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Evaluation of the Baltimore Police Department Predictive Policing Pilot

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Executive Summary

On February 29, 2012, the Baltimore Police Department began an innovative pilot project in the Southwest District employing predictive analytics. In cooperation with IBM, BPD's Planning and Research Unit embarked on a 6 week pilot study to determine if the department could benefit from the addition of predictive analytics in identifying and preventing robberies.

The underlying question driving the pilot was if a computer driven model can accurately forecast the increased likelihood of a robbery in a specific post on a specific shift within the Southwest District compared to it not occurring. This approach is based upon a Proof of Concept (POC) that was completed by IBM for Baltimore Police in August, 2011. This POC employed 3 years of historical data to determine if a model could accurately predict if a robbery would occur; which it was able to do with an accuracy of 77 percent and led to enough interest to pursue a more time-sensitive illustration as deployed in this pilot.

The results of the pilot are far more robust than the accuracy of the model, and explore unexpected issues that were identified during the project period. Through personal interviews, survey information, an evaluation of the implementation process, and the 6 weeks of the pilot, a number of valuable insights were gained regarding the use of predictive analytics in the Baltimore Police Department. Some key findings from the evaluation include:

- BPD and District command staff, Planning and Research, and District patrol officers were unsatisfied with the pilot, and found little utility in the predictive results provided by the IBM software.
- The results of the model had little value to the command staff and patrol officers, as it was not clearly operational or easy to interpret.
- Critical errors in the design phase of the model, which led to stoppages during the pilot, could have been avoided with input from BPD subject matter experts.
- There is a need for additional training on devising effective patrol plans when employing new data-driven deployment strategies.
- The way in which predictive analytics was employed in this pilot did not yield immediate added value for BPD; however, there are opportunities to use the IBM SPSS Modeler in ways that could improve the current work of the agency.

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While there was not effective training, and the ultimate transfer of the model to BPD, there is still evidence to suggest that with additional time and training, the SPSS modeling software could be a value to BPD. With such a strong Planning and Research Division, knowledgeable about the data and capable of mapping and advanced statistical analysis, analytical software such as SPSS Modeler or even the basic SPSS software could be a valuable tool in the Divisions' arsenal.

Conclusions and Recommendations

Through the 6-week pilot, Baltimore Police Department was exposed to one application of the IBM SPSS Modeler software, testing the ability of predictive analytics to forecast robberies in the Southwest District. There was significant interest in the pilot; however, given the early challenges, **the experience of the pilot was less than satisfactory from the perspective of BPD.**

The IBM software may not have met the expectations of the BPD staff; however the power of the SPSS Modeler software is not without merits. The Modeler software, with its data mining capabilities, can be a valuable tool for law enforcement if used in an exploratory capacity. For instance, the success of the software in the Miami Dade Police Department is based on the utility of the software to match patterns; namely crime signatures with known suspect profiles. This application is working with the strength of the predictive analytics, finding patterns in data. In this pilot, the short 6 week time period in only one District, coupled with the attempt to predict a statistically rare event, yielded an unsatisfactory result. It is recommended that **if BPD has a continued interest predictive analytics, that it undertake a second pilot that has a longer time frame in the field and covers more than one District.** Further, there are additional applications of the software that may be of interest to BPD; however, adopting the software could require additional funds for technology upgrades.

While the pilot may have been unsatisfactory, it did produce a number of valuable insights for BPD. The pilot highlighted:

- The current capabilities of the Planning and Research Division in providing hotspot analysis to Districts.
- The value of understanding the community and social factors that could increase the likelihood of a criminal event taking place, and the ability of statistical software to assist in the development of these models.
- The use of data-driven analytics, such as hot spot maps, in informing police operations.
- A need for additional training on developing and employing deployment plans that implement results of predictive analytics.

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- The value of testing new and innovative technologies, such as predictive analytics, to assess the value added to the agency.

The success of this pilot required more than just an accurate prediction of a robbery in a certain post on a certain shift. It also required a clear statement of goals and expected outcomes, proper training on the software and interpreting the results, a product that had operational utility for patrol officers, and ultimately buy-in from Southwest District. The 6 week pilot ended with a high level of dissatisfaction at BPD, ranging from the patrol officers to the staff in Planning and Research. Ultimately the lack of operational value of the data produced within the first week of the pilot yielded a waning interest among the District leadership, which ultimately led to a complete lack of interest and faith in the predictive analytic tool. While the Planning and Research staff worked diligently to meet the expectations of the District, the issues were deeper than capabilities and were more targeted at expectations.

The expectation of this pilot was that that BPD would receive operationally relevant information that could help assist patrol in real-time in predicting robberies in the Southwest District. The reality did not meet the expectations, and quickly jeopardized the success of the pilot. The need for changes to the model and other modifications further reinforced the perception that the results coming from this modeling approach were not of value to BPD. Nevertheless, there are recommendations for consideration in future approaches to employing predictive analytics or other intelligence-based policing strategies:

- The IBM SPSS Modeler software is not of value to BPD for the particular purpose outlined in this pilot; however, it may add value in other contexts where there is a need to explore patterns in existing data.
- Create a mandatory training for all first line supervisors in constructing a deployment plan, with a particular focus on the integration of police intelligence and crime data into patrol strategies.
- When piloting a new technology or analytic tool, require training up front prior to the start of the pilot, to ensure that all questions are answered and the key personnel using the product are able to effectively communicate the results to the target audience.
- Set clear goals and expectations for pilot projects, including expected outcomes. It may be helpful to ask the vendor to set reasonable benchmarks for success and determine if these metrics are satisfactory to the agency prior to initiating the pilot.

Finally, the pilot had a relevant value to BPD, even if there was a high level of dissatisfaction. While predictive analytics did not perform as expected in this application, Baltimore Police Department