Environmental Protection, and Department of Housing Preservation and Development all relied on NYC311 data. More recently, the city began using the data to create predictive models that might help direct inspectors to potentially unsafe buildings, or identify where illegal apartment conversions might be taking place.

Morrisroe and his team had considered the potential downsides of agencies relying too heavily on NYC311 data or on its predictive power. Not all residents felt empowered to contact 311, and less tech-savvy constituents might not feel comfortable using the app to access information. In the sheer volume of the data and its potential to enable a new approach to city services, were biases around income, education, race, gender, neighborhood, home ownership, and other factors, hiding too? Morrisroe considered the question posed to him and its implications. He asked for the data (see **Supplementary Data File**) and a team to assess it: Are we hearing from everyone?

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About 311

Across the U.S., the 311 phone service allowed citizens to communicate non-emergency questions, requests, or feedback to their cities.² In 1996, the city of Baltimore, Maryland, assisted by a \$300,000 federal grant, launched the first 311 service as an option to prevent residents from calling 911 in non-emergencies.³ The Baltimore experiment proved successful, and in 1997 the Federal Communications Commission (FCC) offered the 311 number to police departments across the country.⁴ In 1997, Chicago, Illinois, which had operated separate phone numbers and call centers for different services, was the first city to invest in a comprehensive 311 system, establishing a centralized call center for all city services. In 2001, Baltimore expanded its 311 reach to cover all city services including trash collection, graffiti removal, and noise complaints. The following year, Los Angeles, California unveiled a similar 311 service. Over the next decade, more cities throughout the U.S. continued to launch 311 services.⁵

By 2015, over 200 cities along with smaller townships in the U.S. had invested in 311 systems.⁶ Residents could contact their local 311 service via phone, text, mobile application (app), social media, or web chat. Call service representatives and employees monitoring 311 social networks responded to inquiries, logged complaints, and forwarded requests that required further action to the appropriate city agencies.

NYC311

New York City covers 304.8 square miles of land and was comprised of five boroughs (Bronx, Brooklyn, Manhattan, Queens, and Staten Island), 59 community districts, and hundreds of neighborhoods. (See **Exhibit 1** for facts about New York City.) In 2017, New York City was the most populous city in the U.S. with over 8.5 million residents. It was also the densest city in the country with 27,578 residents per square mile. Two-thirds of all housing units were renter-occupied. The population was 33% white (non-Hispanic), 22.6% black (non-Hispanic), 28.9% Hispanic, and 13% Asian. Over 37% of the city's residents were born outside of the U.S. Half of all residents spoke a language other than English at home. The city government, with a \$69.9 billion operating budget, consisted of over 135 agencies focused on culture and recreation, education, environment, health, housing and development, public safety, social services and transportation.

In March 2003, under Mayor Michael Bloomberg (2002-2013), New York City first introduced NYC311, allowing its millions of residents to contact city officials and access information for more than 3,600 city services including trash removal, noise complaints, transit delays, illegal parking, streetlights, graffiti, lost property, and tax questions. ¹² Residents could dial 311 from a landline and speak to an operator who could answer questions or transfer their calls to another department. Information was available in over 180 languages. ¹³ "Not only did 311 make it easier for New Yorkers to get information from the city—and file complaints—it also gave city government more information on what New Yorkers were concerned about and helped us keep track of how well we were doing at addressing their concerns," Bloomberg explained. ¹⁴

The NYC311 system was designed by the city's Department of Information Technology and Telecommunications (DoITT) and consulting firm Accenture. "The new 311 program has vaulted New York City into the forefront of improving citizen access to their government," an Accenture partner offered. In 2003, NYC311 employed a staff of 375 with operational costs of \$27 million. One expert explained, "[NYC311] reflects a national trend of cities and counties that view 311 service as an enterprise customer relationship management (CRM) initiative."

Morrisroe recalled, "In 2007, we started to look at moving 311 online. By 2008 we really started to move forward." He added, "It drove us to think—who is it going to reach? How will they access it? It raised the age-old 'digital divide' question. Will we be missing some customer base? Will it skew the data one way or the other?" In October 2009 the NYC311 app was launched. Over the next several years, the program was extended to provide support to users on social media. Since 2012, with the signing of the "Open Data Law," a the city was required to store all of its public data, including its 311 records, on an accessible public website, NYC OpenData. (See Exhibit 2 and Exhibit 3.)

In 2016, NYC311 recorded 36 million resident interactions. Representatives monitored the NYC311 social media accounts during regular business hours, answering direct messages or linking citizens to helpful websites. NYC311's call center, mobile app, and text messaging services were available 24 hours a day. Morrisroe explained, "311 is not just a complaint hotline, as most people think. Less than 10% of our contacts are complaints. People are accessing 311 for information." The service was most commonly accessed to pay parking tickets; access street cleaning and parking information; access benefits provided by the city's HRA (Human Resources Administration) such as food assistance and emergency rental assistance; participate in the New York City Housing Lottery; learn about affordable housing; civil service exams; and access property documents. NYC311 provided information in English and Spanish about Supplemental Nutrition Assistance Program (SNAP) benefits, rent freezes for seniors, outdoor film screenings in city parks, and information on voting in city elections.

NYC311 and Equity

NYC311 documented each phone call, tweet, or text received, along with information on who was using the service. That data could be used by agencies to better understand the needs of residents. The city also used 311 data to help allocate annual budgets. ^{21,22} James Perazzo, who in 2017 was acting director of Mayor Bill de Blasio's Mayor's Office of Data Analytics (MODA), described NYC311 data as "one of the richest and best-maintained data sets." He added, "There is just about no city business problem where 311 data won't be at least relevant in some way."

City officials worried, however, that 311 data might not reflect the needs of the City's whole populace and may contain biases. "The administration is very concerned with equity," Chenda Fruchter, NYC311 strategy and development director said. One 2013 study of Boston's 311 service found little evidence that the service was underused by historically disadvantaged groups, particularly once 311 services were made available on smartphones beginning in 2009.²³ However, a 2014 study suggested that Boston's 311 program was used less by people living in traditionally black or first-generation immigrant communities.²⁴

Craig Campbell, a MODA research fellow, noted that some communities were likely over-represented in the NYC311 data. "For example, just because the Upper East Side has the most ratsighting complaints, that doesn't mean that's where the most rats are," he explained. It was hard to say, for sure, however, since there was often not a "ground-truth" about rat populations or other city questions. (See **Exhibit 4** for service requests by census block group.) When Morrisroe joined 311, he looked at complaint types, particularly those from people filing complaints on apartments not being maintained properly by landlords. He was frustrated to find that lead paint complaints were overindexed in wealthy areas, and under-indexed in poorer areas. "Our agents think that senior citizens

^a In 2012, New York City Council passed legislation requiring agencies and departments to make their data available online using open standards in an attempt to make "the operation of city government more transparent, effective and accountable to the public." (Source: "Read the Open Data Law," NYC Information Technology and Communications, https://www1.nyc.gov/site/doitt/initiatives/open-data-law.page, accessed October 2017.)

tend to call in more. I'm not sure that's true. Perhaps those conversations are just more memorable," Morrisroe explained. Perazzo added, "I don't think the agencies and city departments that use 311 data to fulfill service requests think much about whether or not there are biases in the data they receive. We're trying to change that."

The high volume of calls made in English also led city officials to suspect that non-English speaking communities might be underrepresented in the data. In July 2015, half of the 8.56 million New Yorkers spoke a language other than English (or in addition to English) at home. ²⁵ When Morrisroe first joined NYC311 in 2006, he expected to find that 25% to 30% of 311 callers spoke a language other than English. He was struck when the data instead showed that it was less than 5% of callers. Frutcher observed, "Today there is still a thought that people who don't speak English as a primary language don't use 311 much." Perazzo added, "It's possible their son or daughter, who is more comfortable speaking in English, calls on their behalf. But there are also some immigrant groups that are reluctant to interact with the government in any way."

Morrisroe was interested in knowing whether or not some common assumptions surrounding the NYC311 data were true. At the same time, he thought some concerns were exaggerated. His team often heard anecdotally that the only people using 311 were typically higher income, white, or native English speakers. Noise complaint data was not centered in the wealthy parts of the city, and both iPhone users (who tended to have higher income) and Android users (typically lower income)²⁶ made 311 calls and used the app, although, by 2017, iPhone users did tend to log more complaints.

The city government considered how to best to ensure as many residents as possible were familiar with NYC311, but Morrisroe acknowledged that some residents still might actively choose not to interact with the 311 system.

Predictive Uses

By 2017, many cities were using predictive analytics, fueled by 311 data, to better anticipate and quickly react to problems. In Philadelphia, Pennsylvania, police officers could access 311 data from laptops in their vehicles and view previous complaints about vacant properties and other location-based data.²⁷ New Orleans, Louisiana used behavioral science in combination with the data to address urban blight. When a 311 complaint about a property was received, before researching and inspecting the property, the city's Office of Performance and Accountability (OPA) sent homeowners a letter stating that a 311 complaint made about their property. OPA found that the letters resulted in a 6% decrease in observed violations.²⁸ The city of Chicago found that 311 calls about garbage could help the city predict a future spike in rat populations, and used 311 data to proactively target areas for rat control.²⁹ Chicago also leveraged 311 data, sanitation complaints, and previous inspection data to identify which of Chicago's 15,000 restaurants were most likely to face health code violations. The Chicago Department of Public Health inspectors used predictive analytics to prioritize inspections and prevent food borne illnesses.³⁰

NYC311 data was used to help make predictions on what buildings or neighborhoods might require inspections. Morrisroe explained, "Using 311 data, the MODA team came up with a predictive model to prioritize building inspections." Certain factors made buildings more likely to catch fire, including neighborhood income, the building's age, and electrical issues; some NYC311 data could help determine those buildings at risk. The NYC fire department catalogued over 60 factors that allowed them to rank buildings according to fire risk, and used that data to prioritize building inspections. ³¹

In other examples, MODA cross-referenced weather data with NYC311 data to help the city prepare for weather-related problems and determine, for example, when more snow plow drivers might be needed. The city also used NYC311 data to maintain a list of complaints about a lack of heat and hot water in apartment buildings. These complaints would be responded to by the Department of Housing Preservation and Development (HPD). Violations issued were compiled by the Office of the Public Advocate (the second-highest ranked elected official in New York City), which maintained a "Worst Landlords Watchlist" based, in part, on this data. (See Exhibit 5 for the landlord watchlist.)

MODA also worked to identify illegal apartment conversions — apartments reorganized to squeeze in more occupants—using location data, housing type, crime rates, emergency calls received, and rodent reports.³² One observer explained, "[Illegal conversions] are major fire hazards, as well as cauldrons of crime, drugs, disease, and pest infestation."³³ The city received over 25,000 illegal-conversion complaints each year, but employed only 200 full-time city inspectors.³⁴ Morrisroe explained, "They looked at 311 and other data and developed a predictive model to identify illegal conversions." Prior to using data analysis, inspectors followed up on complaints they considered to be the most serious, and in 13% of cases issued vacate orders. Using a predictive model, inspectors were able to better identify the most problematic buildings, and issued vacate orders for over 70% of inspected buildings. As one observer noted, "By indicating which buildings most needed their attention, big data improved their efficiency fivefold." ³⁵

311 data was also used to assist a tenant harassment task force—a partnership between housing preservation, Department of Buildings, Department of Health and Mental Hygiene—that worked to identify cases of landlords engaging in practices to illegally drive tenants from rent-stabilized apartments. MODA considered what data might indicate that this was taking place. Campbell explained, "People don't call 311 and say 'My landlord is harassing me.' But they do call and say 'Construction is going on all hours,' and file a noise complaint. Or they call and say there is lots of dust. Those are some of the factors." He added, "We created a model that looked for certain complaints in the data, and used that to help prioritize inspections."

Future Uses

Morrisroe, Frutcher and their colleagues looked to more ways to modernize NYC311. In early 2017, they planned to integrate IBM's machine learning platform Watson, into NYC311's customer management system, to better answer resident queries. NYC311 excelled at answering simple queries such as "What side of the street can I park on?" but struggled with more complicated requests. A caller asking for instructions on how to dispose of a couch might be directed to Department of Sanitation guidelines. Watson, Morrisroe explained, could provide a specific answer in the future, not just a policy answer, and through machine learning, improve its answers over time. ³⁶

The NYC311 and MODA teams also expected agencies to rely more heavily on 311 data in the future, and wanted to ensure that certain neighborhoods would not be overlooked. Perazzo explained, "Going forward, we want to make sure that we're thinking about how equitable 311 data is." Bias, he continued, "has always been a concern, but it's not always obvious how to handle it. Sometimes the 311 data is all you have." MODA planned to continue working with other groups in the city to magnify the impact of the data collected through 311, but it was hard to forecast how that data might be used in the future. Perazzo noted, "I couldn't possibly predict the next four or five years in terms of data science. Maybe I could just now predict the last four or five years."

What Does the Data Say?

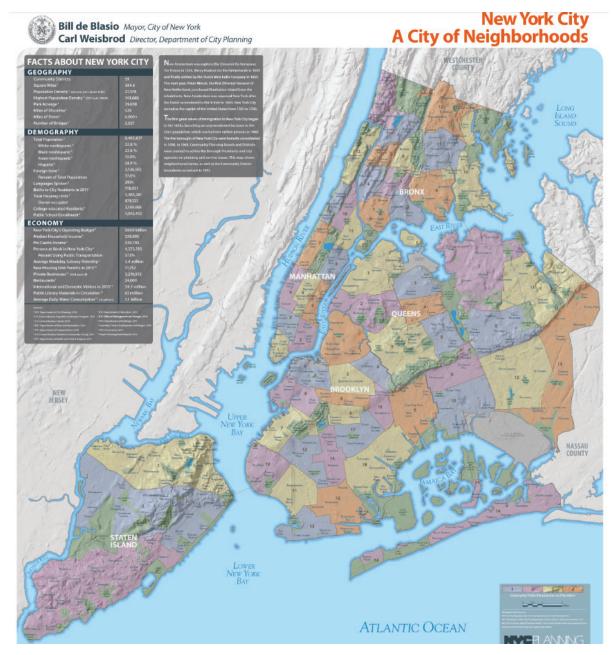
Analyzing the data would not be a simple task. The public data set that covered all 311 service requests from 2010 through October 2017 ran more than 16.2 million rows. (See Exhibit 6 for a data dictionary explaining the 53 columns and Exhibit 7 for a record of one service request.) At that size, typical spreadsheet or statistical software packages were not well-suited for the analysis. More advanced programming languages and visualization tools were needed. Completeness of the records varied. Over 1.3 million, for example, had blanks for "Community Board," which was a key geographic indicator. These data would then have to be imputed or extracted and merged from other city datasets. 311 service requests also did not include the race, age, or other demographic information about the requestor. Therefore, getting a more complete picture of service request activity would require using other datasets—such as U.S. Census data or the NYC Department of City's Planning PLUTO (Primary Land Use Tax Lot Output) database—to understand the influence of socioeconomic characteristics of a neighborhood or the specific physical conditions (size, age, assessed value, etc.) of a particular building on request activity.

Another significant challenge to identifying any underlying reporting bias in the data would be establishing "ground truth." In most cases, problematic conditions were only revealed when someone chose to report them to 311. This then triggered inspections and, potentially, the issuance of violations. However, this created a circular logic: Morrisroe and his team only knew of the problems people actually complained about. They could predict where to expect problems, but in most cases that would rely on the same 311 calls that may be biased. How, then, could they create an objective assessment of conditions or problems to benchmark expected reporting behavior, and deviations from it?

People in different neighborhoods also called 311 about significantly different things. In lower density parts of the City, common complaints included downed trees or blocked driveways. In high density, mixed-use areas, calls about noise or air quality tended to dominate. These variations further complicated the exercise of detecting bias: one would need to look at more than just the total volume of calls in an area, but also the type. And under-reporting about blocked driveways probably did not rise to the same level of concern for city agencies as under-reporting of heating problems. Capturing these variations increased the analytical complexity of the problem, but would be critical to creating equitable prediction models as part of the city's response to 311 calls.

Morrisroe and his team were keen to know more and determine whether or not some common assumptions were true. He planned to enlist researchers at NYU's Urban Intelligence Lab trained in urban informatics. "There's the notion that 'more empowered people call 311.' That's probably the number one theory we want to put to rest because we don't feel like that's true," Morrisroe said. "Or I want to make sure they aren't being prevented from using 311. What I worry about is a conscious effort to deprive people of services." Frutcher added. "This is part of a larger conversation taking place."

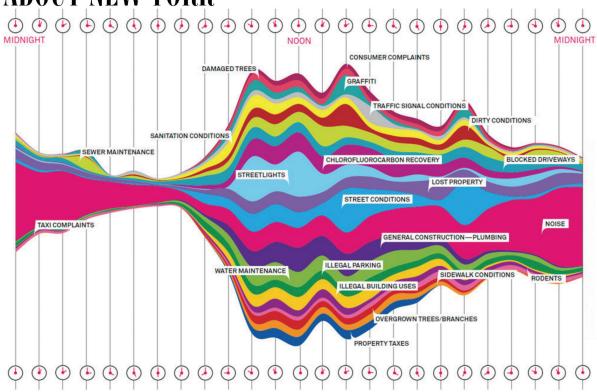
Exhibit 1 New York City Facts, 2017



Source: "New York City: A City of Neighborhoods," City of New York, http://www1.nyc.gov/site/planning/data-maps/city-neighborhoods.page, accessed October 2017.

Exhibit 2 311 Data Visualization

WHAT A HUNDRED MILLION CALLS TO 311 REVEAL ABOUT NEW YORK



There were 34,522 complaints called in to 311 between September 8 and September 15, 2010. Here are the most common, plotted by time of day. Illustration: Pitch Interactive

Source: Steven Johnson, "What A Hundred Million Calls to 311 Reveal About New York." WIRED, https://www.wired.com/2010/11/ff_311_new_york/, accessed October 2017.

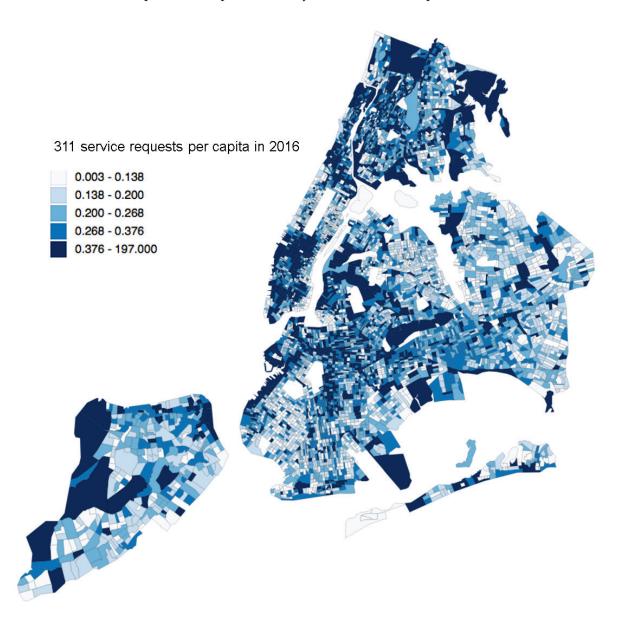
Exhibit 3 NYC311's 10th Anniversary, 2013

2003 NYC 2013 NYC 311 CELEBRATES 10 YEARS



Source: Alexander Altenhof, https://www.behance.net/gallery/8196929/311, accessed October 2017.

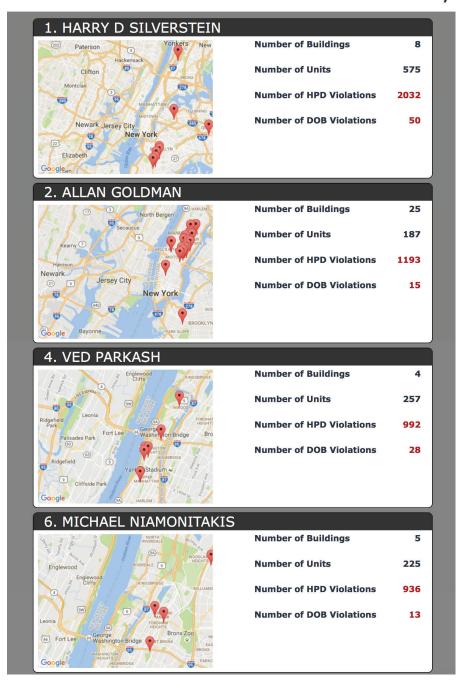
Exhibit 4 Service Requests Per Capita in 2016, by Census Block Group



Source: Company documents.

Exhibit 5 The Landlord Watch List - Excerpt

The 100 Worst Landlords in New York City



Source: Letita James, "The 100 Worst Landlords in New York City," Public Advocate for the City of New York, http://www.landlordwatchlist.com, accessed October 2017.

Exhibit 6 311 Service Request Data Dictionary

Column Name	Description	Expected Values
Unique Key	Unique identifier of a Service Request (SR) in the open data set	
Created Date	Date SR was created	Date in format MM/DD/YY HH:MM:SS AM/PM
Closed Date	Date SR was closed by responding agency	Date in format MM/DD/YY HH:MM:SS AM/PM
Agency	Acronym of responding City Government Agency	Bate in formativity BB/ 1 1 111 invite: GG 7 447/1 W
Agency Name	Full Agency name of responding City Government Agency	
Complaint Type	This is the fist level of a hierarchy identifying the topic of the incident or condition.	
	Complaint Type may have a corresponding Descriptor (below) or may stand alone.	
Descriptor	This is associated to the Complaint Type, and provides further detail on the incident or condition. Descriptor values are dependent on the Complaint Type, and are not	
2: :	always required in SR.	
Status	Status of SR submitted	Assigned, Cancelled, Closed, Pending, +
Due Date	Date when responding agency is expected to update the SR. This is based on the Complaint Type and internal Service Level Agreements (SLAs).	Date in format MM/DD/YY HH:MM:SS AM/PM
Resolution Action Updated Date	Date when responding agency last updated the SR.	Date in format MM/DD/YY HH:MM:SS AM/PM
Resolution Description	Describes the last action taken on the SR by the responding agency. May describe next or future steps.	
Location Type	Describes the type of location used in the address information	
Incident Zip	Incident location zip code, provided by geo validation.	
Incident Address	House number of incident address provided by submitter.	
Street Name	Street name of incident address provided by the submitter	
Cross Street 1	First Cross street based on the geo validated incident location	
Cross Street 2	Second Cross Street based on the geo validated incident location	
Intersection Street 1	First intersecting street based on geo validated incident location	
Intersection Street 2	Second intersecting street based on geo validated incident location	
Address Type	Type of incident location information available.	Values: Address; Block face; Intersection; LatLong; Placename
City	City of the incident location provided by geovalidation.	
Landmark	If the incident location is identified as a Landmark the name of the landmark will display here	
Facility Type	If available, this field describes the type of city facility associated to the SR	
Community Board	Provided by geovalidation.	
Borough	Provided by the submitter and confirmed by geovalidation.	
X Coordinate (State Plane)	Geo validated, X coordinate of the incident location.	
Y Coordinate (State Plane)	Geo validated, Y coordinate of the incident location.	
Latitude	Geo based Lat of the incident location	
Longitude	Geo based Long of the incident location	
Location	Combination of the geo based lat & long of the incident location	
Park Facility Name	If the incident location is a Parks Dept facility, the Name of the facility will appear here	
Park Borough	The borough of incident if it is a Parks Dept facility	
School Name	If the incident location is a Dept of Education school, the name of the school will	
	appear in this field. If the incident is a Parks Dept facility its name will appear here.	
School Number	If the incident location is a Dept of Education school, the Number of the school will	
Cahaal Basian	appear in this field. This field is also used for Parks Dept Facilities.	
School Region	If the incident location is a Dept of Education School, the school region number will be appear in this field.	
School Code	If the incident location is a Dept of Education School, the school code number will be appear in this field.	
School Phone Number	If the facility = Dept for the Aging or Parks Dept, the phone number will appear here.	
SCHOOL PHONE NUMBER	(note - Dept of Education facilities do not display phone number)	
School Address	Address of facility of incident location, if the facility is associated with Dept of	
	Education, Dept for the Aging or Parks Dept	
School City	City of facilities incident location, if the facility is associated with Dept of Education, Dept for the Aging or Parks Dept	
School State	State of facility incident location, if the facility is associated with Dept of Education,	Any
School Zip	Dept for the Aging or Parks Dept Zip of facility incident location, if the facility is associated with Dept of Education, Dept	NY
Cohool Not Es	for the Aging or Parks Dept	V. AL DI ANIK
School Not Found	Y' in this field indicates the facility was not found	Y; N; BLANK
School or Citywide	If the incident is about a Dept of Education facility, this field will indicate if the	V. N. DI ANK
Complaint Vehicle Type	complaint is about a particualr school or a citywide issue. If the incident is a taxi, this field describes the type of TLC vehicle.	Y; N; BLANK Car Service; Commuter Van; Green Taxi
Taxi Company Borough	If the incident is a taxi, also lied describes the type of TEC vehicle. If the incident is identified as a taxi, this field will display the borough of the taxi company.	Car Service, Commuter Van, Green Taxi
Taxi Pick Up Location	If the incident is identified as a taxi, this field displays the taxi pick up location	Grand Central Station; Intersection; JKF Airport; La Guardia Airport; New York-Penn
		Station; Other; Port Authority Bus Terminal
Bridge Highway Name	If the incident is identified as a Bridge/Highway, the name will be displayed here.	
Bridge Highway Direction	If the incident is identified as a Bridge/Highway, the direction where the issue took place would be displayed here.	
Road Ramp	If the incident location was Bridge/Highway this column differentiates if the issue was	Beatwey Barra
Bridge Highway Segment	On the Road or the Ramp. Additional information on the section of the Bridge/Highway were the incident took	Roadway; Ramp
Garage Lot Name	place. Related to DOT Parking Meter SR, this field shows what garage lot the meter is located in	
Ferry Direction	Used when the incident location is within a Ferry, this field indicates the direction of ferry	Manhattan Bound; Staten Island Bound
Ferry Terminal Name	Used when the incident location is Ferry, this field indicates the ferry terminal where the incident took place.	,

Source: 311 SR Data Dictionary. https://nycopendata.socrata.com/api/views/erm2-nwe9/files/1c02701c-39b4-4365-837b-36f785eb33db?download=true&filename=311%20SR%20Data%20Dictionary.xlsx, accessed October 2017.

Exhibit 7 Record of a Single Service Request

Unique Key	37348038	
Created Date	10/5/17 0:00	
Closed Date	10/5/17 1:06	
Agency	DHS	
Agency Name	Operations Unit - Department of Homeless Services	
Complaint Type	Homeless Person Assistance	
Descriptor	N/A	
Location Type	Residential Building/House	
Incident Zip	10025	
Incident Address	932 AMSTERDAM AVENUE	
Street Name	AMSTERDAM AVENUE	
Cross Street 1	WEST 105 STREET	
Cross Street 2	WEST 105 STREET	
	MEST TOD STREET	
Intersection Street 1		
Intersection Street 2	100000	
Address Type	ADDRESS	
City	NEW YORK	
Landmark		
Facility Type	N/A	
Status	Closed	
Due Date	10/5/17 1:00	
Resolution Description	The mobile outreach response team went to the location provided but could not find the individual that you reported.	
Resolution Action Updated Date	10/5/17 1:06	
Community Board	07 MANHATTAN	
Borough	MANHATTAN	
X Coordinate (State Plane)	993,706	
Y Coordinate (State Plane)	230,839	
Park Facility Name	Unspecified	
Park Borough	MANHATTAN	
School Name	Unspecified	
School Number	Unspecified	
School Region	Unspecified	
School Code	Unspecified	
School Phone Number	Unspecified	
School Address	Unspecified	
	Unspecified	
School City	·	
School State	Unspecified	
School Zip	Unspecified	
School Not Found	N	
School or Citywide Complaint		
Vehicle Type		
Taxi Company Borough		
Taxi Pick Up Location		
Bridge Highway Name		
Bridge Highway Direction		
Road Ramp		
Bridge Highway Segment		
Garage Lot Name		
Ferry Direction		
Ferry Terminal Name		
Latitude	40.80027065	
Longitude	-73.96584602	
Location	(40.80027064646156, -73.96584601974453)	

Source: "311 Service Requests from 2010 to Present," NYC Open Data, https://nycopendata.socrata.com/Social-Services/311-Service-Requests-from-2010-to-Present/erm2-nwe9/data, accessed October 2017.

Endnotes

¹ "311 Sets New Record with Nearly 36 Million Interactions in 2016," City of New York, January 19, 2017, http://www1.nyc.gov/office-of-the-mayor/news/033-17/311-sets-new-record-nearly-36-million-interactions-2016, accessed September 2017.

² "About NYC311," New York City, http://www1.nyc.gov/311/our-story.page, accessed September 2017.

³ Sarah Goodyear, "3-1-1: A City Services Revolution," Citylab (via The Atlantic), https://www.citylab.com/city-makers-connections/311/, accessed September 2017.

⁴ Sarah Goodyear, "3-1-1: A City Services Revolution," Citylab (via The Atlantic), https://www.citylab.com/city-makers-connections/311/, accessed September 2017.

⁵ Sarah Goodyear, "3-1-1: A City Services Revolution," Citylab (via The Atlantic), https://www.citylab.com/city-makers-connections/311/, accessed September 2017.

⁶ Sarah Goodyear, "3-1-1: A City Services Revolution," Citylab (via The Atlantic), https://www.citylab.com/city-makers-connections/311/, accessed September 2017.

⁷ "New York City: A City of Neighborhoods," City of New York, http://www1.nyc.gov/site/planning/data-maps/city-neighborhoods.page, accessed October 2017.

⁸ "Population Facts," City of New York, https://www1.nyc.gov/site/planning/data-maps/nyc-population/population-facts.page, accessed October 2017.

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