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A Primer on

Body Worn Camera Technologies

Prepared for
The Department of Justice's
National Institute of Justice

NIJ | National Institute of Justice

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Prepared by
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in cooperation with
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1. EXECUTIVE SUMMARY

There has been a dramatic increase in the criminal justice use of body worn cameras (BWCs) in the last few years. As a result of governmental and news media scrutiny of law enforcement interactions with the public, many think that BWCs have the potential benefit of increased legitimacy and accountability for both citizens and the law enforcement community. Since then, commercially available BWCs have flooded the market. There are now over 60 different body worn cameras produced specifically for law enforcement use.

BWCs are cameras with a microphone and internal data storage, and allow audio/video footage to be stored and analyzed with compatible software. The cameras are typically located on the police officer's chest or head.

The National Institutes of Justice (NIJ) is interested in learning about existing BWC technologies and other considerations for integrating BWC into current systems. Commercial BWC information is aggregated and summarized to aid law enforcement officers and public safety practitioners in the planning, acquisition, and implementation of this technology. This paper provides background context for BWC, methodology for developing the market survey, compiled results from the market survey, and considerations for implementing BWCs. For more technical specifications on each BWC, please refer to the accompanying NIJ BWC Market Survey document.

To collect this information, a request for information (RFI) was created and posted as a Notice in the Federal Register. In addition, data was solicited directly from BWC product vendors. A total of 31 vendors responded to the RFI (BWC: n=28, Software: n=3). When vendors did not respond to our attempts to contact them, we obtained as much information as we could from their websites (BWC: n=10, Software: n=1). From this research, we obtained information for 66 BWCs and 4 BWC data management software/storage standalone systems.

From this market survey, we uncovered the following: 1) There are many more vendors now that sell BWC products as compared to a previous market survey from one year ago; 2) the incorporation by vendors of new technological BWC features prompts the strong need for clear policies; and 3) This is an evolving area of law and some legal issues are currently unclear with regard to BWCs.

This market survey presents an overview of the technologies available at the time of data collection. When considering an acquisition of BWC equipment, additional information should be sought from the specific vendors of interest.

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2. INTRODUCTION

There has been a dramatic increase in the criminal justice use of body worn cameras (BWCs) in the last few years. As a result of governmental and news media scrutiny of law enforcement interactions with the public, many think that BWCs have the potential benefit of increased legitimacy and accountability for both citizens and the law enforcement community. Since then, commercially available BWCs have flooded the market. There are now over 60 different body worn cameras produced specifically for law enforcement use.

The National Institutes of Justice (NIJ) is interested in learning about existing BWC technologies and other considerations for integrating BWC into current systems. To collect market survey data on BWC products, a Request For Information (RFI) was created and posted as a Notice in the Federal Register. In addition, data were solicited directly from BWC product vendors. Most vendors responded to the RFI and some to our direct contact. When vendors did not respond to our attempts to contact them, we obtained as much information as we could from their websites. This commercial BWC information was aggregated and summarized in a separate market survey document to aid law enforcement officers and public safety practitioners in the planning, acquisition, and implementation of this technology. This market survey was not intended to evaluate or rank these products. No judgments were made concerning the quality of these products. Instead, it was designed to provide the law enforcement and public safety community with an overview of current BWC technology for their uses. This market survey only reflected the technologies available with accessible information at the time of data collection. When considering an acquisition of BWC equipment, additional information should be sought from the specific vendors of interest. For further details and more technical specifications on each BWC, please refer to the accompanying NIJ BWC Market Survey document.

The purpose of this document is to provide background context for BWC, methodology for developing the market survey, and results from the market survey. In addition, important considerations for integrating BWC into current systems, including data storage, policy, and legal implications, are discussed.

3. BODY WORN CAMERA SYSTEMS BACKGROUND

3.1 Background

In light of the national attention on the Michael Brown shooting in Ferguson, Missouri, and Freddie Gray death in Baltimore, Maryland, discrepancies in eyewitness accounts have prompted calls for police officers to be outfitted with BWCs (CBC News, 2014). The premise is that BWCs will help capture a record of police-involved incidents and provide increased transparency and legitimacy. Other perceived benefits of implementing BWCs include: improved behavior for both police officers and citizens; expedited resolution of complaints and lawsuits; improved evidence for arrest and prosecution; and opportunities for police training (White, 2014). In the past few years, there has been a dramatic increase in the criminal justice use of BWCs, as well as increased public and media attention of BWC use.

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Despite their increasingly widespread use, a single set of BWC technical requirements does not exist. Instead, a set of recommendations for product selection were reported in the Department of Homeland Security's (DHS) System Assessment and Validation for Emergency Responders (SAVER) Wearable Camera Systems Focus Group Report (ManTech, 2012) and by the Police Executive Research Forum (PERF) in the Implementing a Body-Worn Camera Program Report (Miller, 2014). The reader may wish to refer to these two documents.

In order to demonstrate clearly the public safety purpose for BWC and to develop a concept of operations (CONOPS) for their use, a written policy statement outlining public safety purposes and goals of BWC use is important. Such policies and CONOPS may be important factors in selecting BWC products with specific features. However, policies and CONOPS vary widely among jurisdictions, and a more detailed discussion is beyond the scope of this document.

Among the law enforcement agencies that use BWCs, there is a perception that BWCs provide a useful tool for law enforcement (Miller, 2014). The perceived benefits of capturing a video recording of critical incidents and encounters with the public, strengthening police accountability, and providing a valuable new type of evidence largely outweigh the potential drawbacks. Perceived potential problems include citizen privacy concerns, police officer privacy, health and safety of the officer wearing the BWC, BWC training and policy development, and substantial cost for implementation.

A study of the BWC impact on complaints against officers was conducted with the Rialto Police Department, a mid-sized police department in California in February 2012 (Farrar, 2013). Front-line officers were randomly assigned to shifts with or without a Taser Axon body camera system that recorded police-public interaction for 12 months. This study resulted in 50,000 hours of recorded data. The study concluded that the use of BWCs led to a 60% reduction in use-of-force incidents (61 to 25) and an 88% reduction in complaints (24 to 3) in the experimental shifts as compared to the control shifts. Shifts without BWCs experienced twice as many use-of-force incidents as shifts with BWCs. A survey of all officers before and during the study revealed no changes in officers' self-legitimacy (i.e., the confidence they have in their authority). These results appear to suggest that self-awareness through heightened certainty of being observed in social context may deter wrongdoing by both the citizen and the police officer. The study also describes several limitations of using BWCs, including high cost, privacy issues, and the need for consistent policies.

A similar study conducted in Mesa, Arizona also found a reduction in complaints against police officers (MPD, 2013). In October 2013, the Mesa Police Department implemented a one-year pilot program that assigned officers to shifts with or without Taser Axon Flex cameras. This study concluded that officers without BWCs received three times more complaints than officers who wore BWCs. There was a reported 75% reduction in use-of-force incidents and a 40% reduction in complaints for officers who wore BWCs as compared to the previous year when BWCs were not implemented.

On the contrary, a Cambridge study found that wearing body cameras increases assaults against officers and does not reduce use of force (Ariel, 2016). A prospective, multi-national

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randomized controlled trial from 10 discrete tests was conducted. Averaged over ten trials, the study showed that BWCs had no effect on police use of force, but led to an increased rate of citizen assaults against officers wearing cameras. In this study, the police defined "force" as anything beyond the use of verbal commands during an arrest.

The same authors from the Cambridge study looked further into the counter-intuitive findings mentioned above to determine the effect of officer discretion in the Journal of Experimental Criminology (Ariel, 2016). They used established criteria from the previous study to categorize the ten experimental sites into subgroups of "high compliance," "no compliance," and "mixed compliance." In this study, "force" was defined as any application of physical restraint beyond handcuffing. When officers complied with the experimental protocol and did not use their own discretion to turn on/off the camera, use of force rates were 37% lower. On the other hand when officers did not comply with treatment protocol and instead chose when to turn the cameras on/off, use of force rates were 71% higher. This means that BWC-use can reduce police use of force when the officer has minimal discretion to turn on/off the camera.

3.2 Previous Market Surveys

A market survey of body worn cameras was conducted by ManTech Advanced Systems International, Inc. for NIJ in March 2014 under the Sensor, Surveillance and Biometric Technologies Center of Excellence. That market survey, entitled "Body-worn Cameras for Criminal Justice: Market Survey," gathered information from a government issued RFI that was posted in the Federal Register in December 2013. A total of 18 different cameras were reviewed in the market survey (ManTech, 2014).

More recently, the Department of Homeland Security (DHS)'s System Assessment and Validation for Emergency Responders (SAVER) conducted a body worn camera market survey for law enforcement, entitled "Body-Worn Video Cameras for Law Enforcement Market Survey Report." This report gathered information from September 2014 to March 2015 from vendors, Internet research, industry publications, an emergency responder focus group, and a government issued Request for Information (RFI) that was posted on the Federal Business Opportunities website. Twenty cameras were reviewed in SAVER's market survey (SPAWARSYSCEN, 2015).

3.3 BWC Technology Overview

Body worn camera systems typically consist of a camera, microphone, battery, and onboard data storage. They may also include other features, such as infrared illumination or tagging video data with a case number for reference. The cameras are designed to be head-mounted or worn at various locations on the body. They can be used by law enforcement personnel to record a variety of incidents, including traffic stops, sobriety tests, interviews, and arrests. Aside from the actual BWC, there is usually accompanying software that allows users to review video, archive, search, redact, and export the video footage. Some key features of interest are further described below.

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3.3.1 Camera Mount

Camera mounting systems allow officers to attach and detach BWCs to several areas, including around the ear or head, on a helmet or hat, on the chest, and in many other places. When purchasing a BWC, clips are typically provided that allow for camera mounting. Mounting is a serious item to consider as lapel/chest mounted cameras are always body-facing units, whereas head-mounted units have a view of the direction the officer is looking. The field of view and subject's distance from the camera are confounding factors that prevent the recorded video from coinciding with the officer's actual visual perceptions at the time (Williams, 2016).

PERF recommends that police department policies specify the location on the body on which cameras should be worn. The most appropriate camera placement will depend upon requirements set forth by each police department (i.e., what do you need the camera to do). Other factors include field of vision, comfort, functionality, and ease of use. Police executives have provided the following feedback to PERF regarding different camera placements (Miller, 2014):

- Chest placement was the most popular placement location among agencies.
- Head/sunglasses is a very popular location because the camera looks in the direction the officer sees. The downside, however, is that an officer cannot always wear sunglasses. Some officers have also reported that the headband cameras are uncomfortably tight, and some expressed concern about the potential of injury when wearing a camera so close to the eye area.
- Shoulder/collar placement may provide a good perspective, but the camera can too easily be blocked when officers raise their arms. One agency, for example, lost valuable footage of an active shooter incident because the officer's firearm knocked the camera from his shoulder.
- Some agencies specify that officers should wear cameras on the gun/shooting side of the body, which they believe affords a clearer view of events during shooting incidents.

3.3.2 Camera Resolution

Camera resolution is the amount of detail that a camera can capture and it is measured in pixels The more pixels a camera has, the more detail it can capture and the larger pictures can be without becoming blurry or "grainy" (Nice, 2016).

The DHS SAVER Wearable Camera Systems Focus Group recommends a minimum video graphics array (VGA) resolution (640 x 480 pixels) (ManTech, 2012). The type of post-recording analysis that will be done on the video must be considered before selecting a resolution. For example, if forensic video analysis is anticipated, a resolution less than VGA would not be recommended, and a resolution higher than VGA may be appropriate for better quality video to be used as evidence in court. Some cameras have the ability to record in multiple resolutions that can be set by the user. Camera resolution, along with frame rate, contributes to the camera's ability to provide a sharp, clear image with minimal distortion so the user can identify people and objects.

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The higher the resolution, the more storage space is needed. At VGA resolution (640 x 480) and a frame rate of 30 frames per second, an hour of video recording would take approximately 550-1,100 MB of storage. High definition (HD) resolution, also called 720P, is 1280 x 720; an hour of recording would take approximately 1,650-3,325 MB of storage (NIJ, 2013).

3.3.3 Field of View

The field of view (FOV) is the surrounding area that the camera can monitor. Specifically, it refers to what the camera lens sees while stationary. Therefore, it is not the same as coverage angle, which would include the extent of camera panning and tilting. According to the Video Quality in Public Safety (VQiPS) Digital Video Quality Handbook, the FOV is typically measured in two different ways: horizontal (i.e., from left to right edges of the frame) and vertical (i.e., from the top to the bottom of the frame), or diagonal (i.e., measured from one corner to the opposite corner of the frame) (VQiPS, 2012). The field of view is specified in degrees, which may be listed either as diagonal or as horizontal X vertical. Most vendors provide a single number, which is diagonal. Some provide the horizontal X vertical, which provides a more specific indication of what the camera can see. For example, a 125 degree horizontal X 100 degree vertical field of view would be the same as a 160 degree diagonal field of view. This is important because a diagonal field of view specification essentially assumes that the field of view is square, losing more specific information, as in this example. Also, it is important to note that, for a given resolution, a larger FOV will encompass more objects but in less detail, while a smaller FOV will include less objects, but in greater detail.

3.3.4 Lux Rating

Lux refers to the measurement of the amount of light falling on an area, weighted for human eye sensitivity. The lux rating of the camera refers to minimum amount of light that produces an acceptable image during normal camera operation, not taking into account any night mode feature. A camera with a high lux rating may have difficulty visualizing information in shadow or low light conditions. The DHS SAVER Wearable Camera Systems Focus Group recommends that the camera should have a lux rating less than or equal to 1 lux, with the preferred rate being closer to 0.1 lux (ManTech, 2012).

3.3.5 Frame Rate / Recording Speed

The frame rate (or recording speed) is defined by the number of frames (or images) the camera takes per second. The DHS SAVER Wearable Camera Systems Focus Group recommends a minimum frame rate of 25 frames per second (fps) (ManTech, 2012). Thirty fps is a standard video frame rate that provides clear and smooth video. Too low a frame rate may miss important action, such as the direction a suspect flees or the use of a weapon. The higher the frame rate, the smoother (less jumpy) the video will be. Frame rates lower than 25 fps suffer from increased motion blur (NIJ, 2013). Frame rate, along with video resolution, contributes to the camera's ability to provide a sharp, clear image with minimal distortion so the user can identify people and objects.

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Frame rate also has an impact on the size of the video files. Higher recording frame rates capture more motion detail but require increased storage. This larger video file has impacts on data storage considerations, which in turn impacts the resources (financial and human) needed to store, back up, and manage large amounts of data (Sallee, 2014).

3.3.6 Battery Runtime

Battery runtime is the length of time the BWC can run without the battery needing to be recharged. The camera should be able to record continuously for at least 3 hours on a fully charged battery (ManTech, 2012). Consideration should be given whether the battery should provide enough power to record a full shift by the officer wearing the device, such as an 8-12 hour battery life. Devices that do not use rechargeable batteries are not recommended (NIJ, 2013). Another battery characteristic to consider is the number of times rechargeable batteries can be recharged before replacement is recommended.

3.3.7 Data Storage

Data storage is a general term for archiving data. For purposes of this market survey, we looked at data storage on the BWC itself (i.e., whether it can hold 16 GB, 32 GB, etc. of data) and a central location to store all the recorded audio and video footage.

Among police executives interviewed by PERF, security, reliability, cost, and technical capacity were the primary factors cited for choosing a particular method for storing video files from body worn cameras. Among the more than 40 departments that PERF consulted, all stored body worn camera video on an in-house server (managed internally) or an online cloud database (managed by a third-party vendor).

No matter what method is chosen to store the data, it should explicitly prohibit data tampering, editing, and copying (Newcombe, 2015). The data storage system should also include protections against tampering with the data prior to downloading. This alleviates concerns that officers will be able to alter or delete recordings prior to downloading. The storage system should also have a record of who accesses video data, when, and for what purpose. Some storage systems include a built-in audit trail, thus helping to preserve the chain of custody. The data storage system should also have a reliable backup system that preserves recorded data.

The data retention policy of the agency will likely drive the storage capacity requirements. Data retention policies are also important to consider because the longer that recorded videos are retained, the longer the period of time during which they are subject to public disclosure (e.g., Freedom of Information Act requests). These policies vary from department to department, may be based upon their legal jurisdiction, and usually differ based on whether the video is considered evidentiary or non-evidentiary (Miller, 2014). Except for evidentiary use, there is often a deletion date because storage of large amounts of video data may incur significant costs.

In terms of camera's onboard storage, the camera should be able to capture a minimum of three hours of recording, keeping in mind that recording time is dependent on the video resolution settings (ManTech, 2012). In terms of cloud storage, consideration should be given to integrity

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preservation, anti-tampering features, and policies concerning changes in the cloud computing service vendor such as a change in contract or vendor bankruptcy. Because cloud storage is usually third party, consideration should be given as to whether this complies with the local rules of evidence for admissibility in court.

3.3.8 Low-light Recording

Low-light recording capability refers to the camera's ability to provide a sharp, clear image with minimal distortion so the user can identify people and/or objects in low-light conditions. The SAVER focus group noted that options such as a low lux, infrared light, and black-and-white modes might improve the ability of the camera to record in low-light conditions. The quality of video footage recorded in low light or night conditions should be examined to make certain it is useable by law enforcement. Visible flash and infrared illumination can increase the quality of video taken at night but will affect battery life. Low-light filtering, infrared, near infrared, and other lowlight compensation technologies or mechanical filters can increase the quality of video taken in low light and severe weather conditions, but may also affect scene and motion detail (NIJ, 2013).

3.3.9 Pre-event Recording

Pre-event recording is a feature that allows the BWC to capture footage for a pre-determined amount of time before an event. A BWC that has this capability will continuously record video images into the temporary storage device (such as a cache memory). In response to a triggering event (i.e., when the police officer presses record), this feature will record the temporarily stored video images into a long-term storage for later retrieval. So when a police officer presses the button to record, this feature will include footage for a pre-determined amount of time prior to him or her actually pressing the record button. The amount of buffered time varies from BWC to BWC, ranging from 15 seconds to 2 minutes. For example, if a police officer approaches a scene where two individuals are fighting and presses the record button, this pre-event recording feature will allow the police officer to include prior recorded footage that may allow him to determine which individual instigated the fight.

3.3.10 Software Redaction

Responding to Freedom of Information Act (FOIA) and other requests for obtaining BWC video by non-law enforcement entities takes time and money because someone must review the video for sensitive information, such as unintentional viewing through windows into private residences, as well as faces and audio of minors, informants, bystanders, undercover officers, witnesses, and patients. This information then needs to be redacted to protect privacy. It may take as long as 5 to 10 hours for a technician to edit one hour of video (PR Newswire, 2015). With the increased use of BWC and the large video files that are produced, redaction effort and cost is becoming more important. To meet this need, vendors are beginning to introduce software that makes this process automated or semi-automated.

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4. METHODOLOGY

4.1 Background Research

To develop the accompanying NIJ BWC Market Survey document, it was necessary to obtain a thorough understanding of BWC technology including its purpose, currently deployed concepts of operation, technical capabilities, features that were important to users, and previous research. To accomplish this, a three-pronged approach was taken: 1) conducted an extensive literature review; 2) gathered information from subject matter experts at BWC conferences; and 3) conducted a legal review. These efforts were intended to ensure the market survey was well balanced and delivered information that is pertinent to prospective BWC purchasers.

4.1.1 Literature Review

Many open-source materials, such as academic and professional journal articles, previous evaluations, a small sample of agency RFIs, vendor web sites, news articles, and NIJ-funded research were reviewed and contributed to an enhanced understanding of the BWC technology. For agencies interested in purchasing or leasing BWCs, the following resources provide useful background material.[1]

- *Police Officer Body-Worn Cameras* (White, 2014). This publication is intended to be a general guide for those agencies seeking to understand the costs and benefits to the law enforcement community to use body worn camera technology.
- *Implementing a Body-Worn Camera Program* (Miller, 2014). This document includes extensive research and analysis by PERF and is intended to serve as a guide to the thoughtful, careful considerations that police departments should undertake when adopting body worn cameras.
- *A Handbook for Public Safety Officials: Developing the Policy, Technology and Operational Strategies Needed for a Future-Proof Body Camera Program* (Insight, 2015). This guide highlights key planning questions as well as insights from agencies initiating their own programs. It also includes checklists and resources to help further an agency's exploration in each planning area.

4.1.2 Information Gathering from BWC-Related Symposiums

To gain a basic understanding of current need and uses of BWCs in law enforcement, the project team attended BWC-related conferences to gain insight from end-users.

Center for Evidence-Based Crime Policy (CEBCP) Symposium, George Mason University, August 2015

Key observations included:

[1] This list represents a sample of the existing material and should not be considered complete. For in-depth information about individual products, the vendor should be engaged.

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- Results from pilot evaluations of body worn cameras found a rise in acceptance; advantages outweigh the disadvantages.
- Design features critical to the law enforcement community include durability (despite a heavier weight), resilience of the docking station, strong mounting clip (for fear of BWCs falling off), and video retrieval.
- Primary concerns with BWCs include citizen's privacy, officer's privacy, training/policy requirements, and logistical/resource requirements (e.g., data storage and retrieval).
- Additional critical insight from end users of the law enforcement community.

The Law and Policy of Cybersecurity Symposium, University of Maryland, February 2016

Key observations included:

- Civil liberties
  - 1st Amendment – freedom of expression becomes particularly important when talking about controversial topics. One way to protect people's political conduct and religious activity is to protect their ability to speak anonymously.
    - Do recorded audio and video BWC footage undermine the freedom of expression of those who want to speak anonymously? There are no case studies yet, but it is a definite possibility. If recording of audio and video BWC footage reveal too much about the individual, then that may also reveal their Internet identity (e.g., medical websites info, sexual preference, etc.)
    - There are no easy answers; courts are still grappling with these issues.
- Encryption
  - Encryption is one of the best protections against harm from hacking and cyber attacks, particularly when applied to storing video footage for BWCs.
  - Many federal agencies recommend the use of encryption: NIST, FTC, FCC, etc.

4.1.3 Legal Review

Lastly, to identify relevant statutes and case law that might impact the implementation of a BWC, basic legal research was conducted. Authors conducted legal case search and law review scholarly journal search by topic on Lexis-Nexis using the following search terms: body worn cameras, body cameras, BWC, Fourth Amendment, Freedom of Information Act, FOIA, and privacy. Results of this work can be found in Section 7.

4.2 Request for Information

Based upon the information gathered via the process described above, an RFI was developed. The purpose of the RFI was to seek input on 66 items from BWC vendors with the types of information clustered into five broad categories:

1. Vendor Information
2. Product Information – BWC
3. Product Information – Software for Video Data Storage and Management

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4. Usability/Training
5. Installation

The RFI was both sent to known BWC vendors and posted as a Notice of Request for Information in the Federal Register that was published on 28 April 2016 and expired on 31 May 2016 (see Appendix B for the full text). In addition, attempts were made to contact each company identified in previous market surveys.

The vendor responses were received and compiled. A summary outcome of the survey is presented in Section 5. The data are presented in a general cross-comparison table that provides an overview of BWCs and BWC-related software across the vendor responses. For more data presented on a vendor-by-vendor basis, please refer to the accompanying NIJ BWC Market Survey document.

In all, 31 vendors for BWC and BWC-related software responded to the RFI. In some cases, vendors expressed concern that the compilation of data in one location could provide competitors with access to their proprietary information. Another vendor noted that their technology was in prototype development and therefore they were not ready to participate in the market survey. One vendor responded that their product was no longer in production or for sale, so this information was not used in the survey. Finally, price was found to be a sensitive item to the vendor due to competition, so the reported price is meant to be relative and could vary.

Ten vendors were found through a web search to supplement the RFI. Attempts were made to contact them based upon the information in their websites. When there was no response from the vendor, we used information available from their websites. From those vendor websites with current information about BWCs, data were collected and included in the survey. Data collected via this web research rather than through vendor response to the RFI are noted.

Data were collected for 66 BWC products manufactured by 38 vendors. Additional data were provided for 4 data management/storage products manufactured by 4 vendors. See Table 1 below.

Table 1. Summary of Number of Vendor Responses

BWC Cameras	66
Total Vendors	38
- Responded to RFI	28
- Information via Internet Search	10
BWC Stand-alone Software	4
Total Vendors	4
- Responded to RFI	3
- Information via Internet Search	1

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5. MARKET SURVEY DATA COMPILATION

This section will provide a snapshot of the BWC industry and the respective capabilities this technology possesses at the time of data collection. The purpose is to assist public safety and criminal justice practitioners who may be considering the acquisition, integration, and implementation of this type of technology in their community. Therefore, cross-industry information as well as vendor-by-vendor information is presented.

Readers looking to get a sense of the capabilities and features across the BWC industry can refer to Subsection 5.1 below. Data such as the physical characteristics are aggregated and presented. In addition, the total number of vendor-offerings with specific desirable features will be presented. Readers who are looking for information about a specific vendor's offering should refer to the accompanying NIJ BWC Market Survey document.

Note that the amount of information varies based upon survey response – some vendors did not respond to the RFI or did so with incomplete information. Some vendors did not address each survey question or sent general information from which we had to extract answers to the survey. For those vendors that did not respond to our attempts at direct contact or the RFI, we used the information we found on their websites. The data collected from online marketing materials are significantly sparser than that collected as a result of the RFI. Therefore some of the information in Tables 2 and 3 may be the result of incomplete or out of date information.

No judgments should be made on the quality of a vendor's product based on this information. Anyone interested in one of these products should contact the vendor directly. The purpose of this document is not to provide an evaluation of these products, but simply to give the law enforcement and public safety community a broad overview of the technology that is currently available on the market. By examining the data, a prospective purchaser may compare features across the industry and seek out the vendors who provide the features of most interest.

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5.1 BWC Cross Comparison

Table 2 in the next section lists all 66 of the BWC products from the 38 vendors identified in this survey. Vendors who provided a response to the RFI are marked with an asterisk by the vendor name. Of these 38 vendors, 28 replied to the RFI, while information from the remaining 10 vendors was derived from their websites. In addition to these 38 vendors, there were four vendors that only made BWC video management software systems and not cameras (See Table 3). Of these four vendors, three had replied to the RFI, while the information from the fourth was derived from their website.

Tables 2 and 3 are intended to provide a single overview of the BWC marketplace. These tables should not be considered comprehensive but are believed to be representative of the marketplace. Please keep in mind that this is a survey and not an evaluation of vendor products; there is no intent to evaluate or judge the quality of the BWC products. The reader is encouraged to contact the vendors for the most complete and up-to-date information.

Based on the DHS SAVER recommendations (ManTech, 2012) and critical insight obtained from end users of the law enforcement community, the following subset of information is listed as columns of Tables 2 and 3:

- **Vendor name**
- **Product name and model**
- **Manufacturer's suggested retail price (MSRP)**
- **Product dimensions** – height (inches) x weight (inches) x depth (inches)
- **Product weight** – weight of the camera including batteries (ounces)
- **Camera mount options** – locations available for mounting the BWC
- **LCD display** – whether there is an LCD display on the BWC to view footage
- **Recording capacity** – amount of data storage available on the BWC
- **Video resolution** – amount of detail the BWC can capture (pixels)
- **Field of view (FOV)** – surrounding area that the BWC can monitor (degrees)
- **Lux rating** – measurement of the amount of light falling on an area weighted for human eye sensitivity
- **Night mode** – capability of the BWC to record footage in low light conditions
- **Recording speed** – number of frames or images the camera takes per second (fps)
- **Capture photos** – capability of the BWC to take still photos
- **Date/time stamp** – capability of the BWC to provide a date/time stamp on the footage
- **Pre-event recording** – capability of the BWC to capture footage for a pre-determined amount of time before an event
- **Event marking** – capability of the BWC to bookmark the footage for easier retrieval later
- **Microphone** – capability of the BWC to record audio
- **Battery life at standby** – length of time the BWC is fully charged, turned on, and ready for operation
- **Battery life recording** – length of time the BWC can run without needing to recharge the battery

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- **Global positioning system (GPS) data** – whether the BWC has GPS coordinate feature
- **Warranty –** written guarantee for the BWC (months)
- **Data management** – data management features of the back end software that may include searching, categorizing, and tagging capabilities
- **Data export** – capability of the back end software to export data
- **Data redact/edit** – capability of the back end software to redact or edit the audio/video footage
- **Chain of custody support** – capability of the back end software to chronologically document the trail of the recorded audio/video footage, including custody, control, transfer, analysis, and disposition of the electronic evidence
- **Report generation capability** – capability of the back end software to generate any type of report (daily, historical, etc.)

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Table 2. Cross-Industry Comparison of BWCs

#	Vendor	Product Name & Model	MSRP	Dimensions (H" x W" x D")	Weight (oz)	Mounting Options	LCD Display	Recording Capacity (GB)	Video Resolution (P)	FOV (degrees)	Lux Rating (lux)	Night Mode	Recording Speed (fps)	Photo Capture	Date/Time Stamp	Pre-Event Recording	Event Marking	Microphone	Battery Standby (hours)	Battery Life While Recording (hours)	GPS	Warranty (months)	Data Management	Export	Redacting / Editing	Chain of Custody Support	Report
1	Aventura*	GPC-RA	$2,000	3.5 x 2.4 x 1.2	5.9	Chest, head, helmet	Y	16-128	2592x 1944	120	0.1	Y	30	Y	Y	Y	Y	Y	200	12	Y	24	Search, categorize, and tag	Y	Y	Y	Y
2	Black Mamba*	BMPpro Elite	--	3.3 x 2.4 x 1.2	4.8	Chest, lapel, belt, helmet, vest, life jacket, GoPro mounts	Y	32-64	1296	140	0.0	Y	30	Y	Y	Y	Y	Y	120+	6	Y	12	Search, categorize, and tag	Y	Y	Y	Y
3	BrickHouse Security	HD Waterproof	$349	2.8 x 2.3 x 1.2	3.5	Shoulder	Y	32	1080	170	–	–	–	Y	–	–	–	Y	–	–	–	–	–	–	–	–	–
4	BrickHouse Security	Ultra Compact HD WiFi	$199	--	1.7	--	Y	–	1080	113	--	–	--	Y	–	–	--	Y	–	2.5	–	--	–	–	--	–	--
5	BrickHouse Security	HD WiFi Police Button	$499	1.2 x 1.7 x 1.7	4.0	Head	Y	64	–	173	–	–	–	–	–	–	–	Y	–	–	–	–	–	–	–	–	–
6	Brimtek*	EdveVis VB320W	$870	3.4 x 2.5 x 1.0	3.5	Chest, head, helmet, glasses	N	16	720	150	1.0	Y	30	Y	Y	Y	Y	Y	48	8	N	12	Search, categorize, and tag	Y	Y	Y	Y
7	Brimtek*	EdveVis VB340W	$950	3.4 x 2.5 x 1.2	5.0	Chest, head, helmet, glasses	N	32	720	150	1.0	Y	30	Y	Y	Y	Y	Y	96	14	N	12	Search, categorize, and tag	Y	Y	Y	Y

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8	COBAN*	COBAN Body Camera	$499	3.4 x 2.7 x 1.0	4.5	Chest	N	32	1080	160	0.0	Y	30	Y	Y	Y	Y	Y	240	13	Y	12	Search, categorize, and tag	Y	Y	Y	Y
9	Data911	Verus BX1	–	–	–	–	–	–	1080	124	–	–	30	–	–	–	–	–	216	10-12	Y	–	Search, categorize, and tag	Y	–	–	–
10	DEI*	Getac Veretos	$399	3.3 x 2.2 x 1.1	4.8	Chest, epaulet	N	32	1080	115	0.1	Y	30	Y	Y	Y	Y	Y	16	8	Y	12	Search, categorize, and tag	Y	Y	Y	Y
11	Digital Ally*	FirstVu HD	$499-$795	4.0 x 2.6 x 0.6	3.1	Head, chest, shoulder, glasses, helmet, belt	N	32	720	130	0.1	Y	30	N	Y	Y	Y	Y	12	4.5	N	12	Search, categorize, and tag	Y	Y	Y	Y
12	Digital Ally*	FirstVu HD One	$499-$795	2.6 x 4.2 x 0.8	3.9	Chest	N	32	720	133	0.1	N	30	N	Y	Y	Y	Y	12	4.5	N	12	Search, categorize, and tag	Y	Y	Y	Y
13	FlyWIRE	Body Worn Security Camera Kit	$300	–	–	Chest, hat, windshield, K9, etc	N	micro SDHC memory card	1080	145	–	–	30	Y	–	–	–	Y	–	4	–	12	–	–	–	–	–
14	FlyWIRE	Glasses Worn Security Cam Kit	$300	--	–	Hat, windshield, K9, etc	N	micro SDHC memory card	1080	145	--	–	30	Y	–	–	--	Y	–	4	–	12	–	–	--	–	--

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15	Global Justice*	Eagle NextGen	$350	3.2 x 2.2 x 1.0	5.2	Chest, lapel, shoulder, in-car dash	Y	16-64	1080	142	< 0.1	Y	60	Y	Y	Y	Y	Y	36	14	Y	36	Search, categorize, and tag	Y	Y	Y	Y
16	GoPro*	Hero4 Silver	$400	1.6 x 2.3 x 1.2	5.2	Chest, head, helmet, belt, in-car dash, bicycle, motorcycle	Y	64	2160	150	--	Y	120	Y	Y	N	Y	Y	–	2	N	24	Search, categorize, and tag	Y	Y	Y	Y
17	GoPro*	Hero4 Session	$400	1.5 x 1.5 x 1.4	2.6	Chest,head, helmet, belt, in-car dash, bicycle, motorcycle	N	64	1440	170	–	Y	120	Y	Y	N	Y	Y	–	2.5	N	24	Search, categorize, and tag	Y	Y	Y	Y
18	HauteSpot*	HauteVIEW 100	$409-$499	3.7 x 2.4 x 1.3	5.6	Uniform, helmet, window, bicycle, belt	Y	32-64	1296	140	0.0	Y	30	Y	Y	Y	Y	Y	12	10	Y	12	Search, categorize, and tag	Y	Y	Y	Y
19	HauteSpot*	HauteVIEW 200	$999	4.0 x 2.4 x 1.1	6.8	Belt, lapel, pocket	N	64-512	1080	135	0.0	Y	30	Y	Y	Y	Y	Y	6-8	6-8	Y	12	Search, categorize, and tag	Y	Y	Y	Y
20	HD Protech	CITE M1G2	--	4.1 x 2.4 x 1.1	6.4	Shoulder, belt	Y	32	1080	130	< 0.1	Y	30	Y	–	–	--	Y	24	4	Y	--	Search, categorize, and tag	Y	--	Y	Y
21	Kustom Signals*	Eyewitness Vantage	$858	3.3 x 2.3 x 1.0	3.7	Uniform	N	32-64	1080	120	1.0	Y	60	N	Y	Y	Y	Y	48	4.5	Y	12	Search, categorize, and tag	Y	Y	Y	Y

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22	L-3 Mobile-Vision*	BodyVision XV	--	3.2 x 2.0 x 1.2	5.0	Uniform	N	32	720	130	--	N	30	Y	Y	Y	Y	Y	90	10	N	12	Search, categorize, and tag	Y	Y	Y	Y
23	Law Systems*	Witness BWC	$299	3.0 x 2.2 x 0.9	8.0	Chest, shoulder	N	64	1296	140	N	Y	60	Y	Y	Y	Y	Y	18	10	Y	12	Search, categorize, and tag	Y	Y	Y	Y
24	Marantz Professional*	PMD-901V	$499	2.4 x 1.2 x 3.7	6.4	Chest, shoulder, belt	Y	32-64	1296	140	1.0	Y	60	Y	Y	Y	Y	Y	15	10	Y	12	–	–	--	–	--
25	Martel	Frontline Cam	–	3.5 x 2.1 x 1.0	3.0	–	Y	–	1296	175	–	Y	30	Y	Y	Y	–	Y	–	12	Y	12	–	–	–	–	–
26	Martel	Vid-Shield	--	2.0 x 3.8 x 0.9	2.0	--	Y	SD memory card	1080	120	--	Y	60	Y	–	–	--	--	–	–	–	--	–	–	--	–	--
27	Motorola*	Si300	$1,000	4.7 x 2.4 x 1.0	7.8	Chest, shoulder, epaulet, carry holder	N	32	1080	164	0.5	Y	30	Y	Y	Y	Y	Y	10	10+	Y	36	Search, categorize	Y	Y	Y	Y
28	Motorola*	Si500	$1,200	4.7 x 2.4 x 1.1	7.8	Chest, shoulder, epaulet, carry holder	Y	32	1080	164	0.5	Y	30	Y	Y	Y	Y	Y	10	10+	Y	36	Search, categorize, and tag	Y	Y	Y	Y

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29	Panasonic*	Arbitrator	$1,150	3.3 x 2.4 x 0.8	4.6	Shirt sleeve, collar, pocket, belt, epaulet, helmet	N	32	720	130	0.9	Y	30	Y	Y	Y	Y	Y	12	8	Y	12	Search, categorize, and tag	Y	Y	Y	Y
30	Patrol Eyes*	SC-DV1	$300	3.7 x 2.4 x 2.8	6.5	Suction cup, epaulet, tripod adaptor	Y	32	1080	170	--	Y	60	Y	Y	Y	Y	Y	12	8	Y	12	Search, categorize, and tag	–	--	–	--
31	Patrol Eyes*	SC-DV5	$325	3.3 x 2.4 x 1.2	5.8	Chest, epaulet	Y	16-32	1080	140	–	Y	30	Y	Y	Y	N	Y	6	6	Y	12	Search, categorize, and tag	–	–	–	–
32	Patrol Eyes*	SC-DV6	$450	3.3 x 2.3 x 1.3	5.5	--	Y	32-64	1080	140	--	Y	30	Y	Y	Y	Y	Y	10	6	Y	12	Search, categorize, and tag	–	--	–	--
33	Patrol Eyes	SC-DV7	$399	3.0 x 2.2 x 1.1	4.5	–	Y	64	1080	170	–	Y	60	Y	Y	Y	Y	Y	12	6	–	12	–	–	–	–	–
34	Paul Conway	OnCall Camera	$400	--	–	Vest, coat, or shirt	–	64	1080	150	--	Y	60	Y	Y	Y	--	Y	–	8	Y	12	–	–	--	–	--
35	Pinnacle*	PR5 BWV	–	3.6 x 2.3 x 1.2	4.3	Chest, shoulder, belt	N	16	720	120	0.4	Y	30	N	Y	N	N	Y	12	5+	N	12	Search, categorize, and tag	Y	Y	Y	Y

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36	Pinnacle*	PR6 BWV	--	3.9 x 2.3 x 0.9	5.2	Chest, shoulder, belt	N	32	1080	130	0.3	Y	30	N	Y	Y	Y	Y	180	6.5	N	12	Search, categorize, and tag	Y	Y	Y	Y
37	PRG	PRG 10 Defender Body Worn Camera	–	1.3 x 1.1 x 2.0	1.7	Chest, shoulder, vehicle, bicycle	Y	32	1080	100	–	–	30	Y	–	N	–	Y	200	14	N	24	–	–	–	–	–
38	PRG	PRG 51 Defender Body Worn Camera	--	2.3 x 1.7 x 1.4	4.6	--	Y	32	1080	45	--	N	30	Y	Y	N	--	Y	300	11	N	24	–	–	--	–	--
39	PRG	PRG 60B Defender Body Worn Camera	–	3.2 x 2.3 x 1.3	6.0	–	Y	32	1080	130	–	Y	30	Y	Y	Y	–	Y	300	15	N	24	–	–	–	–	–
40	PRG	PRG 77LE Defender Body Worn Camera	--	2.8 x 2.3 x 1.2	3.8	Chest, shoulder, vehicle	Y	32	1080	135	--	Y	30	Y	Y	–	--	Y	100	15	N	24	–	–	--	–	--
41	Primal USA*	DutyEGS	$199	–	1.3	Face	N	64	720	140	1.0	Y	60	Y	Y	N	N	Y	24	4	N	12	Search, categorize, and tag	Y	Y	Y	Y
42	Primal USA*	DutyVUE Prime OBSERVER I	$399	3.8 x 2.3 x 1.3	5.0	Chest, epaulet, collar, holster	Y	16-128	1080	130	1.0	Y	60	Y	Y	Y	Y	Y	240	5	Y	12	Search, categorize, and tag	Y	Y	Y	Y

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43	Primal USA*	DutyVUE Prime OBSERVER II	$499	3.8 x 2.3 x 1.3	6.0	Chest, epaulet, collar, holster	Y	16-128	1080	140	1.0	Y	60	Y	Y	Y	Y	Y	240	8-12	Y	12	Search, categorize, and tag	Y	Y	Y	Y
44	Primal USA*	DutyVUE Prime OBSERVER 2020	$199	3.8 x 2.3 x 1.3	4.0	Chest, epaulet, collar, holster	Y	64	1080	170	1.0	Y	60	Y	Y	Y	Y	Y	240	5	Y	12	Search, categorize, and tag	Y	Y	Y	Y
45	PRO-VISION*	BodyCam	$349	3.1 x 2.0 x 1.0	5.6	Chest, shoulder, belt, helmet, vehicle dash, bicycle,	Y	32	1296	150	0.0	Y	60	Y	Y	Y	Y	Y	–	13	–	12	Search, categorize, and tag	Y	Y	Y	Y
46	Reveal Media*	RS2-X2L	--	3.9 x 2.2 x 1.0	5.2	Uniform, shoulder, epaulet, helmet, car	Y	8-32	1080	120	0.1	Y	30	N	Y	Y	Y	Y	168	8.5	–	12	Search, categorize, and tag	Y	Y	Y	Y
47	Safety Innovations	VidCam VX	–	–	–	–	–	8-64	–	92	–	Y	–	–	–	Y	–	–	–	14	–	–	Search, tag	Y	–	Y	Y
48	Safety Innovations	VidMic VX	--	--	–	Uniform, belt	–	8-64	–	92	--	Y	--	--	–	Y	--	--	–	14	–	--	Search, tag	Y	--	Y	Y
49	Safety Vision*	Prima Facie	$579	3.7 x 2.3 x 1.7	5.3	Multiple mounting options available	Y	32	1080	120	0.0	Y	30	Y	Y	Y	N	Y	8	5	N	12	Search, categorize, and tag	Y	Y	Y	N

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50	TASER*	Axon Body 2	$399	3.4 x 2.8 x 1.0	5.0	Chest, belt, pocket	N	64	1080	142	< 0.1	Y	30	N	Y	Y	Y	Y	12+	11.3	N	12	Search, categorize, and tag	Y	Y	Y	Y
51	TASER*	Axon Flex	$599	0.8 x 0.7 x 3.2	3.8	Glasses, head, hat, collar, epaulet	N	8	480	75	< 1	Y	30	N	Y	Y	N	Y	12+	9	N	12	Search, categorize, and tag	Y	Y	Y	Y
52	Titan*	BWC-3HV2	$350	3.7 x 2.3 x 1.4	6.0	Chest, shoulder, eye level, collar	Y	16-64	1080	110	< 1	Y	60	Y	Y	Y	Y	Y	120	13-15	Y	24	Search, categorize, and tag	Y	Y	Y	Y
53	Utility*	BodyWorn	$400	5.5 x 2.9 x 0.2	5.1	Chest	Y	64	4000	130	1.0	Y	30	Y	Y	Y	Y	Y	24-48	12+	Y	12	Search, categorize, and tag	Y	Y	Y	Y
54	VieVu*	LE4	--	3.3 × 2.1 × 1.1	5.5	Chest, car	N	64	1080	95	--	N	30	Y	Y	Y	Y	Y	14	12	N	3	Search, categorize, and tag	Y	Y	Y	Y
55	VieVu*	LE4 Mini	–	1.9 x 1.9 x 1.0	2.5	Chest, car	N	64	1080	95	–	N	30	Y	Y	Y	Y	Y	3	3	N	3	Search, categorize, and tag	Y	Y	Y	Y
56	VP360*	Argus Gen 1 Digital BWC	$235	3.5 x 2.3 x 0.9	6.2	Chest, ear, button hole, shoulder tab	Y	16-64	1296	140	< 0.1	Y	30	Y	Y	Y	Y	Y	10	8	Y	24	Search, categorize, and tag	Y	Y	Y	Y

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#	Vendor	Product Name & Model	MSRP	Dimensions (H" x W" x D")	Weight (oz)	Mounting Options	LCD Display	Recording Capacity (GB)	Video Resolution (P)	FOV (degrees)	Lux Rating (lux)	Night Mode	Recording Speed (fps)	Photo Capture	Date/Time Stamp	Pre-Event Recording	Event Marking	Microphone	Battery Standby (hours)	Battery Life While Recording (hours)	GPS	Warranty (months)	Data Management	Export	Redacting / Editing	Chain of Custody Support	Report
57	VP360*	Argus Gen 2 Digital BWC	$295	3.5 x 2.3 x 1.2	5.9	Chest, ear, button hole, shoulder tab	Y	16-128	1080	170	< 0.1	Y	60	Y	Y	Y	Y	Y	18	8	Y	24	Search, categorize, and tag	Y	Y	Y	Y
58	WatchGuard*	Vista Extended Capacity	$1,120	3.1 x 1.9 x 1.1	5.3	Chest, head	N	32	720	130	0.9	Y	30	N	Y	Y	Y	Y	19	9	N	12	Search, categorize, and tag	Y	N	Y	Y
59	WatchGuard*	Vista Standard Capacity	$995	3.1 x 1.9 x 0.9	4.3	Chest, head	N	32	720	130	0.9	Y	30	N	Y	Y	Y	Y	12.5	6	N	12	Search, categorize, and tag	Y	N	Y	Y
60	WatchGuard*	Vista WiFi	$1,250	3.1 x 1.9 x 1.1	5.3	Chest, head	N	32	720	130	0.9	Y	30	N	Y	Y	Y	Y	19	9	Y	12	Search, categorize, and tag	Y	N	Y	Y
61	WOLFCOM*	3rd Eye	$475	3.8 x 2.4 x 1.3	5.5	Chest, belt	Y	32	1080	120	1.0	Y	60	Y	Y	N	Y	Y	–	6.5	Y	12	Search, categorize, and tag	Y	Y	Y	Y
62	WOLFCOM*	Vision	$350	2.9 x 1.5 x 0.6	2.2	Chest, shoulder, head, glasses, helmet, hat, gun, belt	N	32-64	1080	120	1.0	Y	60	Y	Y	Y	N	Y	120+	2.5	Y	12	Search, categorize, and tag	Y	Y	Y	Y
63	Zepcam	TI	–	2.4 x 1.3 x 3.8	6.2	Helmet, flat surfaces, shoulder	Y	32	576	–	0.1	Y	25	–	Y	–	–	Y	20	–	Y	–	Tag	–	–	–	–

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64	Zepcam	TI XT	--	--	–	Helmet, shoulder, flat surface, straps, clothing	Y	32	576	–	0.1	–	30	--	Y	–	--	Y	–	6	Y	--	Tag	–	--	–	--
65	Zepcam	TI LIVE	–	–	–	Helmet, shoulder, flat surface, straps, clothing	Y	8-32	576	–	0.1	–	25	–	Y	–	–	Y	20	6	Y	–	Tag	–	–	–	–
66	Zetronix	HD Blue Line	$400	2.4 x 1.3 x 3.8	6.2	Pocket, belt, lapel collar, placket, uniform	Y	32	1080	130	--	Y	60	Y	Y	Y	--	Y	120	9	–	12	Tag	–	--	–	--

Legend	
Y	Yes
N	No
--	No Info
*	Responded to RFI

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Table 3. Cross-Industry Comparison of BWC Data Management/Storage Standalone Systems

#	Vendor	Product Name & Model	MSRP	Dimensions (H" x W" x D")	Weight (oz)	Mounting Options	LCD Display	Recording Capacity (GB)	Video Resolution (P)	FOV (degrees)	Lux Rating (lux)	Night Mode	Recording Speed (fps)	Photo Capture	Date/Time Stamp	Pre-Event Recording	Event Marking	Microphone	Battery Standby (hours)	Battery Life While Recording (hours)	GPS	Warranty (months)	Data Management	Export	Redacting / Editing	Chain of Custody Support	Report
1	IBM*	Intelligent Video Analytics Data Management	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Search, Categorize, and Tag	Y	Y	Y	Y
2	MotionDSP	Ikena Spotlight Video Redaction Software	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Y	Y	--	--
3	Quantum*	Quantum BWC Storage	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No; this is a function of the VMS	No; this is a function of the VMS	No; this is a function of the VMS	No; this is a function of the VMS	No; this is a function of the VMS
4	Visual Labs*	Body Camera Solution	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Search, Categorize, and Tag	Y	Y	Y	Y

Legend	
Y	Yes
N	No
--	No Info
*	Responded to RFI

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5.2 Discussion on the Market Survey Data

For many categories of information, little data were available. Several questions from the RFI have not been included due to a lack of vendor response. The reader is urged to see data from individual vendors for specifics about their products in the accompanying NIJ BWC Market Survey document.

Some vendors did not provide all of the above information for their products. When it was provided, the following ranges were observed. BWC weights ranged from 0.53 to 6.5 oz. The recording capacity ranged from 8 to 64 GB. The video resolution ranged from 576 pixels to 5 MP. The diagonal FOV ranged from 45 to 175 degrees. The lux rating ranged from 0 to 1. The frame rate ranged from 25 to 60 fps. Standby battery lifetimes ranged from 8 hours to 216 hours, while recording battery lifetimes ranged from 2.5 to 23 hours. Most vendors did not provide price information but, among those that did, the costs for one camera ranged from $199 to $2000.

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6. CONSIDERATIONS FOR INTEGRATING BWC INTO CURRENT SYSTEMS

6.1 Planning

The Bureau of Justice Assistance (BJA) of the US Department of Justice (DOJ) developed the Body Worn Camera Toolkit (BJA, 2015) to provide law enforcement, criminal justice professionals, advocacy organizations, and community members with a consolidated online resource to implement body worn camera programs. This toolkit was created by a panel of subject matter experts consisting of law enforcement leaders, recognized criminal justice practitioners, national policy leaders, and community advocates.

This is an excellent resource to begin learning the fundamentals about body worn cameras and related considerations, including checklists, key links, and available templates.

6.2 Cost Considerations

When implementing BWC systems, budget considerations need to be made for purchasing the cameras, data storage, and redaction. Naturally, the required number of cameras will depend on the size of the city, town, or municipality in question. Procurement officers need a substantial amount of money up front to purchase the equipment and provide training to the officers.

However, the most substantial cost of employing body worn cameras lies in the fee for storing video data on secure servers (Lowry, 2015). As such, data management/storage fees are an important feature to take into consideration when purchasing the body worn camera. Alternatively, police departments can implement policies to reduce the amount of recorded footage or footage retention time. However, these policies may be limited by local legal data retention requirements. Finally, redacting footage is another costly and time-consuming element.

General cost considerations are described in the table below:

Table 4. Cost Considerations

Cost Consideration	Description
Acquisition	Initial purchase of the BWCs
Installation	Cost to install the software, hardware, and server (if needed)
User Training	Cost to provide training and periodic refresher trainings
Maintenance	Data storage of audio/video footage on local server or via cloud
Consumables/Accessories	Cost for batteries and/or additional accessories needed for mounting
Energy and Energy Dependence	Cost for additional energy expenditure due to BWC use
Software Licenses	Cost to obtain and renew the software license
Operations and Labor	Daily cost for operations and labor of using the BWC, including redaction in response to FOIA requests

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6.3 Data Users

Access to the BWC data must be limited and controlled in order to maintain chain of custody requirements and to ensure privacy rights are upheld. A variety of people will, however, need access to the data during the course of an investigation, so a plan for use of the data should be created prior to implementation of a BWC pilot or program (Milwaukee PD, 2015).

Law enforcement agencies are using BWC data during the investigation and prosecution of crimes and citizen complaints; BWC data has also been used in internal audits and in training to support formal and informal officer performance evaluation. Some have suggested developing the ability to mine the footage or create searchable databases of faces or voices (Goodall, 2007).

The regulations on officer access to footage vary somewhat by jurisdiction. Typically, the officer who shot the footage is allowed to review it when writing reports or preparing for court (Patrol Operations Support, 2014). Some agencies, however, feel that viewing footage taints the officer's memory of the event. They hold that it is more important to record the officer's memory of the incident than what the camera saw and prefer to have officers to complete incident reports prior to reviewing BWC footage (BWCs, 2015).

Most agencies agree that officers should not have access to footage of an incident that was shot by other officers (BWCs, 2015). Shift officers and their supervisors may have access to footage shot during their watch (Patrol Operations Support, 2014). In addition, access may be needed for supervisory officers assigned to investigate a citizen complaint of police misconduct (Milwaukee PD, 2015). Other court and government officials who may need access to the data include prosecutors, city auditors, inspectors, and personnel with the Office of Police Complaints (Davis, 2015).

Citizens involved in filmed incidents and those filing complaints against officers may also require access to BWC data (Komi, 2015).

6.4 Data Storage/Management

Storage and access to stored data is complex. Data must be downloaded from the camera to the primary database, catalogued, stored securely, accessed by authorized individuals, and eventually discarded using standard rules (Hoffman, 2015). Issues to consider before selecting a system include (Milwaukee PD, 2015):

- Cloud vs. local storage
- How long to keep the data (considering policy and legal requirements, storage costs, etc.)
- How to access data
- How to limit data access to authorized individuals
- How to maintain the primary database and local hardware and software
- How many personnel will be needed locally to run and maintain the system and what qualifications those people should have
- Whether the system will allow for growth when needed

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Commercial BWC companies offer either cloud storage managed by the company for an ongoing fee or storage on hardware purchased and maintained locally by the law enforcement agency. Typically, these commercial BWC companies also supply the software needed to access and manipulate the BWC data. Both types of storage systems have pros and cons.

Cloud systems can store nearly limitless quantities of data (for a fee), and can expand storage as the system grows. Cloud storage also eliminates the need for in-house IT staff to run and maintain the system, and the need to regularly upgrade the hardware. Policies should be in place to cover data security contingencies, as well as what happens if the cloud company goes bankrupt or if the agency contract with the cloud company expires and is awarded to a different company.

Localized systems require the purchase of hardware and the ongoing cost of equipment upgrades. In addition, many law enforcement agencies would need IT personnel to maintain the system. A minimum of one full-time dedicated employee is needed to run and maintain an in-house BWC's hardware and software, and many law enforcement agencies have little or no IT expertise in-house. The primary advantage of a localized system is control, as the law enforcement agency manages data storage and access completely.

6.5 Data Access/Security

The information captured (both video and its metadata) is sensitive and access to it must be closely regulated. Security of the video/audio obtained by BWC is vital. Access to stored footage should be limited and tightly controlled. The system should be able to allow and disallow users as needed (BWCs, 2015). System operators should also be able to lock out specific users entirely or be able to reinstate them after some period of time. Policies regarding prohibited uses of stored camera data should be developed. Some examples may include personal or non-business purposes and uploads to social media or news without agency authorization (BWCs, 2015).

In many systems, officers can annotate footage prior to downloading it into the main repository. Officers should be provided with a standard protocol detailing when and how to annotate footage, as well as specific instructions on how to download data at the end of each shift (ManTech, 2012). Existing policies vary on whether officers should be able to review footage they have taken. Some allow or encourage them to review their footage before writing administrative reports or giving a statement. Some allow the officer to review footage they took of an incident, but not footage taken by other officers of the same incident (ManTech, 2012). On the other hand, some agencies suggest that reviewing footage of an incident sullies the officer's memory and may alter reporting of the incident. Most agencies, however, allow officers to review their own footage.

Maintenance of the chain of custody for evidence is another issue to be considered. Once BWC footage is obtained, then its likely pathway should be considered, such as who downloaded it and how, whether others can manipulate the footage after it has been uploaded, how access to the footage is monitored and recorded, and how long the footage is maintained. Some more

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expensive BWC systems have safeguards that control access and handling of the footage. If these features are not available, a comprehensive training program should be developed for everyone who has access to the system. The BWC footage should also include time and date stamp/identifiers that is imprinted in the video footage or in the underlying metadata. The addition of GPS data is also useful (Milwaukee PD, 2015).

Integrity of digital evidence must be preserved over time. Stored data may need to be refreshed periodically or moved from one physical storage medium to another (e.g., from older tape to a newer hard drive or other storage medium). This avoids physical decay of the data and obsolescence of the storage medium. Similarly, digital data may need to be migrated from one set of hardware/software to another periodically to keep the data accessible and viable. Digital emulation (i.e., where an older software system is mimicked electronically so that newer software can use it) can also be used to access data stored on outdated systems (Gingrande, 2013).

6.6 Comprehensive Training

A comprehensive training program is recommended to successfully implement a BWC system. Training should include: the mechanics of how to use the camera; how and where to place and secure the camera; how to charge the camera (in the field and office); how to replace batteries (in the field and office) if needed, how to start and stop recording; how to use annotation features if available; how, when and where to download data; and what incidents to record or not record (BWCs, 2015).

The literature suggests that the cameras should be turned on anytime the officer interacts with a citizen. The exception to that rule is when officers are meeting with an abuse victim (some jurisdictions limit this to abuse victims who are minors), or with a confidential informant. Some jurisdictions limit video capture in private homes, while others allow it if the officer enters a home in the course of their duties (BWCs, 2015). Most jurisdictions also require officers to obtain verbal consent for filming and are required to turn off the video if consent is not obtained. Ideally, refusal of consent will be filmed, and the officer will include this fact in reports of the incident (BWCs, 2015).

Officers should also be told whether the BWC footage will be used in training of other officers, and if the footage will be routinely reviewed by superiors as a part of ongoing training and review. Using BWC footage for training and particularly for monitoring officers' performance is controversial. The New York City Fraternal Order of Police has stated that the footage should not be used as a police performance monitoring device, and has brought suit against New York City to prevent implementation of the policy. Other jurisdictions have faced little pushback by officers or unions once the procedures for review are thoroughly explained and documented (ManTech, 2012).

Another important consideration for proper training is to ensure officer safety. Important feedback from end users is that officers are worried about how the footage will be interpreted. As such, officers may be more likely to use less force than necessary when apprehending a suspect,

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for example. This can be greatly detrimental to the officer's safety. Also during such situations, officers may be overly conscious of the BWC such that their primary concern is to protect the camera and make certain the necessary footage is captured. Such a distraction may lead the officer to place him or herself unintentionally at greater risk of personal injury. Therefore training provided only at the time of the initial purchase is insufficient to effect behavioral change. A more comprehensive and periodic training program is needed, particularly one that outlines what the officer should not do.

6.7 Policy Considerations

As BWC systems become more commonly used among law enforcement, the technology continues to evolve, creating additional features and complexity. Technology and policy needs to work together to meet the objective of the agency.

Interactions between this evolving technology and policy need to be considered when deciding which technological features may be desired.

For example, whether the recorded video stays with the device or is transmitted wirelessly to some other device, consideration should be given to issues such as electronic evidence chain-of-custody concerns, susceptibility to inadvertent or unauthorized data alteration or release, and privacy concerns for informants, witnesses, and suspects. Also, some camera systems have a pre-event record feature (i.e., a feature that includes a data buffer before the recorded event to show what triggered the recording), which may be initiated automatically under certain conditions (e.g., officer down) or manually by the user. Some devices may store the data with different degrees of access security (ranging from unencrypted and no password required to encrypted data with multiple user authentication steps). Once video data are acquired, a particular BWC may have a range of safeguards for protecting these data. Therefore, consideration of BWC features should be made with potential policy issues in mind. Policies vary widely among agencies and jurisdictions, so purchasers will need to consult with their agencies and users when determining which features to have or to avoid.

Law enforcement agencies need to work with the community during development of procedures and policies (Milwaukee PD, 2015). Bringing them into the process from the beginning improves the chances for community acceptance. For example, the community may want assurances that the footage would not be used to identify people attending a lawful demonstration who are not under investigation (Milwaukee PD, 2015).

Furthermore, since BWC decisions are a part of the overall video management for public safety, law enforcement agencies should consider guidance from VQiPS. The VQiPS working group provides unbiased guidance and resources to assist public safety in defining and articulating information on how surveillance is being used, what technology is available and what end users need to make it more efficient. Guidance on policy development can be found on the VQiPS website (https://www.dhs.gov/publication/vqips-policy-considerations-use-video-public-safety).

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The International Association of Chiefs of Police (IACP) released a Technology Policy Framework to guide the development and support of policies that ensure effective deployment and technology use (IACP, 2014). This framework stressed nine important points, which are summarized below (please refer to original reference for full details):

1. Specification of Use – Agencies should define the purpose, objectives, and requirements for implementing BWCs, and identify the types of data captured, stored, and generated.
2. Policies and Procedures – Agencies should have policies and procedures in writing in order to educate personnel and to enforce said policies. These policies must be reviewed and updated regularly, particularly when technology provides significant changes.
3. Privacy and Data Quality – The agency should assess privacy risks and articulate privacy protections in the aforementioned policies. This should be reviewed regularly to ensure data quality (i.e., accurate, timely, and complete information) is in compliance with local, state, federal, and constitutional laws.
4. Data Minimization and Limitation – Agencies should recognize that BWCs should be deployed to accomplish the specific objectives only for as long as it demonstrates continuing value that is in line with laws.
5. Performance Evaluation – Agencies should regularly monitor and evaluate the performance and value of BWCs to determine whether continued deployment is warranted.
6. Transparency and Notice – Agencies should openly communicate with the public regarding adoption, deployment, use, and access to BWC, the data it provides, and the policies governing its use, including privacy policies.
7. Security – Agencies should develop and implement tools and resources to ensure security of BWCs and the data it provides to safeguard against risks of loss, unauthorized access or use, destruction, modification, or unintended or inappropriate disclosure.
8. Data Retention, Access and Use – Agencies should have policies that clearly articulate data collection, retention, access, and use practices. These practices and the retained data should conform with laws and legislation.
9. Auditing and Accountability – All access to data derived and/or generated from BWCs should be subject to specific authorization and regularly audited to ensure policy compliance.

7. LEGAL IMPLICATIONS

In general, the government cannot collect information on U.S. persons without consent or legal justification. This concept of protecting individuals from government intrusion into personal matters is commonly understood as the right to privacy. The notion of privacy can encompass many things (e.g., freedom from surveillance, protection from searches, and control over personal information). However, any government collection of this information triggers privacy compliance responsibilities.

Specifically, body worn camera surveillance implicates privacy laws and constitutional doctrines. The section below provides a general overview of privacy issues associated with BWC

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systems. It is important to note that these sections do not constitute a comprehensive discussion of privacy issues that may arise in the deployment of body worn camera systems.

7.1 Constitutional Law

The United States Constitution does not explicitly mention privacy. The right emanates from other constitutional protections, namely the Fourth Amendment's protection against unreasonable searches and seizures. The Fourth Amendment provides, in relevant part, that "[t]he right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated" except where there is a search warrant based on probable cause.[2] Accordingly, the Fourth Amendment only prohibits "unreasonable" searches and seizures. Under the Fourth Amendment, a search occurs when a government employee or agent violates an individual's reasonable expectation of privacy. This is a two-pronged test: 1) the person subject to search expects privacy in the thing searched, and 2) that expectation is reasonable.[3]

In the landmark case *Katz v. United States*, the Supreme Court held that the Fourth Amendment protects against government searches when an individual has a "reasonable expectation of privacy."[4] Numerous subsequent Supreme Court rulings recognize a constitutionally protected privacy right, particularly with regard to the protection of personal information from unwarranted government access and disclosure, and decisions individuals make about their personal conduct.[5]

As of the date this report is completed, there have not been any legal challenges raised to body worn cameras under Fourth Amendment rights. However, courts have adopted the general rule that camera recordings do not implicate the Fourth Amendment. In United States v. Mancari,[6] the court ruled "visual images of a scene by means of photography do not amount to a seizure because it does not 'meaningfully interfere' with any possessory interest." Likewise, it has been found that officers who take photographs of items "that were visible [in plain view] during the scope of the initial welfare search" were legally seized.[7] Furthermore, the U.S. Supreme Court has ruled that law enforcement officers may generally record footage that they can lawfully see and hear without violating the Fourth Amendment.[8]

Generally, video surveillance cameras are authorized in the United States as long as they do not intrude upon a person's Fourth Amendment right to privacy. Because the United States Supreme

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[2] U.S. Const. Amend. IV.
[3] *Katz v. U.S.*, 389 U.S. 347. (1967).
[4] *See Katz v. United States*, 389 U.S. 347 (1967) (holding that the government wiretap of phone booth to capture the conversation of petitioner Katz constituted an unreasonable search).
[5] *See United States v. Jones*, 565 U.S. (2012); *Whalen v. Roe*, 429 U.S. 529 (1977); *Griswold v. Connecticut*, 389 U.S. 479 (1965).
[6] 463 F.3d 590 (7th Cir. 2006).
[7] *Lord v. State*, 676 S.E.2d 404 (Ga. Ct. App. 2009).
[8] *Lopez v. United States*, 373 U.S. 427 (1963).

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Court has decided in a long line of cases that there is no expectation of privacy in a public place[9], it follows that a person in public places cannot have a reasonable expectation of privacy from video surveillance cameras. Since the ruling of the *Katz* case, almost all federal courts have held that federal law does not prohibit silent video surveillance.

7.2 Freedom of Information Act

The Freedom of Information Act (FOIA) mandates that public records (with some exceptions) must be made available to the public upon request[10]. Since 1967, the Act has defined agency records subject to disclosure, outlined mandatory disclosure procedures, and granted nine exemptions to this statute (e.g., footage that is part of an ongoing investigation, footage that threatens to reveal confidential sources or violation of privacy, or footage that could harm any individual).

Police recordings fall under the definition of public records and are subject to public request. However, these recordings may have the potential to invade privacy. In accordance with privacy measures, particularly for minors or victims of domestic abuse, there are general provisions for archiving, retrieving, and redacting footage before the recordings can be made public following a proper FOIA request. To protect the privacy of citizens, faces are blurred out and audio is removed as well. FOIA requests for these recordings can inundate law enforcement with the expensive and time-consuming task of redaction.

To circumvent this problem, the Seattle Police Department placed all their police body worn camera footage onto their own YouTube channel (SPD YouTube, 2016). This resolves the time-consuming problem of responding to individual FOIA requests and the major cost of data storage by placing all data on the YouTube server instead. However, time-consuming redaction still remains a problem because of the need to blur faces and remove audio.

The Michigan House of Representatives is considering a bill to exempt body worn camera footage from FOIA requests. This bill would exempt from FOIA requests any police audio and video recordings taken in a private place, connected to an ongoing investigation, or relating to a civil action (Hines, 2015). A similar bill proposed in Minnesota would make police body worn camera footage available to the public if a gun is fired or if the police caused substantial bodily harm; otherwise all footage would be considered private and not subject to FOIA (Linehan, 2016).

[9] *Katz v. United States*, 389 U.S. 347 (1967).
[10] Freedom of Information Act, 5 U.S.C. §552(b)(7) (2012).

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7.3 Federal Electronic Communications Privacy Act and State Wiretapping Laws

Title I of the Federal Electronic Communications Privacy Act of 1986 prohibits the intentional interception of any wire, oral, or electronic communication.[11] Oral communication is defined as "any oral communication uttered by a person exhibiting an expectation that such communication is not subject to interception under circumstances justifying such expectation."[12]

As such, video surveillance systems that record sound would violate federal law. The principal exception to this statute allows a private person to intercept an oral communication if the person is a party to that conversation or if one of the parties to the conversation has given consent.

Likewise, some state wiretapping laws require consent from one or all parties. As such, it is imperative for police officers in those states to obtain consent prior to recording (e.g., New Hampshire). Because wiretapping laws vary from state to state, it is pertinent that law enforcement agencies adopt policies that adhere to their respective state laws.

7.4 Other Privacy Concerns

Cameras generally should be turned off in dressing rooms, rest rooms, etc., unless that is the scene of the investigation or confrontation with the suspect. In addition, there are private residence and patient privacy issues described below.

7.4.1 Private Residence

Body worn cameras have the potential for raising privacy issues when police officers enter private residences or other places where individuals may have a reasonable expectation of privacy. Police officers enter private residences on a regular basis in response to calls for service, to take reports, to speak to witnesses, and to investigate crime. Courts have not yet ruled on challenges to body worn cameras and whether situations will deem a warrant necessary prior to entering a domicile with a body worn camera. Similarly, it is unknown whether evidence captured on body worn camera footage but not spotted by the police officer is admissible as "plain view" evidence. This is an evolving area of law and these issues are unclear with regard to body worn cameras.

[11] 18 U.S.C. §§ 2510-2520. The statute defines a "wire communication" as "any aural transfer made… through the use of facilities for the transmission of communications by the aid of wire, cable, of origin and the point of reception." 18. U.S.C.§ 2510(1).
[12] *Id.*

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7.4.2 Patient Privacy

Body worn cameras may also raise privacy issues when police officers enter a hospital or other medical facilities. There is a potential risk of the body worn camera capturing footage that would be considered protected by medical privilege or private medical information protected by the Health Insurance Portability and Accountability Act (HIPAA)[13]. HIPAA is a federal law enacted in 1996 to restrict access to individuals' private medical information. It is therefore crucial to have clear policies that dictate when body worn cameras may or may not capture footage to prevent inadvertent recording of medical information.

8. FUTURE CONSIDERATIONS

BWC technology, like many technologies, is improving seemingly every day. Three future trends seem likely to involve more automated analytics, including facial recognition, weapons detection, etc.

Facial recognition features allow the user to identify or verify a person from a digital image or a video frame. This back end capability can allow law enforcement to overcome the difficulties and time involved in achieving accurate identification when reviewing video footage at a later time. It also eliminates the need for agencies to hire and train personnel for this task.

Weapons detection features allow the user to identify or verify previously programmed weapons of interest from a digital image or a video frame. Similar to facial recognition, this back-end capability can allow law enforcement to overcome the difficulties and time involved in achieving accurate identification.

Automated analytics is another feature of interest; having an automated analytics feature will be a great improvement over the manual, labor-intensive task being conducted today. Currently, the medical field has technology that can automatically redact medical images to meet strict Institutional Review Board (IRB) requirements and comply with HIPAA regulations. Bluering Inc. saw the correlation between redacting medical images and redacting persons/objects of interest and is now adapting this technology to BWC applications for law enforcement use. In addition to auto-redaction, this standalone application has tag, search, and transcribe capabilities.

Technology is improving and increasing potential – as long as this technology trend continues, BWC system technology will continue to evolve in the coming years.

[13] http://www.hhs.gov/hipaa/for-professionals/privacy/

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9. CONCLUSION

With recent publicity about interactions between police officers and citizens, popularity for employing body worn cameras are proliferating exponentially. The BWC market is growing and the number of vendors and offerings is expanding. The NIJ sponsored a survey to review currently available literature, seek input from vendors, and compile vendor responses to the RFI. From this market survey, we uncovered that there are many more vendors now that sell BWC products as compared to previous market surveys; that all the new technological BWC features prompts the strong need for clear policies; and that this is an evolving area of law and these issues are currently unclear with regard to BWCs. The market survey should be considered a snapshot of the technologies available at the time of data collection. Because the market is changing rapidly, additional information should be sought from the specific vendors of interest when considering an acquisition of BWC equipment. For more technical specifications on each BWC covered by the survey, please refer to the accompanying NIJ BWC Market Survey document.

There is no indication that these BWC systems will stop proliferating. In fact, vendors are developing and fine-tuning next-generation BWC features such as facial recognition and weapons detection.

Technology should be implemented based upon agency objectives along with careful consideration of policy and legal implications. Privacy laws and constitutional doctrines related to BWC systems are evolving and these issues are unclear until they are tested in court.

Key features of BWC technology include high camera resolution, low-light recording, pre-event recording, and software redaction capabilities. It is important to reiterate that implementing a body worn camera program is not as simple as choosing the best feature that the law enforcement agency can afford. Before making a choice, much planning should be done and many key points must be considered. Implementing a BWC program touches upon many financial obligations, policy concerns, and legal implications. The technology is only as good as the people who implement it. A law enforcement agency can purchase the best equipment available on the market but, without the proper policies and guidance on how to effectively use the BWC, it may become more of a problem than a solution. This document is intended to provide an overview of the issues, implications, and concerns that should be addressed when implementing the use of BWC.

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APPENDIX A.ACRONYMS AND ABBREVIATIONS

Acronym	Description
BJA	Bureau of Justice Assistance
BWC	Body Worn Camera
CEBCP	Center for Evidence-Based Crime Policy
DHS	Department of Homeland Security
FOIA	Freedom of Information Act
FOV	Field of View
FPS	Frames Per Second
FRN	Federal Register Notice
HIPAA	Health Insurance Portability and Accountability Act
IACP	International Association of Chiefs of Police
IRB	Institutional Review Board
JHU/APL	The Johns Hopkins University Applied Physics Laboratory
NIJ	National Institute of Justice
PERF	Police Executive Research Forum
RFI	Request for Information
SAVER	System Assessment and Validation for Emergency Responders
VQiPS	Video Quality in Public Safety

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APPENDIX B.REQUEST FOR INFORMATION

Abstract: This form is filed with ATF Form 1, 4 or 5 applications when the applicant, maker, or transferee is other than an individual or government agency. This allows ATF to conduct background checks of persons who make, acquire, or possess firearms.

5. *An estimate of the total number of respondents and the amount of time estimated for an average respondent to respond:* An estimated 115,829 respondents will take .25 hours to respond.

6. *An estimate of the total public burden (in hours) associated with the collection:* The estimated annual public burden associated with this collection is 57,914.5 hours.

If additional information is required contact: Jerri Murray, Department Clearance Officer, United States Department of Justice, Justice Management Division, Policy and Planning Staff, Two Constitution Square, 145 N Street NE., Room 3E–405B, Washington, DC 20530.

Dated: April 22, 2016.

Jerri Murray,

Department Clearance Officer for PRA, U.S. Department of Justice.

[FR Doc. 2016–09877 Filed 4–27–16; 8:45 am]

BILLING CODE 4410–FY–P

DEPARTMENT OF JUSTICE

[OMB Number 1140–0015]

Agency Information Collection Activities; Proposed eCollection eComments Requested; Application for Tax Exempt Transfer and Registration of Firearm (ATF Form 5 (5320.5)

AGENCY: Bureau of Alcohol, Tobacco, Firearms and Explosives, Department of Justice.

ACTION: 30-Day notice.

SUMMARY: The Department of Justice (DOJ), Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), will submit the following information collection request to the Office of Management and Budget (OMB) for review and approval in accordance with the Paperwork Reduction Act of 1995. The proposed information collection was previously published in the **Federal Register** 81 FR 8100, on February 17, 2016, allowing for a 60-day comment period.

DATES: Comments are encouraged and will be accepted for an additional 30 days until May 31, 2016.

FOR FURTHER INFORMATION CONTACT: If you have additional comments especially on the estimated public burden or associated response time, suggestions, or need a copy of the proposed information collection instrument with instructions or additional information, please Gary Schaible, Industry Liaison Analyst, Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), 99 New York Ave. NE., Washington, DC 20226 at email: *nfaombcomments@atf.gov.* Written comments and/or suggestions can also be directed to the Office of Management and Budget, Office of Information and Regulatory Affairs, Attention Department of Justice Desk Officer, Washington, DC 20503 or sent to *OIRA_submissions@omb.eop.gov.*

SUPPLEMENTARY INFORMATION: Written comments and suggestions from the public and affected agencies concerning the proposed collection of information are encouraged. Your comments should address one or more of the following four points:

- Evaluate whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility;
- Evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used;
- Evaluate whether and if so how the quality, utility, and clarity of the information to be collected can be enhanced; and
- Minimize the burden of the collection of information on those who are to respond, including through the use of appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology, *e.g.*, permitting electronic submission of responses.

Overview of This Information Collection

1. *Type of Information Collection:* Revision of a currently approved collection.

2. *The Title of the Form/Collection:* Application for Tax Exempt Transfer and Registration of Firearm.

3. *The agency form number, if any, and the applicable component of the Department sponsoring the collection:*

Form number: ATF Form 5 (5320.5).

Component: Bureau of Alcohol, Tobacco, Firearms and Explosives, U.S. Department of Justice.

4. *Affected public who will be asked or required to respond, as well as a brief abstract:*

Primary: State, Local, or Tribal Government.

Other (if applicable): Individuals or Households; Business or other for-Profit; and Not-for-profit institutions.

Abstract: This form is filed to obtain permission to make and transfer a National Firearms Act (NFA) firearm. Transfer without approval and possession of an unregistered NFA firearm are illegal. The approval of the application effectuates the registration of a firearm to the transferee. The transferee claims an exemption from the transfer tax by filing this application.

5. *An estimate of the total number of respondents and the amount of time estimated for an average respondent to respond:* An estimated 10,591 respondents will take .51 hours to respond.

6. *An estimate of the total public burden (in hours) associated with the collection:* The estimated annual public burden associated with this collection is 5,350 hours.

If additional information is required contact: Jerri Murray, Department Clearance Officer, United States Department of Justice, Justice Management Division, Policy and Planning Staff, Two Constitution Square, 145 N Street NE., Room 3E–405B, Washington, DC 20530.

Dated: April 22, 2016.

Jerri Murray,

Department Clearance Officer for PRA, U.S. Department of Justice.

[FR Doc. 2016–09876 Filed 4–27–16; 8:45 am]

BILLING CODE 4410–FY–P

DEPARTMENT OF JUSTICE

Office of Justice Programs

[OJP (NIJ) Docket No. 1708]

Body Worn Camera Technologies Market Survey

AGENCY: National Institute of Justice (NIJ), Justice.

ACTION: Notice of request for information.

SUMMARY: The NIJ is soliciting information in support of the upcoming National Criminal Justice Technology Research, Test, and Evaluation Center (NIJ RT&E Center) "Market Survey of Body Worn Camera (BWC) Technologies." This market survey, which will identify commercially available body worn camera systems, will be published by NIJ to assist purchasing agents or other representatives of law enforcement officials in their assessment of relevant information prior to making purchasing decisions. Comments with regard to the market survey itself, including which

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categories of information are appropriate for comparison, as well as promotional material (*e.g.*, slick sheets) and print-quality images in electronic format, are also invited.

DATES: Responses to this request will be accepted through 11:59 p.m. Eastern Standard Time on May 31, 2016.

ADDRESSES: Responses to this request may be submitted electronically in the body of, or as an attachment to, an email sent to *administrator@nijrtecenter.org* with the required subject line "Body Worn Camera Federal Register Response." Questions and responses may also be sent by mail (please allow additional time for processing) to the following address: National Criminal Justice Technology Research, Test and Evaluation Center, ATTN: Body Worn Camera Federal Register Response, Johns Hopkins University Applied Physics Laboratory, 11100 Johns Hopkins Road, Mail Stop 17–N444, Laurel, MD 20723–6099.

FOR FURTHER INFORMATION CONTACT: For more information on this request, please contact Vivian Hung (NIJ RT&E Center) by telephone at (240) 228–2286 or *administrator@nijrtecenter.org*. For more information on the NIJ RT&E Center, visit *http://nij.gov/funding/awards/Pages/award-detail.aspx?award=2013-MU-CX-K111* and view the description, or contact Jack Harne (NIJ) by telephone at 202–616–2911 or at *Jack.Harne@usdoj.gov*. Please note that these are not toll-free telephone numbers.

SUPPLEMENTARY INFORMATION:

Information Sought: Information is sought for an upcoming "Market Survey of Body Worn Camera (BWC) Technologies," which seeks to identify commercially available body worn camera systems for law enforcement use.

Usage: This market survey will be published by NIJ to assist law enforcement agencies in their assessment of relevant information prior to making purchasing decisions.

Information Categories: Comments are invited with regard to the market survey, including which categories of information are appropriate for comparison, as well as promotional material (*e.g.*, slick sheet) and print-quality photographs of the technology. At a minimum, the Center intends to include the following categories of information for *each* Body Worn Camera technology that may be of use to law enforcement officials:

1. Vendor Information

a. Name
b. Address and phone number of corporate office
c. Web site
d. Years your company has been in business
e. Number and types of customers (*e.g.*, municipal, county, or state officers)
f. Location where technology is manufactured, assembled, or refurbished

2. Product Information—BWC

a. General
  i. Name and model number
  ii. Physical dimensions (height × width × depth, in inches) of device
  iii. Weight (in ounces) of device
  iv. Mounting options (*e.g.*, head, chest, glasses, helmet, etc.)
    1. Accessories needed for optional mounting locations
  v. Whether the BWC is able to mount on a vehicle for dashboard applications
    1. If so, any accessories needed
  vi. LCD display (*i.e.*, whether the BWC has a playback screen for on-person video viewing)
  vii. Recording capacity (*i.e.*, the memory storage capacity of the BWC)
  viii. Operating conditions or limitations (*e.g.*, temperature, humidity, precipitation, high wind, etc.)
b. Video and Optics
  i. Maximum video resolution of the BWC (*e.g.*, 640×480, 1080p)
  ii. Field of view of the BWC (*e.g.*, 75°, 120°)
  iii. Lux rating of the BWC (*i.e.*, minimum amount of light needed to produce an acceptable image)
  iv. Whether the BWC has a night mode and in what format (*e.g.*, low light, IR lens, etc.)
  v. Recording speed of the BWC (*e.g.*, 30 frames per second)
  vi. Recording format of the BWC (*e.g.*, MPEG–4, MOV)
  vii. Recording time of the BWC under default resolution settings
  viii. Whether the BWC captures still photos
  ix. Whether the BWC embeds a time/date stamp in the recorded video
    1. Whether there are any means to authenticate and validate the integrity of the time/date stamp
  x. Whether the BWC has a pre-event record feature (*i.e.*, a feature that includes a data buffer before the recorded event to show what triggered the recording)
    1. If so, the time buffered and whether audio is recorded
  xi. Whether the BWC possesses an event marking capability
  xii. Whether the BWC has wireless capabilities to communicate with a computer or external DVR unit
c. Audio
  i. Microphone feature
  ii. Microphone sensitivity
  iii. Audio format of the BWC (*e.g.*, MP2, AAC)
  iv. Whether there is a default police radio interface for the BWC
d. Data Upload
  i. Single device vs. docking station for multiple video/audio upload
  ii. Data transfer method (*e.g.*, wire, wireless, removable media card, etc.)
  iii. Manual vs. automatic uploading capabilities
e. Battery Information
  i. Battery type used by the BWC and whether it is internal or removable
  ii. Recording duration
  iii. Battery standby duration
  iv. Battery charge time
  v. Battery lifetime until replacement needed
  vi. Battery replacement procedure and where it must be done (*e.g.*, field or factory), if applicable
  vii. Availability of supplemental charger for emergency battery charging (*e.g.*, hand crank, backup battery, external battery charger with USB, solar, etc.), if applicable
f. GPS
  i. Whether the BWC possesses a GPS
    1. If so, whether GPS coordinates are embedded in recorded video
  ii. Alternative geolocation methods (*e.g.*, using smartphone or Bluetooth information via cell towers)
g. Consumer Testing Results
  i. Sturdiness/fragility
    1. Drop test results
    2. Dust intrusion/water resistance rating (IPX scale)
    3. Ruggedized
    4. Pressure/depth
    5. Shock
    6. Vibrations
  ii. Whether the BWC has undergone environmental testing other than that listed above
    1. If so, specify tests, pass/fail results, and ratings received
h. Safeguards
  i. Privacy safeguards or features
    1. Remote viewing
    2. Remote activation/deactivation
    3. Privacy masking (*i.e.*, feature that allows blurring or completely blocking certain areas to protect personal privacy or sensitive information)
    4. Redacting/editing capabilities
  ii. Safeguards for cyber security, unintentional disassembly, jamming, or intentional damage
i. Regulatory
  i. Regulatory and Compliance safety

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requirements (*e.g.*, FCC approved) and/or any potential NIJ Technology Standards, if applicable
ii. Radiation safety standards (*e.g.*, ANSI, ICRP, NCRP, EURATOM, etc.), if applicable
j. Warranty and Maintenance Plans
i. Length of warranty (in months) that comes standard with the system/device and the components that are covered
ii. Optional extended warranties available
1. Duration and cost of extended warranties
iii. Availability of extended maintenance plans
1. Duration and cost of extended maintenance plans
iv. Service contract costs
k. Auxiliary equipment (*e.g.*, car chargers, emergency chargers, etc.)
i. Manufacturer suggested retail price (MSRP) for each piece of auxiliary equipment
l. MSRP without optional features, accessories or service plans
m. Manufacturer's estimated lifetime of the device
n. Other information or notes that are relevant to the system/device

3. Product Information—Software for Video Data Storage and Management

a. Data Management
i. Searching capabilities
ii. Categorizing capabilities (*e.g.*, by law enforcement officer, location, incident, etc.)
iii. Tagging capabilities (*i.e.*, a feature that allows users to add additional metadata, such as case number and case notes)
iv. Archiving and file retention capacity
v. Data saved on or offsite (*e.g.*, cloud storage)
1. If saved offsite, specify data accessibility and storage costs
2. Video data storage capacity local vs. cloud
3. Capability to accommodate multiple site installations
vi. Export capabilities
1. If yes, whether there is a traceability feature that shows which user exported the data
vii. Redacting/editing capabilities
1. If redacted/edited, specify whether changes are permanent
viii. Support provided for chain-of-custody requirements
ix. Scalability for different organization size
x. User management and role-based access levels
b. Video Analytics
i. Whether there is companion software to analyze the video and audio data recorded by the BWCs
ii. Types of reports that are built into the software
1. Standard reports (*e.g.*, distribution of number of hours of recording per officer in a given period)
2. Daily reports, historical reports, etc.
3. Audit reports that support chain-of-custody requirements
4. Customization of reports
iii. Facial recognition capabilities
iv. Weapons detection capabilities
v. Other analytical capabilities not mentioned above
c. Video Security and Authentication
i. Compatibility of the BWC video outputs with existing video management software for viewing and recording
ii. File integrity checks to ensure authenticity
iii. Data protection mechanism while in transit and during storage (*e.g.*, SSL, encryption, password strength, etc.)
iv. Routine software updates, approximate frequency, and how it is updated (*e.g.*, manual or automatic)
v. Cost of software updates

4. Usability/Training

a. Types of processes used to ensure usability of hardware and software products (*e.g.*, requirements gathering, observation, task analysis, interaction design, usability testing, ergonomics, interoperability, etc.)
b. Types of data gathered from the user community (*e.g.*, interviews, observations during hands-on training, survey, satisfaction surveys, repeat customers, etc.) to evaluate your products, and how often it is collected
c. Types of user-group meetings and frequency of their occurrence (*e.g.*, dedicated face-to-face hosted meetings, in conjunction with established meetings such as those of the Body Work Video Steering Group and the Metropolitan Washington Council of Governments Police Technology Subcommittee, etc., interactive webinars).
d. Categories of problems reported to the vendor and estimated percentage of user community that experienced them within the last three (3) years
i. Resolution(s) to the problems identified above
e. Hours of technology support provided and location (*e.g.*, telephone, web-based, or on site at agency), including any additional costs beyond the license/purchase
f. Hours and type of training provided (*e.g.*, on-site, web-based, pre-recorded, play environment etc.)

5. Installation

a. Average time to install the complete BWC system and activate the first BWC device (in minutes, hours, or days)

Nancy Rodriguez,
Director, National Institute of Justice.

[FR Doc. 2016–09958 Filed 4–27–16; 8:45 am]
BILLING CODE 4410–18–P

DEPARTMENT OF LABOR

Employee Benefits Security Administration

Proposed Exemptions From Certain Prohibited Transaction Restrictions

AGENCY: Employee Benefits Security Administration, Labor.

ACTION: Notice of proposed exemptions.

SUMMARY: This document contains notices of pendency before the Department of Labor (the Department) of proposed exemptions from certain of the prohibited transaction restrictions of the Employee Retirement Income Security Act of 1974 (ERISA or the Act) and/or the Internal Revenue Code of 1986 (the Code). This notice includes the following proposed exemptions: D–11813, The Michael T. Sewell, M.D., P.S.C. Profit Sharing Plan (the Plan); D–11822, Plumbers' Pension Fund, Local 130, U.A. (the Plan or the Applicant); D–11858, Liberty Media 401(k) Savings Plan (the Plan); and, D–11866, Baxter International Inc. (Baxter or the Applicant).

DATES: All interested persons are invited to submit written comments or requests for a hearing on the pending exemptions, unless otherwise stated in the Notice of Proposed Exemption, within 45 days from the date of publication of this **Federal Register** Notice.

ADDRESSES: Comments and requests for a hearing should state: (1) The name, address, and telephone number of the person making the comment or request, and (2) the nature of the person's interest in the exemption and the manner in which the person would be adversely affected by the exemption. A request for a hearing must also state the issues to be addressed and include a general description of the evidence to be presented at the hearing.

All written comments and requests for a hearing (at least three copies) should be sent to the Employee Benefits