Technology and Law Enforcement

(Implementations and Implications)

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Abstract

Scholars both in and outside of Law Enforcement have debated the role of technology in modern day policing in a variety of contexts. This paper will review the theoretical and empirical aspects of the role of technology as it applies to analyzing the implementation and overall evaluation processes that today's police departments must consider. This paper will also discuss the challenges that modern Law Enforcement agencies will face once potentially beneficial technologies are adopted.

The research attempted to determine at what stage in development law enforcement technology applications are and how agencies are incorporating the new technologies into their organizations. Many police agencies have taken full advantage of new crime fighting technologies while other departments have failed to do so or do not feel the need to do so. Although cost is often a major hurdle to many agencies, other departments have overcome this problem by finding outside resources.

The research method relied on previously written surveys, studies and manuscripts. A true study of this nature would have involved personal interviews or questionnaires sent out to surrounding police agencies to determine their technological status in the three areas of police activities covered in this research. Comparisons with a large Metropolitan police force such as Detroit and surrounding suburban departments would not have provided adequate insight into this problem based on the population size, tax base, and size of police force.

The research is concluded with the recommendation that police agencies take advantage of the resource assistance that is available, both federal and non-federal, to aide in determining what technologies are right for their agencies and the implications of implementing the technology.

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INTRODUCTION

With the signing of the Patriot Act in 2002, the President of the United States not only gave Federal and local law enforcement agencies a broader scope of powers to fight anti-terrorism and other threats to national security, but also the resources needed to obtain the cutting edge technologies which would allow police agencies to fight these threats at a higher more sophisticated level. Today's modern police department must be well informed and well equipped with the leading edge technologies that are available for deployment within every aspect of policing including communications, patrol, investigations, surveillance, information technology and forensics.

Historically, technological innovation that had law enforcement applications was few and far in between. Modern policing can trace its roots back to Akron Ohio when in 1899 the first patrol car was put into service; it was at this point that the beat patrol began to disappear. In 1901 Scotland Yard began using the Galton-Henry system of Fingerprint Classification, which is the most widely used method of fingerprinting to date. Twenty years later, in 1921 John Larson developed the first Polygraph machine that even though controversial among psychologists, and not always judicially accepted, is still used today as an important investigative tool. (Bellis, p1) In 1928 the Detroit Police Department began operating a one-way radio system for their police vehicles. At the end of the 1930s Detroit had seventy-five patrol cars equipped with radios and reportedly credited with making twenty thousand arrests and an average response time of one minute and forty- two seconds.

Modern technological advances available to law enforcement are being marketed at such a fast pace that it is very hard for many police agencies to keep pace with the technologies and the software improvements. The rate at which police agencies across the country have adopted new technology varies greatly. Even today with the prevalence of the computer, a Rand Corporation survey of police agencies nationwide, found that as many as thirty-five percent of agencies still did not have Computer Assisted Dispatching Systems, and another forty-one percent reported that computer training was not available to their agency. Over half of the police agencies surveyed felt that their radio equipment was either obsolete or old while fifty-eight percent of the respondents indicated that their department did not have computers in the patrol cars. (Schawbe, Davis, Jackson, 2001, table 2)

The varying rate at which police agencies adopt new technology can be explained by several factors, the most important of these being the fragmentation of local policing across the United States. In the 1960's there were approximately 40,000 separate local police agencies serving over 3000 counties across the Nation. Currently there are some 800,000 police officers employed in 18,000 police agencies across the country. Ninety percent of these agencies have twenty-four or fewer officers. (Schawbe, 1999, p6) Equipment acquisition is usually done on a department-by-department basis with very little pooled purchasing between the agencies. Decentralization also results in neighboring police agencies purchasing incompatible technology, which undermines their ability to serve a common area. Several adjoining police departments unable to communicate with each other due to incompatible radio equipment is not uncommon even with today's threat of terrorism that could strike any of these same communities.

The fact that there are so many police agencies that often serve overlapping jurisdictions throughout the country and that each of there needs and abilities to acquire the necessary

technology beneficial to law enforcement differ, will mean that awareness and information about the new technology seep into the core expertise of police departments at very different rates whereas some departments will be state of the art in technology, others will lag behind in years.

Another barrier to police agencies obtaining and implementing the latest in technological products designed for law enforcement is the obvious cost factor. Many local law enforcement agencies do not have the resources or the expertise to develop test, and integrate the new technology that its agency may need. There will always be a trade off between technology and other resources an agency must decide between. A great deal of most police departments' budget goes toward manpower, and even larger cities strapped with smaller tax bases such as Detroit, will have money for little else. Savvy salesmen promise a police department that their product will provide great benefits and reduce workloads only to have the agency find that this product does not meet the needs of the department and further resources must be utilized to enhance the product or purchase the proper technology. Often software products developed for different industries and not specific to law enforcement forces the agency to adapt to the software rather than having the software work to fulfill the needs of the department. Federal assistance offered through the current anti-terrorism legislation will help some departments overcome the shortage of resources, but as has been the case in the past with government aide, those jurisdictions with the most voting power will most likely receive the bulk of the assistance and not necessarily the police agencies who are plagued with the highest crime rates.

Unanticipated costs are almost always associated with the adoption of new technology. The publics' reaction to the use of a technology by the police if deemed unacceptable could outweigh any law enforcement benefit. Invasion of privacy issues and liability issues could spawn lawsuits as well as bad press for a police department.

Increasingly, modern police departments across this country are coming under pressure to become as efficient as well managed corporations, applying the same theories and technology driven efforts that corporations use to be successful in business. Words such as mission statements; business plans, marketing strategies with an emphasis on performance measures and crime management are now common in many law enforcement agencies. Police departments such as Detroit are reorganizing Sections and Bureaus replacing titles with " Corporate Communications", "Customer Service Zones" and referring to the citizens of their communities as clients. At the same time police agencies are striving to become more community oriented in their approach to law enforcement in an effort to make police officers more sensitive to the needs of the community. The time will come when police department managers will be viewed as ineffective and their agency mismanaged if they do no implement new technology available to assist in their endeavors. According to Schwabe, **"**The technical challenge is how to plan for technological innovation as part of continuing, sustainable improvements in both community policing and law enforcement—and how to measure the effectiveness of new technologies**.**"(Schwabe, 1999, p9)

BACKGROUND AND SIGNIFICANCE

Technology has enabled police agencies to perform many existing tasks better and more efficiently. Access to the computer by law enforcement, increases the quantity and range of information that can be stored electronically and automating manual processes that were once time consuming and inefficient. Technology has also redefined the knowledge and skills that are now required to perform police work. In a 1933 study of police service in California, researchers concluded that over 3000 types of skill and applications of knowledge were required by a police officer. (Schewer, 1969, p51)

Despite all of the time saving and economical advantages of modern technology it has not led to major changes in the way agencies conduct business. Traditional policing tends to view information technology useful only if it leads to an arrest, and some argue that technological advances in law enforcement applications has not led to any measurable decrease in the crime rate in this country. Historically more cops on the street and hardware have had much more political appeal than the softer technologies. Further yet agency members that are not able to adapt, or view the technology as creating more work rather than improving or streamlining will create conditions whereby the technology could be incompletely adopted or ineffectively applied. The fact that technology alone will not solve the crime problem is hardly a reason not to invest in this area, and so to many of the police officers being hired today have been exposed to the computer more extensively than some of the senior members of the agency thereby decreasing the chances of informational overload.

The need and desire for members of the community and the general public to know current crime conditions in there local and what is being done to reduce crime in their city will be a driving force for police departments to improve the technology to gather store and disseminate this information. In the past, meeting the demands for federally mandated crime statistical data such as the Uniform Crime Reporting system as well as other external bodies such as traffic authorities and insurance companies were partially responsible for the need by police agencies to improve technology in this area as a means of reducing the costs associated with gathering and storing this information. Technology applications to law enforcement will affect almost every aspect of police operations, as Tom Steele, the founding member of the I.A.C.P. stated,

We are just beginning to realize the significance of what is happening. There is not one- I repeat not one area of the law enforcement culture that will go untouched. The very essence of how

we do business has been impacted through greater communications and information sharing. Over the next 15-20 years you will see the greatest redirection, reorganization and modification of policing since Robert Peel and the Metropolitan Police. (Chu, 2001, p3)

LITERATURE REVIEW

The Rand Corporation has published three major research papers dealing with the state of law enforcement and crime fighting technology. The 1999 "Needs and Prospectus for Crime Fighting Technology", research paper dealt with the current status of the federal role in assisting state and local law enforcement. "Challenges and Choices for Crime Fighting Technology " 2001, discusses the technology available to law enforcement and the role of the Federal government in assisting agencies making the transition into new technology. In 2003 the Rand corporation published "Biometrics; A Look at Facial Recognition" which is a briefing for the Virginia State Crime Commission as the State of Virginia debated the possibility of implementing facial recognition technology.

The National Law Enforcement and Corrections Technology Center provides the Law Enforcement News Summary to law enforcement and correctional officers. The JUSTNET NEWS Summary includes abstracts from major national news periodicals, business magazines national and international news services and periodicals on law enforcement and corrections technology.

PC magazines March 12, 2002 article "Technology and Crime" outlined the conflict between law enforcements use of technology, modern criminals and the court system.

PROCEDURES

Research for this paper comprised a review of current periodicals, newsletters, journals, and books in print and or published on the Internet. Sources of information derived from the libraries of the following Universities; Wayne State, Eastern Michigan, and Oakland. Information contained in this document was also obtained through interviews with members of the Detroit Police Departments' Cyber Crime Unit, and Technology Division.

The objective of this research was to identify technological advances in three areas of police functions, crime prevention, communications and information technology, and to determine how law enforcement has incorporated these technologies into their organizations. This paper also discusses the resources available to assist law enforcement agencies as they introduce new technology to their organization.

INFORMATION TECHNOLOGY

Law enforcement in the United States has been characterized as extremely fragmented. Large urban cities such as Detroit can have as many as ten different agencies operating within the city boundaries at any given time. As a result of the September 11 attack on this country it has become increasingly apparent that the most important improvement that can be made to assist law enforcement is technology that increases the efficiency of information sharing between these agencies.

The advent of the computer in law enforcement applications led to a dramatic increase in electronic information sharing between Federal agencies and local police departments. The creation of the National Crime Information Center in the 1960's was the first application of computer technology that allowed police agencies across the country to share information. The best-known

database is the FBI's Automated Finger Print Identification System. Created in 1990, AFIS can perform a search of one million fingerprint cards in approximately thirty minutes; this same search done manually would take about 65 years to complete. Similarly, the increased use of DNA evidence has led to the creation of a national DNA database by the FBI. The Federal Bureau of Investigation has recently invested six hundred million dollars to upgrade the Trilogy Network that will include a new database designed to infer relationships between twenty-six million agency records. The database can store 100 Terabytes of data culled from federal, state and local agencies as well as news media, audio video, and 3-D mapping files. The Global Justice Information Sharing Advisory Committee, which advises the federal government on how to implement standards based electronic information exchange, has launched an Extensible Markup Language (XML) project as a solution for connecting the information systems of various police agencies without compromising data security or autonomous operations. The project is intended to create a standard for connecting the information sharing systems of law enforcement agencies. (Emblay, 2003, p28)

Local police agencies have begun to create information sharing systems such as the Northeast Gang Information System that was implemented in 1996 and comprises New York, Vermont, Rhode Island, New Hampshire, and Massachusetts law enforcement agencies. In March of 1998 the Cal Gang system was created that enables any law enforcement agency within the state to access master index and share information about street gang activity including photographs and identifying information. The National Sheriffs Association has supported the Pegasus Project that promotes data sharing between local state and federal agencies. The project emphasizes information sharing between criminal justice agencies, fire agencies, public and private utilities, port authorities, news media and financial institutions.

COMMUNICATION TECHNOLOGY

With the inception of the first mobile computing device in the late 1970's the Mobile Data Terminal allowed a dispatcher to send electronic messages directly to a patrol unit and also allowed the patrol unit to send messages back to the dispatcher and other patrol units. The MDT gave the patrol officer the ability to perform inquiries of a suspects driving record, to determine if a person had outstanding warrants and vehicle registration checks, all without the need to radio dispatch or the station house and wait on a response. Still in use by even large police departments such as Detroit, the MDT is by today's standards considered obsolete. The MDT is referred to as a dummy computer due to being notoriously slow, with limited memory capacity, the inability to accept any software, and only allowing for limited inquiries of information on potential suspects.

Modern law enforcement agencies have a variety of Mobile Data Computers available for use in patrol cars. Laptop computers allow police officers greater flexibility and access to real-time information as well as access to a greater amount of information. With the latest mobile data computers the field officer can now electronically receive criminal history information, view mug photos, access the internet, complete and forward reports to the station house, take fingerprints of suspects, all while remaining on the street. These mobile laptop computers are specifically designed by the manufacturer to fit into police vehicles, which have limited front seat area space. They are high-speed computers, (500-700MHZ), with greater memory and hard drive capacities, (20-40gigabyte), and have Global Positioning System capabilities. The multiple features of the Mobile Computer Terminals translate into faster more improved service to the public, improved safety for the officers and a more informed response for the citizen.

Data devices will never completely replace voice radio. The only effective form of communication during a critical incident response is talking to one another. A mobile radio is the most important piece of equipment a law enforcement officer will use. Many of the police departments in the United States are currently using conventional analog communication systems that operate in the high UHF bands. The Trunked 800MHZ radio systems will be the standard shaping the way police agencies are dispatched operated and organized. The trunked radio system makes better use of the limited radio spectrum and permits a larger number of users than the conventional system. Conventional radio systems limit each of its users to just their assigned frequency and channel assignments can not easily be recognized or shared by other city agencies. The trunked system uses a pool of frequencies for any of the system users, when an officer transmits a trunked system looks at which frequency is not used and immediately assigns it to the officer for the duration of the transmission. The advantage of the trunked radio system is in its flexibility, in times of emergency police departments can quickly create an additional channel or change channel assignments to allow other city agencies to communicate on what would normally be channels reserved for police only. The trunked radio system also allows for greater ease to set up complex channel assignments and the system can be reconfigured without the aid of a technician.

Just as important as communication is between police officers and dispatch, equally important is the line of communication between victims of crime and the law enforcement agency they contact to report the criminal act. In January of 1968 AT&T announced the creation of the 911 system, which is currently in use in approximately 90 percent of all law enforcement agencies in the country. With the creation of the 911 system a victim or witness to a crime could simply dial a three-digit number to be connected to a central location, after which the police would be dispatched to the location of the crime. Although this system initially created more efficient and rapid police

response, by the 1980's it had become what has been described as a tyrannical burden to many police agencies. To alleviate the overburdened system many cities converted to the enhanced version of the 911 systems as well as creating a non-emergency three digit reporting system. The latest innovation in 911 emergency reporting technologies is the Reverse 911 system currently being used by the Crestwood Missouri Police Department. The Reverse 911 computer based notification system enables the Crestwood Police to send a recorded message to hundreds of residents and businesses in a very short period of time. The system also contains a Guardian calling feature that allows the department to program telephone calls to residents who may need to be checked on periodically. According to the Crestwood Police Department this system has been credited with solving a number of crimes in the city.

Computer Aided Dispatch systems are crucial once the 911 emergency call has been made. Developed in the early seventies, the CAD software keeps records of incidents or calls for service that a police agency handles. Early versions of Cad consisted of a mainframe located in a computer room, linked to "dumb" terminals in the communication center showing text-based information only. Today's CAD systems use a client server configuration with data residing on a central computer linked to PC workstations. The software makes use of color graphics and symbols to convey information. (Dispatch Monthly, p6)

CRIME PREVENTION TECHNOLOGY

In the area of crime prevention technology that records video or audio information is valuable in supporting investigation and enabling prosecution. Fixed site video surveillance has been widely used by corporate America for many years but is still not used by many law enforcement agencies. Very few law enforcement agencies have comprehensive fixed site closed circuit television

surveillance. New York Police Department has 24 hour fixed site surveillance system located in and around Central Park, subway stations and other public areas. The City of Baltimore has fixed site surveillance cameras at all one hundred six major intersections within the city. In comparison, in the United Kingdom there are more than two hundred fifty thousand surveillance cameras transmitting images directly to police departments throughout the country. (Schwabe, Davis, Jackson, 2001,p15) Modern law enforcement agencies now have new technology to combine with fixed video surveillance to help combat crime. The Seal Beach California Police Department has combined the use of digital surveillance cameras, located in banks and other businesses, with in car laptop computers to provide officers with the ability to receive real time video of the inside of a business while in route to a hold up alarm. Visionics Corporation of Jersey City first developed facial recognition technology, and initially used by law enforcement in the Newham district of London in1988.

Officials in Newham reported that the crime rate dropped by thirty percent two years following the installation of the facial recognition system. (Flynn, 2000, p2) In The United States the City of Tampa was the first to implement this technology in combination with fixed site video surveillance cameras, which were placed in the Cento Ybor public entertainment complex. Virginia Beach Police Department implemented the facial recognition system in 2001 in the city's Oceanfront tourist area. The facial recognition software captures between sixty and one hundred faces per minute, the software then maps a face by identifying markers that make each face unique, and compares the face to a list of known criminals or terrorists. The department of Commerce recently published the Facial Recognition Vendor test, which concluded that the 10 companies who produce the Facial Recognition software have made significant advances in this field of technology. These systems were able to confirm an individual's identity ninety percent of the time, with an error rate of one

percent. In April of 2003 National Law Enforcement and Correction Technology Center reported that Scotland's Grampia Police Department began using Image Technologies ID-2000 Facial, Recognition system that can identify faces from an image database, based on six hundred ninety two facial features, in seconds. This system cannot be fooled by plastic surgery or disguises and can match faces from video images, photographs, artist composite drawings, and police e-fits.

TECHNOLOGY SUPPORT

As greater amounts of new technology are made available to law enforcement agencies there arises a strong need for managers of these agencies to be well informed as to not only what new technologies are available, but what are a particular technology's capabilities as it applies the agency needs, whether the costs of the technology will be to prohibitive or whether an outside funding source is available to offset some of the costs, or what vendor to choose to purchase the technology. Fortunately there are several federal sources available to assist law enforcement agencies with technology information resources.

The National Law Enforcement and Corrections Technology Centers provide technical publications, conducts equipment compliance testing, technical education, science and engineering advice and support, and technology demonstrations. In 2000, the NLECTC responded to over six thousands requests for assistance by law enforcement agencies. The Office of Law Enforcement Technology Commercialization is a program of the National Institute of Justice that is dedicated to developing and referring new strategies to accelerate the commercialization of innovative law enforcement and corrections products. The National Center for Forensic Science is a joint project of the University of Central Florida and the National Institute of Justice. The goal NCFS is to create a unique laboratory facility staffed and equipped to service the forensic and law enforcement

communities in the areas of fire and explosion debris. The Border Research and Technology Center partners with several federal law enforcement agencies in the development and implementation of Secured Electronic Network for Travelers Rapid Inspection Technology, human presence detection, night vision and thermal imaging technologies evaluation, vehicle immobilization, communications interoperability and seismic sensor upgrade demonstrations. The National Institute of Justice provides consumer report type testing, evaluation and technology assistance through four regional centers, serving 10-15 states each. These are only a few sources for technology resource information available to local law enforcement, which if utilized may prevent police department management from purchasing the latest and greatest crime fighting technology only to discover afterwards that the product falls well short of expectations.

DISCUSSION/IMPLICATIONS OF TECHNOLOGY

Technologies that have made law enforcement more efficient, more effective and provided officers with faster and more thorough response to street level inquiries, has at the same time caused some concern amongst those who believe the use of many of these technologies have put police departments on a collision course with the Constitution and the rights of the average citizen. Concerns as to how the technology should be used, what controls should be set on the use of this technology, and the potential dangers law enforcement technologies present if left unchecked, have created a further mistrust of police and to some extent fostered a greater sense of alienation between citizens and police agencies.

It has been speculated that the creation of the telephone created some distance between the community and the police. A shift from beat patrol to the automobile and the use of the mobile radio meant even less contact between the police and the public and magnified this distance. These

early technological advances by law enforcement contributed to a greater sense of alienation between the public and the police. This alienation is one of the factors that fostered a mistrust of the police by the community. Today civil libertarians argue technology that allows law enforcement to accumulate and share vast amounts of personal information in various data banks and files is a threat to individual privacy rights. The creation of a comprehensive DNA database, high- tech closed circuit surveillance systems that incorporate facial recognition software violate Fourth Amendment rights to be free from unreasonable searches and seizures. In the City of New York there are over three thousand surveillance cameras monitoring the public daily. (Sullivan, 2002, p1) As a result of the signing of the Patriot Act, Justice Department agents can now eavesdrop on the conversation of federal prisoners and their attorneys to deter future acts of terrorism. Another product of the Patriot Act allows the FBI to examine all e-mail at the ISP level.

Beyond privacy concerns, others are skeptical that the modern digital police force has had little effect in deterring crime. These detractors claim that video surveillance systems can be fooled, that facial recognition software has notorious failure rates and bank surveillance systems that broadcast real-time video could be hacked by criminals. What is left are high-tech systems which only catch petty criminals and tracks the movement of law abiding citizens.

Court decisions involving law enforcements use of technology to investigate and prosecute individuals have not provided police agencies much guidance in this area. In 1994 Costa Mesa police detectives investigating a homicide initiated a DNA dragnet throughout the city. After no suspects were found one citizen demanded that his DNA sample that he had provided be returned to him. After a two-year battle to have the genetic material returned, the court finally ordered the sample returned. In 1999 the FBI installed a keystroke sniffer on the personal computer of a New

Jersey mobster under investigation. The keystroke sniffer allowed the FBI to obtain the password to encrypted files on the computer that were used in the prosecution of the mobster.

The defense contended that the use of the sniffer was an illegal wiretap and a violation of the defendants Fourth Amendment rights. The court held in favor of the FBI and quashed both defense objections. In a 2001 ruling, the United States Supreme Court held that government agents using a thermal imaging device on a private residence to detect the use of grow lamps and subsequently the seizure of marijuana plants from inside the residence was an unlawful warrant less search. The court noted that the homeowner would be at the mercy of advancing technology and a decision in favor of the federal agents would allow police technology to erode the privacy guaranteed by the Fourth Amendment.

In reaction to the Patriot Act cities across the country are taking a stance against the perceived threat to civil rights. In Massachusetts, the cities of Cambridge, Northampton, Amherst, and the township of Leverette, and the town of Carrboro North Carolina have joined Berkley California and Ann Arbor Michigan in passing resolutions that call the USA Patriot Act a threat to the civil rights of their communities. (Schabner, 2001, p1)

CONCLUSION

Law enforcement is facing a significant information overload and at the same time tremendous opportunities for new innovation. One caveat organizations must be aware of is not to waste resources chasing after the latest whiz – bang technology, creating change so rapid that confusion within the department results. Police department managers must be concerned with the technological needs of their organization within budgetary restraints as well as creating the necessary

change in operating procedures breaching entrenched established practices at odds with the new technology.

Major city police departments can no longer serve the large citizen base without the aide of modern technology and the resources to implement them. An example of this would be the Detroit Police Department, serving a community of over nine hundred thousand people, is facing critical decisions deciding what investments in technologies are to be made to bring the department into the high-tech arena of policing.

The problem that many areas within the department need technological improvement is compounded by the fact that the cities tax base is not reflective of its population thereby creating funding troubles. Detroit has one of the highest numbers of police shooting incidents in the nation and is only now researching the implementation of less than lethal weaponry such as the Taser-Gun. Detroit maintains a property room that contains over five hundred thousand pieces of evidence and the property tracking system in place was obsolete when it was purchased in 1993. Updating the property tracking system has been made a priority within the organization. The departments' patrol force is currently using the Mobile Data Terminal system, which as previously noted before is considered obsolete to the point they are termed "dummy" computers. These examples though not unique to the Detroit Police Department demonstrate what many departments face as a result of rapid changes in law enforcement technology.

Computer technology is now being used by criminals to commit a variety of new crimes as well as conventional crimes. The result has been for law enforcement to respond by creating Cyber Crime Units that are staffed with officers who are highly trained in computer forensics and computer investigations. Departments to assist in the investigations of homicides, kidnappings, and many white-collar crimes are utilizing Cyber Crime Units. Training in computer forensics is being

offered throughout the country and is being attended by private industry personnel and in some cases the training is given by non-governmental agencies. Governmental and non-governmental agencies offer an abundance of research and assistance resources for any agency choosing to utilize them, but as the Rand survey indicates, most departments have failed to take advantage of these resources when seeking new technology. Instead many agencies look within their department or locally for assistance in choosing the proper technology.

Privacy concerns and perceived violation of Constitutional Rights with the use of technology will continue to be an issue with law enforcement as more and more sophisticated technology is implemented. Regardless of what position is taken in these arguments the simple fact remains that there will be no turning back from technology. Police agencies must require strict policy guidelines, and greater oversight and accountability with the use of any technology that has the potential for abuse by its members.

A study of the Queensland Police Service in Canada, found that two thirds of the officers who responded indicated that greater use of information technology had required them to report on their activities more frequently and made them more accountable for their actions. (Chan, Brereton, Legolsz, 2001, pp.)

Where technology will lead law enforcement agencies in their quest to rid communities of crime is a matter of opinion. The fact is law enforcement managers can no longer disregard the impact that technological change has meant to crime fighting. The invention of the computer and the advancement of the microprocessor brought the world into a new era and as criminals find new ways to utilize this technology to commit transgressions law enforcement agencies must be equipped with the technological tools to combat them. Could technology one day become the answer rather than a means to the end? This is highly unlikely but who knows what the future holds in store.

In June of 2002 a film entitled the Minority Report told the story of the Washington D.C. Police Department, in the year 2054, utilizing psychic technology to arrest and convict murders before they committed their crime, thus implementing an extremely efficient crime prevention program while at the same time completely dismantling all privacy and Constitutional rights of the citizenry.

BIBLIOGRAPHY

Woodward, John, Horn, Chris Thomas, Aryn Gatune, Julius, (2003) Biometrics; A Look at Facial Recognition, Rand Corporation Publication, pp.1-71

Schwabe, William, Dacis, Lois, Jackson, Brian, (2001), Challenges and Choices for Crime Fighting Technology, Rand Corporation Publication, pp. 1-199

Schwabe, William, (1999) Needs Prospectus for Crime Fighting Technology, Rand Corporation Publication, pp. 1-71

Marchland, Donald, (1980), The Politics Of Privacy Computers and Criminal Justice Records, Informational Resources Press

Schewer, James, (1969), To Walk the Streets Safely, the Role of Modern Technology in our Criminal Justice System, Doubleday and Company, Garden City New York

Schmaller, Frank, (1990) Computers in Criminal Justice, Windam Hall Press

Chu, Jim, (2001), Law Enforcement Information Technology, CRC Press LLC

Angell, Mike, (2003), When Trouble Arises the Seal Beach Police Take to the Internet, JUSTNET NEWS, Thursday February13, 2003

Computer Aided Dispatch Software Resources Dispatch Monthly at **http://www.911.com**

Chan, Janet, Brereton, David, Legosz, Margaret, Doran, Sally, (2001), Queensland Criminal Justice Commission study

Bellis, Mary, Police Technology and Forensic Science History at **http://www.investors.about.com**

Reews, Nate (2002), Police Technology Advancing by Leaps and Bounds, Holland Sentinel Archives, February 27, 2002 at **http://www.thehollandsentinal.net**

Sullivan, Bob (2002), Warming to Big Brother, MSNBC NEWS, November 4, 2002 at **http://www.msnbc.com.news**

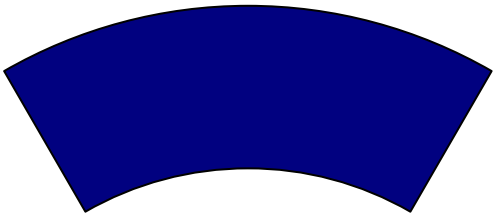
Rist, Oliver (2002), Technology in America, PC Magazine, March 12, 2002 at **http://www.pcmag.com/article2/0,4149,1516600.asp**

Schabner, Dean (2002), Patriot Revolution? , ABC News July 7, 2002 at **abcnews.com**

Flynn, Kevin (2000), Police Gadgets Aim to Fight Crime with 007 Style Ingenuity, March 7, 2000 at **http://www.mediaeater.com/cameras/news**

Unknown Author (2001), New Technology Must be Carefully Used, Cannabis News, July 13, 2001 at **http://www.cannabisnews.com/news**

Embry, Paul, (2003), XML in Justice Information Sharing, Sheriff, Vol. 55 No. 1, p28 in JUSTNET NEWS, Thursday March6, 2003 at **http://www.justnetnews@nlectc.org**



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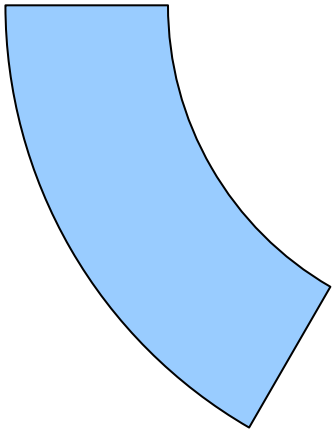

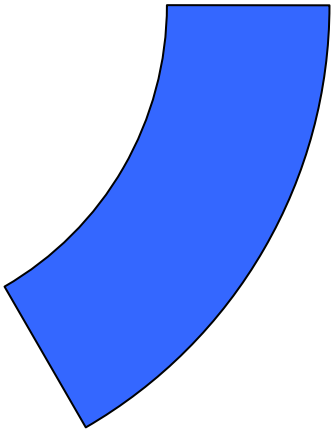

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