Mayor's Office of Data Analytics: Testimony before the City Council Committee on Technology in Government Oversight Hearing

April 23, 2014

Good morning, Chairperson Vacca and members of the City Council Committee on Technology in Government. My name is Nicholas O'Brien, I'm the Chief of Staff at the Mayor's Office of Data Analytics. Thank you for the opportunity to testify today. Also joining me today from the Fire Department are Fire Operations, Assistant Chief Edward Baggott, Deputy Commissioner and Chief Information Officer Joel Golub and Assistant Commissioner for Management Initiatives Jeff Roth.

The Mayor's Office of Data Analytics (MODA) works with agencies to develop and implement data-driven solutions to City service delivery issues. We enable the City to aggregate and analyze data from across City agencies and other sources to more effectively address crime, public safety, and quality of life issues. To facilitate this work, MODA works closely with the Department of Information Technology and Telecommunications (DoITT) to develop and maintain a Citywide Data Platform and Data Exchange Architecture, collectively known as DataBridge. MODA is also responsible for ensuring compliance by City agencies with the New York City Open Data Law, Local Law 11 of 2012, which is designed to increase access, accountability and transparency in government.

I'm here today to discuss specifically the MODA projects that use data to proactively address health and safety issues. I'd like to highlight two in particular that MODA is involved in: the Fire Department's Risk Based Inspection System and the multi-agency Illegal Conversion Task Force. Additionally, I'd like to discuss the City's Open Data initiative and how we are engaging with the Civic Technology community to address health and safety issues.

This is certainly not intended to be an exhaustive inventory of all uses of technology to address these issues. There are numerous other initiatives that agencies undertake on their own to proactively address health and safety concerns.

New York City Fire Department (FDNY) Risk Based Inspection System

The first initiative I would like to highlight is the Fire Department's Risk Based Inspection System. FDNY proactively conducts 50,000 building inspections per year. These inspections are primarily focused on buildings with commercial activity such as retail stores and restaurants, high-occupancy towers, densely populated apartment complexes, and facilities like schools and senior centers -- buildings where large groups of people live and work, and where a single fire could cause many casualties.

MODA partnered with the Fire Department in their development of a system that enables fire companies to prioritize inspections on the buildings that pose the greatest fire risk. The result was the Risk Based Inspection System (RBIS), launched in May 2013. RBIS has changed how each of the City's 341 fire units – engines and ladders – conduct daily building inspections. Fire units are responsible for inspecting buildings within their immediate response area. This work was previously performed

essentially on a cyclical basis, with limited information about each structure. RBIS accesses data on the buildings and past inspections. Individual building information is also accessed from several other City agencies through the DataBridge data warehouse, including the Department of City Planning, Department of Buildings, Department of Environmental Protection and Department of Finance.

RBIS uses this data to score, prioritize, and automatically schedule a building for inspection. At the core of the system is the FireCast risk model that allows the FDNY to prioritize buildings for inspection based on specified risk criteria. By combining FDNY's fire incident data with building characteristics data from across the City, FireCast leverages a sophisticated statistical algorithm to assess fire risk on a daily basis. The algorithm is trained to identify buildings that resemble other buildings that have previously experienced fire by examining thirteen (13) structural risk factors, including location within the city, age of the building, the principal use of the building, and history of previous fire incidents, among other factors. The system also captures and tracks violation history and then reschedules follow-up inspections when necessary.

Since its launch, RBIS has increased inspection targeting accuracy more than eightfold.

During the process of developing and validating RBIS, FDNY allocated funding to stand up an in-house analytics unit. The FDNY Analytics Unit has now assumed full responsibility for RBIS and is currently planning for an expansion of the model with additional data sources including fire history and Fire Code enforcement actions. The model will continue to grow over time through the inclusion of additional data and risk factors and will be shaped and refined through on-going monitoring and evaluation.

Illegal Conversion Task Force

Another way we are addressing dangerous health and safety conditions is through the Illegal Conversion Task Force. Illegally converted units pose an acute risk to residents, neighbors and first responders. They often lack second means of egress and may be equipped with illegal unpermitted gas and electrical lines. After two deadly fires in illegally converted units in the Spring of 2011, in which five New Yorkers died, the City established the Illegal Conversion Task Force. This multi-agency initiative involves the Department of Buildings, the Fire Department, the Department of Housing Preservation and Development and the Mayor's Office of Data Analytics.

The Department of Building receives roughly 18,000 illegal conversion complaints a year and is required to inspect them within 40 days. Some of these illegal conversions present a significantly higher risk of catching fire and resulting in injury or death. A risk analysis model was developed by MODA using historical data from past fires in buildings with illegally converted units to determine which of these complaints pointed to the most dangerous conditions. The model evaluates all illegal conversion and single-room occupancy complaints based on twenty (20) metrics, which have historically correlated with dangerous fires.

High-risk complaints are inspected by a joint inspection team within 48 hours of being identified by MODA. Joint inspections are designed to increase the rate of successful access. The joint task force gains access on 57% of inspections compared to a roughly 41.6% access rate for routine inspections. If, after

gaining access, the joint inspection team determines the building is a risk to health and safety, a full or partial vacate order is issued. In the event that a vacate order is imposed, tenants are offered relocation services through an HPD Client Services team.

Since the inception of the Task Force in June 2011, 15.57% of buildings inspected have been issued vacate orders and 41.8% have been issued one or more violations. This is a marked improvement over the rates for routine inspections which see 7% vacated and 19% issued violations.

Facilitating Data Sharing

To facilitate these types of initiatives, the City has been focused on developing technology solutions, especially inter-agency data sharing to improve operations and performance of City services. One incident in particular that highlighted the need for better data sharing was the fire which occurred at the Deutsche Bank building at 130 Liberty Street, Manhattan on August 18, 2007. This fire tragically took the lives of two New York City firefighters, Robert Beddia and Joseph Graffagnino. One of the recommendations coming out of the review of this deadly incident was that the City should implement a system to share the relevant results of inspections between Departments of Buildings, Fire and Environmental Protection. This recommendation resulted in the creation of DataShare.

DataShare enables the sharing of inspection information called for in the Deutsche Bank fire report. The system has been extended beyond this initial use case to cover more than 118 exchanges between 21 City entities and external partners including Con Edison and National Grid. Before DataShare, many City agencies had expressed a need to share information but exchanges were manual, inefficient, and unreliable, resulting in delayed customer service and enforcement issues. DataShare maintains data exchanges between entities in a standardized format. These automated exchanges ensure that data is validated, sent in a timely manner, and enable data transparency and integrity.

To maximize the City's investment in the DataShare program and the DoITT Analytics system, MODA partnered with the Mayor's Office of Operations to create DataBridge: a central repository for City operational data. Access to much of this data is available to City employees on their desktop computers via request. The data has also been modeled in to a suite of powerful tools to enable deeper analysis. The Analytics system currently has over 600 active agency users across 47 agencies and organizations.

We are also liberating this data from the desktop and putting it in the hands of inspectors in the field. MODA has partnered with the Mayor's Office of Special Enforcement (OSE), a multi-agency team of inspectors who respond to various health and safety complaints. OSE has worked over the last eight months to pilot the development of the City's first mobile data platform for enforcement in the field.

The tablet based solution promotes more efficient field enforcement by using geo-coded map based interfaces and providing accessibility to information previously unavailable. It gives inspectors real time report generation, submission, and analytics from the field. During the first month of the pilot, OSE did more inspections than in any other previous month completing 191. This marks a 52% increase from their highest inspection count in previous months before the use of the mobile tablets.

Moving forward, there is an opportunity to leverage the lessons learned through the pilot and to take the mobile tablet to other agencies that perform routine inspections in the field to increase efficiencies, collect more data, and better ensure the safety and health of New Yorkers.

Proactively Gathering Intelligence

While 311, 911 and inspections are highly valuable sources of information the City get about current conditions, the City proactively gathers information about hazardous conditions through the Street Conditions Observation Unit (SCOUT). SCOUT is a team of inspectors based in the Mayor's Office of Operations. Their mission is to drive every City street once per month and report conditions that negatively impact quality of life and may pose a risk to safety. SCOUT inspectors send reports of conditions they observe to the relevant agency for appropriate corrective action. The goal of the SCOUT program is to improve the street level quality of life and address dangerous conditions in City neighborhoods, while enhancing the responsiveness of City government to these issues.

The SCOUT unit has partnered with the Department of Transportation, the Department of Parks and Recreation, the Department of Sanitation, Department of Citywide Administrative Service and the Lower Manhattan Construction Command Center in tailored field inspections and validation of reported conditions Citywide. SCOUT has also been effectively deployed in the aftermath of Hurricane Sandy and other major storms to gather on-the-ground intelligence to assist agencies with addressing street conditions. This demonstrated the flexibility and ability of the team to address changing conditions and target different types of hazards.

Tapping into the expertise of New Yorkers

In addition to the efforts the Mayor's Office of Data Analytics and City agencies are undertaking to improve the use of technology to directly address health and safety, we are also working to activate the public and in particular the civic technology community to assist in developing solutions. The lifeblood of these efforts is the public data released under the New York City Open Data law. The law, passed by the City Council in 2011, is widely considered the most progressive Open Data legislation in the nation. The law requires all public data to be posted on nyc.gov by the end of 2018. As of this month, we have already released over 1,100 datasets including many that address health and safety including Fire Codes, Department of Buildings vacates and violations.

The law aims to make City government operations more transparent, effective and accountable to the public. It permits the public to assist in identifying efficient solutions for government and promotes innovative strategies for social progress. The technology community in New York City has been working hard to make this a reality. In February, BetaNYC, a local civic technology group, hosted a Crime and Public Safety Data Hacknight to start to build tools based on the data the City has released in this area. This is one of many events the community holds to work on a variety of issues. MODA works closely with this community to connect them with subject matter experts and look for ways the City can use the insight of these dedicated individuals to improve City services.

Future Opportunities

I've provided a summary of just a few of the initiatives and programs the Mayor's Office of Data Analytics undertakes. MODA continues to work towards its mission of assisting agencies in leveraging City data for more effective, efficient, and transparent government. Analytics will continue to be a resource that helps leaders make complex decisions and ultimately improve the quality of life for New Yorkers.

We have seen a growing interest in creating dedicated analytics units within agencies. MODA worked closely with FDNY in the development of their analytics unit and continues to coordinate them to share best practices and technologies. Another example of this growth is the Department of Buildings which also created an in-house analytics unit. The growth of in-house analytics units allows City agencies to execute analytics projects faster and cheaper. As these analytics efforts grow, MODA will continue to work to facilitate access to City and external data and to consult on inter-agency projects.

For additional information on the work we do please visit our website at nyc.gov/analytics where you can find our annual report and further detail on other initiatives.

Thank you for the opportunity to testify today. I am now happy to address any questions you may have.

Testimony to the Committee on Technology in Government of the New York City Council

Using Technology to Proactively Address Health and Safety Issues in New York City

Good Afternoon, and thank you Chairman Vacca and other members of the Technology Committee for holding this timely hearing. My name is Dominic Mauro, and I am testifying today on behalf of Reinvent Albany, where I am the Staff Attorney. Reinvent Albany also co-chairs the New York City Transparency Working Group. Our organization and coalition strongly support the application of statistical modeling and predictive analytics, and would like to see a Mayor's Office of Data Analytics with the resources to effectively perform such analysis and share the results with the public.

We are here to make two points:

1. The Mayor's Office of Analytics should be robustly funded and staffed. It is an extremely powerful tool for the sound and efficient management of the city.

2. Whenever possible, data produced by the mayor's office and city agencies should be available to the public via the city's open data portal. In some cases, concerns about the privacy of individuals and concerns about security preclude making data open. However, a significant share of the data used by MODA, and assembled in the city's Databridge database, and data used in "AgencyStat" performance management by agency executives, does not affect security or impinge on individual privacy. This data should be public. Currently, the city has a small public data universe, and a very large, internal data universe that the public cannot see. This is not in the spirit of the Open Data Law, and does not get the best value from the data the city is collecting and analyzing at great tax-payer expense.

The Mayor's Office of Analytics (MODA) was formally established about a year ago, although New York City has saved tremendous amounts of taxpayer money and employee time over the last decade, thanks to the previous administration's investment in data-driven government. We strongly urge the City to continue to support a large and robust MODA, with at least a dozen analysts. We believe the

city would see enormous savings from the kind of insight that MODA can provide with data analytics.

The comprehensive agency data the city has access to via its DataBridge data management system is among the most valuable the city has. The data is highly scrutinized and refined and expensively collected. Policy decisions for the entire city should be informed and driven by MODA and its team of data analysts.

For instance, MODA used data from the Fire Department to improve the efficiency of inspections for fire code violations. There are 300,000 buildings in New York City, and the Fire Department can only inspect about 25,000 per year. MODA's data analytics have helped the Fire Department find 71% of violations in the first 25% of its inspections by directing limited resources to where they are needed most. Other agencies should make their data available to MODA for this kind of analysis and prediction; the savings would be staggering.

However, this data should not just live on DataBridge for MODA's private use. These data sets and analytics and should be shared with the public. If the Health Department were to find a novel connection between environmental conditions and risk of disease or infection, they should put it online. If the police department finds a connection between crime and a local indicator, they should put that online. The collection and analysis of this data was paid for by the public, and it belongs to the public. Barring some specific infringement of personal privacy, this data should not be secret.

Likewise, the information which agencies are already collecting and analyzing about their own performance, collectively known as AgencyStat, should be made available as open data. New York City should not have a two-tiered system with public data sets for the public to use, and private data sets for MODA's use only. To realize the maximum value of this data, it needs to be shared with the public.

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New York City Council Technology Committee
Testimony by Dara Adams, SAS
April 23, 2014

Mr. Chairman, Members of the Committee,

Thank you for inviting me to present to your committee today. My name is Dara Adams, and I am the Account Executive for New York City Local Government at SAS Institute, Inc. Prior to joining SAS I spent six years in public service, including my roles as the Community Affairs Director for the New York City Department of Education and as an Aide to Congresswoman Carolyn Maloney for four years.

SAS is a 38 year old company based in Cary, North Carolina, and is the industry leader in Advanced Analytics and Statistical Software and Solutions. We are the largest privately held software company in the world with more than $3B in revenues last year. Financial Services, Government and Health & Life Science are our largest industry sectors. We employ more than 13,000 people worldwide, about half of those in the US, and approximately fifty-one in New York. We recently launched an Advanced Analytics Lab for State & Local Government that employs over 200 researchers, all with advanced degrees, focused exclusively on applying analytics to solve the most challenging problems facing governments like ours. New York City has partnered with SAS for decades with close to 20 agencies already relying on SAS solutions, including the Mayor's Office of Data Analytics, the Center for Innovation through Data Intelligence, the Department of Health and Mental Hygiene, the Department of Finance, and the Human Resources Administration, to name a few.

In your effort to improve the Health and Safety of residents of New York City, I would like to focus today on how analytics can be applied to help protect and improve the lives of some of our most vulnerable New Yorkers -- our children.

I'd like to take a brief moment to explain what I mean by analytics. Simply stated, analytics involves applying advanced math and statistics to data to reveal information. The use of analytics provides its value in answering questions not just about the past, but also about the future. Rather than, just addressing questions like, "Who, What, When, Where and How Much", analytics can help answer questions like "Why?", "What is likely to happen in the future?", "What is the impact?" and "What actions are needed to obtain the optimal outcome?"

A good example of this from popular culture is the Orlando Magic. Professional sports teams in smaller markets often struggle to build a big enough revenue base to compete against their larger market rivals. Using SAS, the Orlando Magic has the seventh-largest revenue stream in terms of

ticket sales in the NBA, despite being in the 20th-largest market. The Orlando Magic accomplishes this by studying the resale ticket market to price tickets better, to predict season ticket holders at risk of defection (and lure them back), and to analyze concession and product merchandise sales to make sure the organization has what the fans want every time they enter the arena. The club has even used SAS to help coaches put together the best lineup. By using SAS the Orlando Magic grew revenue, optimized ticket pricing and gained a better understanding of lifetime customer value. In other words, in an environment of limited resources and economic constraints, the team was able to maximize its outcomes. I submit that this challenge is a familiar one to local government today and that analytics can help.

In government, analytics can be used in many different ways to solve problems and save both lives and money. As you already heard from the Mayor's Office of Data Analytics, New York City is using analytics-- but I believe that we have only scratched the surface of what is possible.

In North Carolina in 2008, Alvin Lovette and DeMario Atwater were on probation when they shot and killed University of North Carolina at Chapel Hill student body president Eve Carson. Lovette was also found guilty of murdering Duke graduate student Abhijit Mahato. A review found that probation officers lacked access to prior criminal records for Lovette and Atwater. If they had access to these records, the offenders may never have been paroled and/or would have been more closely supervised by officers, potentially preventing these tragic murders. To safeguard against tragedies like this in the future, the North Carolina Controller reached out to SAS to help integrate offender data across multiple agencies, local law enforcement, county jails and the judiciary to provide a comprehensive review of each offender and enable criminal justice professionals to make quicker and more effective decisions that better protect the public.

In January of this year, here in New York City, 4 year old Myls Dobson was starved, tortured and beaten to death by his father's girlfriend while his father was in jail. An investigation revealed that among other red flags, the Administration for Children's Services was not aware that Myls's father was in jail or that he had been incarcerated for six months previously -- despite ACS having made nine visits to the home during that time. Just as in North Carolina, this tragedy and ones like it can been avoided with better data integration across agencies and the application of advanced analytics.

Sadly, incidents like these are not uncommon, and SAS is engaged by state and local governments around the nation to prevent them from occurring. When the Florida Department of Children and Families (DCF) came under scrutiny for a rash of child fatalities and wanted to make improvements to child protective investigations, it turned to SAS. SAS analyzed five years of DCF data and using advanced analytics was able to give DCF the knowledge it needed to reform its policies, expand its focus on the right issues, empower them to make better decisions relating to supervision, intervention, and programs and services offered to families in crisis.

Likewise, Los Angeles County also uses SAS analytics to help protect against child abuse within its foster care programs. Through analytics, it is able to use existing data files of cases to identify the risk attributes for abuse in Los Angeles. Using this new information, it can now, in a better, smarter way determine child placement and case worker protocols for each child, based on his or her unique situation.

New York City can be smarter and more effective when it comes to the safety of our most precious and vulnerable New Yorkers. We have an obligation to protect our children and analytics is an extremely effective and underutilized tool in our arsenal.

Having worked in City government, I understand that there are challenges and barriers to using analytics to improve government operations. The first is data. Analytics needs data. The more data the better. However, data is often housed in many different databases, systems and silos. Agencies are often reluctant to share data with each other due to cultural, regulatory or privacy concerns.

The second challenge is cultural. Governments must embrace a culture of fact based decisions and analytics, and this must be driven from the very top down to the rank-and-file. Again, the benefits are proven. The State of Washington uses SAS analytics in its Workers' Compensation program to identify non-compliant employers. After implementing an analytic approach to determine audit candidates, the State was able to increase its audit hit rate -- the number of audits that result in positive finding of non-compliance -- from 50% to 80%. In addition, the State of Washington was able to increase the average collections per positive audit by 33% using analytics to focus limited auditor resources on those cases that were of the highest potential value to pursue. As a result, the State was able to recover almost $150M last year in unpaid workers' compensation premiums.

New York City has done some amazing work as it relates to the adoption of analytics by City agencies, but there is much more that can be done and the time to act is now. Income inequality continues to rise, and the challenges we face are historically difficult. We must act differently. Smarter. More cooperatively. More effective and efficiently. As we've seen from the offices that have started to adopt it, the impact analytics can have on government operations and effectiveness is transcendent. It allows government to make policy and operational decisions based on facts rather than intuition. It allows government to be more transparent and accountable to the citizenry. It allows government to maximize limited resources, improve program outcomes, and better protect public safety and welfare. This ultimately results in improved quality of life for all citizens.

Further, compared to other technology initiatives, analytics are relatively low cost and easy to implement, and can be done in small and iterative phases that provide immediate benefits within a few weeks rather than years. It does not involve replacing existing systems, but rather placing a data integration and analytics layer on top of those systems. New Yorkers have only just begun to see the benefits of analytics and I hope you will continue to encourage discussion on how agencies can better share, integrate, and analyze data.

Mr. Chairman, I again thank you and the Committee for your time and attention today, and I would be happy to answer any questions the Committee may have.

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