



IMPLEMENTING EXECUTIVE ORDER 50 (2019)

SUMMARY OF AGENCY COMPLIANCE REPORTING

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INTRODUCTION

In September 2020, the Algorithms Management and Policy Officer (AMPO) launched the first ever agency compliance reporting process, asking New York City agencies to take a foundational step toward accountability as we work to make the City’s use of algorithmic tools fair and responsible for all New Yorkers. As required by [Executive Order 50](#) (EO 50), the compliance process has culminated in this report, which will make available to the public, for the first time, a directory of high-priority [1] algorithmic tools currently in use by City agencies.

In this report, we will provide some background on the reporting process, provide a summary of agency reports, and then publish the directory of high-priority algorithmic tools. We conclude with information about plans for future AMPO work.

REPORTING REQUIREMENTS

Sections 2.a (iv) and 2.a (vi) of EO 50 require the AMPO to develop a process by which agencies report information about algorithmic tools they use, and to maintain a public-facing portal where the public can access this information. To fulfill this requirement, the AMPO team conducted a four-month process to engage and educate agencies, establish reporting requirements, work with agencies on reporting documentation, and prepare reports.

Importantly, the AMPO team worked closely with agencies to refine and understand what exactly they were asked to report by clarifying the meaning of the term “algorithmic tool” and specifying which algorithmic tools were subject to reporting.

Generally, an algorithmic tool is a partially or fully automated computerized system that uses an algorithm or series of algorithms to turn data (“input”) into a result (“output”) to be used to make a prediction, determine a course of action, or otherwise influence decision-making.

[1] The AMPO policies include a framework that helps agencies to prioritize, or rank, algorithmic tools according to a set of criteria. This prioritization allows for a more tailored approach to algorithms management. See “Reporting Requirements” section of this report for additional information about prioritization.

Examples of algorithmic tools include but are not limited to risk scoring instruments, categorization or grouping algorithms, and optimization models. Often such tools incorporate artificial intelligence (AI) or machine learning (ML) techniques.

What do algorithmic tools do?

Although the specific purpose of an algorithmic tool depends on the mission and purpose of the agency using it, in general agencies use algorithmic tools to help them make data-driven decisions. Algorithmic tools can leverage data—sometimes in ways that a human could not—to bring evidence and objectivity into the decision-making process. Algorithmic tools may also speed up a process or make it more efficient through full or partial automation of steps of that process.

For the purposes of EO 50, we apply additional criteria to further specify which systems are subject to the EO's requirements. In particular, to qualify as an algorithmic tool for EO 50 purposes, a system must:

- Be derived from complex data analysis approaches, or routinely employ complex data analysis approaches to operate;
- Support agency decision-making; and
- Have a material public effect [2].

Tools or systems that perform basic administrative tasks (like word processing, basic mathematic calculators, and report generation) do not count as algorithmic tools for this report. Additionally, EO 50 policies exclude systems that may be heavily driven by complex analytical techniques but are in development (i.e. not ready for actual use), or that are far removed from any material impact upon the public.

Not all systems that meet the EO 50-specific criteria of an algorithmic tool will necessarily be subject to reporting. Agencies were provided with another set of criteria to determine the priority level of any identified tools. For 2020, the first reporting year, agencies were asked to report only on “Level 1”—i.e. high-priority—algorithmic tools.

[2] A material public effect is a discrete, discernible, or otherwise identifiable impact of a system's outputs or outcomes on individuals or populations, which relates to procedural or substantive rights under the law; individual or population protected status; eligibility, receipt, or denial of a City or agency program, service, or benefit; subjection to a specific City program or activity; or judicial, administrative, or other forms of redress.

Specifically, a tool was considered a Level 1 priority tool if it met either of the following criteria:

- It was developed with artificial intelligence (AI) or machine learning (ML) techniques;
- It collects or analyzes personally identifying information.

The criteria outlined above to identify and prioritize algorithmic tools are described in detail in the AMPO policies, published on the [AMPO website](#), which includes an “Identification and Prioritization Framework.”

SUMMARY OF AGENCY REPORTS

The following table on pages 5-6 summarizes the reporting results from City agencies. Note that not all agencies identified algorithmic tools, and some agencies may have identified algorithmic tools that did not meet the criteria to be considered a Level 1 tool for reporting as part of the 2020 cycle.

Agency	Number of Tools Identified	Number of Tools Reported
311	0	0
Administration for Children's Services, ACS	2	2
Business Integrity Commission, BIC	0	0
Chief Technology Officer, CTO	0	0
Civic Engagement Commission, CEC	1	1
Civilian Complaint Review Board, CCRB	0	0
Commission on Human Rights, CCHR	0	0
Conflicts of Interest Board, COIB	0	0
Cyber Command, Cyber	0	0
Department for the Aging, DFTA	0	0
Department of Buildings, DOB	0	0
Department of City Planning, DCP	0	0
Department of Citywide Administrative Services, DCAS	0	0
Department of Consumer and Worker Protection, DCWP (formerly Department of Consumer Affairs, DCA)	1	1
Department of Correction, DOC	1	1
Department of Cultural Affairs, DCLA	0	0
Department of Design and Construction, DDC	0	0
Department of Education, DOE	3	3
Department of Environmental Protection, DEP	0	0
Department of Finance, DOF	0	0
Department of Health and Mental Hygiene, DOHMH	1	1
Department of Housing Preservation and Development, HPD	0	0
Department of Information Technology and Telecommunications, DOITT	0	0
Department of Investigation, DOI	0	0
Department of Parks & Recreation, DPR	0	0
Department of Probation, DOP	0	0
Department of Records and Information Services, DORIS	0	0
Department of Sanitation, DSNY	0	0
Department of Small Business Services, SBS	0	0
Department of Social Services, DSS	1	1
Department of Taxi & Limousine Commission, TLC	0	0
Department of Transportation, DOT	0	0
Department of Veterans' Services, DVS	0	0

Department of Youth and Community Development, DYCD	0	0
Fire Department, FDNY	3	3
Landmarks Preservation Commission, LPC	0	0
Law Department	0	0
Mayor's Office	0	0
New York City Housing Authority, NYCHA	0	0
New York Police Department, NYPD	3	3
NYC Emergency Management, NYCEM	0	0
Office of Administrative Trials and Hearings, OATH	0	0
Office of Chief Medical Examiner, OCME	0	0
School Construction Authority, SCA	0	0
Grand Total	16	16

*Note: Young Men's Initiative (YMI) was included in Mayor's Office for reporting purposes.
Edit made 2/1/2021.*

*Note: All agency reports are confirmed as final.
Edit made 2/16/2021.*

ALGORITHMIC TOOL DIRECTORY

As a result of the 2020 agency compliance reporting process, the following algorithmic tools were identified and prioritized as Level 1 algorithmic tools. The directory that follows provides general information about these tools to facilitate unprecedented transparency into the way agencies are leveraging relevant technologies for delivering services to New Yorkers.

For each of the tools reported, the directory provides the name of the agency reporting the tool, the tool name and usage date, and importantly, it provides narrative descriptions about the tool's purpose and how it functions to aid the agency in making decisions.

Agency: Administration for Children's Services	
Name of Tool Severe Harm Predictive model	Date Tool Entered Usage May 2018
Purpose of Tool The Quality Assurance Unit in the Division of Child Protection at ACS has the capacity to review about 3,000 investigation cases out of about 56,000 investigations annually. ACS developed a predictive model to support the selection of cases for review. Open investigation cases involving children with the highest likelihood to experience future severe harm -- substantiated allegations of physical or sex abuse in the following 18 months -- are selected for review. The tool does not support decisions about individuals or families involved with ACS, beyond the selection of the case for this additional Quality Assurance review.	
Overall Function Predictions of Severe Harm (identifying likelihood of substantiated allegations of physical or sex abuse within the next 18 months) are based on machine learning methodology and are calculated for all children involved in active investigations. An investigation is assigned a numeric likelihood of this outcome based on the child in the case with the highest likelihood. The ACS Quality Assurance unit in the Division of Child Protection reviews about 3,000 active investigations annually that have the highest likelihood of severe harm. If the review team identifies gaps in documentation or practice, the field office conducting the investigation is notified of these gaps so that they are addressed, and is required to follow up with information on how these gaps have been addressed. No staff in the Quality Assurance unit or in the investigative unit see these scores. The model only supports the decision of which investigation cases will be prioritized for review by the ACS Quality Assurance unit.	
Agency: Administration for Children's Services	
Name of Tool STC Model	Date Tool Entered Usage July 2017
Purpose of Tool When a family is ready to exit ACS prevention services, an end of services conference is required (known as a "service termination conference"). ACS has limited capacity to facilitate these conferences. ACS developed a tool to prioritize cases for ACS facilitation based on the family's likelihood to be involved in a future indicated investigation. Service termination conferences that are not facilitated by ACS are instead facilitated by the prevention program provider.	
Overall Function Predictions of future indicated investigations are computed by machine learning methodology and are calculated for every child receiving preventive services. The likelihood of a family to be involved in a future indicated child protective investigation is determined by the child in the case with the highest likelihood. Staff at the ACS conferencing unit or at the prevention agency do not see these predictive scores. Prevention cases with the highest likelihood of the outcome are assigned for ACS facilitation to ensure the family has received necessary services and is ready to transition. Conferences not facilitated by ACS are facilitated by the prevention program. The model does not guide decisions about individuals or families or about the readiness to end prevention services. The model only supports the decision of which conferences will be facilitated by ACS.	

Agency: Civic Engagement Commission	
Name of Tool Methodology for Poll Site Language Assistance	Date Tool Entered Usage November 2020
Purpose of Tool This is a methodology for determining how the New York City Civic Engagement Commission (CEC) will provide interpretation services at poll sites for limited English proficient (LEP) voters. The methodology explains how the NYCCEC will identify the languages and locations in which interpretation services will be offered during the November 2020 election and beyond. These services supplement the interpretation assistance provided by NYC Board of Elections in several languages. Under the Charter, the NYCCEC can only provide interpretation services in a language if: (1) it is a designated citywide language; or (2) it is spoken by a greater number of LEP New Yorkers than the lowest ranked designated citywide language and at least one poll site has a significant concentration of speakers of such language with LEP. This methodology ensures service for all languages that are eligible under the Charter.	
Overall Function Since no dataset is currently available that reliably captures the number of limited English proficient (LEP) registered voters for all program languages, the CEC uses the percentage of LEP citizens of voting age (CVALEP) as a substitute or proxy measure of need. The CEC ranks the Program Eligible Languages in order of magnitude of CVALEP and distributes poll sites to each language based on its ranking (excluding CVALEP persons that speak languages served by NYCBOE in certain New York City counties). The number of poll sites that will receive services in any given language will depend on each language's share of the total CVALEP in the population eligible to be served. For example, according to U.S. Census data, approximately 207,926 New Yorkers are CVALEP and speak a language that is served by this program. This proportionality approach allows the CEC to balance goals of including diverse language communities as well as fair access to the total number of eligible voters within each language community. The program provides interpreters in Program Eligible Languages at poll sites based on U.S. Census data showing concentrations of CVALEP individuals who speak these languages and reside around each poll site. For each language, poll sites are chosen in descending order of concentration of CVALEP, until the language's share is met. This process is repeated for each language, thereby including the poll sites with the highest concentration of CVALEP for each Program Eligible Language until that language's share is met, and the total number of poll sites for which resources are allocated is reached. It may be possible, based on analysis of data, to reassign poll sites to languages with greater need; however, each language will receive a minimum of at least one poll site. Models used include the thiesen polygon method to create a voronoi diagram to determine CVALEP estimates.	

Agency: Department of Consumer and Worker Protection (formerly Department of Consumer Affairs)	
Name of Tool Route Automation	Date Tool Entered Usage July 2020
Purpose of Tool DCWP inspectors conduct inspections based on a route, or list of businesses to be inspected on a specific day, which must be pre-approved by their supervisor. The Route Automation tool generates a route for an inspector on a specific date based on configuration variables and geographic area.	
Overall Function Inspection Supervisor selects an inspector, enters a date and the number of businesses to be inspected, and the geographic area to be considered. The system identifies businesses in the selected area and assigns them to the route based on inspection priority until the number of businesses entered has been reached. Then the tool runs a Simulated Annealing Algorithm to optimize the order businesses appear on the route based on proximity and method of travel.	

Agency: Department of Correction	
Name of Tool Housing Unit Balancer (HUB)	Date Tool Entered Usage April 2017
Purpose of Tool The Housing Unit Balancer (HUB) is used for informing housing decisions made by operational staff designed to produce less conflict in housing areas.	
Overall Function The HUB is comprised of two functions: (1) a classification tool based on decision trees that determines an individual's propensity for violence, and (2) a housing area risk assessment, which utilizes advanced predictive analytics (i.e., neural networks) to determine optimal housing areas based on the classification scores of people in custody. The primary operational use of the HUB is for the classification score, which is used to track populations and optimize housing arrangements.	

Agency: Department of Education	
Name of Tool MySchools	Date Tool Entered Usage August 2018
Purpose of Tool MySchools is an application used to house online school directories, collect application choices, and run the admissions matching algorithm that is used for all centralized admissions processes (3K, pre-K, Gifted & Talented, middle school, and high school). The tool encompasses a family-facing portal, a school-facing portal, and an administrative portal.	
Overall Function The tool utilizes the Gale-Shapley deferred acceptance algorithm to match applicants to schools. This algorithm has been in existence for many years, used internationally for various purposes. Perhaps most common is its use in the National Resident Matching Program for medical school students. Deferred acceptance works as an iterative series of steps: students and programs are tentatively matched in each step, but nothing is finalized until the algorithm terminates (hence the “deferred”). 1. Each student “proposes” to their first choice <ul style="list-style-type: none"> • Programs assign seats to students one at a time • When all seats are filled, programs may reject previously accepted students in favor of new applications from students they prefer (e.g., students with a better lottery number) • Remaining students are rejected 2. Students rejected in the last step “propose” to the next choice on their list 3. The algorithm terminates when all students are matched or have proposed to all the programs they listed Layered on top of this algorithm are different admissions methods (screened versus unscreened), different admissions priorities (e.g., prioritizing students residing in a specific zone over those residing outside of it), and different diversity priorities (e.g., prioritizing a certain percentage of seats for students who qualify for free or reduced priced lunch).	
Agency: Department of Education	
Name of Tool NYCDOE APPR Measures of Student Learning (MOSL) Growth Model	Date Tool Entered Usage September 2013
Purpose of Tool In accordance with New York State law and New York State Education Department (NYSED) regulations, the Department developed and maintains a "growth model" to produce Measures of Student Learning (MOSL) ratings for use in annual professional performance reviews (APPR) for teachers and principals. The MOSL ratings are combined with Measures of Teaching/Leadership Practice (MOTP/MOLP) ratings to produce an annual Overall Rating for each eligible educator.	
Overall Function The growth model uses a variety of student-level data (assessment scores, English Language Learner, Disability, and Economic Disadvantage indicators), classroom-level data (e.g. % Students With Disabilities), and school-level data (e.g. % English Language Learners, % Students With Disability, average prior achievement, school type) to estimate/predict a student's score on one of many possible course-culminating assessments. These predicted scores are either 1) used to identify "peer groups" of students, from which student growth percentiles (SGPs) are determined, or 2) compared to actual scores to determine student credit values. These units (SGPs or credit values)	

are then weight-averaged to generate a educator-level result - the MOSL Rating. The MOSL Rating is combined with the MOTP Rating to produce an Overall Rating. Per State Law 3012-d, annual ratings “shall be a significant factor in HR decisions.” This is often implemented by making ratings a qualifying/disqualifying element in decision-making concerning employment, tenure, salary, and other professional opportunities.

Agency: Department of Education	
Name of Tool NYCDOE APPR Measures of Teaching/Leadership Practice (MOTP/MOLP) Calculation	Date Tool Entered Usage September 2013
Purpose of Tool In accordance with New York State law and New York State Education Department (NYSED) regulations, the Department developed and maintains databases and calculation rules to produce Measures of Teaching/Leadership Practice (MOTP/MOLP) ratings for use in annual professional performance reviews (APPR) for teachers and principals. The MOTP/MOLP ratings are combined with Measures of Student Learning (MOSL) ratings to produce an annual Overall Rating for each eligible educator.	
Overall Function Throughout a school year, evaluators observe teachers/principals multiple times and use a rubric to provide a numerical rating on one or more rubric components. These rubric component scores are then weight-averaged according to collectively bargained rules to produce an MOTP/MOLP Rating. The MOTP/MOLP Rating is combined with the MOSL Rating to produce an Overall Rating for each eligible educator. Per state law 3012-d, annual ratings “shall be a significant factor in HR decisions.” This is often implemented by making ratings a qualifying/disqualifying element in decision-making concerning employment, tenure, salary, and other professional opportunities.	

Agency: Department of Health & Mental Hygiene	
Name of Tool Improving Foodborne Disease Outbreak Detection by Incorporating Complaints Identified in Social Media Data	Date Tool Entered Usage November 2016
Purpose of Tool Foodborne disease outbreaks are identified through many mechanisms. Restaurant associated outbreaks are often identified through complaints received via NYC's 311 non-emergency information system, however not all individuals report to 311. The New York City Department of Health and Mental Hygiene (NYC DOHMH) in collaboration with Columbia University developed a text classifier program which monitors Yelp and Twitter data to identify complaints of foodborne illness, with support from the Alfred P. Sloan Foundation and the National Science Foundation. These data are used in addition to complaint data received through NYC's 311 system to identify and respond to foodborne disease outbreaks.	
Overall Function The classifiers assign a "sick score" to each Yelp review or tweet indicating the likelihood that the review or tweet pertains to foodborne illness. The sick score is based on whether the review/tweet contains key words indicative of foodborne illness ("e.g. vomit"); the Yelp classifier also incorporates if the review indicates that multiple people became sick and if the review indicates a time between eating at a restaurant and illness onset (incubation period) that is consistent with foodborne illness. Each review and tweet with a sick score greater than or equal to a threshold value are reviewed and annotated by DOHMH foodborne disease epidemiology and environmental health staff to determine if the review/tweet was actually reporting foodborne illness possibly associated with a NYC restaurant; if yes, Yelp messages are sent to Yelp reviewers, requesting that they contact DOHMH, and a Twitter message with a survey link is tweeted back to Twitter users to confirm foodborne illness. Data from annotations are used to improve classifier performance. Foodborne disease complaints identified through Yelp and Twitter are combined with foodborne disease complaints reported to 311 to improve efficiency of outbreak detection.	

Agency: Department of Social Services	
Name of Tool Homebase Risk Assessment Questionnaire (RAQ)	Date Tool Entered Usage June 2012
Purpose of Tool The Homebase program was created to prevent households from entering the Department of Homeless Services (DHS) shelter system. Since NYC has a range of antipoverty programs and the number of households entering shelter is small compared to the pool of New Yorkers who enrolled in public assistance or have an eviction filing each year, DHS had to ensure that the households who most needed additional homelessness prevention services were being enrolled in Homebase programs. Research showed that staff were not accurately able to predict who would or would not enter the DHS shelter system and that using a risk assessment would provide a much better way to match resources to the families who would benefit the most.	
Overall Function Homebase applicants answer questions about their current housing situation, history of disruptive experiences, and shelter history. Each of the answers is assigned a number of points, and applicants that reach a certain point threshold are eligible for additional Homebase services such as financial assistance and case management. Workers are able to override a limited number of model decisions with permission of a supervisor.	

Agency: Fire Department	
Name of Tool RBIS (Risk Based Inspection Program): ALARM (A Learning Approach to Risk Modeling)	Date Tool Entered Usage November 2019
Purpose of Tool ALARM creates risk scores for each building in the city. These scores are used to schedule our Fire Operations building inspections within the inspectable population of buildings in the City (about 330,000 building identification numbers), as a part of the Risk-Based Inspection Program.	
Overall Function ALARM is a combined approach using machine learning and risk ratios to assess the risk of a building for structural fire ignition (probability) and civilian fire injury/death (impact). The machine learning algorithm takes incident data, housing characteristics, and 311 data, and creates a probability of structural fire ignition. This is combined with a civilian injury or death risk ratio for the building, which is based on building characteristics, incident data and nearby felony crimes to create a risk score (range is 1-9), with 1 being highest risk and 9 being lowest. Buildings are prioritized within each of the nine risk scores according to the residential population in each building.	
Agency: Fire Department	
Name of Tool EMS Hospital Suggestion Algorithm	Date Tool Entered Usage March 2007
Purpose of Tool The EMS Hospital Suggestion Algorithm is used to determine the closest, most appropriate hospital to the incident location based on the needs of a patient requiring transport.	
Overall Function The algorithm computes a list of hospitals in order of closest to furthest in time for each medical condition category as currently established. (For example, there is a list of hospitals computed in order of closest in time for all hospitals that accept General Emergency Department patients, and for all hospitals that accept special conditions, such as burns). Depending on the medical needs category of the patient, the algorithm produces a pre-determined list of hospitals based on the location of the patient, which is then made available to the crew as a list of "closest, most appropriate hospitals."	
Agency: Fire Department	
Name of Tool EMS Unit Suggestion Algorithm	Date Tool Entered Usage March 2007
Purpose of Tool The EMS Unit Suggestion Algorithm is used to determine which order of geographic regions (known as atoms) to search in order for the EMS Computer Aided Dispatch (EMSCAD) system to select an appropriate EMS unit for dispatch to an incident.	
Overall Function The algorithm computes a list of geographic atoms in order of closest to furthest in time for each atom in the city. This list of ordered atoms is the output of an algorithm that relies on a calibrated network model to derive travel time estimates. The output is an excel file which is converted into an EMSCAD-compatible file and loaded into the system for real-time unit selection capabilities. The file is generated and implemented as a 24/7 source file, meaning, the recommended search order is not currently varying by time of day. The Department is intending to implement time-of day search orders in the near future.	

Agency: New York Police Department	
Name of Tool Facial Recognition Technology	Date Tool Entered Usage October 2011
Purpose of Tool Facial recognition is a digital technology that NYPD uses to compare images obtained during investigations with lawfully possessed arrest photos. The tool analyzes an uploaded image, known as a probe image, and searches and compares the image against a gallery of lawfully possessed arrest photos. The purpose of the tool is to enhance law enforcement's ability to investigate criminal activity, as well as to identify deceased persons and missing persons. When used in combination with human analysis and additional investigation, facial recognition technology is a valuable tool in solving crimes and increasing public safety.	
Overall Function The tool analyzes an uploaded image, known as a probe image, and searches and compares the image against a gallery of lawfully possessed arrest photos. The technology will generate a pool of possible match candidates. If possible matches are identified, trained Facial Identification Section investigators conduct a visual analysis to assess the reliability of a match and conduct a background check to compare available information about the possible match and relevant details of the investigation. If a possible match candidate is approved, the facial recognition investigator will prepare a possible match report and attach it to the requesting investigator's case file in the case management system. The match serves as an investigative lead for additional investigative steps.	
Agency: New York Police Department	
Name of Tool ShotSpotter	Date Tool Entered Usage March 2015
Purpose of Tool ShotSpotter provides acoustic gunshot detection to assist with emergency call response. The tool supports patrol operations in alerting units to potential gunfire and enhances investigations involving firearms.	
Overall Function Specialized software analyzes audio signals for potential gunshots, determines the location of the sound source, and once classified as potential gunfire sends the incident to acoustic experts for additional analysis. Notifications are sent for confirmed gunfire. ShotSpotter activations may result in evidence collection that can enhance case investigations. Problematic locations identified through alerts may require additional resource deployment and/or investigations.	
Agency: New York Police Department	
Name of Tool Patternizr	Date Tool Entered Usage December 2016
Purpose of Tool Patternizr aids crime analysis in detection of potential crime patterns.	
Overall Function Patternizr compares features of crimes and finds ones that are similar, and may be part of a crime pattern. Analysts will look at the candidate crimes and suggest the formation of crime patterns to a pattern identification module. If a pattern is formed, detectives often consolidate the investigative efforts (e.g. one detective investigates all the crimes in the pattern).	

WHAT COMES NEXT

Agency compliance reporting is an annual process. With the first ever reporting period concluded, we will focus on preparing for subsequent reporting periods by taking stock of this year's process, incorporating agency and public feedback about the process and this report to inform policy updates, and continuing to provide both agencies and the public with accessible guidance that allows for a greater shared understanding about the role that algorithmic tools play in supporting agency decision-making.

Additionally, for the tools identified in the current Directory, we'll begin to work with agencies on the next set of policies related to fair and responsible use of algorithmic tools, including channels for public inquiry about tools in use and impact assessment.