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CityScore: Big Data Comes to Boston

"A man has to have goals - for a day, for a lifetime."

— Ted Williams¹

In March 2021, Martin “Marty” Walsh stepped down from his position as the mayor of Boston to become the U.S. Secretary of Labor. Walsh had served as mayor since 2014, and his administration had achieved many of its goals during this time including transforming Boston’s government into a more data-driven organization. In 2014 Walsh had promised to make Boston “the first 21st-century city in America.” Central to this data-driven approach to governing was the creation of CityScore, a data dashboard that measured the city’s progress across a range of metrics. The dashboard was spearheaded by his chief of staff, Dan Arrigg Koh. It was updated daily and was available online for all to see. It was also displayed in offices throughout City Hall so that city workers and constituents knew where the city was succeeding and where it was falling short. The Mayor frequently discussed CityScore targets in cabinet meetings, and the information it provided had become an important tool in making policy decisions and allocating budgets.

But with Walsh moving on, what would become of CityScore? Following the eight-month term of interim Mayor Kim Janey, Michelle Wu was elected and sworn in as Boston’s new mayor. Should the City of Boston continue to use CityScore as a tool to measure the city’s performance? If so, how should it be adapted and updated? Or, was it time to move on?

Big Data in City Management

By 2020, 56% of the world’s population² and 86% of the U.S. population lived in cities.³ Growth in cities had been outpacing population growth in rural areas, and the United Nations projected that 68% of the world’s population would reside in cities by 2050.⁴ With increased populations came new challenges. In the United States, city governments, on their own or in conjunction with the state and federal government, were responsible for providing a wide range of services including: primary and secondary education; police; fire; parks and recreation; emergency medical services; transportation; municipal courts; housing services; and public works (including roads, streetlights, signage, and snow removal). Most U.S. cities were governed by an elected mayor and city council.^{5,6} The average city

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budget of the 100 largest cities in the U.S. was \$2.1 billion, with an average spent per citizen of \$2,605.⁷ Cities paid for these services from a range of revenue sources. Property taxes contributed 24% of city revenues on average.⁸ Aid from the federal and state governments was for most cities their second largest revenue source. Other revenue sources included: sales tax, utilities tax, and gasoline and hotel tax. (Not all cities had the authorization to raise these taxes.) City governments also had the power to raise debt by issuing bonds, largely to pay for infrastructure projects.⁹

In recent years, urban administrators had faced demands for increasing engagement with and accountability to their citizens. At the same there had been rapid development in technological tools making such engagement practical and cost-effective to implement.¹⁰ One increasingly popular tool used by cities was a centralized services hotline. In 1996, Baltimore, MD became the first U.S. city to implement a 311 system. 311 was a non-emergency phone number that citizens called to ask questions, report problems, or make complaints.¹¹ The original objective of these lines was to reduce unnecessary traffic on emergency call lines (911). In 2003, Mayor Michael Bloomberg had introduced the 311 line in New York City. By 2014, approximately 300 cities had 311 call systems in place. These systems could be expensive to operate with an average cost of \$3.40 to answer a call.¹² Over time 311 call volume was shifting to 311 apps and websites.

In 2017, the World Economic Forum produced its study, "Data Driven Cities: 20 Stories of Innovation." The study highlighted the ways in which cities across the globe were using data and focused on three key types of data: "opportunistic data," data collected for one reason but then repurposed in other capacities; "purposely-sensed data," data generated via the use of sensors; and "user-generated data," data submitted by individuals through social media or other outlets.¹³ In Quito, Ecuador, a mobile platform had been created to allow citizens to report sexual harassment incidents on public transportation.¹⁴ The government of United Arab Emirates used blockchain technology across a range of government and non-government transactions. For example, the Roads and Transport Authority was working on a platform that allowed buyers, sellers, mechanics, insurance companies, and others to record vehicle history details—allowing for greater transparency in the transfer of used cars.¹⁵ In Copenhagen, where bicyclists made up 41% of traffic, the city was using dynamic bicycle signs and a mobile app that provided real-time traffic information. They installed smart streetlights that turned on and off in response to traffic. The city hoped by making cycling more appealing it would increase its share of traffic to 50%.¹⁶ The Chinese city of Yinchuan was using a facial recognition system to collect fares via an automated payment system on city buses. This was one of 200 "smart city" projects being piloted across China.¹⁷ CrimeRadar was an app available to citizens in Rio de Janeiro, which provided projections on crime and crime risk. Police departments across the globe were using data tools to project crime trends, but access to the data was generally limited to the police. This product was unique in that the data was made public.¹⁸ Finally, the Massachusetts Institute of Technology had constructed its Senseable City Laboratory, which used data to analyze urban patterns and predict changes. Its Stockholm Flows project used 281,863 geotagged tweets to draw conclusions about how (and if) people from different backgrounds crossed paths within the city.¹⁹

Many cities had developed "smart city" plans, which layered technology tools onto existing urban systems to improve effectiveness and efficiency. One study estimated that such tools could be used to "reduce fatalities by 8-10 percent, accelerate emergency response times by 20-35 percent, shave the average commute by 15-20 percent, lower the disease burden by 8-15 percent, and cut greenhouse gas emissions by 10-15 percent, among other positive outcomes."²⁰ In addition to Boston, U.S. cities that led the way in development of smart city technologies included: New York, San Francisco, Chicago, Seattle, Austin, and Los Angeles.²¹

The City of Boston

In fiscal year 2019, the city of Boston's revenues totaled \$3.4 billion, and expenses totaled \$3.3 billion. (See **Exhibits 1a and 1b** for a breakdown of revenues and expenses by type.) Boston had enjoyed significant growth in recent years—the city's population had grown by 9% over the previous 10 years and by 2020 totaled 675,647.²² Boston had also grown more diverse, with its non-Hispanic white population declining to 45% of total population.²³ The city's operating budget had increased by 40% since 2009.²⁴ By 2030, the population of Boston was projected to grow to 710,000-724,000 residents.²⁵

Boston was governed by a mayor and a city council, both of which were directly elected by the citizens of Boston. The city council was comprised of 13 members (nine district councilors and four at-large councilors) who served two-year terms. The mayor served a four-year term, and there were no term limits. City government offices were located in Boston's City Hall. Boston utilized what was described as a "strong-mayor" governance system, which gave the mayor a high level of administrative authority and flexibility in organizing the city's government. The mayor also set the city's annual budget—with the city council's budget authority limited to an up or down vote.^{a,26}

Since the 1960s Boston had been led by a series of long-serving mayors. Kevin White served as mayor from 1968 to 1984. Ray Flynn was mayor from 1984 to 1993, and Thomas Menino was elected in 1993. Menino, who served as Boston's mayor until 2013, was famous for his belief in the personal touch. By the time he left office it was believed that he had personally met over half of Boston's residents.²⁷ He also considered himself an "urban mechanic," someone who focused on the details of running a city and on making incremental improvements. In the 2000s, Menino introduced a 24-hour citizen complaint line, utilizing the seven-digit phone number already in place at City Hall. One city executive recalled that prior to that point, complaints from constituents regarding city services were received and processed in a decentralized, haphazard fashion. "When I started with public works in 1996 you would find out about a pothole on the elevator or in the men's room or on a piece of paper that someone gave you," he explained. "And there was no responsibility whatsoever to finish that constituent engagement and confirm to someone that the pothole was filled or that the streetlight was fixed. There was no cycle of constituent engagement at all." In the hotline's first few years, about 450 calls were received per day. Roughly 90 calls per day were logged as complaints and were forwarded via email to the relevant department (e.g., a complaint about potholes was emailed to the Department of Public Works). However, by 2008 there was still no system in place to track complaints. A *Boston Globe* study surveyed a group of hotline callers over a three-month period in 2008 and found that half of the complaints submitted required a second call before they were resolved.²⁸ (See **Exhibit 2** for details on this study.)

In 2010, Menino launched the Office of New Urban Mechanics (MONUM) to "explore and tackle experiments and prototypes that cover a range of topics."²⁹ One of the office's early projects was a constituent response management system (CRM), which included a mobile app for constituent requests and an app that city workers could use to manage requests and close them when the work had been completed.³⁰ In 2013, Boston City Hall finally got voicemail. Menino had historically been a staunch opponent of voicemail—wanting citizens who called in to reach a real person. Once installed, its use was limited to when City Hall was closed or if a caller specifically asked to be transferred to voicemail. "The concept is still personal service whenever possible," said Bill Oates, Boston's chief information officer at the time.³¹ Menino also launched Boston About Results, a web-based performance management platform that collected operating statistics from across city departments and made them

^a The City Council gained increased budgetary powers after a 2021 referendum giving it the authority "modify and amend appropriation orders" passed.

publicly available. Annual targets were set and tracked, and online statistics were updated quarterly. (See **Exhibit 3** for Boston About Results performance for FY 2013.)

Mayor Walsh

"For this kid from Taft Street in Dorchester, you've made Boston a place where dreams come true...Together we're going to make Boston a place where dreams come true for every child and every person in every corner of this city."

— Mayor Walsh, November 5, 2013³²

In November 2013, Walsh was elected mayor of Boston. Prior to entering elected politics, Walsh had been a member of the Laborers Local 223 union and had gone onto head the Building and Construction Trades Council. Walsh recalled that his interest in politics stemmed from his childhood:

Since I was a little kid I've always been around politics or political rallies with my father and my uncle. Growing up I was active in the community, whether it was running a civic association or coaching or running baseball leagues, hockey leagues, things like that. And I just always had this desire to be in the public sector. In 1996, my state representative at the time, Jim Brett, decided he wasn't going to run again. So I ran for state representative. I was elected in 1997 to the House of Representatives. I served 16 years in the House of Representatives. And then in 2013 when Mayor Menino made the decision that he was not going to seek another term, I instantly knew that I was going to run for mayor. I had wanted to run for mayor of Boston for a long time. But you don't know in politics when it's going to happen. So I threw my hat in the ring for mayor in 2013. It was a highly contested field, and I was fortunate to win the primary and fortunate to win the race.

In January 2014, Mayor Walsh announced that Dan Arrigg Koh would be his chief of staff. Koh, a 2011 Harvard Business School graduate, had previously served as a leadership fellow in Mayor Menino's office and had gone on to be chief of staff at Huffington Post and then general manager of HuffPost Live, its video streaming network. Mayor Walsh recalled,

Bringing his perspective from HBS and bringing my perspective from labor, the legislature, and the political side of it, I thought that we could have an interesting relationship, which we did. And one of the first things we started talking about was data—the use of data, not on a year-to-year basis, but on a day-to-day. Rather than getting a report from previous years, how do we measure from day to day, from week to week, from month to month, from quarter to quarter, and from year to year?

A trip to visit Mayor Bloomberg further inspired Walsh with respect to what could be achieved using data to manage city services. "It was interesting because he had changed the style and the way they did business in New York," Walsh explained. "He had a bullpen, kind of like a newsroom, and his desk was in there and his Deputy Mayors were there next to him. And he talked about no walls and full transparency and understanding what was going on. And on the wall behind him were different data points. In Boston, in any reports I'd ever seen, there was usually year-to-year data. But he was looking at something more up-to-date."

At his inauguration in January 2014, Walsh laid out his priorities, "Strengthening our economy and creating jobs, Improving public safety and stopping senseless gun violence; Ensuring our schools help every child to succeed, and, Increasing trust and transparency in city government."³³ Walsh and

Koh began working on how they could better employ data in managing the city. One of the first things they did was to “drag a 40-inch TV on wheels into the Mayor’s office and use it to display some excel graphs on a rotating basis,” recalled Koh. This makeshift data dashboard was comprised of statistics that were already being produced, such as: the percentage of school buses that arrived on time, the number of potholes filled the previous day, and the number of narcotics-related incidents relative to previous year. Jascha Franklin-Hodge, Boston’s Chief Information Officer, joked that when a *Boston Globe* photographer published a picture of their makeshift dashboard “it was humorously mocked online. Somebody took the photo of the dashboard from the *Globe* and replaced the content with the 1980s video game Pong because it looked like about that level of visual sophistication.”

Franklin-Hodge explained that the initial statistics were largely manually generated. “Somebody was inputting things from a spreadsheet every morning. And we knew that this was both not scalable and also that these metrics were not designed based on the Mayor’s goals. These metrics were what was available.” Koh added, “We were very deliberate about not making perfect be the enemy of the good. It was important that we started the initiative with the data, systems, and hardware that we had, and iterated on it, versus waiting to do a more evolved version all at once. It allowed people to see the vision of where the Mayor wanted to go and helped us eventually get there.”

The Origins of CityScore

“It literally started with the conversation around the government batting average,”³⁴

— Dan Koh

Chris Osgood, who served as the Chief of Streets under Walsh, explained that the initial data work for the Mayor “led to a series of conversations, looking at some of the existing performance management systems that we had. We asked ourselves, how do we create a standard language around performance within the City? How do we make performance hyper-visible to the Mayor with screens on his walls, to the public through online dashboards, and to managers and City employees?” Just as Walsh and Koh had compiled a dashboard for the Mayor’s office, the city’s performance management team worked with department heads and cabinet chiefs to develop data dashboards for each department. Koh recalled, “We were new, the cabinet chiefs were new, and we asked them: what would you like to measure? What do you want to have first and foremost available for you?” (Walsh organized his government using a cabinet-style format, with each cabinet member responsible for a different portfolio, e.g., finance, health. The cabinet met weekly as a group.³⁵ See **Exhibit 4** for more detailed information on Walsh’s cabinet.)

Chris Dwelley, the city’s director of Performance Management, recalled, “As we rolled out dashboards for each department, and we started to refine the metrics that told the story of how the city was performing, this idea of CityScore came about. ‘Is there a way that we can make all of this data a little more manageable and roll it into one score that could highlight the health of the city?’” The CityScore project reflected Walsh and Koh’s beliefs about how the new Mayor could drive performance within the city and communicate, internally and externally, that commitment to continuous improvement. Walsh explained, “Data doesn’t lie. Data gives you an accurate picture of where you are. It helps you get to where you want to get to.” Koh, who had spent a summer during business school working for Major League Baseball (MLB) in their labor relations department was also inspired by how baseball teams, led by Billy Beane at the Oakland A’s, were using statistics to drive decision-making and improve performance. Walsh also quickly realized that having readily available data was a great time optimization tool. Rather than dig through excel spreadsheets or make calls, he was able to look at the dashboard and see instantly if a certain metric was on-track. This allowed Walsh to

quickly get his arms around the complex operations of the city and to think about how he was going to make changes. As Osgood explained, "He's somebody who is in this job not because he loves the status quo, but because he wants change. He wants to push the city forward."

The process of determining which metrics should be included in the unified city dashboard was three-fold. First, the data team met with cabinet chiefs and asked each of them, "What are the top two or three metrics that are really representative of your core responsibilities and are indicative of the overall health of the city from an outsider's perspective?" The team relied on the departments, as the subject matter experts, to provide the specific content, and then helped them to translate those activities into quantifiable metrics. Next, they went outside City Hall and polled the community. "What are the things you find most valuable in your day to day?" The team conducted several surveys and raised the topic at community meetings to get feedback. Finally, they incorporated the goals of the Walsh administration. Osgood explained that the items being measured needed to reflect the Mayor's belief that "the purpose of government is about supporting those who are most in need of support" and focus on areas that were fundamental to that purpose. These included: education, homelessness, and substance abuse. This process of coming up with a list of potential data items for what was to become CityScore took approximately six months.

Once the team had honed in on what should be measured, the next step was to think about *how* to measure those items. Franklin-Hodge explained that as they were developing the new dashboard, the feedback they were getting from the Mayor and Koh was that while their makeshift dashboard contained a lot of detailed data about individual departments, it didn't tell them what the indicator meant, why it might be moving in a particular way, or whether they should be worried. The idea behind CityScore was to do some of that assessment work upfront. What should we expect to see? What is a good number? What would be a warning sign? "And this had to be done across a variety of data types and rolled together in a way that made it easy to see at a glance, not necessarily what is happening, but whether something is happening that needs attention," Franklin-Hodge explained. To establish standards for individual city services the departments looked at historic data. How many potholes did we fill last year? How long did it take us, on average, to fill a pothole? These historic statistics were then used to set the service level agreement for each job. Each metric was given a score that was based on a pre-established service level agreement. A metric that was meeting its target was scored a "1." A score of higher than one meant that the target was being exceeded, a score of below one meant that the city was failing to meet the target.

The individual metrics were then rolled up into one single "CityScore" for the city of Boston. There was some discussion about using weightings when calculating the aggregate score, with metrics weighted based on perceived relative importance, but the team opted to start out with an unweighted average. Dwelley recalled, "We wanted to test out and prove the CityScore model as something of use to both internal and external stakeholders, and the thought at the time was that once we had done that, we could then see how we could apply weights to different metrics." The metrics would be updated daily, giving Boston a new score each day. The team was conscious of the downside risks of too much data measurement and the impact that this could have on employee morale. Because of this, Koh explained that "we wanted to send a message that this was something that we cared a lot about and that this was not meant to be penalizing a team but focusing them on the right metrics." Thus, they avoided using letter grades or labeling any department as failing.

In designing the visuals for CityScore, the team turned to Fenway Park (home of the Boston Red Sox) and its beloved Green Monster scoreboard (named for its location on the "Green Monster," the left field wall at Fenway Park and the highest field wall in Major League Baseball.) The CityScore background was Fenway Park Green, and the font and layout mimicked the look and feel of the Red

Sox scoreboard. Sam Kennedy, president and CEO of the Boston Red Sox, explained his perspective on the CityScore-Red Sox tie-in,

This is our world every single day in sports. We make judgments and decisions based upon data and information and statistics. Not just with our baseball decisions, when we're signing and trading players, but in our business operations as well. We're a very data centric organization in terms of how we do our pricing, how we handle negotiations for sponsorship sales. So we loved the idea of CityScore, and it just made a lot of sense to us, given the culture of our organization being so focused on using data to improve our operations.

Discussing the potential for CityScore's usage of the Green Monster image to cause controversy, Kennedy opined, "I understood how it could be controversial at first, but I think it was important for transparency and openness. There's a lot of skepticism around government and publicly elected officials, especially in today's world, so I think it was meant to be transparent, and more importantly, it was meant to improve things." Koh added, "The way CityScore was adopted by City Hall, and the way the media covered it was much more exciting because of the twist on baseball. People found it much more interesting than if we just had an excel spreadsheet, even though it's the exact same thing in terms of measurements." (See **Exhibit 5** for an image of the Green Monster.)

Another key piece of implementing CityScore was getting the buy-in of City Hall workers. Mike Dennehy, who served as commissioner of the Department of Public Works, recalled a meeting with union employees about distributing cell phones to field workers so they could receive and log new cases. "One of the gentlemen in the back asked, 'What does that red light mean on the phone?' And another person in the room stood up and said, 'That means they're watching you!' For a public works employee that was taboo." Some workers saw CityScore as a tool for managers to keep tabs on their employees; others saw it as unnecessary work. For example, there were employees within the Street Lighting Division who balked at the idea of setting targets. "Their thinking was, 'There are 60,000 streetlights, and there are going to be streetlights out. We'll get to them when we get to them,'" one employee recalled. "But Walsh and Koh understood that to the person who reported a streetlight outage it was not just another streetlight. It was a priority to them."

The Department of Public Works, which was responsible for emptying litter baskets and cleaning the streets and other tasks, was selected as one of the first groups to pilot the program. They set it up as a friendly competition between the geographic districts within this group. Who could fill more potholes? Who could plow streets in a more efficient manner? Other groups followed, and as they began to measure the average time it took to complete various jobs, many of those time frames declined. One of the most impressive statistics came from the Street Lighting Division – with the average time it took to repair a streetlight declining from 35 days to one week. These improvements came from a variety of factors. In some cases, the increased oversight generated productivity gains. In other cases, the measurement process highlighted problems or inefficiencies that were easy fixes – in the case of the streetlights, they realized that the department's storekeeper frequently did not have the right inventory on hand. Once they improved the inventory ordering process, the group became more efficient. They also authorized overtime so that groups could play catch-up on metrics and get them to a good starting point.

In August 2015 the Mayor's hotline was updated with a 311 number. Walsh commented on the launch, "This is a way to increase civic engagement...Our job is customer service. And this is about changing the culture here."³⁶ The 311 system could be accessed via telephone, online, or via an app. An individual using the 311 app could, for example, report a pothole and when the pothole was filled, they

would be notified through the app (including a picture of the filled pothole). The Citywide Analytics Team was also created in 2015. The team's mission was:

to use data to improve quality of life and to enhance government operations in the City of Boston. By combining modern data analysis and visualizations with a deeply engaged approach to performance improvement and change management, the team works with departments across the City to solve challenging problems, build a more effective government, and deliver better outcomes for people who live and work in Boston.³⁷

By 2020, the Citywide Analytics Team had grown to 14 members and completed 141 projects. One such project was Vision Zero, which established an automated process for sharing data on serious and fatal traffic accidents across city departments.³⁸ The team also created apps and maps to help the Parks Department in monitoring the watering of newly planted trees.³⁹ CityScore was one of the team's early projects.

CityScore was up and running internally for several months before its roll-out was publicly announced in October 2015 by Koh, who explained the initiative as "a way for the Mayor to say, in a given day, how well are we doing to meet our targets, or how much improvement do we need to meet our targets?"⁴⁰ The initial CityScore included 21 metrics. CityScore went live to the public in January 2016. (See **Exhibit 6** for a list of CityScore metrics as of January 2016.)

CityScore in Action

"CityScore is about measuring our city across the board and making sure that we do the best job we can possibly do for the people of Boston. That's really the concept behind it."

— Mayor Marty Walsh

With CityScore in place, the focus shifted to using that data to generate action items. Walsh and Koh discussed the CityScore statistics at weekly cabinet meetings. Dennehy recalled, "When they put those scores up there, you didn't want to be the cabinet head, who had a glaring deficiency. You wanted to be that person who was turning a C plus into B and then that B into an A minus. They brought attention to it, and they made it a priority. They wouldn't try to shame you, but they would make note of it." The group generally focused on the top five performing metrics (labeled "Exceeding Expectations") and the bottom five metrics (labeled "Follow-up").

One early adopter of CityScore within the administration recalled, "Some of the cabinet members that I worked with weren't passionate about this at first, and then were literally transformed and soon felt the same way we did." And Mayor Walsh explained,

At first I think people were skeptical, but they quickly bought into it. And what we found early on was that rather than a sense of concern, there was a sense of pride. A lot of people feel a sense of ownership for their particular office, and I think they enjoy the fact that the Mayor and the leadership of the city are watching that work. It's not meant to be a negative. It's meant to be a positive. It's meant to help with a solution rather than being critical of somebody not doing their work.

As efficiency increased, some targets were adjusted. The original service level agreement for potholes was to fill them within 48 hours of someone making the request. When the Department of Public Works commissioner saw that the average time to close a pothole request was getting shorter, he changed the standard to 24 hours. In the second year of CityScore, budget requests were tied to

CityScore targets. "We identify a problem and then address that problem through budgets and also through the way we deliver services," explained Walsh. The Department of Public Works added incremental employees for the first time in nearly 10 years. The team also considered the question of frequency with respect to reporting certain data points. While they had the ability update many metrics daily, a daily view wasn't always insightful. Some metrics were better viewed from a monthly or even quarterly perspective.

CityScore evolved with several public-private sector partnerships. The City of Boston partnered with Bigbelly, which produced trash cans fitted with sensors. Real-time fill levels were reported directly back to City Hall and allowed workers to prioritize emptying full trashcans rather than simply going street by street as had previously been done.⁴¹ The city also partnered with the traffic app Waze. People traveling through the city could use the app to report traffic obstacles like double parked cars. Boston traffic officials used that data to better deploy resources.⁴²

However, the new system had its share of challenges. CityScore was limited in its scope—designed to measure the operational health of the city only. As one participant pointed out, the scores "were not reflective of each individual resident's perspective or a gauge of their health as a city resident. 'Am I having a great experience in the city in which I live in?' That goes far beyond any metric or data point." Even within the sphere of city operations, some jobs were easier to measure than others. A streetlight was either broken or fixed, but a street might have been plowed once but may not be completely clear and require a second trip. Outside consultants were hired to help City Hall utilize technology to improve reporting, and some initiatives were less successful. For example, the Department of Public Works tried to integrate software that would automatically communicate from a plow to a central database once a street had been plowed. However, they couldn't find the right software to make this system work. There were also concerns among the team that they hadn't spent enough time talking to citizens about the CityScore initiative. Many of the metrics depended on a feedback loop (with citizens reporting operational issues and the City responding), and there was a sense that many citizens were not fully engaged with that process. Efforts to accurately gauge community engagement were still a work in progress. For a while, departments were asked to track the number of followers that they had on social media accounts (thinking that this might be a proxy for engagement levels), but they found that those metrics weren't meaningful. This was also the case with tracking attendees at community events—it was unclear that these numbers provided an overall picture of engagement.

Critics of CityScore questioned whether it was equitable for city services to be delivered based on individual requests. Were the people who felt empowered to call in representative of the full population of the city? Franklin-Hodge explained, "It raises questions about how you organize your workforce. Do you structure your workforce to be responsive to complaints? Or do you structure your workforce to deliver on a more objective measure of overall quality?" This question was particularly pertinent during the winter of 2015 when Boston received record-breaking snowfalls and did not have the resources to respond to everyone who called in about an unplowed street. Officials decided that the best way to efficiently remove the snow was to depend on inspectors who drove around and observed conditions with an expert eye—rather than trying to respond to constituent calls. Similarly, a formal grading system had been created to assess sidewalk quality. Sidewalks were regularly reviewed and graded, and repairs were done starting with "F" grade sidewalks. If a constituent called in to complain about a cracked sidewalk they were informed that sidewalks were repaired on a rotating schedule, and it might be years before that particular sidewalk was repaired. Similar benchmarking efforts were underway with street safety improvements, and the creation of a prioritization framework that measured social vulnerability in parts of the city.

The Mayor's office also had to balance the desire to be responsive to constituents with the need to manage competing priorities with limited resources. For example, the city's road crews had a lot of new potholes to fill in the spring and could work efficiently with a quick completion time. However, in late fall, pothole requests were more sporadic and to fill them in a way that made sense from a resource utilization perspective often took longer. Thus, the team was considering managing to targets that varied based on the time of year. Additionally, some city activities were not captured well by quantitative metrics, and the team was exploring different approaches to measuring progress on these fronts. This was the case with projects such as Imagine Boston 2030, a multi-year city planning initiative. In such cases, the project teams were asked to think about key milestones that could be used to measure progress enroute to a final set of objectives.

Some CityScore critics lamented the loss of the personal touch. Koh admitted, "We believe deeply that nothing, nothing, will ever replace the shaking of a hand, the appearance at a community event, or the general feel of a neighborhood. But...we believe that technology has evolved to give the public sector the tools to serve constituents better and that it's our responsibility to do that every single day."⁴³ And some felt that the initiative expanded too quickly leading to questions over what the City's priorities were. But Koh argued, "I think we struck a healthy balance between looking at the data and taking action, but not making it the sole director of our actions. If everyone in these departments felt like the only thing they were measured on was how quickly they cleaned up graffiti, or how quickly they changed the streetlight, and not whether they sat with a person who was upset because their sidewalk was not repaired, that's not what we wanted to do. We wanted it to help guide us but not to decide for us how to act as managers."

The Mayor and the department heads used customized versions of CityScore that reflected their own priorities. The Mayor's dashboard hung in his office. Some of the metrics changed throughout the year—in the warmer months the Mayor's office monitored cutting and trimming trees while in the winter months they focused on ensuring streets were plowed. However, other data items were monitored at all times. Some of these statistics were scored along the lines of the CityScore format, while for others, the raw data was displayed. Mayor Walsh explained,

The constants on my boards are hiring, and the diversity of our hiring. So that tells me a story of how many people we're hiring, what are the genders of these hires, what are their races, what are their salary ranges. We have to make sure that everyone has an opportunity; that we continue to be an equitable city. We're also measuring crime stats. We're measuring permitting. When we see permitting going up that means our economy is moving forward. If there's a dip in our permitting statistics, we have to find out what the reason for that is. We also check school attendance, community center attendance, calls into our elderly commission office and calls into our veterans' office on a daily basis. It tells me how busy our offices are. And if our offices slow down, there's one of two things going on. One, everyone's happy, which could be the case, or two, there's not enough outreach to those different communities and constituencies, and generally it's that piece.

Osgood argued that CityScore became a barometer for "are we making a difference in people's lives? Are we actually making progress on those things that our residents are concerned about? It was a way of aggregating the voices of hundreds of thousands of people in a simpler way." Walsh added, "Every now and then, something will jump out at me. And I'll pick up the phone, call a department head, or call the commissioner, and ask what's going on. And sometimes there's a very good answer for it. And sometimes they might not even see it, but they eventually find the answer. Having that information at your fingertips is so important."

Ambulance Response Times Early on in the CityScore project Walsh looked at the dashboard and noted that ambulance response times were below targets for the month and the quarter. "So I called Chief Hooley, who was the chief of EMS, and I asked him what was going on," Walsh recalled. Hooley explained that the number of calls had been increasing due to the growing population and the ongoing opioid crisis. The department did not have enough ambulances to maintain response times. As they dove into the data they realized that they also did not have sufficient technicians or paramedics. To address this, the next city budget included an allocation to train 20 additional EMTs and purchase 10 new ambulances.⁴⁴ The team also researched the types of calls that were increasing. Franklin-Hodge explained,

Part of why the response times were going down was that we had this huge growth in a particular type of call, which was essentially a social services call. It was not necessarily a medical emergency, but it was somebody who required a counselor or required somebody with access to social services and an ambulance had been called. And that was taking up a larger and larger share of EMS resources and leading to an overall drop in response times.

Because many of those calls did not result in a transport to a hospital, the data team worked with EMS to devise a new response plan. In certain geographic areas, where these calls were most prevalent, they would station EMTs who would be on foot, on bikes, or in regular vehicles. The EMT would respond to a call and then communicate with dispatch as to whether a transport to the hospital was required. This freed-up ambulances to be better deployed where they were needed. "That kind of a project is about as far as you can get from CityScore's radical simplification of a really complex set of services into a single number," Franklin-Hodge explained. "But those conversations and that in-depth analysis were in part enabled because you had a management team that could look at the consequences of what was happening on the ground and ask questions and push for different strategies and more investigation."

Crime in 2020 In the early months of the pandemic the number of shootings in the city increased. Walsh explained,

There was a connection, I believe, to the coronavirus because we didn't have our normal interveners out in the street. We were able to make some adjustments early on. And in the third quarter of the year, we had a reduction in homicides along with a reduction in shootings and crime, and part of that was due to allocating resources, human resources, to those areas where we were seeing the increases. We activated our public safety officers, activated our street worker program, worked on making sure that we had the right interventions out in the community. And if we didn't have that dashboard front and center what might have happened was we might have had a meeting and put it off for a couple weeks and then had another meeting and looked at the data again, but when the data is literally right in front of you and is constantly updated, it's a constant reminder. I hear these stories every day. But if you have the data in front of you and you can actually go back and look at the day-to-day data and the year-to-date data and where it is happening in the city, you can take better action.

In 2021, while many other major U.S. cities saw violent crime rates continue to rise, Boston experienced a notable decline. One community activist reinforced Walsh's comments, attributing the decline in crime in Boston to "smart, targeting policing" and partnerships between the police and community groups.⁴⁵

The Covid Pandemic Some City Hall officials observed that one impact of CityScore was the way in which it made data-based discussions the norm in City Hall. During the Covid-19 pandemic there were near daily calls with the Mayor and his leadership team to discuss how things were progressing. Each conversation would start with a rundown of the statistics—cases, hospitalizations, deaths, hospital utilization rates. Osgood recalled that the attitude of the team was, “Let’s ground ourselves in the data. Let’s ground ourselves in the facts, and let’s have that as the start of our conversation.” He believed that this approach stemmed from the work they had done with CityScore, and the general comfort level this had created in terms of understanding and utilizing data.

See Exhibits 7a and 7b for two CityScore dashboards from 2021.

What Worked

Dwelley recalled that prior to the launch of CityScore performance management meetings were spent reviewing a long list of department-level metrics. (For example, emergency services tracked approximately 40 metrics.) “It almost became a chore. It really deterred from getting to a place where you could actually see a change in operations. You went through the motions.” While some argued that CityScore was too simplistic, Dwelley believed that it produced a positive outcome by forcing the team to focus on a few metrics and leaving more time to dig into those metrics. Concern over metrics led to conversations with the individuals involved “to truly understand what was going on with these data points.” Often the issue turned out to be straightforward—a department member was out on leave or resources had been allocated to another department to help with a priority project. However, for issues that were less straightforward, the Mayor’s office created an impact team, internal consultants that were deployed as needed. This team would spend “weeks, days, or months working with a particular division to truly change something.”

Given his background as a union leader and his reputation as a relationship person, many believed that Mayor Walsh was the ideal standard bearer for this type of project, arguing that he had credibility with city workers that others did not. Dennehy also highlighted the importance of Koh’s role.

Dan Koh became an operations guy. He wanted to roll up his sleeves and become that guy in the plow truck. And find out what it takes to replace a streetlight. Most of the people who came before Dan didn’t want to understand the process. They just wanted to say it needs to be done better. And Dan dug in and figured out what the operations looked like and then asked questions before pushing stuff on the departments.

Walsh and Koh would also single out departments that did a particularly good job on one of their metrics, and when they discussed the project with the media they would ensure that any credit went to the individuals in the relevant department. “And that went a long way,” recalled one employee. “A lot of these people were never recognized except for their faults for decades.” And by aggregating the individual metrics into one single score it sent the message that the many employees and departments at City Hall were all in this together. Koh explained the importance of what he termed “crossover players” to the success of the initiative—people who had in-depth knowledge of operations and also understood data and statistics. Osgood concurred, saying, “We now have members of the city-wide analytics team and staff in the operational Departments seeing great value in each other.”

The Future of CityScore

"Is this the best way you can play this?"

— Billy Beane⁴⁶

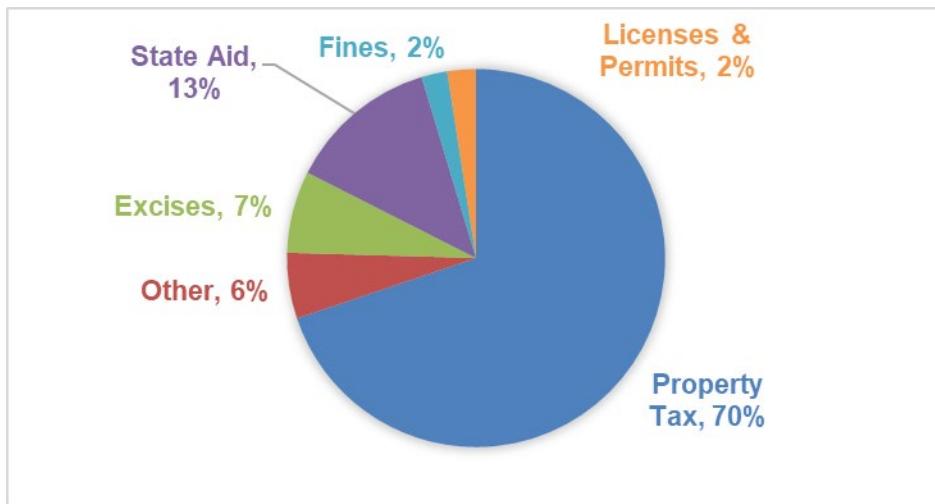
For those involved in the project, the ongoing use of CityScore as a management tool highlighted the importance of measurement and accountability in all aspects of city government. Walsh commented,

The key to an initiative is monitoring it to make sure that you're hitting the benchmarks and hitting the deadlines that you want to hit. You just can't create a program that aims to make a difference in somebody's life and not have the follow up. It just becomes an announcement. It's like with any business. When they have a new product, they're going to monitor that new product, and if it isn't performing the way it's supposed to, they're going to discontinue that product. And they would never know that it's not performing if they're not tracking that product. It's a similar analogy here in the city when we launch a new idea. We're monitoring and following it to see if it's working. If it's not working then you either make adjustments or you move to something else.

Walsh believed that areas that could benefit from increased use of CityScore included education, and the efforts there to better measure outcomes, and the police department. A 2020 police reform taskforce had recommended, among other things, increased transparency. A data dashboard might be one to achieve that. Walsh added, "It's probably time to think about readjusting some of what we do with CityScore because you can't let it just become a piece of furniture. It has to constantly evolve and change. And our team has done a really good job of changing and evolving."

What was the future of CityScore in 2022? What should CityScore 2.0 look like?

Exhibit 1a City of Boston: Total Revenues FY 2019



Source: Casewriter from City of Boston, "Fiscal Year 2021 Adopted Budget—Operating Budget," https://www.boston.gov/sites/default/files/file/2021/04/2-Volume%201%20-%20Operating%20Budget_0.pdf, accessed December 2021.

Exhibit 1b City of Boston: General Fund Appropriations by Cabinet & Department (\$ in millions)

EXPENDITURES	FY18 Actual	FY19 Actual	FY20 Budget	FY21 Budget
Mayor's Office	\$16.0	\$16.8	\$21.2	\$21.2
Operations	\$41.9	\$45.3	\$44.9	\$45.1
Civic Engagement	\$3.1	\$3.0	\$3.7	\$4.1
Arts & Culture	\$37.1	\$40.0	\$42.6	\$43.6
Economic Development	\$4.6	\$6.1	\$6.3	\$8.5
Education	\$1,093.3	\$1,126.7	\$1,178.6	\$1,258.6
Environment, Energy & Open Space	\$28.8	\$30.8	\$29.9	\$30.3
Administration & Finance	\$272.6	\$288.5	\$290.4	\$268.6
Health & Human Services	\$123.0	\$129.3	\$140.1	\$156.8
Housing & Neighborhood Development	\$13.7	\$14.2	\$20.6	\$29.1
Information & Technology	\$33.8	\$39.1	\$34.4	\$35.0
Public Safety	\$634.0	\$677.3	\$686.8	\$676.7
Streets	\$151.3	\$151.3	\$169.7	\$163.8
Non-Mayoral Departments	\$6.8	\$7.0	\$7.4	\$7.4
	\$2,460	\$2,575	\$2,676	\$2,749

Note: Amounts exclude external funds and capital budget items.

Source: City of Boston, "Fiscal Year 2021 Adopted Budget—Operating Budget," https://www.boston.gov/sites/default/files/file/2021/04/2-Volume%201%20-%20Operating%20Budget_0.pdf, accessed December 2021.

Exhibit 2 Mayor's Complaint Line (January-March, 2008)

Between January 1 and March 20, the Mayor's 24-hour hot line logged 5,585 calls. A *Boston Globe* survey of 50 of those callers showed that half of them required more than one call before the city acted on their complaint.

Most frequent call topics:	Number of Calls
<i>Traffic Issues</i>	
Traffic signal repair	485
Street lighting	456
Potholes	317
Debris in roadway	216
Snow plowing / street sanding	152
Sign replacement / repair	128
Parking enforcement	99
	1,853
<i>Quality of Life Issues</i>	
Abandoned cars	452
Debris on private property	339
Animal control	305
Graffiti	305
Building problems	101
Housing conditions	84
Minor police issues	73
	1,659
<i>Utilities, Services</i>	
Trash pickup	216
No heat	178
Water complaints	111
Electricity	62
Recycling	54
	621
Opinions for the Mayor	93

Source: Casewriter from Donovan Slack, "City complaint line lags," *Boston Globe*, April 6, 2008, http://archive.boston.com/news/local/articles/2008/04/06/city_complaint_line_lags/, accessed December 2021.

Exhibit 3 Boston About Results—Performance Goals

Performance Measure	Responsible Department	FY 13 Actual	FY 13 Target	FY 14 Target
Building Quality Homes and Schools				
Square footage available to small builders for middle class housing	Neighborhood Development	—	—	500,000
4 year cohort graduation rate – all students	Boston Public Schools	66%*	80%	80%
Businesses assisted with financial or technical assistance	Neighborhood Development	2,530	3,120	3,088
Supporting Residents				
Participants at Women on Main events	Neighborhood Development	—	—	300
Young women participating in negotiation workshops	Women's Commission	—	—	500
Families of new borns visited	Health Commission	—	—	800
Engaging Children and Youth				
Arts and cultural programs	Parks and Recreation	170	170	200
Community center visits	Boston Centers for Youth and Family	1,126,961	1,003,740	1,130,000
Youth completing peer leadership training	Public Health Commission	121	100	100
Modernizing the Resident Experience				
% of service requests made via Citizens Connect mobile application	Public Information	20%	20%	20%
Digital items available in all of BPL's digital collections	Boston Public Library	125,205	125,000	140,000
Sustaining Progress and Healthy Growth				
Recycling diversion rate		18%	19%	19%
Total rides by Hubway bike share users	Transportation	646,548	333,000	720,000
Annual kWh savings from LED streetlight program	Public Works	7,500,000	7,500,000	3,400,000
An Engaged City is a Safer City				
Walking and bicycle beat patrols	Police	173,339	200,000	200,000
Youth engaged by Street Workers	Boston Centers for Youth and Family	19,500	19,000	20,000
Part I crimes – violent (all districts)	Police	4,950	4,916	4,950

Source: City of Boston, "Boston About Results: Performance Goals," 2013, <https://www.boston.gov/sites/default/files/embed/f/fy14-volume1-budget-and-performance-goals.pdf>, accessed December 2021.

* Note: The FY 13 Actual is for the 2012 school year.

Exhibit 4 Mayor Walsh's Cabinet

Members of the Mayor's Office	Other Cabinet Heads
Operations and Administration	Arts and Culture
Corporation Counsel	Economic Development
Chief of Staff	Schools Superintendent
Chief of Policy	Environment, Energy, and Open Space
Communications Officer	Finance and Budget
Joint Chiefs of Public Safety	Health and Human Services
Police	Housing
Fire	Information Technology
<u>Emergency Management</u>	Transportation and Sanitation

Source: Casewriter from Megan E. Irons, "Mayor Walsh shakes up Cabinet structure," *Boston Globe*, January 29, 2014, <https://www.bostonglobe.com/metro/2014/01/29/walsh-shakes-cabinet-structure/UUfZwYb39EcubBQsZMaGjJ/story.html>, accessed December 2021.

Exhibit 5 Fenway Park: Green Monster



Source: Boston Red Sox Baseball Club Limited Partnership, accessed February 2022.

Exhibit 6 CityScore: Metrics and Definitions

CityScore's 21 metrics are monitored daily to get an understanding of the overall health of the City. Since inception, CityScore has prompted key process improvements, increased data-driven decision-making at all levels of city government, and informed the budget process. The following list details the performance metrics and targets that currently make up CityScore. Daily scores and additional information can be found here: <http://boston.gov/cityscore>

311 CALL CENTER PERFORMANCE - Target 95% of calls answered within 30 seconds

BOSTON FIRE DEPARTMENT INCIDENTS - Fewer incidents than previous years

BOSTON FIRE DEPARTMENT RESPONSE TIME - Target 90% of responses in 4 minutes or less

BOSTON PUBLIC SCHOOLS ATTENDANCE - Target 95% of all students

CONSTITUENT SATISFACTION SURVEYS - Target 4 on a 5 point rating scale

BOSTON EMERGENCY MEDICAL SERVICES INCIDENTS - Fewer incidents than previous years

BOSTON EMERGENCY MEDICAL SERVICES RESPONSE TIME - Target median of 6 minutes

GRAFFITI ON-TIME % - Target 80% completed within 45 business days

HOMICIDES (TREND) - Fewer incidents than previous years

LIBRARY USERS - More users than previous years

MISSED TRASH ON-TIME % - Target 80% completed within 1 business day

ON-TIME PERMIT REVIEWS - Target 75% completed within 20 business days

PARKS MAINTENANCE ON-TIME % - Target 80% lighting issues completed within 7 business days; 80% all other issues completed within 5 business days

PART 1 CRIMES - Fewer incidents than previous years

POTHOLE ON-TIME % - Target 80% completed within 1 business day

SHOOTINGS (TREND) - Fewer incidents than previous years

SIGN INSTALLATION ON-TIME % - Target 80% completed within 30 business days

SIGNAL REPAIR ON-TIME % - Target 80% completed within 24 hours

STABBINGS (TREND) - Fewer incidents than previous years

STREETLIGHT ON-TIME % - Target 80% completed within 10 business days

TREE MAINTENANCE ON-TIME % - Target 80% completed within 365 calendar days

Source: City of Boston, "Data Analytics: Data-Driven Boston," 2016, https://www.cityofboston.gov/images_documents/06%20Data%20Analytics_tcm3-53287.pdf, accessed December 2021.

Exhibit 7a City Score (January 11, 2021)

Scores below 1 indicate that performance is below the target.

Scores above 1 indicate that performance is exceeding the target.

TODAY'S SCORE	
1.12	

Topic	Day	Week	Month	QTR
311 CALL CENTER PERFORMANCE	0.95	0.97	0.93	0.92
CODE ENFORCEMENT ON-TIME %	1.25	1.25	1.25	1.25
CODE ENFORCEMENT TRASH COLLECTION	0.48	1.1	1.09	1.15
GRAFFITI ON-TIME %			1.25	0.6
MISSED TRASH ON-TIME %		1.24	1.22	1.21
PARKS MAINTENANCE ON-TIME %	1.25	0.59	0.8	0.93
POTHOLE ON-TIME %	1.25	0.73	0.91	0.96
SIGN INSTALLATION ON-TIME %		0.86	1.18	0.79
SIGNAL REPAIR ON-TIME %	1.07	1.15	1.15	1.15
STREETLIGHT ON-TIME %	1.25	0.8	0.74	0.55
TREE MAINTENANCE ON-TIME %		1.25	1.2	1.16
ON-TIME PERMIT REVIEWS		0.94	0.94	0.91
LIBRARY USERS	1.23	1.26	1.25	1.19
BPS ATTENDANCE		1.03	1.01	0.99
BFD RESPONSE TIME	1	0.97	0.97	0.97
BFD INCIDENTS	1.7	1.51	1.19	1.21
EMS RESPONSE TIME	1.08	0.95	0.93	0.98
PART 1 CRIMES	2.6	1.73	1.41	1.25
HOMICIDES (TREND)		0.5	1.72	1.87
SHOOTINGS (TREND)		2.5	1.6	0.9
STABBINGS (TREND)		1.8	1.34	1.11
311 CONSTITUENT EXPERIENCE SURVEYS		1.25	1.17	1.16
CITY SERVICES SATISFACTION SURVEYS	0.25	0.79	0.75	0.77

Source: City of Boston, "City Score," <https://www.boston.gov/innovation-and-technology/cityscore>, accessed January 2021.

Exhibit 7b City Score (December 10, 2021)

Scores below 1 indicate that performance is below the target.

Scores above 1 indicate that performance is exceeding the target.

TODAY'S SCORE
0.99

Topic	Day	Week	Month	QTR
311 CALL CENTER PERFORMANCE				0.9
CODE ENFORCEMENT ON-TIME %	1.25	1.22	1.24	1.24
CODE ENFORCEMENT TRASH COLLECTION	1.25	0.92	0.97	1.08
GRAFFITI ON-TIME %	1.25	1.25	0.86	0.77
MISSED TRASH ON-TIME %	1.17	1.21	1.22	1.22
PARKS MAINTENANCE ON-TIME %	0.89	0.81	0.95	0.93
POTHOLE ON-TIME %		0.8	0.84	0.85
SIGN INSTALLATION ON-TIME %	0.31	0.34	0.45	0.48
SIGNAL REPAIR ON-TIME %	1.25	1.05	1.08	1.09
STREETLIGHT ON-TIME %	0.63	0.96	0.95	0.98
TREE MAINTENANCE ON-TIME %	1.18	1.13	1.17	1.17
ON-TIME PERMIT REVIEWS		0.72	0.82	0.85
LIBRARY USERS	1.18	1.2	1.23	1.2
BPS ATTENDANCE	1.04	0.94	0.94	0.94
BFD RESPONSE TIME	0.94	0.97	0.95	0.94
BFD INCIDENTS	0.93	1	1.05	1.05
EMS RESPONSE TIME	0.8	0.9	0.93	0.93
PART 1 CRIMES		1.44	1.4	1.31
HOMICIDES (TREND)				1.68
SHOOTINGS (TREND)		2.42	1.07	1.13
STABBINGS (TREND)		1	1.32	1.39
311 CONSTITUENT EXPERIENCE SURVEYS	1	1	1.16	1.13
CITY SERVICES SATISFACTION SURVEYS	0.89	0.69	0.87	0.83

Source: City of Boston, "City Score," <https://www.boston.gov/innovation-and-technology/cityscore>, accessed December 2021.

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