DOWNSIZING THE FUTURE EVIDENCE ROOM

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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Recent advances in DNA (Deoxyribonucleic acid) technology, computer forensics and digitized electronic images have greatly added to the current evidence storage dilemma facing many California police departments. The impact and importance of the collection, storage and retention of this critical evidence leads to the challenge of what is next. One crystal ball predicts that in ten years we will need less evidence storage space than we currently use. That's right…. less space.

It's safe to say advances in technology will continue to occur. This begs the question; how will this affect police evidence storage space? How might technological changes affect the types and amount of evidence collected? Considering those advances, what facility design issues should be incorporated as police departments plan? On the pages that follow, we will explore how advances in DNA collection and analysis, computer forensics and holographic imaging will help resolve of the most pressing issues facing evidence storage today – will we have enough space?

Limited Police Facility Space

It's a known fact: police facilities are expensive to build. In addition to costly security features, California police and fire agency buildings must adhere to California Government Code 8878.90, the Essential Services Buildings Seismic Safety Act of 1986 (CA Codes, 1986). Engineering, design and construction costs are higher as facilities must meet these strict earthquake standards. As an example, in late 1994 construction on

the new Santa Ana Police headquarters in California had just begun. In response to a structural engineering report which focused on the recently discovered blind thrust type earthquake fault that was so destructive during the January 1994 Northridge earthquake in California (Southern California Earthquake Data Center, 1994), the City ordered "moment" steel connections added to the construction already underway. This change had a price tag of over $500,000, but was deemed crucial to ensure the new seismic stability standard was added and the lifetime structural quality of the headquarters facility improved (Emery, 1994).

Most police facilities continue to operate well past their planned life span. While structural integrity and infrastructure may continue to meet the needs of the users, serious overcrowding can take place, as the overall size of facilities cannot meet the growth needs of the department (IACP 1998). Efficiently allocating the limited square footage of any facility is a challenge. More so in a police setting, where competing interests vie for the same limited resources and space within a framework of enforcing laws and maintaining public safety. Evidence retention and the space needed to securely store all necessary items is one of those competing interests.

Space Needs Surveyed

Insufficient evidence storage space is a common thread among the law enforcement community. A March 2007 survey conducted by the International Association of Property and Evidence (IAPE) asked members to "Describe the available space for

property and evidence storage in your department". Their response solicited the following results:

More space than can ever be used	28	(4%)
Room to grow	43	(7%)
Sufficient for now	121	(20%)
Running out of space	195	(33%)
Completely full	88	(15%)
Must move overflow to off site storage	92	(15%)
Other	14	(2%)

Out of the 581 responses, 496 indicated they had sufficient space for the present (not the future), were currently running out of space, or were completely full and must move overflow to offsite storage. In total, 83% reported their current or future evidence storage space, was not sufficient in size (IAPE, March 2007). One of the biggest impacts to current and future evidence storage needs is increased DNA collection and retention (Thompson, 2007).

Impact of DNA

Many state and county forensic crime labs across the United States have received substantial funding for DNA related staffing, facilities and equipment, as the critical importance of their work continues to be publicized and supported. Municipal law enforcement agencies, especially in the state of California, are major stakeholders in the collection and storage of vast amounts of DNA evidence. They have not, however,

received similar funding to reduce there mounting personnel and evidence storage costs related to DNA and other emerging forms of evidence.

DNA's critical importance continues to grow, and its collection and analysis continues to be viewed as a priority. In November 2004, California voters passed Proposition 69, the "DNA Fingerprint, Unsolved Crime, and Innocence Protection Act", resulting in an initial $7 million to immediately expand the collection of DNA samples to include convicted felons and some convicted non-felons, as well as individuals arrested for certain offenses (State of California, 2004). In September 2004, the Department of Justice awarded $11 million to the State of California for the "President's DNA Initiative and Crime-Solving Forensic Services Program". This funding was specifically earmarked to enhance county DNA laboratory capacities and hire county staff to work on expanding DNA forensic casework backlogs (Department of Justice, 2004).

To illustrate the volume of DNA being collected, prosecutors in the United States submit an estimated 10,000 biological samples for DNA testing and try thousands of cases with DNA evidence every year (Willing, 2000). In fact, it is now virtually impossible to commit a criminal act, particularly a crime against another person, without leaving an identifiable DNA calling card behind. As Salt Lake County, Utah, Sheriff Aaron Kennard told *USA Today*, "These days you need to wear a spacesuit to commit a crime without leaving any DNA behind." (Willing, 2000).

California municipal police agencies, not county agencies, are usually responsible for the initial collection and long-term (in most cases a "lifetime") secured storage of this vital evidence. Unfortunately, they are not recognized as an essential part of the overall process. According to US World News, "Of the initial collections (of earmarked funds from a special court fee to pay for California's DNA database efforts) most went to the state and county crime labs which left a relative trickle of funding for cities" (US World News, November 30, 2007). This has resulted in an imbalance as municipal law enforcement must not only process and store the rapidly growing supply of DNA evidence, but other increasing technology influenced evidence as well.

Future of DNA

A positive development for the future of DNA is that new technology is on the forefront that may revolutionize the storage dilemma. In two to five years, advances in new technology may actually reduce the sample size and lower the quantity of DNA evidence being placed into property rooms. This would be a significant and welcome change over the current space allocation challenges most evidence personnel are faced with.

In October 2007, NEC Corporation and Aida Engineering announced they had jointly developed the world's first portable human DNA Analyzer. This device integrates all steps of the DNA analysis process, from DNA extraction to electrophoresis and individual profiling. The analyzer takes and stores each swabbed sample, so booking items into evidence, transferring them to a lab, and then storing them for a lengthy time will no longer be the norm. It has been developed mainly for the law enforcement market

and is packaged in a compact device the size of an attaché case that can be easily transported and utilized at crime scenes (JCN Newswires, 2007).

The compact nature of the analyzer facilitates coordination between each step and greatly expedites the procedure where DNA fragments are alternatively heated and cooled. As a result, the device can complete the entire process, from DNA extraction to analysis, in approximately 25 minutes. It will also allow for direct linkage and downloading of forensic sample information into the state and federal DNA databases, thus amplifying the quantity of samples entered. NEC is confident the analyzer will speed up criminal investigations and they hope for full-scale production in late 2008 (JCN Newswires, 2007). Attempts to locate law enforcement agencies or crime labs currently testing this analyzer were unsuccessful.

This device and its future offspring will be a welcomed advance in technology to reduce the associated DNA storage needs in police evidence rooms. Consider the ramifications of only maintaining small swab samples, and needing less or possibly no evidence freezer space. Consider the freed up staff time and available storage space due to the impact of such technology. Freeing both space and staff time would be a major breakthrough for those working in or managing an evidence unit.

Impact of Computer Forensics

Another arena that has affected law enforcement's evidence storage room is the technological revolution taking place within business, industry, government and our

homes. Americans use computer and networking facilities to bank and transfer money electronically, and are much more likely to receive e-mail than a letter. The worldwide Internet population is currently 1.3 billion and growing every day (Internet World Statistics, 2008). The Internet, computer networks, and automated data systems provide an enormous opportunity for illegal activities. Computer technology is being used to commit crimes against persons, organizations, governments and property. Some traditional white-collar crimes in finance and commerce continue; however, paper trails have become electronic trails. Crimes associated with the theft and manipulation of data; such as identity theft, are detected daily. Crimes of violence are also aided by technology. Common criminals, drug cartels, and crime syndicates all use the computer network to conduct worldwide operations (Newman, 2007). Certainly, the need for computer forensic investigations is one of the pressing needs of policing.

Computer Forensics is the science of identifying, recovering, extracting, preserving, and documenting this information, also known as ESI, (Electronically Stored Information) for presentation as evidence in a court of law. Only since 1999 have the tools been developed that make the examination process comprehensive, expedient, and financially feasible (Demopoulos, 2008). It is a growing area of focus for most police agencies; one that began to impact evidence room storage about five-years ago, as more computer hardware is seized and retained for long durations.

According to Santa Ana Police Department Digital Forensic Examiner Eric Demopoulos, the goal of a computer forensic examination is a structured investigation of a computer or

peripheral device. The goal of the examination is to protect evidence from corruption, while maintaining a documented chain of custody to discover what evidence the computer data holds, and who is responsible for that data. Once the hardware is seized, it is booked into the evidence room and then temporarily released to the assigned digital forensic examiner to investigate, usually at their desk or in a separate work area. The hardware is returned to the evidence room when the detective has finished with it and the copied disks of information removed from the computer (Demopoulos, 2008). "This is only the beginning," Demopoulos predicted. "Computer forensic investigations will become commonplace in the near future. There are a lot more technologically savvy officers on the force now than there were eight to ten years ago. My prediction is this type of investigative knowledge will be a staple for new investigators very soon."

Future of Computer Forensics

According to Demopoulos, "The future of computer forensic long-term storage methods will include transferring electronic evidence from a hard drive to a compact disk, flash drive or other upcoming devices, thus removing the actual computer from the evidence storage room." He predicts cloning evidential hard drives at crime scenes will become commonplace, thus the computer hardware will not be collected and booked into property. Demopoulos added, "Within the next ten years, specialized computer evidence environments will become the focus, with hardware storage slowly fading into the past" (Demopoulos, 2008). He is not alone amongst the varied experts and practitioners seeking solutions to space needs for evidence storage.

Elizabeth Thompson, Forensic Scientist III for the Orange County Sheriff Coroner Department in California, noted the Federal Government is seeking State funding to create countywide forensic computer labs, thus centralizing the collection and examination of electronic evidence, similar to the current county DNA laboratory scenarios. She predicts the design of the future electronic evidence collection and testing arena will be on a countywide level, which will limit the amount of electronic storage needs for municipal law enforcement and centralize the training and hiring of forensic computer experts (Thompson, 2007). Doug Tougaw, an engineering professor who is developing nanocomputers at Valparaiso University near Chicago, predicts computers will be much smaller in the future. This will also be a welcome advancement and amount to less needed shelf storage space in any evidence room. Tougaw claims, "We're getting closer to our goal of creating computers that are a thousand times faster and smaller and use one-thousandth of the energy of today's computers." (Valparaiso University, 2004). William Halal, professor emeritus at George Washington University and author of "Technology's Promise: Expert Knowledge on the Coming Transformation of Society" predicts "Starting around the year 2018, we'll have optical computers that operate at the speed of light, sending thousands of message streams down a single channel." His crystal ball sees the future overall size of computers shrinking to a palm size device or smaller (Halal, 2008).

With converging technologies, hardware downsizing, and the evolution of the personal computer (PC) and the Internet, it's very possible the future will bring us a PC that is a small, portable audiovisual projector and a laser keyboard. One step forward and it's also

possible this will evolve into a small portable projector, a holographic keyboard, and a light pen that works the same way as a mouse (Halal, 2008). Just picture it: Something incredibly small, possibly carried in someone's shirt pocket or purse compartment. Again, for those working in or managing an evidence unit, this is a major positive breakthrough. Size does matter when it comes to finding room in an overflowing property storage environment. A future that replaces physical items of evidence with electronically stored bits of digital information, which are then used to recreate the item's image, is very exciting, both in terms of technological advancement and to downsize overall evidence storage needs.

Impact of Digital Photography and Holography

Digital images are electronically stored, thus eliminating the need for film, chemical processing, special preservation techniques, or storage of negatives and prints. The first digital cameras for the consumer-level market were made available in 1994. Digital image technology has evolved at a tremendous rate during the past fourteen years and today, digital cameras are everywhere. In police work, they are often found mounted inside patrol vehicles to record car stops and other activities, and have become a staple for crime scene investigators and detectives. Physical photographs and film negatives are seldom booked into evidence anymore, replaced by compact discs containing electronic images.

Holograms have become the next step in the technology based, digital-world's progression. They are computer-generated three-dimensional views produced from two-

dimensional digital images (Halal, 2008). Once just a sticker collector's novelty or as highlighted in 1992, a memorable Sports Illustrated cover featuring Michael Jordan, holograms have recently been taking on a whole new dimension. Hologram images are now commonplace on credit cards and debit cards to provide extra security to minimize counterfeiting. Medical doctors use three-dimensional holographic scans to make measurements without invasive surgery. Holography has also been used to make archival recordings of valuable and/or fragile museum artifacts, which leads us to consider similar uses for police evidence documentation.

Municipal law enforcement's current use of holograms has mainly been limited to police identification products, such as employee identification badges or facility access cards. Other uses are just beginning to be explored as technology advances and the use of holograms becomes more commonplace and affordable. One future expectation would include the use of hologram technology to record evidence items in lieu of them physically being delivered and stored in a police property room. It's this future possibility that is truly exciting for those in the field of evidence management.

Future of Holography

In 2006, an exciting new process to create a more sophisticated hologram was designed by Zebra Imaging in Austin, Texas. It involved sending image data to a computer, which generated thousands, sometimes millions of different views of the object. The image was then downloaded and burned onto a piece of plastic. After processing, it was laminated.

In the correct lighting, it revealed some of the most accurate three-dimensional images ever seen (Science Daily, 2006).

Future digital three-dimensional holograms may be the key to inventing new cars, designing buildings, mapping entire cities and in the police evidence arena, used to make archival recordings of evidential items at the scene of a crime. Consider the possibilities. If we could eliminate the storage of most physical pieces of evidence and instead, capture it at the scene in a holographic, electronic format, would that not be a monumental change? If an item of evidence is needed as a court exhibit, why couldn't its three-dimensional holographic image be downloaded into the District Attorney or court's database and displayed for the jury at the appropriate time?

To help visualize a futuristic view of hologram use by law enforcement, one can be seen on the current Fox network television show, *Bones.* It features forensic anthropology and reading clues left behind in a murder victim's bones. The show created a unique way to render original crime scenes by using three-dimensional computer images to create realistic holographic scenes. These holograms are displayed using varied data to illustrate different injury or body placement scenarios from different possible weapons, angles and locations. In one recent episode, a three-dimensional holographic image of all underground city conduits was displayed and evidentiary data was utilized to pinpoint specific locations where a homicide could have occurred, based on the victim's injuries, soil content, and chemicals found on the bones. Making the leap to include holographic imagery of evidence items would not be difficult.

Hologram technology may turn out to have big impact on police evidence rooms. While its acceptance by the courts and law enforcement may be ten to fifteen years in the future, it has the possibility to revolutionize the actual evidence room environment. These areas may be transformed from linear storage shelf rooms into computer, server room environments complete with raised flooring, dedicated uninterrupted power sources (UPS), and dust, humidity and other environmental controls. These features need to be considered when planning an evidence room for the future.

Conclusion

Three-dimensional electronic images should replace many, if not most physical items of evidence, thus taking up much less storage space and reducing incidents of physically taking items of evidence to court. Amazingly, the future also includes DNA samples being collected at the crime scene with swab results available in the field within twenty-five minutes. This will allow more detailed and timely investigations to take place at the time the call is first received, as well as diminish the need to transport actual items back to police evidence rooms. Instead of booking each item in that contains DNA and storing it for ten, twenty, or sometimes fifty years, the DNA profile and swab samples will be stored either physically or electronically. In any case, the physical amount of storage will be much less.

The crystal ball projected in this article has given us a compelling image of a future where less, and not more, space is needed to store and secure criminal evidence. The current trend to confiscate “anything and everything” that might be used as evidence and

place it into police property rooms should diminish. In its place, a refined scientific basis to collect items of evidence will take its place. The current trend of overflowing rows of storage shelves with miscellaneous packages of evidence that sit and collect dust for years without moving will fade away. It will slowly be replaced with a smaller “clean room” that houses a computer server environment with digital images electronically stored that perfectly reflect the physical makeup of each item.

Members of the International Association of Property and Evidence (IAPE) should especially welcome the future spatial downsizing of municipal police evidence rooms. This will allow for more manageable situations, while freeing up expensive and badly needed space for other important police business. The bigger prize is that evidence collection will be much more selective and based in science more than ever before. This alone is a remarkable step, as the quality of evidence will become the focus, rather than quantity.

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