ADVANCING DIGITAL TECHNOLOGY AND ITS EFFECT ON POLICING IN THE 21ST CENTURY
THE FUTURE MAY BE CLOSER THAN YOU REALIZE

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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Imagine a time when an entire law enforcement call for service, or even an entire criminal investigation, can be "replayed" in real time for a judge or jury. Imagine the replay will have full audio and video, supplemented by sensing equipment that can detect the presence of alcohol or drugs, read a suspect's heart rate and body temperature, and map the location of involved parties relative to the investigator. All interaction with dispatch, criminal history information, communication with other officers and the supervisor related to the case will be imbedded in a "time-stamped" digital file – permanently recording what was said, done, and known at the time it actually occurred.

In this future, the devices used to facilitate this recording will also allow the officer to receive real-time analytical feedback of a suspect's stress level and a probability evaluation as to whether voice patterns or other physiological indicators suggest truthfulness or lying. Facial recognition technology will be automatically initiated during any contact an officer makes, providing an instant verification of ID. If the person has a warrant, the system will also automatically dispatch backup officers to the scene.

Envision a time when all of this information will be incorporated into a digital file to allow attorneys, a judge, and a jury to instantly access and review a law enforcement call or investigation (or portions thereof) with the click of a mouse – in a virtual courtroom where involved parties may be miles apart. There are very few written reports to review in this future: criminal investigations will be interactive multi-media products – with all the individual inputs and components merged together in a seamless presentation.

This future may be closer than you realize. In this future, integrated evidence collection technologies will allow a single employee to locate, identify, collect, preserve and document even microscopic traces of evidence in any crime scene with the efficiency and accuracy of an entire forensic team of today. Experts agree that significant advancements in digital technology may soon make this a reality. Technology will go beyond just being a "normal part of life" and become nearly invisible.[i] The ever-increasing employment of biometric, chemoreceptive, and sonoproxemic technology will have considerable impact on law enforcement operations over the next two decades; and thus, will significantly affect the entire criminal justice system in years to come.

Biometrics

The term "biometrics" means "to measure life," and that is what modern biometric devices do: they measure and analyze an individual's characteristics, ranging from physical traits- friction ridge patterns on hands, iris, and facial structure- to behavior-related characteristics such as voice dynamics, respiration, body temperature, and handwriting. These devices typically consist of a sensor that scans for the targeted characteristic, software that converts scanned data into digital form, and a database that stores the data for comparisons.[ii] Most biometric activity is measured by assessing minute fluctuations in a person's electro-physical characteristics that occur through motion or some kind of physiological change. This change can be measured by sensors and used to quantify and evaluate a subject's individual characteristics.

The field of remote sensing of a person's biometric activity has advanced considerably in the past few years. In 2007, researchers at the University of Sussex in England demonstrated it was possible to use sensors to detect electro-physical signals remotely, without any physical

contact to the body.[iii] The authors of this study stated that the techniques used were completely passive, and could be used without the subject knowing he or she was being monitored. They speculated this technology could eventually be used for law enforcement and security applications, including "through-the-wall" surveillance.

In the near future, as military, civilian law enforcement and commercial demand grows more intense, mobile biometric systems will become available. These systems will be capable of instantly providing the user with identification information as well as temperature, heart rate, and respiration readings; thus evaluating whether the subject may be under the influence of a drug without the need for a field officer to perform field sobriety tests, etc.[iv] this capacity can even extend to methods to determine the truth.

The International Society for Optics and Photonics published a report in 2008 on the development of electric-field sensing technology that can remotely and passively (non-invasive, no direct contact with sensors etc.) detect physiological signals from an individual.[v] In 2006, professors at the MIT Media Laboratory in Cambridge, Massachusetts demonstrated that they could use non-invasive electro-physiological sensing to detect stress and lying in players during a high-stakes poker tournament.[vi] In that study, researchers showed that the measurement of voice pitch variation, skin conductance peaks, and heart rate variability could produce a 71% accuracy rate in lie detection. While this result leaves a lot of room for improvement, it does point to the possibility in the near future of assessing a person's "truthfulness potential" in the field via a series of remote, non-invasive techniques and technologies. This is only one application of the interesting technologies that can apply directly to the work of the police. MIT's sensing devices are an example of biodynamic means by which to monitor another. Two others also hold great promise.

Sound and Chemical Sensing

Sonoproxemic and chemoreceptive technology are two of the most interesting areas of emerging technological development pertinent to this discussion. “Sonoproxemics” is the science of sensing of a relative position, distance, and motion of objects surrounding a base object through the use of remote sonic, magnetic resonance, and laser technology. The technology is said to be “remote” when the sensors are not connected physically (by wire, cable, etc) to the subject being sensed.

Chemoreceptive equipment can chemically analyze liquids and odors when they come in contact with receptors. Technology is already available to “sniff” for toxic gasses and the airborne presence of alcohol, etc. and this technology is being rapidly developed to detect a wider variety of chemicals and substances, with ever-increasing sensitivity.

Considerable scientific research concerning the remote acquisition of this type of data has already been completed. In 2006 the Urban Sonar Partnership produced a product called “Urban Sonar” which is a monitoring system that senses an individual’s experience as they move through an urban environment and records that information for viewing at a later time.[vii] The sensing system is integrated into a jacket that facilitates the measurement of the wearer’s proximity to other people and objects to the left, right, front and back. The data collected can then be uploaded to a server for playback at a later time, allowing documentation and analysis of the activities captured by the equipment. If we might consider equipping peace officers with this technology, that future may be upon us in short order.

In 2008, The Cornell Center for Technology Enterprise and Commercialization announced the development of a silicon-based chemoreceptive neuron transistor that has been demonstrated to be successful in effectively sensing the presence of selected chemicals or

conditions, and that these chemoreceptive transistors can be coupled together to sense multiple chemicals or conditions.[viii] Certainly, the potential of these technologies holds promise. One day, we may even be able to do many of the things the public already "sees" in popular media.

The "CSI" Effect

Anyone who has seen the television show "CSI: Crime Scene Investigation" knows that technology now plays a key role in the investigation of crime. Many police agencies are advancing in the use of technology, employing devices like ground-based light detection and ranging equipment (LIDAR) to produce highly-detailed and accurate three-dimensional representation of a crime scene.[ix] With this system, millions of laser points are aggregated to produce a highly-detailed three-dimensional model of the crime scene. Latest-generation systems include the ability to collect all data in color, resulting in imagery with far more depth and detail than a two-dimensional photograph. Additionally, the end-result is completely digital, which allows it to be organized, viewed and analyzed from multiple perspectives.

Crime scene investigators must gather, label, and describe the evidence at a crime scene, passing on any items collected and a detailed report to a range of criminal justice agencies. Researchers at the University of Birmingham have developed a system to make this process quicker, easier, and more complete than ever before. A small device is worn by the crime scene investigator, who uses a headset to give voice commands to the system – to trigger the attached digital camera, to register GPS coordinates, and to record narration by the CSI which describes the evidence and any other pertinent information. [x]

As can be seen, innovation in biometric technology, the constant miniaturization of electronic equipment, the increasing mobility of devices, and advances in sensing equipment could conceivably be integrated into public safety uniforms, patrol cars, and crime scene

investigation units to routinely provide a host of evidentiary information not currently available to criminal prosecutors. This aggregation of technology would, in effect, allow the law enforcement incident or investigation to be "brought into" the courtroom as a comprehensive multi-media event; and experienced by everyone involved in the criminal justice system as never before.

How will this technological advancement affect future policing? In March 2010, a focus group comprised of subject matter experts was convened in Southern California to explore the issue of advancing technology and its impact on law enforcement operations and the criminal justice system. The group included an Information Technologies Manager for a large municipality, a Sheriff's Homicide Investigator, a Chief Deputy District Attorney, a Sheriff's Criminal Intelligence Officer, a Superior Court Judge, a Chief Deputy Public Defender, an Information Technologies Manager for a large law enforcement agency, and a retired bank president.

The results of the focus group indicate there are a wide range of concerns about the advancement of technology and its impact on the future of policing. One of the most significant issues identified by the group include the future ability of organizations to integrate information obtained from a wide variety of diverse databases into well-structured informational products that are useful to both law enforcement and the court. Advancing technology will almost certainly mean the capability for more comprehensive collection of information and evidence in criminal cases, with greater accuracy from an ever-expanding number of sources. As seen above, there are a number of emerging technologies that will directly impact law enforcement operations. Managing the information accumulated by virtue of this technology in an efficient and meaningful way will be one of the greatest challenges to future policing.

A concurrent concern is the challenge of adapting the work force to new technology. When change is introduced into the workplace, there has typically been a natural, logical resistance to it. Individual work patterns and schedules, job groupings, and even the definition of work itself may be transformed as the technology's capabilities redefine the capability and productivity of the individual employee. In this transition, an employee's perception of their place and worth within the organization may come into question. Criminal Justice administrators will have to create and maintain an organizational environment which successfully blends technology and people into a highly productive and efficient operation. Subordinating or ignoring people during technical systems implementation may prove fatal to the success of the initiative.

Another significant issue identified by the group is the ever-increasing expectations of prosecutors, jurors, etc. in the capability of digital technology to produce meaningful and more exact information and evidence. It is logical to assume that evidence procedure will be forced to progress and evolve as new systems, new methods of investigation, and improved evidence gathering techniques begin to be presented in court. How will a jury perceive these technological advances? How will the courts adapt to the new technology? Will the current system of *stare decisis*, and the inherent sluggishness of this system to address rapid change, be able to accommodate the explosion of technology and adequately govern the change it brings?

The future promises to be far different from today, in a variety of significant ways. During the next decade criminal investigation, legal processes, the administration of justice as a whole; and the types of media inputting into the systems available to support these systems; will be significantly impacted by advancement in digital technology systems. As technology advances in the 21st century, as the size of equipment and devices grows ever-smaller, as digital

capability and capacity continues to grow exponentially, the impact of data collected through the use of this equipment on the legal system will be substantial. Criminal justice professionals must be aware of and understand the probable changes that may occur in their professions and organizational systems as the result of advancing technology, and take steps to prepare their organizations now for the change that will most certainly come.

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