Crystal balls, phrenology and predictive analysis- one of them actually works

by

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The Command College Futures Study Project is a FUTURES study of a particular emerging issue of relevance to law enforcement. Its purpose is NOT to predict the future; rather, to project a variety of possible scenarios useful for strategic planning in anticipation of the emerging landscape facing policing organizations.

This journal article was created using the futures forecasting process of Command College and its outcomes. Defining the future differs from analyzing the past, because it has not yet happened. In this article, methodologies have been used to discern useful alternatives to enhance the success of planners and leaders in their response to a range of possible future environments.

Managing the future means influencing it—creating, constraining and adapting to emerging trends and events in a way that optimizes the opportunities and minimizes the threats of relevance to the profession.

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Its 3:00 am, and you a few other officers are on a surveillance. Your city has been plagued by a rash of hot-prowl burglaries over the past few weeks. The suspect has not been seen, usually because the victims were asleep when they discovered the burglar standing over them. Not really sure what you and the others are looking for, your mind begins to wonder in the silence of the night… The Crime Analysis Unit said this guy could strike in this area between the hours of midnight and 4:00am. They said he might be on foot or on a bicycle. His M.O. is to remove louvered window panels or to enter via unlocked doors, so he travels light, and carries no burglar tools. He likes to strike first floor structures. At 3:25 am, the radio silence is broken. "I see movement at post #3" one of the officers said. "1L31, the suspect just entered via a louvered window". 3:30am "1L32, Code-four, suspect in custody".

Any law enforcement agency could be the problem solver here, by using predictive analytics to solve crimes before they occur again. In this instance, the local police crime analysis unit was able to process large amounts of police report data from past incidents. By using advanced software and hardware, they were able to predict when and where the next crimes were likely to occur. The watch commander only had to strengthen their staffing in those areas and wait.

Advanced predictive analytics could be the next generation of problem solving tool for the policing profession. Predictive analytics combines some of our existing technologies like computers, crime analysis and well developed police reporting techniques and adds a few newer technologies like artificial intelligence, universally

shared data and borrowed technology from the consumer industry to build a system that is capable of predicting crime before it happens. The result is a system that gathers huge amounts of data and uses software that is engineered and tested in the private customer management industry to model patterns and trends from crime data. Crime analysts within the agency then analyze the results and offer police management insight into where their police resources are likely needed most. Management has to balance their daily needs for patrol services with the potential to catch criminals by strategic placement of officers. This process of strategic placement of personnel resources is sometimes referred to as "Cops on Dots" (Mathias, 2005).

Police and Sheriff Departments have been contributing crime data to the Uniform Crime Reporting system since the 1930's. The value of this program is further demonstrated by the fact that participation is not mandatory, however in 1995, the statistics represented in the UCR report included 95 percent of the nation's total population (UCR, 2008) This ability to quantify crime incidents is one of the reasons that predictive analytics is such an excellent option for problem solving. Residential burglaries occur once every 14.4 seconds in the US (FBI Crime Clock, 2006). Of the roughly 2,183,746 residential burglaries reported nationwide, only a little more than 275,000 resulted in a clearance by arrest (12.6%) (FBI Table 2, 29, 2006). These numbers alone seem to present a huge opportunity for policing to get ahead of the curve, and actually make a dent in reducing or eliminating property crimes altogether.

Property crimes are the most prolific and commonly repeated crimes in the United States according to FBI statistics. In 2006, crimes of passion like homicides occurred much less frequently; at an average of one every 30.9 minutes (FBI Crime Clock, 2006).

In either case, it is possible to predict certain drug related or domestic violence related homicides, because of the meticulous counting we do. (McCue, 2008) Fueled by the confluence of evolving computer technology, improved sharing of data between agencies and adaptations of some social sciences from the private sector**,** it is possible to bring reliable predictability and advanced problem solving to local police agencies. It's a matter of simple averages that computer technology alone will solve some crimes, and so will improved data sharing between law enforcement agencies. What modern policing needs to understand is that advanced predictive analytics act as a force multiplier that is created when all of these technologies are focused on problem solving.

Computing capabilities are growing at a phenomenal rate. Gordon Moore, one of the founders of Intel Corporation, postulated in 1965 that computer growth would double every 2 years. Using Moore's Law, the quantity of transistors on a single chip has been doubling every 2 years for the last 30 years (Yu, 1998). In an even shorter time period, police use of computers in the field has grown from 5 percent in 1990 to 56 percent in 2003 (Hickman and Reaves, 2003). Extrapolation of that data places field computer use near 71 percent by 2008. With only 51 percent growth in 13 years, the policing industry seems slow to adopt and accept computers into their workplace as a potential problem solving tool. The use of computers alone will not solve the crime problems in the United States (McCue, 2008). Policing needs to look beyond its traditional framework, and consider technology sharing from sources outside police work. Albert Einstein said it best; "The significant problems we face cannot be solved at the same level of thinking we were at when we created them." (Covey, 1989)

Well before computers, police data was stored on 3x5 index cards. From a problem solving perspective, the concept was a centralized source (file cabinet) where all of the information was stored. The disadvantages of such a system were numerous and included the system's inability to cross-reference seemingly different data, lack of a universal format and physical access. Using the old system, if you wanted to link a car to a suspect, you had to write that information on the suspect index card and on the car card, and then re-file each card back in the correct place within the filing cabinet. Today, indexing of data among different data sets is straightforward, thanks to computers superseding the manual systems. Access is easy; you can retrieve data virtually, so you don't need to go to a file cabinet to get it. Universal formatting is slowly becoming a non-issue, as the computer industry has adopted standards at many levels and within most disciplines. The windows XP and Vista platforms are examples of how Microsoft has standardized many aspects of the PC market. Within the justice community, the Global Justice Extensible Markup Language Data Model (GJXDM) has been adopted to ensure agencies can share data among and between data systems (US DOJ, 2008).

Customer Relationship Management and Policing?

The Customer Relationship Management (CRM) industry focuses on predictive behaviors in the consumer industry. This is the industry that has pioneered work with companies like Amazon.com or your local grocery store. When you last logged onto Amazon.com and ordered an item, did you see something to the effect of "other customers who place your order also ordered these items"? At your grocery checkout have you received coupons because of your club membership that you might actually

use? The CRM industry is huge, and may be considered an experienced partner in harnessing the social sciences to predict human behavior.

In 2005, global revenue for customer relationship management software was $5.7 billion (Gartner, 2006). The processes involved in predicting your shopping behavior are the same ones used to determine criminal behavior, just using different data sets (McCue and Stone and Gooch, 2003). Keep in mind that private industry may be able to capture more personal data than a government body like a police department will be allowed to do. This is based upon the perception of what the police are likely to do with this personal information, so it is tightly regulated. In California, the State establishes certain personal data as Criminal Offender Record Information (CORI), and strictly limits the access to that data as a "need to know", and a "right to know". The first being authorized access to certain records by statute. The second definition includes information that is required for performance of official duties. (CORI, 2007) Once authority to access data is established, then one must ask how much data are we talking about, and who is going to enter it?

Police and public safety computer data systems should be smart enough to import data already entered once into a computer to eliminate redundant entries (NIJ, 2003). For instance, when a subject is booked then cited out for the same violation, all of the booking data should be "pre-filled" in the fields for a citation entry screen. Then the officer only has to make simple changes for the citation and then it's completed. On a larger scale, the data collected at one agency that is not shared with another is both inefficient as well as impractical. Inefficient because personnel costs are a large part of what drives data entry costs and they are limited, expensive and slow. Impractical

because “The average company's data storage needs triple every 18 to 24 months and the worldwide data storage capacity has grown from 283,000 terabytes in 2000 to nearly 5 million terabytes by 2005” (GE, 2008). With data growth advancing so quickly, only computer systems will have the power to wade through the massive amounts of data and allow us the opportunity to distinguish the relevant information from the “garbage” (McCue and Stone and Gooch, 2003). Some problem solving solutions, though, seem to create even more problems.

Problem solving- the new state

Today, policing is immersed within a technology revolution. Those same agencies have been using computers to assist with dispatching and record keeping for well over a dozen years now. As a group, Law enforcement is very good at counting its crime data, as evidenced in the annual reports submitted to the FBI by most law enforcement agencies. Police and Sheriff’s departments have become more sophisticated in their approach to technical solutions, and are much better at sharing data using standards like the GJXDM and regional data sharing, as well as deploying field based technology at a steady rate. Police and Sheriff Departments are more aware of outside technology advances thanks to programs that encourage technology transfer from the private sector like the CRM industry or from the Department of Defense through the 1401 Technology Transfer Program (Police Chief, 2008). Perhaps its time to start pulling these resources together to move from counting problems into solving them.

Despite the police profession’s relative slowness to adopt new technology or ideas, there is a solution for our future. The difficulty in the transition to the next level is that it is more of a “state” than a physical platform. That state is problem solving through

predictive analysis. It is a state and not a platform because it is the result of combining technology, shared data and behavioral sciences. With advanced predictive analytics, the profession has an opportunity to move from counting crime to anticipating and responding to crime (McCue, 2008).

Problem solving within our profession enjoys a long and distinguished history dating back to Sir Robert Peel and his establishment of the London Metropolitan Police Department in 1829. Peel is credited with pioneering the concept that the police exist to "prevent crime and disorder" (Ramsay, 1969). Problem solving has been an implied responsibility of law enforcement ever since. Problem solving received renewed attention from law enforcement in the United States with the advent of the Community Oriented Policing Services (COPS) Office in 1994, and the subsequent adoption of the COPS Problem Solving Partnership initiative in 1996 (COPS, 2008).

With prediction and prevention as the new target, there are challenges to new technologies. The initial start and subsequent growth of this industry within policing is going to require a leap of faith. There are only a handful of police agencies in the United States that have moved into this area of advanced predictive analytics, and their demonstrated results are equally limited. One public example was developed by the Richmond Virginia Police Department in 2003. Richmond had issues with random gunfire every New Year's Eve holiday. The police department took several steps to solve this problem using predictive analytics. Historical data was analyzed and prioritized with considerations made for locations that had escalations in gunfire complaints since the first of the year. The information provided by the crime analysis unit included a plan to strategically place personnel where they expected "history to repeat itself" during the

2003 to 2004 New Year's holiday. The outcomes included a 49 percent reduction in gunfire complaints on New Year's Eve, and a 26 percent reduction in gunfire complaints on the days following that. 45 weapons were also seized. An unanticipated additional benefit to this operation was a $15,000 reduction in overtime expenses, as personnel were placed where needed to be effective, and 50 people were able to take the holiday off! (McCue, 2003)

From a fiscal standpoint, many of our purchases of large dollar technology are predicated upon the results we expect to receive before we even consider such a purchase. In the case of predictive analytics, the results are somewhat limited and so measuring their successes are very difficult. It is not all doom and gloom; however, as we need to remind ourselves that the CRM industry has been quite successful in its attempts to predict human behavior in the marketplace. Their combined resources have recently mapped such successes as the buying patterns of internet shoppers when shipping costs were considered too high (PayPal, 2008), or the influence of the Internet on consumers from politics to purchases (Harris, 2008).

There are a few agencies at all levels (Municipal, State, Federal and even international) that are pursuing advanced analytics in the law enforcement arena (McCue, 2008) Those same agencies are not making their information public. Until that happens, it's difficult to know who is making progress in this area, and what outcomes are actually occurring. One real challenge is that uninformed consumers can wreak havoc on the very tools that are necessary to the predictive process. Senator Feingold of Wisconsin nearly killed advanced analytics for police agencies when he introduced the Data Mining Moratorium Act of 2003. The bill died in committee, but it's a reminder that law

enforcement must be careful as we proceed with gathering data in the name of solving problems.

According to Dr. Colleen McCue, the cost of advanced predictive analytics is orders of magnitude less expensive than when she started at the Richmond Police Department several years ago (McCue, 2008). The trend for local agencies to combine their resources in regional approaches is also helpful for many reasons; however, two of those reasons are paramount. First, the costs are shared among agencies, allowing for their contributed dollars to be maximized, and for economies of scale. Second, the open sharing of data increases the potential for agencies to place less emphasis on their political boundaries, since criminals do not tend to observe those same boundaries when they commit their crimes. An added benefit to combined data is that rare and unusual events are more likely to be captured and considered when predicting crimes for that area (McCue, 2008).

Conclusion

As police problem solving strives to move from a reactive (counting mode) to a proactive (anticipation and response mode), advanced predictive analytics offers the opportunity to change outcomes. While this is a simple statement, the implications have far reaching consequences and positive potential for any law enforcement agency. A police agency that is willing to commit to the concept, and to pull the resources together to put predictive analytics into practice is an agency that will be way ahead of most agencies that are still counting their crimes but not doing anything helpful with those numbers. Problem solving has always been an expectation of police and sheriff

departments, now the industry is at a point where the power of prevention has significant and perhaps immeasurably positive consequences.

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