# / FOR THE RECORD:
## UNDERSTANDING THE TECHNOLOGY BEHIND BODY WORN CAMERAS
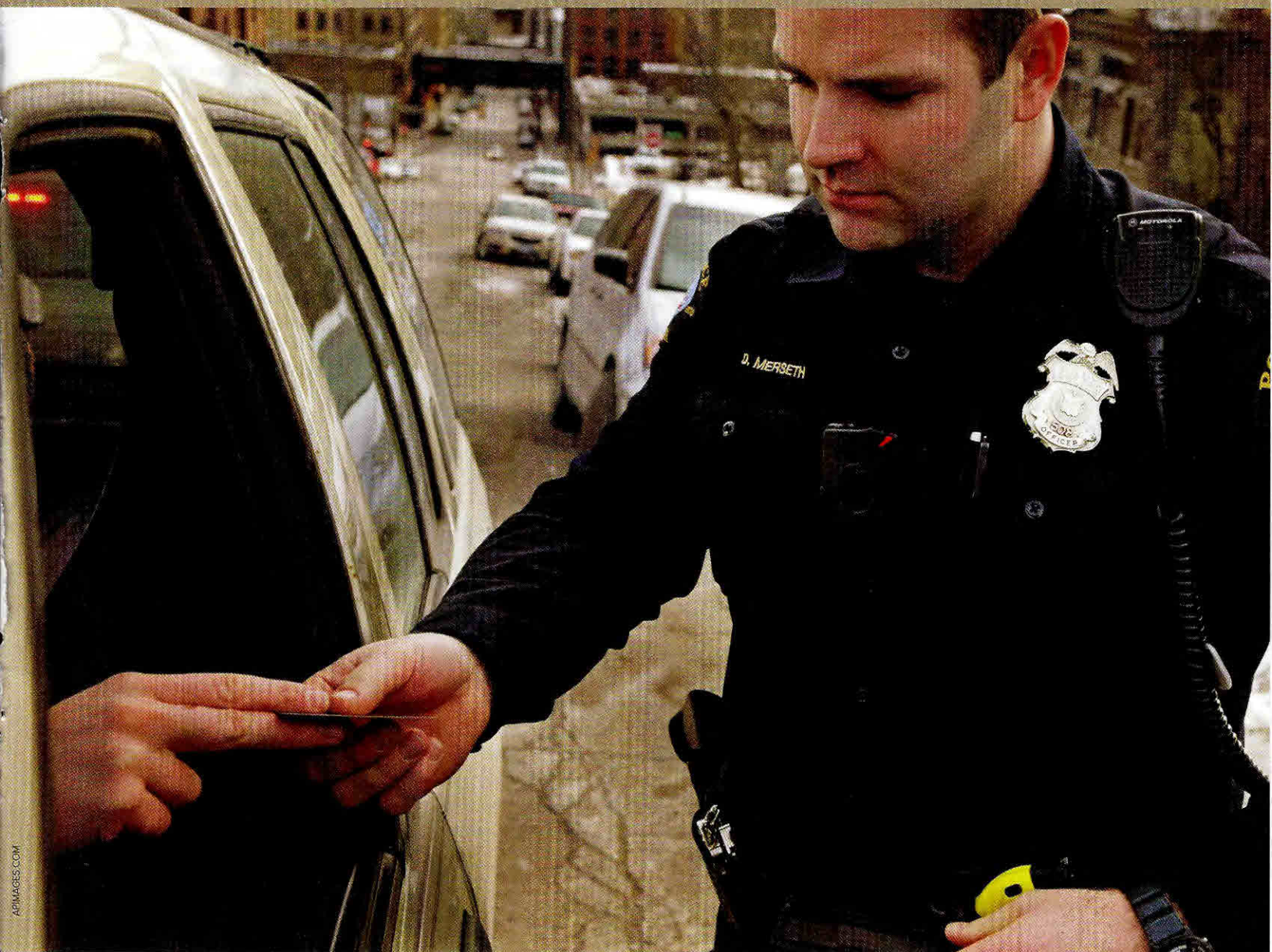
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# INTEREST IN BODY WORN CAMERAS IS GROWING FAST. HERE ARE SOME ISSUES TO CONSIDER BEFORE YOU DEPLOY.

It's been a year since the shooting of unarmed black teenager Michael Brown, which sparked riots in Ferguson, Mo., that lasted for days. In that short time span, a number of other deadly incidents involving young black men and police officers have occurred, triggering a national debate about the use of deadly force by police officers.

At the same time, another discussion has emerged, one that put forward the idea that creating a record of interactions between the police and the public might defuse simmering disputes, improve officer safety and mitigate allegations of racial profiling. The idea of using cameras to record interactions isn't new. In the past decade, police departments have installed more than 17,500 cameras in police cars, according to the International Association of Chiefs of Police (IACP).

But a program where police wear body cameras to record their interactions is still a rather new, and little-tested concept. Two years ago, only a handful of police departments used body worn cameras (BWC). Today, there are various estimates that put the number of law enforcement agencies using, or investigating BWCs at as many as 6,000 out of 18,000 nationwide.

The huge jump in interest has elevated what was once a niche technology for public safety into a major growth market. The federal government has pushed it further with $20 million in grants to fund BWC pilot projects. The grants are part of President Obama's proposal to invest $75 million over three years to purchase 50,000 body worn cameras for law enforcement agencies.

Driving the growth in BWCs are many benefits that go beyond the accountability of police officers and the public. They include transparency, increased professionalism, more peaceful civil interactions and even potential cost savings on internal affairs investigations into possible wrongdoing by officers as well as settlements of lawsuits stemming from the use of excessive force. Every year, law enforcement agencies spend hundreds of millions of dollars to settle claims. New York City spent $348 million on settlements and judgments between 2006 and 2011, according to the *Huffington Post*. Chicago spent a whopping $521 million between 2004 and 2014. The list goes on.

As quickly as interest in the technology has grown, so too have the questions surrounding both the policies needed to govern a workable BWC program, and the technology that would make recording and retaining these police interactions a feasible solution. Like any technology project, BWCs can impact a range of systems, and require project management skills in order to avoid failure. Besides evaluating the attributes of the cameras themselves, CIOs face a major issue in terms of video storage. The amount of data generated by digital video is huge, making storage

costly. The use of cloud services as a storage option raises a host of issues that local CIOs are just beginning to grapple with.

BWC systems will also impact other IT systems used by police departments, including but not limited to computer aided dispatch, records and evidence management systems, content management systems and so on. Then there are concerns around security, support and training. Finally, and perhaps most importantly, there's the question of cost. Data storage costs can reach $2 million annually for a police department, according to the Police Executive Research Forum.

Local CIOs will have a host of considerations to sift through when their jurisdiction decides to implement a BWC program in the police department. This report will walk through some of the key technological questions that confront local jurisdictions as they weigh the costs and benefits of body cameras.

## IT STARTS WITH THE CAMERA

In 2006, police officers in the United Kingdom tested body cameras and found that the technology enhanced the collection of hard-to-refute evidence and resulted in fewer cases going to trial. In 2012, a similar field test took place with the Rialto, Calif., Police Department. The 12-month experiment randomly tested body cameras on officers during their shifts. The cops used cameras from Taser International, which were water resistant, captured video in full color and had a battery life of 12 hours. The test results were startling: When the cameras were turned on, use of force by officers dropped 60 percent and complaints against the police fell nearly 90 percent.

These early positive results have opened the floodgates to BWC programs across the country. As CIOs and police departments begin to evaluate

## 60%
**THE REDUCTION IN POLICE USE OF FORCE DURING A 2012 BWC PILOT IN RIALTO, CALIF.**

## / HOMELAND SECURITY WEIGHS IN ON BWCS

The Department of Homeland Security (DHS), which established the System Assessment and Validation for First Responders Program to objectively assess an validate commercial equipment, came up with the following recommendations for BWCs

**1 /** An image resolution of at least **640 x 480** pixels.

**2 /** A frame rate of at least **25 frames per second.**

**3 /** A battery runtime that allows a camera to record continuously for at least **three hours.**

**4 /** The camera's onboard storage, set at the lowest video quality setting, should be able to capture a minimum of **three hours of recording.**

**5 /** The camera shoul have a **low lux ratin** to allow for recording events in low light.

**6 /** System should have a minimum **one-year warranty**.

DHS provides some more specific issues that police should consider when choosing a type of camera:

*"Standard cameras are likely to have image quality issues (e.g., fuzzy pictures and poor quality at night) as compared to more high-end cameras due to technical compromises to manage costs. There can also be quality issues with stability. For example, when an officer is running or fighting, the video may be shaky and the camera may not be secure; this again links back to placement of the camera on the officer being extremely important. Some feel that head camera placement allows the head to act as a natural gyroscope to reduce some motion issues seen with cameras.*

the systems that can capture and store video, the cameras themselves provide a glimpse at the complexity in options that have to be weighed, both from a field operations perspective as well as from the impact on policies that govern how and when cameras and videos are to be used.

Overall, the camera hardware can be light (cameras used by Rialto police weighed just 4 ounces). Their light weight enables officers to wear cameras in a variety of positions: head, shoulder or chest, for example. In Rialto, the police tried different types of gear and eventually found they liked cameras that fit on their sunglasses or cap. One advan-

tage of a head-worn camera is that it will record what the officer is looking at, while chest or shoulder-worn cameras only record what's in front of the body.

In 2013, the Phoenix Police Department evaluated the impact of BWCs and used the following parameters when they procured cameras for the officers:

*"In terms of the physical characteristics of the camera, the device could not weigh more than a total of five ounces. Also, it had to be able to record and store at least four hours of video, with a battery life of eight hours. The PPD (Phoenix Police Department) was also insistent that the recording indicator was visible to officers in the field, and

that police would have the ability to view the recently recorded video footage on the scene of an incident. The field of vision of the device needed to be at least 50 degrees. The department also wanted officers to have the ability to turn off the night vision function, if there was one, and to be able to change the placement of the device to several locations, including the ear, shoulder and lapel. Finally, there could not be more than two wires on the device, and it would need to have the capacity to automatically label video files with the date and time of the recording."

The Phoenix Police Department tested different camera models. Some of the findings showed officers could get confused with camera features like the pre-record option on some cameras, which retains 30 seconds of video prior to an officer activating a recording. Many officers found this option to be a liability, according to a 2015 report, *Evaluating the Impact of Officer Body Worn Cameras*. Officers also had trepidations about cameras equipped with night vision capabilities. Apparently some officers believed courts and prosecutors would view much clearer images of what happened compared to what officers actually saw, putting their personal conduct at risk in terms of how it might be judged.

Findings from the PPD study showed officers were much likelier to agree that the camera is easy to use (61.8 percent), comfortable to wear (57.6 percent), and that its battery life is adequate (65.6 percent). The officers were much less likely to agree that it is easy to locate and retrieve a video for a specific event (26.5 percent) and that it's easy to download data at the end of the shift (23.5 percent).

## DATA STORAGE: THE GORILLA IN THE ROOM

When the Chula Vista, Calif., Police Department started giving body worn cameras to a handful of police officers, they quickly learned that a 30-minute video took about 800 MB of storage space. The department crunched the numbers and realized that if it equipped every one of its 200 sworn officers with cameras, they could potentially generate 33 terabytes of data every year, according to *Police Chief Magazine*.

When it comes to BWCs, data storage is the 800-pound gorilla in the room. Video, as every CIO knows, is a data hog. And BWC systems can produce vast amounts of video data, as well as the metadata to track and manage the video clips for retention and chain of custody purposes. Data storage is a technology issue and it's one that CIOs try to address in the most cost-effective manner.

But in the case of BWCs, policy is inextricably linked to the question of storage. Retention policies can play havoc with the portion of a BWC budget that's dedicated to storage.

Some jurisdictions say non-evidentiary video should only be kept for 60 to 90 days. Some departments say it should be longer, others say less. The Oakland, Calif., Police Department, which currently has 600 BWCs deployed, retains video for a remarkable five years. As a result, storage needs have grown significantly over the past couple of years and the department now captures on average almost 7 TB of video data per month, according to Officer Dave Burke. And if a video becomes evidence in a court case, the retention requirements can be even longer. "What if there's an appeal in the case 10 years down the road?" asked a CIO. "What are the requirements and policies for handling those scenarios?"

Many cities, under pressure to implement BWCs, have found data storage and related costs to be a major stumbling block. Last year, Baltimore Mayor

## 7TB
**THE AMOUNT OF VIDEO CAPTURED MONTHLY BY OFFICERS WEARING CAMERAS IN OAKLAND, CALIF.**



Lightweight cameras can be worn in a variety of positions.

APIMAGES.COM

Stephanie Rawlings-Blake vetoed a BWC proposal after concluding that data storage costs and other details were not sufficiently taken into account. Baltimore city officials estimated video storage costs at as much as $2.6 million annually.
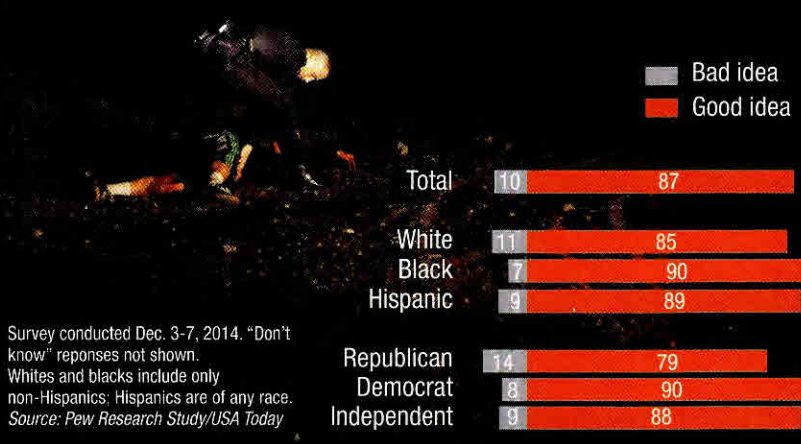
Experts agree that issues concerning privacy must be balanced with storage capacity, transparency and state laws. The Police Executive Research Foundation (PERF) released a report on BWCs in 2014 (*Implementing a Body-Worn Camera Program*) that looked at existing BWC programs around the country and developed a list of key lessons learned when it comes to data storage:

- ✓ Consult with prosecutors and legal advisers.

- ✓ Explicitly prohibit data tampering, editing and copying.

- ✓ Include protections against tampering with the data prior to downloading.

- ✓ Create an auditing system.

- ✓ Explicitly state who will be authorized to access data.

- ✓ Ensure there is a reliable backup system.

- ✓ Specify when videos will be downloaded from the camera to the storage system and who will download them.

- ✓ Consider third-party vendors carefully.

For the final point, PERF reported that police departments, legal advisers and prosecutors were comfortable using third-party storage solutions, but to consider the vendor's technical capabilities and



**/ BIPARTISAN SUPPORT FOR MORE BODY CAMERAS ON POLICE OFFICERS**

More police officers wearing body cameras to record interactions would be... (%)

■ Bad idea
■ Good idea

| | Bad idea | Good idea |
|---|---|---|
| Total | 10 | 87 |
| White | 11 | 85 |
| Black | 7 | 90 |
| Hispanic | 9 | 89 |
| Republican | 14 | 79 |
| Democrat | 8 | 90 |
| Independent | 9 | 88 |

Survey conducted Dec. 3-7, 2014. "Don't know" reponses not shown. Whites and blacks include only non-Hispanics; Hispanics are of any race. *Source: Pew Research Study/USA Today*

whether the system includes protections, such as audit trails and backup.

The National Institute of Justice points out that as video becomes more important to a police department, storage adjustments will need to be made. "The length of storage time can cost numerous man hours in addition to the actual costs of the storage device." It goes on to say that advanced data storage systems can provide end-to-end data management that includes safeguards to control data handling and assist in chain-of-custody control.

## THE CLOUD OPTION

The use of cloud technology as part of a BWC storage solution really hasn't been on the radar for police departments because most cloud computing platforms don't meet the FBI's Criminal Justice Information Services (CJIS) requirements. In a 2013 survey of state and local law enforcement officials by the International Association of Chiefs of Police, the Ponemon Insti-

tute and SafeGov, only 15 percent were using cloud technology for storage; 35 percent were considering it; and 50 percent were not pursuing it at all.

But the situation has changed recently as some big vendors — most notably Microsoft — now offer cloud storage that meets FBI requirements. With the standardization of cloud storage (and other capabilities) police departments have an opportunity to gain from some of the cloud's more recognized benefits: cost effectiveness, scalability and access to innovation. Savings estimates, when comparing cloud storage to an on-premises solution, with servers, labor costs and networks, can range between 30 and 60 percent, according to industry analysts. These benefits are buttressed by the IACP survey, which found that state and local law enforcement officials were considering, adopting or planning to use the cloud to save money (61 percent); reduce on-premises infrastructure and software support

(52 percent); and to take advantage of new innovations (33 percent).

The city of Oakland, which as more than 600 BWCs deployed, had been storing video in an in-house system for five years. But that retention policy had overburdened the department's servers. The department considered reducing the number of years to three, but ended up opting for a CJIS-compliant cloud solution from VIEVU, a Seattle-based maker of BWCs that runs on Microsoft's Azure Government Cloud platform.

The solution is expected to give the Oakland police almost unlimited room to store video, Officer Dave Burke told *Government Technology* in February. The platform will let the department use digital signatures to verify a video's authenticity, should it later be used in court; it will also generate a running audit log of the video database and provide courtroom-ready transcriptions.

Other technical considerations for a video storage solution, whether cloud-based or on-premises, would be advanced search and analytical tools that include facial recognition to help narrow down the relevant video for evaluation. Storage tools should also support the redaction of visual content to protect the privacy of people who interact with police but are not part of any investigation.

## PARADIGM SHIFT FOR EVIDENCE MANAGEMENT

Recently the New Mexico Supreme Court ruled that when a district attorney's office opens a case, police departments must have all evidence in place within 10 days or less. In other words, documents, physical evidence, images, recordings and any video has to be turned over in that time. Such policies have put pressure on police departments to have consolidated evidence management systems that are up to the task.

The Albuquerque Police Department (APD) has a management system for

## THE FULL PICTURE

According to a report on body worn cameras by the National Institute of Justice, camera specifications can include:

- Battery life
- Video quality
- Recording limits
- Night recording
- Camera focal width (point-of-view, or POV)
- Audio recording
- Radio integration capability

physical evidence, but not one that can take into account all the new digital evidence the department now collects from more than 600 officers who are equipped with cameras. "We want to be able to package all that up in an electronic manner and provide it to the DA's office without any delay in delivery," said Rishma Khimji, interim director of APD's tech services.

A BWC system can touch a number of other critical police information systems, ranging from CAD and records management to content management. But evidence management is the one system that will experience the biggest impact from video. In Duluth, Minn., the city's 11 BWCs are generating 8,000 to 10,000 videos per month, according to Police Chief Gordon Ramsay. The Rialto, Calif., Police Department generated 2.3 million videos over a three-year period. With that amount of video evidence entering a police department's overall evidence database, the need for a robust, enterprise management system becomes more crucial.

An evidence management system automates search and retrieval, organizes evidence data, provides security safeguards, creates a workflow, and can
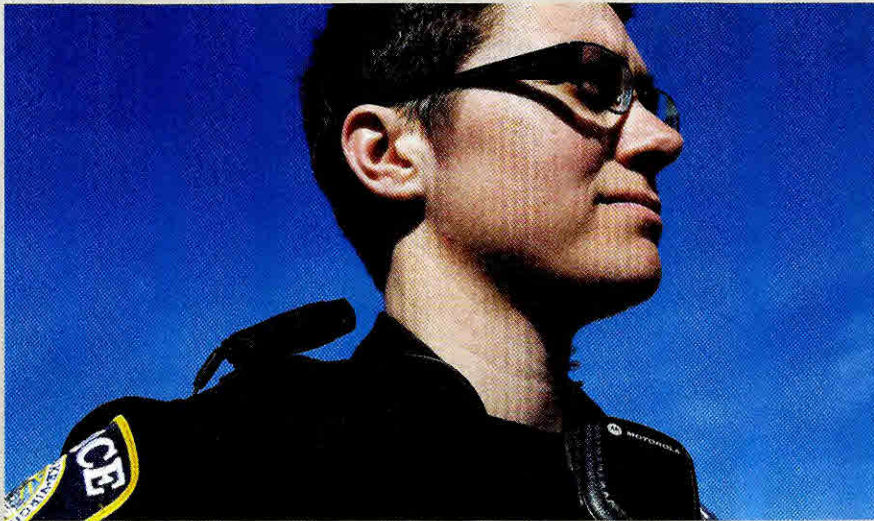
report, track and audit evidence from the moment it is captured on the camera to the time of disposition. Well-designed evidence management systems automat much of the workload done by users, while expanding the effectiveness of the data, not to mention distributing it more broadly across a law enforcement agency

As the scope of evidence management expands, it presents certain IT challenges. First, backup and disaster recovery become critical as evidence management software and data assume a workload once managed by users and with paper. Second, security becomes more essential as the amount of digital evidence increases. In addition, IT can expect to develop an archiving strategy including offline storage, and prepare f growth as the scope of BWCs undoubtedly balloons. All of those factors can b further impacted by policies and future policy changes.

Albuquerque's physical evidence management system creates an electronic catalog of every physical item that gets barcoded and stored for later retrieval. The police department would like to create a similar process for its video evidence. "What we need is a video evidence system that allows for an easy way for officers to enter what they have captured both from BWCs as well as backup cameras carried by some personnel," said Khimji. Besides images video and physical items, the system also must capture and catalog 911 calls and other audio recordings as well. In other words, APD could use a sophisticated, consolidated evidence management system to meet its growing needs.

"The amount of evidence we have to give the DA's office is so large that we have to come up with the right kind of evidence repository system that will contain all that information, based on the case and officers," she added.

The Santa Clara, Calif., Police Department has created an evidence manage-

✓ Use a system that has a built-in audit trail to prevent data tampering and unauthorized access.

✓ Use a system that has a reliable method for automatic backup of data.

✓ Consult with prosecutors and legal advisers before making any final decision.

ment system to catalog all of the digital evidence officers collect. IT provides a customized security level access, a documented chain of custody and a nearly automatic sharing of digital evidence. The system is used by approximately 100 people in the city's District Attorney's office and they have the ability to stream video or download files.

## HOW PRIVACY DRIVES VIDEO SECURITY

The single biggest nontechnical issue dominating any discussion about the use of BWCs is privacy. Deciding when to record an interaction remains a controversial subject. Some advocates of BWCs say all interactions between police and the public should be recorded, while others would like to see officers use discretion in deciding when to record. Meanwhile, in 12 states there are laws that require all parties to consent before any recording can occur.

The policy considerations on this issue are lengthy and detailed, and to cover them effectively is outside the scope of this report. But it raises a fundamental IT consideration: security. The last thing any elected local official wants to see is headlines in the local paper about a data breach exposing hundreds or thousands

of video files. For that reason alone, CIOs will need to practice due diligence in planning how the security of the video files will be handled.

When it comes to an on-premises solution, CIOs will have to weigh such questions as "how much" and "how good" along with access. For law enforcement agencies that are considering a regional storage solution, decisions will need to take into account the security implications of such a system. Cloud storage solutions can provide some law enforcement agencies, especially small ones, with a degree of security they may not be able to develop on their own.

But as the Police Executive Research Forum points out, a cloud solution requires CIOs and law enforcement agencies to perform their due diligence in ensuring that chain of custody for the video is properly established. Other security points to consider when evaluating a third-party cloud storage solution include:

✓ Work with a reputable vendor.

✓ Enter into a legal contract that governs the vendor relationship and protects the agency's data.

## VIDEO'S HIGH COSTS (AND SOME COST-SAVING IDEAS)

More than three-quarters of the nation's 20 largest city police forces use body cameras or plan to do so, but none are using BWCs with all of their officers according to a 2015 survey by the news agency Reuters. Nearly all cited costs as the reason why BWC use isn't more widespread.

In a national survey of law enforcement agencies last year, 39 percent said they had no plans to use BWCs primarily because of cost considerations according to PERF. With so many cities still struggling to regain their fiscal footing after years of retrenchment and cuts that affected police departments, it's not surprising that BWCs are having a rough time moving from plan to pilot to full implementation.

Cameras range in cost from $150 to $1,000, though most average around $300 to $500 apiece. But docking stations can easily cost more than $1,000, and then there's storage and digital evidence systems to help automate the cataloging of what can become a flood of new data. It all adds up. For example, San Diego plans to equip 1,000 patrol officers with cameras by the end of the year; first year costs are expected to hit $1 million, with a large portion of that going to data storage. In Duluth, Minn., the police department spent

$5,000 for 84 cameras and charging bays. But its three-year contract for data storage cost the department $78,000.

Besides hardware and software costs, police departments report having to appoint at least one full-time officer to manage a BWC program. This person administers the BWCs, handles training, helps with tech support and even ensures BWC policy compliance among officers. He or she would also work at educating the community about the program.

An indirect cost that can be overlooked is the extra time officers have to spend reviewing and categorizing videos, making sure they are properly tagged and loaded into the database. This is where the choice of evidence management or records management technology can play a role. More sophisticated solutions can automate some or most of the legwork that many officers currently have to handle manually.

When it comes to cost-saving strategies, there is little in the way of low-hanging fruit. But there are several ways that the overall expense of a BWC program can be reduced, according to PERF.

One recommendation is to reduce the retention time for non-evidentiary video. Oakland currently holds all videos for five years; and some BWC advocates recommend that cops record every interaction they have while on the beat. But that's a costly burden. The Greensboro, N.C., Police Department has a less comprehensive recording policy, but still has managed to produce 40,000 videos in just seven months.

Another challenge is responding to records requests. As the use of video becomes more widespread, police organizations such as PERF and IACP expect members of the public and the news media to request more video recordings. As the amount of stored video increases, the burden of responding to these requests will also grow. Experts

**"WHAT WE NEED IS A VIDEO EVIDENCE SYSTEM THAT ALLOWS FOR AN EASY WAY FOR OFFICERS TO ENTER WHAT THEY CAPTURE."**

recommend that police and their IT staff evaluate other forms of long-term storage, such as offline or cold storage, and to shorten retention policies as much as possible.

Another strategy is to conduct a cost-benefit analysis that considers the legal costs a police department incurs from claims, judgments and settlements related to litigation against officers. Some of those costs could be reduced by having a BWC program. Also costs to prosecute could be reduced if evidence from BWC videos reduce the number of cases going to trial. This was the outcome from one of the earliest BWC tests conducted in the United Kingdom nearly a decade ago.

## CAN TECHNOLOGY SATISFY POLICING, POLICY AND POLITICS?

As this report states in the introduction, one of the biggest drivers behind the rapid escalation of body worn cameras is the series of tragic altercations between police officers and unarmed civilians over the past 12 months. But another reason that comes up from time to time is that more people are using their smartphones to record altercations with the police and posting the images online. It makes sense to law enforcement leaders that the police do the same, to ensure there is a fair and objective record of what occurred.

It's a great example of how technology keeps changing, forcing government policy makers and practitioners to play catchup. Technology has given the police a variety of tools to wage war on crime while providing the public with the kind of public safety they expect.

In recent years, police departments have put cameras on the dashboards of cruisers to record interactions with the public. They have mounted special cameras on their vehicles that can read license plates to look for possible matches with stolen cars and for drivers involved in a crime.

But once again, technology has leaped ahead and now the public can record incidents that the police once had control over. At the same time, BWCs also are having a very nontechnical impact on both officers and the public. As the study of BWCs in Rialto, Calif., revealed, when a camera is turned on, there is a certain self-awareness and conduct changes. Everyone behaves better.

All of these factors have prompted public officials to push hard for BWCs. But what research and experience shows is that rushing toward a technological solution to a complex problem is fraught with potential failure. Setting down IT plans for BWCs before policies on privacy, redaction, retention and evidence management have been hashed out with all stakeholders will make rollout harder and more expensive.

The public, local leaders and law enforcement agencies want to move rapidly on testing and deploying BWCs. The technology is hot and it works. But local CIOs and their counterparts in the police departments are in the middle. They have to make sure everything works and is cost-effective when the switch is turned on and cameras start recording. It will take a great deal of experience, leadership, even consensus-building, to make sure a technology program like this is done the right way. ■