OFFICE OF THE CITY AUDITOR

POLICY AND RESEARCH DIVISION

Overview of Municipal Evaluations on

Gunshot Detection Systems

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Introduction

On May 31st, 2024 meeting of the Administration and Enterprise Oversight Committee approved 2024-00551, a legislative directive to Policy and Research requesting an assessment evaluation options that could inform an analysis of the ShotSpotter program:

> *The Minneapolis City Council directs the Legislative Department Policy and Research Division to give a report and recommendations, including a fiscal analysis, on the following to the Administrative & Enterprise Committee no later than June 18, 2024:*
>
> 1. *Identify, and review potential options to evaluate the city's ShotSpotter data and provide an analysis on effectiveness and success of the program. Evaluation options can include third party contractors. The scope of information can include the following:*
>   a) *Evaluation results on arrests, evidence, witness interviews, and overall ability to clear cases.*
>   b) *ShotSpotter's contribution to productivity of police investigations in incidents where a victim was shot.*
>   c) *Response time and time on scene*
>   d) *ShotSpotter impacts on residents' propensity to call 911*
>   e) *Any trends on ShotSpotter's impacts on gun violence*
>   f) *Any additional evaluative data that can help inform whether the benefits of ShotSpotter outweigh the costs and opportunity costs of other public safety services*

The scope of this analysis is focused on providing a landscape of review or evaluation efforts initiated by municipalities of Gunshot Detection Technology (GDT), including ShotSpotter. To ensure this analysis could be conducted in the timeframe allotted while still providing information in support of continued discussion on this topic, this report highlights the approach utilized by six (6) cities related to discussions or analysis of GDT program usage, as well as identifying areas of potential challenges and barriers that existed across these examples.

Example Municipal Experiences and Analysis of GDT Usage

The following examples provide an overview of the lifecycle of GDT related conversation(s) in multiple municipalities and highlights the different approaches or outcomes in each case. While these examples are intended to be broadly representative of conversations nationally, it is important to note that they were selected by identifying municipalities where these discussions have received elevated publicity. While there are cities where the use of GDT, including ShotSpotter, has been adopted absent extended public discussion or unique analysis, those locations would not be accounted for in this report since the focus was to identify potential options for review or analysis of GDT usage.

<u>Pre-Implementation Evaluation and Recommendations</u>

Portland, OR – Pre-Implementation Discussion and Review

In late 2022, the Portland Police Bureau announced its intention to acquire ShotSpotter as an additional tool to combat gun violence.[1] This decision came following a July report on the "Official Recommendation" from the City's Focused Intervention Team Community Oversight Group (FIT-COG) and was intended to begin with a pilot program focused on two areas of the city.[2] The FIT-COG report contained a number of recommendations as well as a summary of conditions for each. The substance of those recommendations has been included below:

> *The FITCOG makes the overarching recommendation that:*
> *The City of Portland should support and invest in the Portland Police Bureau for the use and implementation of ShotSpotter Technology as a focused deterrence tool as part of the overarching gun violence response strategy.*
>
> *SUMMARY OF CONDITIONS*
> *This overarching FITCOG recommendation supports the use and implementation of ShotSpotter technologies on the following conditions pertaining to concerns in the areas of: community and justice equity, civil rights protections, data collection, data analysis, public transparency, and community engagement:*
> *A. That PPB in collaboration with relevant City of Portland, and community-based stakeholders develop a Violent Impact Players (VIP) List specific to the needs and concerns of Portland to improve and/or enhance data driven tactics for identifying and*

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[1] [ShotSpotter coming to Portland: putting controversial technology in the crosshairs (kptv.com)](#)
[2] [FITCOG ShotSpotter Report](#)

apprehending serial trigger pullers for the purposes of reducing gun violence.

B. *That there is ongoing implicit bias training for all PPB FIT officers, and other patrol officers, and those who would be responding directly to ShotSpotter technology calls.*

C. *That PPB conduct ongoing evaluation and mitigation of any unintended consequences resulting from the implementation of ShotSpotter technology in light of PPB staff shortages.*

D. *That City of Portland agencies, policy makers, and PPB create, and tighten up protections from any potential legal or civil rights violations that may arise from the implementation of SSP technology, including but not limited to, either the direct, or indirect capturing and collecting of information outside that of the scope of gun or ammunition sounds.*

E. *That the PPB should invest in comprehensive data collection and analysis of ShotSpotter technology capabilities to exceed minimum operational and compliance needs and will conduct public safety research and performance analytics, and share such findings with the public in a consistent and accessible manner.*

F. *That City of Portland leadership invite further community input on SSP technology as a process step in adopting this recommendation.*

G. *That City of Portland leadership assist PPB in obtaining full financial commitment to implement and sustain SSP technology for the duration of its established contact of service, and ensuring that funding for SSP technology will not be sourced from any other public service, social service, or public health service.*

H. *That City of Portland leadership in collaboration with PPB, establish a reasonable pilot project timeline to test the efficacy of SSP technology use in the City Portland, whereby the outcomes and data analysis will be up for review to determine service renewal.*

I. *That the City of Portland and PPB secure the contractual right to terminate any SSP technology service contract or agreement consistent with the laws governing contracts.*

J. *That PPB ensure that SSP technology sensors are placed equitably through an evidenced based approach, reflective of current gun violence shooting statistics in the Portland-Metro area.*

K. *That PPB in collaboration with Emergency Service Responders establish stronger, and more streamlined communication and partnerships with EMT, and other medical and crisis responders to gun violence scenes.*

L. *That PPB maintain a high level of public transparency regarding SSP technology sensor data and gun violence trends in Portland.*

M. *That City of Portland leadership in collaboration with legal partners develop judicial and investigative guidelines and limitations on the use and integration of SSP data in the criminal prosecution and conviction of gun violence cases.*

In August, the Portland Bureau of Planning and Sustainability Smart City PDX program, which had been conducting its own work on surveillance technologies, issued a comments memo on the FIT-COG recommended adoption of ShotSpotter.[3] Comments noted that privacy risks from GDT use appeared minimal due to how algorithms are used to classify gunfire and the limited retention time of recordings. However, the memo did express concern related to potential increases in police stops for areas of GDT operation stemming from the presumption of weapons in locations where alerts are occurring. It was noted that the Chicago IG report identified potential concerns related to police behavior and this area may benefit from additional analysis or ongoing assessment.

In response to a range of input on GDT adoption, the City of Portland delayed the process in January 2023 in favor of a competitive bidding process from multiple gunshot detection technology providers.[4] Additionally, in response to requests for expanded community input from groups including the Portland Committee on Community-Engaged Policing[5], the City worked with Portland State University to conduct a community survey on "Gunshot Detection Technology (GDT)".[6]

In June 2023, Mayor Wheeler released a statement that the City would not be proceeding with a potential pilot of gunshot detection technology and would instead focus on alternative strategies to reduce gun violence such as the "Portland Ceasefire" program.[7]

Evaluation by a Partnering Academic Institution

Durham County, NC – Pilot Program and Academic Analysis of Impact

In late 2022, the Durham Police Department began a 12-month pilot program that deployed ShotSpotter devices in a defined geographic area to determine any measurable impact. At the completion of the pilot, Duke University's Wilson Center for Science and Justice performed an analysis of the pilot data and released their report, "Evaluation of Durham's ShotSpotter Installation: Results of a 12-Month Pilot Project".

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[3] Efiles - 2022-Smart+City+PDX+comments+on+ShotSpotter+Recommendation (23/ED/106984) (portlandoregon.gov)
[4] Following Public Scrutiny, Mayor Wheeler Pivots to Competitive Process for Gunshot Detection Pilot Program - Portland Mercury
[5] Smart City PDX Comments Memo on ShotSpotter (Download)
[6] PowerPoint Presentation (portland.gov)
[7] Portland will not pursue gunshot detection technology in favor of 'better strategies' to address gun violence - OPB

Evaluation of Durham's ShotSpotter Installation: Results of a 12-Month Pilot Project from the Wilson Center for Science and Justice at Duke Law.[8]

The major findings include:[9]

- *For total gunshot notifications in the pilot area (1447), 57% had only a ShotSpotter notification, 15% had both a 911 call and a ShotSpotter notification, and 28% only 911 call.*
- *For confirmed gunshots (282), 26% had only a ShotSpotter notification, 34% had both a 911 call and a ShotSpotter notification, and 40% had only a 911 call.*
- *There were 52 serious incidents in the pilot area where someone was wounded or killed. ShotSpotter alerted for 26 of those 52 and 911 calls were received for 50 of the 52. By design, ShotSpotter only detects gunfire occurring outdoors. However, in eight incidents where ShotSpotter did not alert, it was due to human or system error.*
- *The ShotSpotter-only notifications more than doubled the total notifications and led to an additional 2.3 police deployments per day in the pilot area.*
- *All gunshot notifications in the city are a level 2 priority for police response, the same as response to household alarms. ShotSpotter alerts increased the citywide level 2 deployments by about 2%.*
- *ShotSpotter alerts also supplemented 911 notifications by being quicker and providing the location coordinates of the sound. The median response time of officers to the scene for 911 notifications dropped by 1.2 minutes in the pilot area compared to the rest of the city.*
- *Expanded coverage of gunshots due to ShotSpotter-only notifications resulted in 7 additional incidents that resulted in arrest (an increase of 32%), and 71 additional incidents that resulted in collection of shell casings and other evidence (almost doubling the total).*
- *For incidents that generated both 911 calls and ShotSpotter alerts, the likelihood of arrest or evidence collection did not increase. But there was one such incident in which the responding officers arrived in time to administer first aid to the victim and it is plausible, though uncertain that this contributed to saving a life.*
- *Researchers were unable to determine if ShotSpotter had any impact on gun violence.*

Following the release of this report, in March of 2024, the City Council voted not extend the ShotSpotter contract and argued there was not enough data to indicate that the programs success justified the high cost or potential harm to communities.[10]

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[8] ShotSpotter-Evaluation.pdf (duke.edu)
[9] Evaluation of Durham's ShotSpotter Installation – Wilson Center for Science and Justice at Duke Law
[10] Durham City Council votes to end controversial ShotSpotter program - The Chronicle (dukechronicle.com)

Evaluation by City Oversight Entities

Chicago, IL – Post Implementation Review by Inspector General

The 2017 the launch of the Chicago Police Department's Decision Support Center(s) in Chicago's 7th and 11th Districts, expanded into 10th District in the fall, included the initial adoption of ShotSpotter as one of the tools that would be used by this expansion of policing strategies.[11][12] With a defined goal of providing hyper-local and real-time analytics that allows CPD leaders to enable area-specific responses, ShotSpotter was deployed alongside expanded mobile technology for officers and an expansion of the POD Crime Camera program.

In 2021, the City's Office of Inspector General (IG) released a [report] on the Chicago Police Department's use of ShotSpotter technology.[13] The IG report collected data on ShotSpotter alerts occurring between January 1, 2020 and May 31, 2021 to determine related outcomes or impacts. The report's executive summary highlighted some of the findings related to outcomes as follows:[14]

1. *A total of 50,176 ShotSpotter alerts were confirmed as probable gunshots by ShotSpotter, issued an event number—a unique record identification number assigned to distinct "events" of police activity—and dispatched by OEMC; each of these resulted in a CPD response to the location reported by the ShotSpotter application.*
2. *Of the 50,176 confirmed and dispatched ShotSpotter alerts, 41,830 report a disposition— the outcome of the police response to an incident. A total of 4,556 of those 41,830 dispositions indicate that evidence of a gun-related criminal offense was found, representing 9.1% of CPD responses to ShotSpotter alerts.*
3. *Among the 50,176 confirmed and dispatched ShotSpotter alerts, a total of 1,056 share their event number with at least one ISR, indicating that a documented investigatory stop was a direct result of a particular ShotSpotter alert. That is, at least one investigatory stop is documented under a matching event number in 2.1% of all CPD responses to ShotSpotter alerts. Some of those events are also among those with dispositions indicating that evidence of a gun-related criminal offense was found, where an investigatory stop might have been among the steps which developed evidence of a gun related criminal offense.*

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[11] [City of Chicago :: Mayor Emanuel, Police Department Announce Launch of New Technology to Support Strategic Deployments, Reduce Violence](#)
[12] [City of Chicago :: Mayor Emanuel Announces Expansion of Predictive Crime Strategy to Ogden](#)
[13] [OIG Finds That ShotSpotter Alerts Rarely Lead to Evidence of a Gun-Related Crime and That Presence of the Technology Changes Police Behavior - Chicago Office of Inspector General (igchicago.org)](#)
[14] [CPD'S USE OF SHOTSPOTTER TECHNOLOGY](#)

4. *Through a separate keyword search analysis of all ISR narratives within the analysis period, OIG identified an additional 1,366 investigatory stops as potentially associated with ShotSpotter alerts whose event number did not match any of the 50,176 confirmed and dispatched ShotSpotter alerts. OIG's review of a sample of these ISRs indicated that many of these keyword search "hits" were in narratives referring to the general volume of ShotSpotter alerts in a given area rather than a response to a specific ShotSpotter alert.*

The IG report concluded that ShotSpotter related alerts rarely produced measurable actions (recovery of evidence, investigatory stops, etc.) but had impacted how CPD policed certain areas based on references to frequent GDT alerts impacting reasonable suspicion for investigatory stops.[15]

In May 2024, SoundThinking, Inc., which owns ShotSpotter, published a response to the Chicago IG report on its [webpage](#). In the response, SoundThinking focused on two primary areas of concern in the IG report which have been summarized using excerpts below:

1. *"False Alerts"*
   - *The OIG report concluded that ShotSpotter alerts rarely produce documented evidence of a gun-related crime. It states that, "Of the 50,176 confirmed and dispatched ShotSpotter alerts, 41,830 report a disposition – the outcome of the police response to an incident. A total of 4,556 of those 41,830 dispositions indicate that evidence of a gun related criminal offense was found, representing 9.1% of CPD responses to ShotSpotter alerts."*
   - *SoundThinking asserts that a ShotSpotter alert is, itself, digital evidence that gunfire occurred — with the specific location, a precise timestamp, an audio recording, and other forensic elements as part of the digital evidence. The OIG report focuses, instead, on the percentage of ShotSpotter alerts where police did not find "physical evidence" or a witness willing to corroborate the digital evidence made available to CPD via the ShotSpotter service. But in fact, CPD becomes a virtual witness to gunfire with its access to the audio recording and other pertinent data listed above.*
   - *Unfortunately, the findings referenced in the OIG report have been twisted by a few critics to spread a false narrative suggesting that any ShotSpotter alert must be a false alert ("false positive") if no physical evidence or witnesses were found to validate that a gun crime occurred.*

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[15] [Chicago-Police-Departments-Use-of-ShotSpotter-Technology.pdf (igchicago.org)](#)

- *In the real world, many factors can affect whether law enforcement can locate physical evidence or a witness to corroborate that a gun crime was committed. These factors include but are not limited to:*
    1. *the time required for an officer to arrive at the scene;*
    2. *the amount of time that officer has to investigate the scene;*
    3. *whether the perpetrator picked up their own shell casings;*
    4. *the type of firearm involved;*
    5. *whether cooperative witnesses or victims remained at the scene, and more.*

2. *"Incomplete Analysis of Evidence Collected Due to ShotSpotter"*

- *The OIG Report states that, "For this weighing of costs and benefits to accrue in favor of continued use of ShotSpotter technology, CPD and City would be well-served by being able to clearly demonstrate it law enforcement value." Such a value is not clearly demonstrated by presently available data."*
    - *This conclusion shows that the Office of Inspector General determined that more information was needed to fully assess the value (costs & benefits) of the ShotSpotter program.*
- *The OIG Report also concluded that, "Better data on law enforcement outcomes from ShotSpotter alerts would be valuable to support the City's future assessment of whether to further extend, amend, or discontinue its contractual relationship with ShotSpotter."*
    - *SoundThinking agrees with this conclusion, but also contends that any analysis of outcomes must include a more thorough investigation of the outcomes of the ShotSpotter alerts that do lead to physical evidence of a gun crime or, more importantly, to a gunshot victim, and not simply on the percentage of those that do not.*

Following the release of the IG report, multiple community groups and City Aldermen requested a public hearing on the programs accuracy.[16] While discussions on the programs use continued for several years, the City of Chicago announced in February 2024 that it would not renew its contract with ShotSpotter and would decommission the systems use in late September. The City plans to use the remaining period of operation for law enforcement and stakeholders to conduct an assessment of options that could be recommended as alternatives.[17]

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[16] Aldermen Seek Public Hearing On Questions About Accuracy Of Police ShotSpotter Technology - CBS Chicago (cbsnews.com)
[17] City of Chicago :: City Of Chicago Statement On ShotSpotter Contract

New York, NY – Audit of NYPD ShotSpotter Metrics by City Comptroller

On June 20th, 2024 the New York City Comptroller published its "Audit Report on the New York City Police Department's Oversight of Its Agreement with ShotSpotter Inc. for the Gunshot Detection and Location System". This report focused on how NYPD assessed the effectiveness of ShotSpotter usage and raised concerns with the formula not accounting for false positives.

One of the main areas of focus required Auditors to review NYPD data to determine correlation between alerts and confirmed shootings. The audit report defined confirmed shootings as, "ShotSpotter alerts are considered confirmed shooting incidents when NYPD recovers evidence such as firearms, ballistics, or video, or if there are eyewitnesses, victims shot, summary arrests, or 911 calls that report a shooting."[18] Results of this comparison showed very large discrepancies between total alerts and confirmed shooting incidents, the largest occurring in March 2023 with 1,239 alerts compared to 104 confirmed shooting incidents.

Building on the unconfirmed alert data, the report reviewed the officer time spent in and noted that a single month showed 426.9 hours of officer time was spent on unconfirmed alerts. The audit report also explored mapping the placement of sensors across the city to determine if these were in fact the areas with the highest confirmed shooting incidents. The resulting effort determined that, generally, ShotSpotter locations correlated with those areas reporting the highest volumes of confirmed shooting incidents[19]:

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[18] Audit Report on the New York City Police Department's Oversight of Its Agreement with ShotSpotter Inc. for the Gunshot Detection and Location System : Office of the New York City Comptroller Brad Lander (nyc.gov)
[19] NYC Comptroller ShotSpotter Overlay Map

To conclude the report, the authors provided several recommendations, the NYPD response, and the audit team's follow-up response:[20]

1. *Decline to renew the ShotSpotter contract when it expires in December 2024 without first conducting a more thorough performance evaluation, considering the very low rates of confirmed shooting incidents detected, and factoring in the extensive NYPD officer time spent responding to alerts not ultimately confirmed as shootings.*
   1. **NYPD Response:** *NYPD disagreed with this recommendation, stating that "…non-renewal of ShotSpotter services may endanger the public and not renewing the ShotSpotter contract until the Department conducts further analysis would be a premature measure. The Department will continue to have discussions with ShotSpotter in order to enhance the performance and evaluation of the technology; however, it is not feasible to conduct an evaluation prior to the contract renewal period.…In summary, loss of the ShotSpotter program would result in a less safe working environment for Officers and an increased chance of violent encounters for all New Yorkers."*
   2. **Auditor's Response:** *The auditors reiterate the need for NYPD to reassess the performance of ShotSpotter, and its ability to detect shootings, before the contract is renewed; we note that almost 6 months of the current contract term remains, allowing ample time to reconsider the product's overall performance.*
2. *Develop more meaningful performance standards of ShotSpotter's accuracy that better factor in the very high rate of alerts not ultimately confirmed as shootings.*
   1. **NYPD Response:** *NYPD did not disagree or agree with this recommendation. It stated, "NYPD is limited in what it can consider a "confirmed shooting" in conjunction with a ShotSpotter alert by the nature of police work and alerts which don't result in the recovery of evidence (i.e. ballistics, property damage, shell casings/live ammunition, firearms, video, ear or eyewitnesses and/or victims). As discussed in previous meetings, the Department is open to any auditor recommendations for improved standards calculations but have not received a recommended standard."*
   2. **Auditor's Response:** *The auditors' findings show a significant difference in assessing the tool based on the contractual performance standard and assessing the tool's ability to detect actual shootings. This discrepancy is meaningful and should be addressed, NYPD contents in its response that confirmed shootings are not viable as a means to measure its effectiveness, in part because it contends that "confirmed shootings" does not include confirmations that come after more extensive investigation and other activities occur. NYPD should be able to assess the overall*

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[20] Audit Report on the New York City Police Department's Oversight of Its Agreement with ShotSpotter Inc. for the Gunshot Detection and Location System : Office of the New York City Comptroller Brad Lander (nyc.gov)

accuracy of the tool in a manner which accounts for confirmations that come later in time as more evidence becomes available.

3. *To increase transparency, NYPD should collect and publish relevant data, including the number of published alerts, percentage of alerts which result in confirmed shootings, the number of false negatives and missed incidents, time and staff costs spent responding to alerts that are not ultimately confirmed as shootings, and the relative response times to ShotSpotter alerts versus 911 reports of shots fired outside.*
    1. ***NYPD Response:*** *NYPD did not agree or disagree with this recommendation, it stated that "Shooting numbers are ever changing based on investigations and other factors that follow the shootings and therefore, parties that are not familiar with the data could misinterpret the information. In addition, this would need to go through various channels to determine feasibility and legality of such information request."*
    2. ***Auditor's Response:*** *The auditors reiterate the need for greater transparency. There is nothing inherently confidential in the various data points recommended for publication and given the level of public debate concerning the merits of this tool, there is strong public interest in making the data available for review.*
4. *Continue to follow up with ShotSpotter, Inc. on coverage areas where the 90% performance rate is not met and ensure that ShotSpotter, Inc. is upholding the agreed upon Service Level Agreement Performance Rate.*
    1. ***NYPD Response:*** *NYPD agreed with this recommendation.*
5. *Pay its invoices within 30 days after the invoice receipt or acceptance date per the Procurement Policy Board Rules § 4-06.*
    1. ***NYPD Response:*** *NYPD agreed with this recommendation.*

On July 11th, 2024, SoundThinking, Inc. issued its response to the NYC Comptrollers audit report.[21] In the response, SoundThinking expressed their concerns with the reports methodology and not being provided an opportunity for meaningful engagement. The response also listed what it believed were misleading findings from the NYC Comptroller report, as summarized below:

3. *"Very Low Rates of Confirmed Shots Detected"*
    - *A primary concern with the reports methodology was how it determined correlation ignored the realities of criminal activity and police work – officers will not always be able to locate direct evidence of a shooting that occurred.*

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[21] [SoundThinking-Reponse-letter-to-NYC-Comptroller_11JUL2024_FINAL.pdf](#)

4. *"Tracking Relative Response Times"*
   - *At issue in this example was how the City Comptroller attempted a direct comparison of ShotSpotter alerts vs 911 calls by measuring response times for events that may not be related.*

<u>Increased Transparency and Ongoing Evaluation</u>

Houston, TX – Increased Program Updates and Evaluation of Data

In early 2020, the City of Houston began implementing the use of ShotSpotter technologies as part of its effort to combat violent crime.[22] Over the next several years, city leadership received several updates on the programs impact from the Houston Police Department (HPD), examples below:

- [2021 ShotSpotter Presentation from Houston Police Department](#)
- [2023 ShotSpotter Presentation from Houston Police Department](#)

The 2023 presentation noted that, from December 2020 to February 2023, 15,449 gunfire alerts were available to HPD from the ShotSpotter program. Of this total, ShotSpotter reviewers determined 5,450 to be gunfire and notified HPD. These 5,450 alerts resulted in 99 arrests, 126 charges, and identification of 54 gunshot victims. Additionally, alerts resulted in the recovery of 4,332 cartridge casings and 107 firearms.

The response to HPD's presentations was mixed and highlights how various groups and contrasting goals or objectives can impact perception of a program's success. While HPD stressed the program's positive impact on evidence recovery, response times, and role saving three lives in recent months, elected officials and residents focused on the financial cost per outcome from the program and questioned if it was providing enough information that was previously unknown.[23] In June 2024, Houston's Mayor announced a desire to end the city's contract, which was intended to run through 2027, and reallocate the funding to other law enforcement efforts.[24]

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[22] [Houston police begin using ShotSpotter to help combat gun crimes (fox26houston.com)](#)
[23] [Houston City Council members press HPD on ShotSpotter costs (chron.com)](#)
[24] [Mayor Whitmire says he wants to end Houston's $3.5 million contract with 'ShotSpotter' gunshot detection tool (msn.com)](#)

Detroit, MI – Contract Extension and Increased Transparency on ShotSpotter Usage

In October of 2022, the City of Detroit concluded a protracted debate by approving the expansion of ShotSpotter to additional areas of the city.[25] The Detroit Police Department (DPD) also noted that it would provide monthly reports on the use of ShotSpotter technology to the City's Board of Police Commissioners (BOPC), who provided a statement in support of expanding the technology.

- Detroit Police Department Specification Report Responses
- DPD Surveillance Technology Reports and Documents

In a DPD update on GDT usage in 2022 and 2021, DPD noted that areas with ShotSpotter in place saw 27% fewer fatal shootings and a 43% reduction in reported shots fired. Further, fewer than 10% of program alerts for shots fired incidents had a corresponding 911 call to DPD, suggesting that many of these incidents would have been unreported without ShotSpotter usage.

The approval of the Detroit ShotSpotter contract also aligned with changes to the DPD GDT Policy and additional weekly reporting from DPD on ShotSpotter usage.[26] Policy changes included the following updates to the 307.8 - 3 Civil Liberties Protection section of the GDT policy:

> **307.8 - 3.1 Strict Limitations on Access to Audio from Acoustic Sensors**
> 1. *Members shall be strictly prohibited from requesting audio in situations not involving a shots-fired investigation without having first obtained a search warrant.*
> 2. *Recognizing the importance of the Fourteenth Amendments Equal Protection Clause, members are strictly prohibited from using ShotSpotter technology as an unlawful pretext for stopping individuals based on their personal characteristics or mere presence in an area.*
>
> **307.8 - 3.3 ShotSpotter as Investigative Lead**
> *ShotSpotter technology shall not be used as an opportunity to stop large groups of people. Any investigation taking place in conjunction with a ShotSpotter response must be based on an individual suspicion that the suspect has engaged in, is engaging in, or will engage in unlawful activity. In making this assessment, an officer responding to a ShotSpotter run may take into consideration any information provided by the ShotSpotter system, but it may not serve as the sole basis for the stop.*

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[25] Detroit City Council approves $7 million ShotSpotter expansion (michiganpublic.org)
[26] DPD Gunshot Detection | City of Detroit (detroitmi.gov)

At the conclusion of 2023, the BOPC issued its own suggested revisions to the DPD's existing policy on the use gunshot detection technology.[27] These recommendations included further updates to the 307.8 - 3 Civil Liberties Protection section of the GDT policy including:

> **307.8   - 3.1 Strict Limitations on Access to Audio from Acoustic Sensors**
> 1. *Gunshot Detection Technology must be used in a manner consistent with the legal interpretation and court rulings of U.S. Constitution, state laws, and local ordinances applicable to the use of the technology.*
> 5. *Pursuant the Biased-Based Policing Directive, members are strictly prohibited from using Gunshot Detection technology as an unlawful pretext for stopping individuals based on their personal characteristics or mere presence in the area.*

In addition to the work from the BOPC, there remain continued requests for increased transparency of GDT program usage as evidenced by a 2022 lawsuit arguing the contracts violated city requirements for the procurement of surveillance technology.[28]

Identified Challenges and Example Data Points for Analysis

Following the review of multiple locations, there are a number of recurring themes that can be identified as potential sources of conflict, confusion, or areas that would benefit from increased transparency. Examples of these areas can be summarized as follows:

Contrasting or Unclear Goals and Expectations

1. Importance for Identification of Desired Goals and/or Outcomes

    a) While most municipalities adopting ShotSpotter technology cite combating gun violence as one of the primary goals, it can often be unclear what data points or metrics will be used to measure movement(s) towards that goals achievement.

    In addition to added transparency, providing a more detailed explanation of intended goals or outcomes allows for a consistent standard to be used by all parties monitoring any impact or progress. One of the recurring issues appears to stem from parties having conflicting ideas regarding the intended outcomes that are being sought.

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[27] BOPC Recommendations to DPD Manual (detroitmi.gov)
[28] Lawsuit seeks to void ShotSpotter contracts, alleging illegal approval - BridgeDetroit

If one group's measurements are focused on identification of gunshots or impact to dispatch time on potential shots fired, perceived success may be much different compared to another group focused on dispatch outcomes (i.e. evidence recovered, arrest(s) made, changes to clearance rate).

2. Defining Success or Failure

   a) Building on the impact of detailing intended goals or outcomes and what metrics will allow for measurable impact, there appears to be a consistent ambiguity related to how the success or failure of ShotSpotter will be determined. Is there a set timeframe where a specific goal must be reached, or is any measurable progress towards a goal what determines success?

3. Analysis of Opportunity Cost(s)

   a) This was a focus of discussion in almost every location reviewed stemming from both the monetarily high cost of GDT program operation and attempts to measure the benefit or unintended consequences on a specific area. While GDT program supporters generally identified success by highlighting outcomes that may not have been possible without GDT usage, GDT program detractors often framed the analysis by highlighting what they considered to be the high cost per outcome of a specific GDT program.

Establishing Framework and Scope of Data for Review

Once clear goals and expectations have been established, a framework should be established that lay out what data will be gathered by the assessment and how that data is intended to measure impacts, successes, or failures. The following examples highlight a range of potential data points from the examples reviewed in this analysis.

1. Review of Specific Case Outcomes
   a) Collect GDT alert data for a specific timeframe and location(s)
   b) Gathering dispatch data for GDT alerts and 911 reports of shots fired
   c) Connecting GDT/shots fired dispatches with case numbers and resulting actions or outcomes. Potential data points from case files may include:
      1. location mapping
      2. evidence recovered
      3. suspect(s) identified or arrest(s) made

2. Identifying GDT Impact on Police Activity, Response Time, and On-Scene Investigations
   a) Comparing response times for GDT alerts vs 911 dispatch report of shots fired.
   b) Comparison of officer time on scene for GDT alerts vs dispatched report of shots fired.
   c) Does GDT lead to increased investigation times and, if so, does it lead to increased recovery of evidence.
   d) Matching discretionary/investigatory stops related to GDT alerts
      1. This may include unrelated stops following dispatch to a specific area

Identification on the Source(s) of Data and Analysis

It is important to identify available sources, or opportunities, to support data transparency and analysis of GDT. Data transparency and analysis can be supported by a range of entities that include a City's Emergency Management or Police Department, a city's internal risk-assessment mechanisms such an Inspector General or Audit function, or the use of an outside research group or academic institution to conduct an analysis.

Conclusion

While this analysis was limited in scope, it does highlight a clear range of approaches to the review and analysis of GDT. In most cities, it was evident there was no universal definition of what success or failure may look like and this served to undermine many transparency efforts because the data highlighted was being interpreted differently across groups.   Further, as demonstrated in the SoundThinking, Inc responses to the Chicago and NYC reports, a lack of collaboration when attempting to measure outcomes can result in the findings being subject to potential errors such as false equivalencies.

The reviews conducted in Durham, Chicago, and New York illustrate the broad range of analysis options available on GDT usage from the macro-level impact to overall police response and gunshot related calls, to the micro-level analysis of case specific outcomes or impact to the policing behaviors of a specific officer. Any comprehensive review of a GDT program should first recognize that transparency related efforts, data points identified, and types of reporting requested should be tailored to that population and the identified outcomes a location is attempting to measure.

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