The Citywide Analytics Team
OUR 2020 VISION

*Celebrating **5** years of serving our residents in the City of Boston*

As we celebrate 5 years of the Citywide Analytics Team, we have compiled our major projects over the years as an effort to make it easier to understand how we support the City of Boston through data initiatives.

This report also highlights our plans for the future of data in the City of Boston. As we begin a new decade, you can count on us to make data driven decisions that will continue to help our City flourish.

"We created Boston's Analytics Team in 2015, and in five eventful years, the team has helped make data driven decisions that positively impact residents in the City of Boston," said Mayor Walsh. "We use data, process improvement, and technology to make life better for everyone who lives and works in our city."

– Mayor Martin J. Walsh

WHAT DO WE DO?

The Citywide Analytics Team is the central data organization for the City of Boston. We use data, process improvement, and technology to make life better for everyone who lives and works in Boston. Mayor Walsh created our team in **2015** with the goal of developing innovative programs and improving performance across all parts of City government.

Previous Year in Reviews:

2018 YIR | 2017 YIR | 2016 YIR | 2015 YIR

ANALYTICS BY THE NUMBERS

We've completed
141 PROJECTS
since 2015

You can find
158 DATA SETS
on Analyze Boston

Analytics data warehouse currently has
330GB *of data from*
31 DEPARTMENTS

We deployed lots of code to production,
412 CODE REVIEWS *in 2019*

Worked with
OVER 80%
of city departments in 2019

32 *summer, semester, and year-long fellows*

There are
89 PIPELINES
running regularly in the Analytics data warehouse

14 *team members!* (see end of report)*

31 *story maps*

City of Boston
Mayor Martin J. Walsh

How does our work relate to: **STREETS**

1. VISION ZERO (2016-2019)

[Vision Zero Boston](#) is the City of Boston's commitment to focus the city's resources on proven strategies to eliminate fatal and serious traffic crashes in the city by 2030. We are inspired by the belief that even one fatality is too many.

Our team coordinated with multiple city departments to establish an automated process for sharing crash and fatality data. This dataset, provided as part of the Vision Zero Boston program, contains records of the date, time, location, and type of crash for incidents requiring public safety response which may involve injuries or fatalities. All records are compiled by the Analytics Team from the City's Computer-Aided Dispatch (911) system and verified as having required a response from a public safety agency.

Additionally, using open-source geospatial software, the team worked to ensure that data points were being accurately placed in the middle of the appropriate street segment, rather than in the middle of city blocks.

Working closely with our Transportation and Public Safety departments, the Analytics Team developed reports, publically available dashboards and data as well as [a map that constituents can use](#) to report traffic safety concerns to the city.
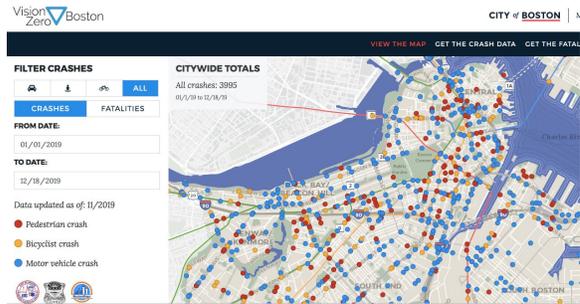
[Vision Zero crash and fatality map](#).

"The Analytics Team has provided extensive support to the Streets cabinet. From helping us track and manage field operations, to analyzing the impact of Go Boston 2030 projects, effective use of data is an important part of managing Boston's streets."

– Chris Osgood, Chief of Streets, Transportation & Sanitation

[Crash data dashboard](#)

*City of Boston
Mayor Martin J. Walsh*
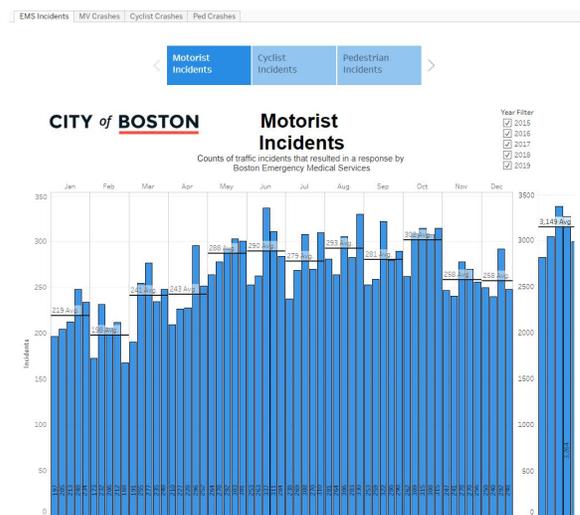
2. STREETCASTER (2016)

Partnered with the Public Works Department to develop a "priority sidewalk network" that allowed the department to assign priority to sidewalk reconstruction as part of their effort to bring equity to street repairs in the City of Boston. This network has informed Public Works' capital reconstruction program since 2018.

3. TRANSPORTATION PILOT PROJECT EVALUATIONS (2015-2019)

Assisted the Boston Transportation Department and the Mayor's Office of New Urban Mechanics with data collection and analysis for a number of pilot projects designed to help ease congestion and/or improve safety, including evaluating the effectiveness of performance parking in the Back Bay and Seaport, a dedicated bus lane in Roslindale, and designated pick-up/drop-off curb space near Fenway Park.

4. MBTA BUS HEATMAP TOOL (2019)

Using the MBTA's publically available real time bus location data, we built a tool that allows Boston Transportation Department planners to visualize bus route performance across different routes and key city corridors.

MBTA bus heatmap

5. PARKING ENFORCEMENT OFFICER SHIFT ANALYSIS (2019)

Worked with the Boston Transportation Department to evaluate the complex Parking Enforcement Officer shift structure, and made recommendations to improve efficiency and citywide shift coverage.

6. CONSOLIDATED STREET CENTERLINE DATA (2019)

Reconciled and merged the city's three separate street layer files into a single centerline, making it possible for departments to share information about what is happening on our streets.

7. DESIGN PILOT EVALUATION (2019)
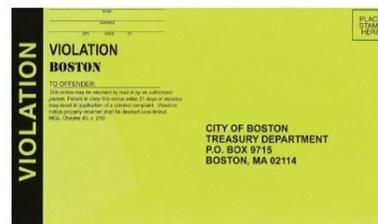
Worked with the Public Works Department and the Digital Team to evaluate the effectiveness of a ticket envelope redesign for Code Violations in increasing payment rates and ensuring constituents are aware of their options.

How does our
work relate to:
HOUSING

1. IMPLEMENTING THE CITY'S SHORT-TERM RENTAL ORDINANCE (2019)

In 2018, the Boston City Council passed an ordinance establishing new guidelines and regulations for short-term rentals in Boston, with the goal of preserving housing while allowing Bostonians to benefit from this new industry.

Enforcing this ordinance required creating, from scratch, a dataset that outlines the eligibility of every residential housing unit in the city, building dashboards to track the progress of the registration process, providing ISD with the data needed for enforcement efforts, and negotiating a data-sharing agreement with AirBNB.

Creating the new dataset required a deep-dive into different addressing and property ownership data sources, working closely with the Assessing and Inspectional Services Departments, and ensuring that clear and transparent instructions and requirements were posted on Boston.gov and Analyze Boston.

We are now developing processes to update and alert the Inspectional Services Department as listings are added to or removed from online platforms in compliance with the ordinance.

"Inspectional Services has worked hand-in-hand with the Analytics Team to implement the City's short-term rental ordinance. Their team was crucial to providing us with the data we need to effectively evaluate eligibility and carry out enforcement."

– Dion Irish, Commissioner, Boston Inspectional Services Department

2. PREDICTIVE MODELING FOR HOMELESS SHELTER REFORM (2019)

The Department of Neighborhood Development (DND), as a part of their effort to eliminate chronic homelessness in Boston, sought to identify patterns of homelessness and shelter use to inform improvements to the system for providing housing assistance.

The team used machine learning techniques to train a predictive model of shelter stay length on historical records of homelessness. The model aims to help Housing services identify individuals who will exit homelessness without additional intervention or aid, and to uncover relevant patterns and trends in the homelessness data.

Our findings will help inform the upcoming Mayor's Action Plan to End Veteran and Chronic Homelessness.

How does our
work relate to:
**PERFORMANCE
AND INTERNAL
OPERATIONS**

1. CITYSCORE (2016)
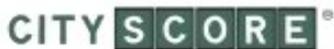
CITY SCORE®

In 2016, the City of Boston launched CityScore. CityScore is an initiative designed to inform the Mayor and city managers about the overall health of the City at a moment's notice by aggregating key performance metrics into one number. CityScore enables city leaders to ask better questions about city services, and enables the public to hold the city accountable.

In 2018, CityScore was updated to include new metrics, and was completely re-engineered and migrated to our data warehouse to ensure sustainability and ease of maintenance over time.

2. AUTOMATED REVENUE REPORTS (2019)

We worked with the Budget Office to automate the revenue reports analysts previously manually compiled for the City's revenue-generating departments. Our work saves that team 40-60 staff hours every month.

3. CREATING A DATA WAREHOUSE (2019)

After carefully scoping our current and future needs, we implemented a centralized data warehouse - powered by the Civis Analytics platform - that enables automated data transfers and supports collaboration in analytics projects.

Prior to the Data Warehouse, data was stored in many different servers, each with different levels and methods of access. It was hard to keep track of, and hard to make sure everything was consistently accessible and up-to-date.

A centralized Data Warehouse allows us to combine datasets from previously siloed systems. This lets us answer questions which were previously unanswerable and gain rich insight into projects spanning multiple departments and enterprise systems.

The Data Warehouse and automation platform is completely hosted in the cloud. Extensive collaboration efforts between internal DoIT teams allowed us to build secure network connections to allow for data flow between on premise data systems and a cloud Data Warehouse environment.

4. ETHICAL DATA WORKING GROUP (2019)

Launched an ethical data working group to start a collaborative conversation about the ethical implications of data science projects.

5. AUTOMATED KPI SCORECARDS (2018)

Developed automated scorecards for the City's key performance indicators to allow the Mayor, his staff, Cabinet Chiefs, and their

departments to track their performance, and to more readily recognize changes and trends in the data. By leveraging our data warehouse, we were able to decommission the system that previously supported the performance management program, saving the City money. What's more, these tools are automated, removing the manual input that the former reporting process relied on. And since these scorecards were designed using the same data collection methodology that we implemented for the second iteration of Cityscore, the Analytics team can have greater confidence in the data quality.

6. DIGITIZING DATA COLLECTION (2019)

Developed processes to create 10 new datasets - digitizing information that was previously on paper or tracked in a siloed spreadsheet on a single computer. This information is now available to city staff for visualization and analysis.

Our work with the Boston Public Library incident reports illustrates how helpful to City operations and public safety digitizing forms and records can be. Previously, there was no way to systematically track or store safety and security incidents occurring at library locations. We worked with the Boston Public Library to build an online, centralized form and database. Library staff now receive

automated reports, are able to follow up on incidents, track issues, and can build reports as needed.

 How does our work relate to: **CIVIC ENGAGEMENT**

1. ANALYZE BOSTON (2017)

ANALYZE BOSTON

In 2017, the City of Boston launched Analyze Boston, our open data hub where you can find facts, figures, and maps related to the City. Built using open source technology, we made the site more transparent and accessible and included more context like data dictionaries and explanations that makes data more usable for the public.

Over time, we have continued to add new datasets to Analyze Boston - nine just in 2019 - including three intended to help promote engagement, and understanding of the city's annual budget.

Analyze Boston is frequently used by students, researchers, and community groups to better understand what's happening in Boston. You can check out our showcases to see what our users have done with open data.

2. DATA LITERACY PROGRAM (2018)

We helped launch the Civic Data Ambassadors Program, a free course that teaches librarians the basics of data analysis and how to use Analyze Boston. The six-week online course was a collaboration with the Engagement Lab at Emerson College. More than 30 librarians, many working in the Boston Public Library system, enrolled in the course.

3. ENSURING EVERYONE IS COUNTED (2018-2019)

To prepare for the 2020 Census we reviewed and updated the US Census Bureau's residential address list in collaboration with the Assessing Department, Elections Department, Department of Neighborhood Development and the Boston Planning and Development Agency - finding over 50,000 new potential addresses. This work will help ensure an accurate decennial census count for Boston, which will determine the allocation of more than $675 billion annually in federal funding.

4. OPERATION THANK-A-VET ROUTING (2019)

In order to efficiently use City staff and volunteer time and resources, the Office of Veterans Services required a new method of planning routes for volunteers to go door-to-door reaching out to veterans.

With our help, staff can automatically generate routes using ArcGIS routing technology and generate spreadsheets and maps to be for volunteers at events. This allows the Office of Veterans Services to be more efficient with their event preparation, reach more veterans per event, improve the volunteer experience, and keep track of veterans that they have not visited.

5. STORY MAPS

Story maps are a way of presenting information in a visual way using maps, images, videos, text and links to web content.

Story maps are being used by 10 city departments in a variety of ways. The Design & Construction story map shows the improvements being made to parks across the city. To Houston with Love tells the story of Boston employees and constituents working together to send help after Hurricane Harvey. The Mayor's Coffee Hours story map shows the schedule of when he will be visiting each neighborhood. Information about neighborhood liaisons, city department locations, museums and community centers can all be viewed as story maps.

6. MAPS AND DATA ON BOSTON.GOV

In addition to Analyze Boston, it's important for departments to share data with constituents through the City's website. To make that process easier, we created a simple template in our data warehouse platform to allow pulling data from Google Docs to an online map automatically. This enables departments to publish their location-based data to Boston.gov. Currently there are 17 daily automated workflows using this template, including public restrooms and climate resilience harbor projects.

How does our
work relate to:
PUBLIC SAFETY

1. IMPROVING AMBULANCE RESPONSE TIMES (2016-2018)

CityScore generated a significant project engagement with Emergency Medical Services that initially led to an investment in new ambulances and additional EMTs to help address growing call volume.

We then worked with EMS to evaluate that investment and ultimately designed and implemented Community Assistance Teams - a novel way to provide specialized care for residents dealing with issues such as substance abuse and homelessness. These teams work in high-demand areas helping EMS keep their response times low and connecting patients with the long-term support and services they need.

2. NEW EMERGENCY SERVICE ZONE FEEDBACK TOOL FOR BOSTON FIRE (2019)

We designed a mapping tool to help firefighters provide feedback on new Emergency Service Zones. Through this tool, firefighters can visually browse and provide feedback on dispatch orders and response zones. This enables the Computer Aided Dispatch administrator to make informed decisions on dispatch areas, helping meet response time goals.

3. COMMUNITY ENGAGEMENT PORTAL (2019)

In order to promote positive relationship building between officers and constituents, we worked closely with the Bureau of Community Engagement and the Office of the Police Commissioner to develop a tool to document the community engagement efforts of the Boston Police Department. This work has resulted in two products that we continue to develop and improve - a digital platform for districts to document their engagement efforts, and an interactive map and dashboard for use in CompStat and other data-driven settings.

4. BOSTON MARATHON DASHBOARD (2018)

We worked with the Massachusetts Emergency Management Agency and the Boston Regional Intelligence Center to develop an operations dashboard for the 2018 Boston Marathon that tracked runners progress from the start to the finish line and allowed Emergency Management to coordinate services according to the volume of runners entering Boston at any given time.

How does our
work relate to:
CLIMATE AND ENVIRONMENT

1. REDUCING GREENHOUSE GAS EMISSIONS (2018)

Boston's Building Energy Reporting and Disclosure Ordinance (BERDO) is a critical tool for achieving the goals of the Climate Ready Boston program. The ordinance requires Boston's large- and medium-sized buildings to report their annual energy and

water use. It further requires buildings to complete a major energy savings action or energy assessment every five years.

We worked with the Environment Department to automate and clean data collected from building owners throughout Boston, in order to more effectively enforce BERDO and gain insights from these reports. This project helps the City reduce its carbon footprint by expanding public awareness of buildings' energy usage and identifying opportunities to improve efficiency through targeted outreach programs. We used this data to build an interactive map, and BERDO data is also made public through Analyze Boston.

2. USING DATA TO SAVE ON ELECTRIC BILLS (2018)

Working with the Environment department, the Analytics Team set up an automated data feed showing real time data on the energy usage by City Hall and Copley Library - the two most energy intensive buildings owned by the City. The data feed and subsequently developed mobile dashboards allow Energy Managers for the buildings to view the data and react the same day. This has saved the City thousands in operational energy costs.

3. TREE WATERING AND INSPECTIONS (2018)

We created a suite of apps, dashboards, and maps to assist the Parks Department in monitoring the health and weekly watering of newly planted trees. By leveraging these tools, the city is better positioned to protect the investments we make in new street trees.

AWARDS AND RECOGNITION

- (2019) Winner - AWS City on a Cloud Public Datasets Award

- (2018) What Works Cities Silver Certification (one of 9 inaugural certified cities)

- (2017) Bright Ideas in Government award - CityScore - The Harvard Kennedy School Ash Center

- (2017) Map of the Month - Harvard Kennedy School Ash Center, *Vision Zero*

- (2016) Winner - AWS City on a Cloud Dream Big Award

- (2016) Winner - Drexel University / CIO.com Analytics 50 award for innovation in analytics

- (2015) Grand Prize Winner - Best Overall Story Map, Esri Storytelling with Maps Contest, *Snow Journal*

- (2015) First Place Winner - Best Infrastructure, Planning and Government Story Map

WHAT'S NEXT?
2020 AND BEYOND

1. ANALYTICS FOR IMPACT

As always, the core work of our team will continue to be project partnerships with City departments to improve business processes and deliver better services to residents by leveraging data, process improvement, and technology.

We expect to continue working with our partners listed above - particularly the Boston Transportation Department, Public Works Department, and Department of Neighborhood Development as they work to achieve the goals of the Go Boston 2030 and Housing a Changing City: Boston 2030 plans.

Additionally, we're excited to work more closely with the Administration & Finance and Economic Development cabinets to help improve internal operations and support the execution of Mayor Walsh's executive order on equitable procurement.

2. DATA LITERACY & TRANSPARENCY

In addition to our project partnerships, the Analytics Team will continue to make data as accessible as possible to the public and city staff. We want to increase data literacy and make it easier to understand the value of data and analytics.

We will continue to develop our own skills while coaching others and providing resources to our colleagues who wish to take on their own analytics projects. Throughout 2020 we'll be developing guides for city staff on best practices and how-to's for taking on different types of analytics projects and data tasks.

We are committed to continuing to improve and update the data science techniques in our toolkit, from natural language processing to

computer vision. These techniques allow us to tackle complex problems like forecasting and routing in new and creative ways.

We're also dedicated to keeping up with the fast-evolving landscape of data and analytics tools, making sure the City is investing in the right technologies while being mindful of sustainability and cost.

3. IMPROVING DATA QUALITY

Insights and conclusions from our Analytics projects are only as good as the data we're working with. That's why we're invested in improving data quality wherever possible. To us, that means having good data documentation and increasing the use of automation to reduce manual data processes.

In 2020 we're undertaking a significant project to upgrade and consolidate our GIS environment. We'll work with our stakeholders to identify authoritative datasets, automate data transfers, and reduce our infrastructure footprint.

Building on the newly reconciled street centerline data, we're working with numerous stakeholders starting in 2020 to develop a central linear referencing system for all City streets. This centerline will be used as a centralized location to add various City owned assets such as parking meters, curb signage, construction locations, road closures, and many more.

4. IMAGE DATA ANALYSIS

The City will be conducting various flyovers to gather the latest image data, including aerial photos and LiDAR. This will allow the Analytics Team to update all maps with the latest street and building outlines. Additionally the LiDAR data will allow for accurate 3D modeling of various city assets such as buildings and trees.

QUOTES RELATED TO OUR WORK

"I use the Vision Zero crash map almost every day. Thanks so much for all your work to make it so user friendly. Having the map and the dashboard update automatically as soon as the data is available has significantly streamlined our workflow and improved our ability to track progress toward making our streets safer."

– Charlotte Fleetwood
Senior Planner,
Boston Transportation Department

"Thanks to the Analytics Team for their work supporting the City's Melnea Cass/Mass Ave 2.0 plan. They're helping us coordinate data collection and reporting across multiple departments to present data in ways we haven't been able to before."

– Eamon Miller
Project Manager and Lead Evaluator,
Boston Fire Department

"Thanks to the Analytics Team for automating our revenue reports process, saving our budget analysts 2-3 hours per department each month and eliminating manual entry errors. We now have more time to spend monitoring and analyzing revenue streams, without the burden of compiling our reports manually."

–Mor Zoran
Assistant Director – Revenue Forecasting and Policy, Office of Budget Management

"The Community Preservation Act requires a level of transparency we weren't sure how to achieve. We wanted to share with Boston residents the scope of projects funded in the first two rounds of this exciting, open process supporting affordable housing, historic preservation, and parks and open spaces. The Analytics Team suggested an interactive map...

We provided them with the right data and voila! Staff on the Analytics team created a fabulous map. Now we want to do more and we know Analytics will show us how and help us along the way. Partnering with Analytics has really upped our game and made our work more community-accessible."

– Christine Poff
Community Preservation Director

"We really enjoyed working with the Analytics Team on creating an interactive map for BCYF. Everyone we've worked with has been incredible. What started with a presentation on analytics and mapping possibilities ended with an amazing resource for Boston residents. We can't thank them enough for all the time and effort they put into this project. Now it's so easy for anyone to find exactly what they are looking for at a BCYF facility from swimming pools to computer labs. We can't wait to see what new opportunities we'll have to work with Analytics."

– Dawn Newcomb and Sandy Holden
Boston Centers for Youth and Family

"The Analytics Team assisted the BFD in developing an easy to use web map that also allowed end users to submit their feedback. Our operational needs were understood and met very easily, and the finished product was produced in a short time."

– Zack Shark
CAD System Administrator,
Boston Fire Department

"There are two distinct eras in the Mayor's Office of Scheduling and Advance: before our new digital tracking/workflow tool and after. We're grateful to the Analytics Team for taking the time to learn what we do and understand how our office functions, as a result we now have a tool that not only allows us to collect and present valuable data, but streamlines our workflow, and honestly, just makes our jobs a whole lot easier. Thank you!"

– Erin Santhouse
Executive Director of Scheduling and Advance.
Office of Mayor Martin J. Walsh

"We wanted to streamline our process for reporting incidents to help us make data-driven decisions. Working with Analytics, we now have a much better process in place for collecting and querying data. We've also received positive feedback from staff on the smooth transition to the new reporting tool."

– Kurt Mansperger
Chief Technology Officer, Boston Public Library

"The types of projects MONUM works on requires a mix of complementary skills around the table, and the Analytics Team has been a critical partner in that work, supporting the data collection and evaluation of many of our experiments."

– Kris Carter
Co-Chair, Mayor's Office of New Urban Mechanics

"The Analytics Team was able to streamline our Code Enforcement database making it easier to access and track requested datasets. By simplifying the process, the Public Works Department is able to respond to residents, media outlets, and public records requests more efficiently."

- Chris Coakley
Public Information Officer, Public Works Department

14 Team Members*

Maria Borisova	Tim Condon
Stefanie Costa Leabo	Kevin Crossley
Max Handler	Joyce John
Albert Lee	Mieka Lewis
Sam Lovison	Kim Lucas
Courtney Moores	Jon Porter
Matt Smith	Chris Stephens
Daniel Kim	