

- 1) What is the company's staffing model?
 - a) Keystats typically uses its own analysts to do all of its analysis. If or when there are components of a project outside of our capabilities, we usually seek to partner with a resource that has that required capability.

- 2) Does the tool/system provide integration points into existing systems, e.g. REST endpoint. That is, can the product be integrated with existing NYPD systems? **Yes**

- 3) Does the product provide a measure of confidence/risk? An estimated volume?
 - a) System will provide a measure of level of confidence/ risk associated with the likelihood of an instance of a crime at a certain level within certain parameters (*parameters to be provided by NYPD*).
 - b) An estimated volume (# of crimes) can be provided as well. To be clear, prediction would provide:
 - (1) Likelihood of a certain crime/offense type
 - (2) Level of the crime type in terms of severity(*severity meaning two things: type of crime, which we address in the previous bullet, and if relevant the volume of crime (i.e., single offender vs. group of offenders, etc.)*) for a given unit of geography

Note: A clearer definition of NYPD's definition of "Volume," would also be helpful.

- 4) Can the size of prediction areas be customized?
 - a) The size of the prediction area can be customized. This is an aggregation of data at different levels.
 - b) Regarding customization, the various levels of geographies or for that matter offenses, or any other dimension would need to be made clear to us, so that we may incorporate it into the system for availability on the back end.

- 5) Can predictions be provided at custom time intervals (e.g., by hour, weekly etc.)?
 - a) Yes, time is another dimension by which predictions can be made, in conjunction with the response to the previous question. As to whether prediction areas can be customized, customization is always available provided we know the dimension and the level desired.

- 6) Can predictions for selected crimes be weighted more heavily based on Departmental and/or Commanding Officer priorities?
 - a) Yes. Most (*if not all*) of the parameters that define the algorithm can be weighted differently to influence the likelihood of the crime/ offense type or any other target prediction variable/ item.

- 7) Can the predictions take into account verticality (or three dimensional data)?
 - a) Yes, the predictions will take into account as many dimensions as the data provided/ used will have.

- 8) Does the product provide accuracy (hit-rate) reports after data updates are delivered?
 - a) Yes, "hit-rates," can be produced and should be used for validation purposes – provided the data is available to us to produce the Hit-Rate Report.

- 9) What, if any, security protocols will be incorporated, (e.g., two phase authentication)?
 - a) The security protocol is known as OAuth2. In addition, the security can be enhanced using SSL.

- 10) Is the application delivered in a secure cloud based solution?
 - a) Yes. The platform is hosted on Amazon Web Services (AWS). AWS is highly secure with Network firewalls , Encryption in transit etc.

- 11) Are the predictions/system mobile compliant?
 - a) Yes our predictions/system is mobile compliant.

- 12) Is the output from the system "map-able" or map based?
 - a) Output from the platform can be easily customized to be "map-able" and to work with existing map software.

- 13) What data is required as input into the system (historical crime data, weather, special events, proximity to other geographic features, demographics, etc.)?

Prevalence or Risk of Crime is driven by:

 - a) Time and Location
 - b) Demographics
 - c) Historical crime data

- d) Special events
- e) Proximity to geographic features
- f) Individuals predisposed to Crime
- g) An environment that enables Crime

See Addendum starting on page 5 (we provided this information to you previously)

- 14) Does the system utilize a broad set of crime theories (e.g. risk terrain modeling and near-repeat modeling) in the generation of predictions?
- a) Yes, our models inherently will incorporate methodology that will incorporate the approaches associated with Risk Terrain Modeling and Near-Repeat Modeling. Our methodology is not limited to any one approach – many approaches and “theories,” will be tested for validity.
- 15) Does the system use machine-learning, or some similar technology to learn which theories are the most applicable and then calibrate the model accordingly?
- a) Yes, our system will utilize machine learning to assist in the development and calibration of the models. (Genetic Programming & Algorithms to be specific)
- 16) Does the system provide the ability to modify parameters based on local/expert knowledge or circumstances?
- a) Yes. (See answer to #6, above)
- 17) Provide professional references, three (3) preferred, who can describe your experience in predictive policing. It is preferred, but not required, from police departments or other law enforcement agencies.
- a) These references are not from law enforcement agencies.
 - b) (Keith Huntoon, [President at LiftEngine (khuntoon@liftengine.com)]
 - c) Gillian Awahakisu, [VP of Strategic Analytics at ZetaInteractive (gahouanvoheke@zetainteractive.com)]
 - d) Dave Lauchman, Former Head of Technology at Bloomberg (Dlakshman@hotmail.com)]
 - e) Sharona Sankor-King [Partner Advanced Analytics at MEC (Sharona.Sankar-King@mecglobal.com)]
 - f) Rick Weinstock [EVP of Marketing Analytics at ACMG (rweinstock@atlanticcoastbrands.com)]
- 18) Complete and sign the Federal Bureau of Investigation Criminal Justice Information Services (“CJIS”) Security Addendum, attached hereto as CJIS Security Addendum. An authorized representative shall sign the Certification to the Addendum on behalf of the Contractor. Contractor shall instruct its employees that individual employees may also be required to sign the Certification, at the discretion of the NYPD. [Done]
- 19) The Contractor as an organization and personnel that have direct knowledge of this procurement will be required to submit confidentiality agreements as requested by NYPD. The selected Contractor shall provide the following information regarding all employees and subcontractor

employees that will have direct responsibility regarding software design, software programming, implementation, project management and/or warranty and maintenance service responsibilities:

1. Name of Individual
2. Sex
3. Country of Birth
4. Business Title
5. Place of Business (address)
6. Telephone #
7. Email address
8. Date of Birth
9. Social Security # (or equivalent) – last four digits.
10. Home Address including Country.

[You have this information from me already. It's in the NDA's we provided to you previously. One other person will be added to this list. Sudip Chatraborty. I have included his signed NDA with this package.]

Addendum

1. Data required as input into the system:

| DIMENSION | CATEGORY OF ELEMENTS | ELEMENT | DESCRIPTION |
|-----------------|----------------------|---------------------|---|
| EVENT/ INCIDENT | Time | Date | Date |
| | | Time | Time |
| | Location | Longitude/ Latitude | Spatial Coordinates |
| | Location | Cross-Street | Nearest Cross Street |
| | Offense Type | Offense Type | NYPD Compstat reports on: |
| | | | |
| | | | Can discuss exact Level of Offense Hierarchy to Consider |
| | | | |
| | Offense Type | Drug/ NonDrug | Event is Drug or NonDrug Related |
| | Offense Type | Drug Offense | Depictive of Specific Drug and Level of Offense |
| | Offense Type | Dispatch Record | Dispatch Record potentially provides auxiliary information not discretely captured elsewhere (Does not have to be linked to a criminal complaint) |
| | | | |

Sources: NYPD

Levels: By incidence level, Place Block group code and Census Tract Code on each incident record

| DIMENSION | CATEGORY OF ELEMENTS | ELEMENT | DESCRIPTION |
|-------------------|----------------------|---|----------------------------------|
| RISK- Individuals | PAROLE PROBATION | # of Parolees, # Individuals on Probation | Count |
| | | # of Parolees, # Individuals on Probation by Type of Past Offenses | Provides Parolee/ Probation Type |
| | | Average # of Past Offenses | Count |
| | | Average Time Since Last Offense By Type | Duration since Last Offense |
| | | Average Frequency of Past Offense By Type | "Volume" of Crime |
| | | (What level is this data available? What about precinct level? Are you saying that NYPD will not have access to probation/parole data . We just want to be clear?) | |
| | | | |
| | | | |

Sources: The New York City Dept. of Corrections , New York State Division of Criminal Justice Services,
New York City Dept. of Probation, New York State Division of Parole
Levels: By Week , at the Block Group Level

| DIMENSION | CATEGORY OF ELEMENTS | ELEMENT | DESCRIPTION |
|----------------|---------------------------------|---|--|
| RISK-GEOGRAPHY | Std Demographics | Demographic | Standard Demographic Information (Age, Sex, etc) |
| | | RATIO OF INCOME TO POVERTY LEVEL IN THE PAST 12 MONTHS | Wealth of Geography |
| | | PLACE OF BIRTH | -- |
| | | MEDIAN INCOME IN THE PAST 12 MONTHS | -- |
| | Residence Last Year - Migration | GEOGRAPHICAL MOBILITY IN THE PAST YEAR | -- |
| | Journey to Work | MEANS OF TRANSPORTATION TO WORK | -- |
| | Children - Relationship | POPULATION UNDER 18 YEARS BY AGE | -- |
| | | HOUSEHOLD TYPE (INCLUDING LIVING ALONE) BY RELATIONSHIP | -- |

Sources: Keystats we utilize Bureau of Census & other data sources to gather this type of information
Levels: *By Year, Block Group Level & Census Tract Level*

| DIMENSION | CATEGORY OF ELEMENTS | ELEMENT | DESCRIPTION |
|----------------|-------------------------|--|-------------|
| RISK-GEOGRAPHY | Children - Relationship | RECEIPT OF SUPPLEMENTAL SECURITY INCOME (SSI), CASH PUBLIC ASSISTANCE INCOME, OR FOOD STAMPS/SNAP IN THE PAST 12 MONTH | |
| | Households - Families | FAMILY TYPE BY PRESENCE AND AGE OF OWN CHILDREN UNDER 18 YEARS | -- |
| | " | HOUSEHOLD TYPE BY TENURE | -- |
| | " | HOUSEHOLD TYPE BY HOUSEHOLD SIZE | -- |
| | " | MULTIGENERATIONAL HOUSEHOLDS | -- |
| | Marital-Status | MEDIAN AGE AT FIRST MARRIAGE | -- |
| | " | MARRIAGES ENDING IN WIDOWHOOD | -- |
| | " | DIVORCES IN THE LAST YEAR | -- |
| | " | MEDIAN DURATION OF CURRENT MARRIAGE IN YEARS | -- |
| RISK-GEOGRAPHY | School Enrollment | SCHOOL ENROLLMENT BY LEVEL OF SCHOOL FOR THE POPULATION 3 YEARS AND OVER | |
| | | POVERTY STATUS IN THE PAST 12 MONTHS BY SCHOOL ENROLLMENT BY LEVEL OF SCHOOL | -- |
| | Educational Attainment | EDUCATIONAL ATTAINMENT FOR THE POPULATION 25 YEARS AND OVER | -- |
| | | HOUSEHOLD LANGUAGE BY HOUSEHOLD LIMITED ENGLISH SPEAKING STATUS | -- |

| | | | |
|----------------|------------------------|--|----|
| | Poverty | POVERTY STATUS IN THE PAST 12 MONTHS | -- |
| | Income | MEDIAN HOUSEHOLD INCOME IN THE PAST 12 MONTHS | -- |
| | Transfer Programs | PUBLIC ASSISTANCE INCOME IN THE PAST 12 MONTHS FOR HOUSEHOLDS | -- |
| | | PER CAPITA INCOME IN THE PAST 12 MONTHS | -- |
| RISK-GEOGRAPHY | School Enrollment | SCHOOL ENROLLMENT BY LEVEL OF SCHOOL FOR THE POPULATION 3 YEARS AND OVER | |
| | | POVERTY STATUS IN THE PAST 12 MONTHS BY SCHOOL ENROLLMENT BY LEVEL OF SCHOOL | -- |
| | Educational Attainment | EDUCATIONAL ATTAINMENT FOR THE POPULATION 25 YEARS AND OVER | -- |
| | | HOUSEHOLD LANGUAGE BY HOUSEHOLD LIMITED ENGLISH SPEAKING STATUS | -- |
| | Poverty | POVERTY STATUS IN THE PAST 12 MONTHS | -- |
| | Income | MEDIAN HOUSEHOLD INCOME IN THE PAST 12 MONTHS | -- |
| | Transfer Programs | PUBLIC ASSISTANCE INCOME IN THE PAST 12 MONTHS FOR HOUSEHOLDS | -- |
| | | PER CAPITA INCOME IN THE PAST 12 MONTHS | -- |

Sources: Keystats we utilize Bureau of Census & other data sources to gather this type of information

Levels: By Year, Block Group Level & Census Tract Level

| DIMENSION | CATEGORY OF ELEMENTS | ELEMENT | DESCRIPTION |
|------------------|-----------------------------|--|---|
| RISK-POLICY | Resources | Budget – Patrol Cars Tours | Dollar amount expended on Patrol Car Tours |
| | Manpower | Budget or # of Patrol Officers | -- |
| | Special Events | Any Special Events | Events at Jacob Javits Center (Auto/ Computer/ Boat Show), Holidays, etc. |
| | Tactics | Stop & Frisk (# stop & frisk events) | -- |
| | Resources | # patrol cars (precinct levelannually) | -- our methodology adjusts for real time production issues |
| | Resources | # officers (precinct level....annually) | ---- our methodology adjusts for real time production issues |
| | Resources | Avg years experience of officer Precinct | ---- our methodology adjusts for real time production issues |
| | | | -- |
| | Resources | Avg # arrests (precinct level) | -- |
| | Resources | Avr # civilian complaints (precinct level....annually) | |

Sources: NYPD

Levels: By Quarter, at Block Group Level & Census Tract Level