Body Cameras with Automatic Activation

Focus Group Report

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NUSTL
NATIONAL URBAN SECURITY
TECHNOLOGY LABORATORY

FOREWORD

The National Urban Security Technology Laboratory (NUSTL) is a federal laboratory within the U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T). Located in New York City, NUSTL is the only national laboratory focused exclusively on supporting the capabilities of federal, state, local, tribal, and territorial responders to address the homeland security mission. The laboratory assists responders with the use of technology to prevent, protect against, mitigate, respond to, and recover from homeland security threats and incidents. NUSTL provides expertise on a wide range of subject areas, including chemical, biological, radiological, nuclear, and explosive detection, personal protective equipment, and tools for emergency response and recovery.

NUSTL manages the System Assessment and Validation for Emergency Responders (SAVER) program, which provides information on commercially available equipment to assist response organizations in equipment selection and procurement. SAVER knowledge products provide information on equipment that falls under the categories listed in the DHS Authorized Equipment List (AEL), focusing primarily on two main questions for the responder community: "What equipment is available?" and "How does it perform?" The SAVER program works with responders to conduct objective, practitioner-relevant, operationally-oriented assessments and validations of commercially available emergency response equipment. Having the right tools provides a safer work environment for responders and a safer community for those they serve.

NUSTL is responsible for all SAVER activities, including selecting and prioritizing program topics, developing SAVER knowledge products, and coordinating with other organizations to leverage appropriate subject matter expertise. In conjunction with DAGER Technology, LLC, NUSTL will conduct an assessment of commercially available body-worn cameras. This equipment falls under the Authorized Equipment List (AEL) reference number 13LE-00-SURV titled "Law Enforcement Surveillance Equipment." As part of the project, assessment recommendations were gathered from a focus group and are highlighted in this report.

SAVER reports are available at www.dhs.gov/science-and-technology/saver-documents-library.

Visit the NUSTL website at www.dhs.gov/science-and-technology/national-urban-security-technology-laboratory or contact the lab at NUSTL@hq.dhs.gov.

U.S. Department of Homeland Security

SAVER

System Assessment and Validation for Emergency Responders

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EXECUTIVE SUMMARY

Through its System Assessment and Validation for Emergency Responders (SAVER) program, the National Urban Security Technology Laboratory (NUSTL) will conduct a comparative assessment of body-worn cameras to provide emergency responders with information that will assist with making operational and procurement decisions.

As a part of the assessment planning process, NUSTL, in conjunction with DAGER Technology, LLC (DAGER), convened a focus group of emergency responders in May 2022 to obtain their recommendations for evaluation criteria, product selection criteria and possible scenarios for the assessment. The focus group consisted of nine emergency responders from Arizona, California, Florida, Georgia, Maryland, Oklahoma, Pennsylvania and Virginia.

Emergency response personnel use body cameras with automatic triggers to record their actions and interactions with the public. Body cameras fall under the Authorized Equipment List reference number 13LE-00-SURV, titled "Law Enforcement Surveillance Equipment."

The focus group identified 31 evaluation criteria by which body cameras should be assessed. They grouped them into the five SAVER categories and concluded that Capability is the most important category influencing a purchasing decision, followed by Usability and Deployability, which were identified as being equally important. The focus group assigned a weight for each criterion and identified that "Computer-Aided Dispatch System Integration," "Adjustable Pre-Event Buffering," "Battery Run Time," "Durability," "IT Support/Availability," and "User-Friendly Controls" are criteria of the utmost importance (i.e., that they would not purchase body cameras that did not meet their expectations for these features). The focus group outlined possible operational scenarios for the assessment to gather feedback on body worn cameras as well as automatic activation sensors. Scenarios include emergency lights with proximity testing where first responders will respond to a disabled vehicle in multiple law enforcement vehicles – one of which will activate the emergency lights to assess automatic activation capabilities, room clearing where first responders will manually activate a BWC and move through the spaces while verbally identifying items in the rooms, unholstering where first responders will utilize a BWC paired with a holster activation sensor to assess the automatic activation capabilities, and. Throughout the room clearing and unholstering scenarios, first responders will also factor in visual acuity where they will identify graphics and labels on posted signage for comparison during footage reviews. NUSTL and DAGER will use these recommendations to plan a SAVER assessment of BWCs and automatic activation sensors.

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1.0 INTRODUCTION

Emergency responders use body-worn cameras (BWC) while on duty to record their actions as well as their interactions with fellow responders and the public. These cameras can be used by all responder disciplines to ensure transparency, deter aggressive behavior, preserve evidence, monitor personnel, document interactions, aid in the accuracy of written reports, provide a training tool for professional development, and aid in improving operational procedures.

In May 2022, the System Assessment and Validation for Emergency Responders (SAVER) program conducted a focus group of experienced users of such technology to obtain information on their practical experiences relevant to operational and procurement decisions. The information provided by this focus group will be used to plan a future SAVER assessment of body-worn cameras and automatic activation sensors.

1.1 PARTICIPANT INFORMATION

Nine emergency responders from various jurisdictions and with at least ten years of law enforcement experience participated in the focus group.

Table 1-1 Focus Group Participant Information

Responder Discipline	Years of Experience	State
Law Enforcement	10-15	AZ
Law Enforcement	15-20	CA
Law Enforcement	10-15	FL
Law Enforcement	20-25	FL
Law Enforcement	15-20	GA
Law Enforcement	20-25	MD
Law Enforcement	35-40	OK
Law Enforcement	20-25	PA
Law Enforcement	15-20	VA

2.0 FOCUS GROUP METHODOLOGY

The focus group opened with an overview of the SAVER program and body-worn camera technologies. After explaining the focus group's goals and objectives, a facilitator led group discussions to elicit four sets of recommendations:

1) Evaluation criteria: specific features that are important to consider when making acquisition or operational decisions

2) Assessment scenarios: operational settings and activities in which the products should be assessed to evaluate their performance in those criteria

3) Product selection criteria: specifications, attributes, or characteristics a product should possess to be considered for the assessment

4) Product suggestions: products, manufacturers and vendors that are relevant to the emergency responder community and should be candidates for inclusion in the comparative assessment

Figure 2-1 highlights the process followed to gather recommendations.

Identify applications and evaluation criteria. → Define, group, and prioritize evaluation criteria by SAVER category. → Assign weights to the evaluation criteria. → Prioritize and assign percentages to the SAVER categories. → Review applications and recommended scenarios. → Recommend product selection criteria and products to assess.
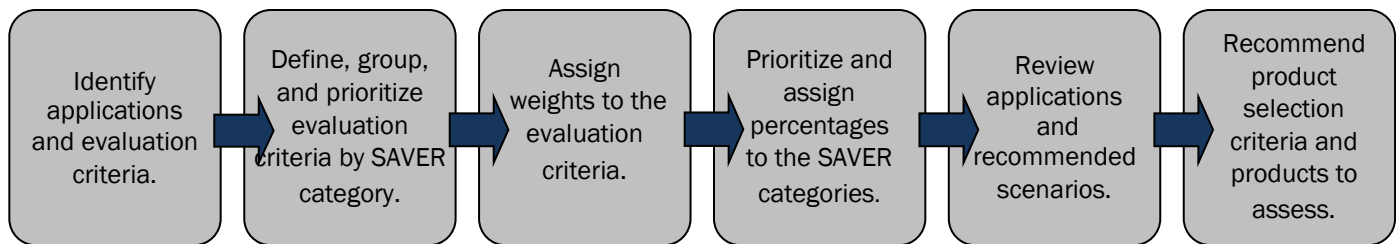
Figure 2-1 Focus Group Process

Focus group participants first identified applications in which body-worn cameras are commonly used. Next, the focus group participants identified and defined evaluation criteria, which were then grouped and prioritized in the SAVER categories: Affordability, Capability, Deployability, Maintainability and Usability. The SAVER categories organize criteria in the following manner:

- **Affordability** groups criteria related to the total cost of ownership over the life of the product. This includes purchase price, training costs, warranty costs, recurring costs and maintenance costs.

- **Capability** groups criteria related to product features or functions needed to perform one or more responder-relevant tasks

- **Deployability** groups criteria related to preparing to use the product, including transport, setup, training and operational/deployment restrictions.

- **Maintainability** groups criteria related to the routine maintenance and minor repairs performed by responders, as well as included warranty terms, duration and coverage.

- **Usability** groups criteria related to ergonomics and the relative ease of use when performing one or more responder-relevant tasks.

Once the evaluation criteria were prioritized within the SAVER categories, focus group participants assigned a weight for each criterion's level of importance on a 1–5 scale, where five is of utmost importance and one is of minor importance. Table 2-1 summarizes the evaluation criteria weighting scale.

Table 2-1 Evaluation Criteria Weighting Scale

Weight	Definition
5	This evaluation criterion is *of utmost importance:* "I *would never* consider purchasing a product that does not meet my expectations of this criterion or does not have this feature."
4	This evaluation criterion is *very important*: "I *would be hesitant* to purchase a product that does not meet my expectations of this criterion or does not have this feature."
3	This evaluation criterion is *important*: "Meeting my expectations of this criterion or having this feature *would strongly influence* my decision to purchase this product."
2	This evaluation criterion is *somewhat important:* "Meeting my expectations of this criterion or having this feature *would slightly influence* my decision to purchase this product."
1	This evaluation criterion is *of minor importance*: "Other things being equal, meeting my expectations of this criterion or having this feature *may influence* my decision to purchase this product."

After the evaluation criteria were assigned a weight, the focus group participants recommended whether the criteria should be assessed operationally or evaluated according to vendor-provided specifications.

Next, considering the evaluation criteria in each category, the focus group participants ranked the SAVER categories in order of importance. A percentage was then assigned to each category to represent its level of importance.

After rating the SAVER categories, the participants identified product selection criteria that should be considered for inclusion in the assessment.

Lastly, the focus group participants reviewed the applications identified at the beginning of the focus group session and recommended operational scenarios for the assessment.

3.0 EVALUATION CRITERIA RECOMMENDATIONS

The focus group identified 31 evaluation criteria and concluded that Capability was the most important SAVER category, then Usability and Deployability, which were identified as being of equal importance, followed by Maintainability and Affordability. Table 3–1 presents the category weights, evaluation criteria and evaluation criteria weights.

Table 3-1 Evaluation Criteria

SAVER Categories				
Capability Overall Weight 40%	**Usability** Overall Weight 20%	**Deployability** Overall Weight 20%	**Maintainability** Overall Weight 15%	**Affordability** Overall Weight 5%
Evaluation Criteria				
Capability	**Usability**	**Deployability**	**Maintainability**	**Affordability**
Battery Life*+ Weight: 5	Ease of Use of Controls+ Weight: 5	Mounting Options+ Weight: 4	IT Support* Weight:5	Warranty* Weight: 4
CAD System Integration* Weight: 5	Field Tagging Weight:4	Size+ Weight: 3	In-House Maintenance* Weight: 4	Training Costs* Weight: 3
Pre-Event Buffer Weight: 5	Customizability of Triggers Weight: 4	Weight+ Weight: 3	Charging Method* Weight: 4	Vendor Storage Flexibility* Weight: 3
Overall Durability+ Weight: 5	DEMS Integration* Weight: 4	User Assignment*+ Weight: 3	Training Services* Weight: 3	
Integration with Court System Evidence Requirements* Weight: 4	Classification Error Rate Weight: 4			
Cellular Connectivity* Weight: 4	Ability to Use While Wearing Gloves+ Weight: 2			

Capability	Usability	Deployability	Maintainability	Affordability
Audio Quality Weight: 4				
Image Quality Weight: 4				
Remote Triggers[+] Weight: 4				
IP Rating[*+] Weight: 3				
Image Stabilization Weight: 3				
Operable Temperature Range[*+] Weight: 3				
Motion Blur Mitigation Weight: 3				
Privacy Controls Weight: 2				
Notes * Indicates assessed by specification + Indicates criteria that will be assessed for both the camera and sensor				

3.1 CAPABILITY

The focus group identified and defined fourteen capability criteria. They are listed below in descending order of importance, as ranked by the focus group.

Battery Life refers to the amount of time the primary power source will power the system. Recharge time and swappable batteries may also be considered.

CAD System Integration refers to the ability of the BWC to automatically integrate metadata from a computer aided dispatch system into recorded files. This helps reduce manual tagging.

Pre-Event Buffer refers to the continuously running buffer that captures a period of time before a BWC starts recording. The ability to specify the length of this buffer, including disabling it will be considered.

Overall Durability refers to the BWC's ability to withstand day to day use in the field without breaking.

Integration with Court System Evidence Requirements refers to the BWC's ability to maintain chain of custody and related evidentiary requirements to be admissible in court.

Cellular Connectivity refers to the BWC's ability to connect to 4/5G cellular networks for live streaming, remote control, and related functions.

Audio Quality refers to the fidelity of the audio recording associated with the video. This includes ability to capture the voice of the officer as well as suspects they're interacting with.

Image Quality refers to the fidelity of the video recording. In particular parity between the camera and the human eye is desired, to convey what the officer using the BWC was seeing at the time of recording.

Remote Triggers refers to the ability of the BWC to be remotely activated by sensors.

IP Rating refers to the degree of water and dust resistance of the device as certified by the ingress protection standard.

Image Stabilization refers to the BWC's ability to resist movement and keep video footage from shaking as the camera is jostled.

Operable Temperature Range is how hot or cold it can be in the environment that the BWC is working in.

Motion Blur Mitigation refers to BWC's ability to resist blurring of moving objects in frame.

Privacy Controls refers to functions such a s mute buttons that protect operator privacy.

3.2 USABILITY

The focus group identified and defined six usability criteria. They are listed below in descending order of importance, as ranked by the focus group.

Ease of Use of Controls refers to the intuitiveness of using the controls, and making adjustments including navigating through menus.

Field Tagging refers to the ability and difficulty of categorizing footage after it is taken.

Customizability of Triggers refers to the ability to change how the BWC reacts to each trigger.

DEMS (Digital Evidence Management System) Compatibility refers to the ability of the camera and its software to correctly sync with the evidence management system employed at the user's department.

Classification Error Rate refers to the likelihood of the system to be accidently triggered.

Ability to Use While Wearing Gloves refers to the compatibility of the system controls with gloved hands.

3.3 DEPLOYABILITY

The focus group identified and defined four deployability criteria. They are listed below in descending order of importance, as ranked by the focus group.

Mounting Options refers to the ability for the BWC and sensor to be affixed to the user's body, holster or vehicle.

Size refers to the physical dimensions of the camera and sensor.

Weight is how heavy the device is.

User Assignment refers to how a user is associated with the BWC or sensor (scanning a badge, done via software, etc).

3.4 MAINTAINABILITY

The focus group identified and defined four maintainability criteria. They are listed below in descending order of importance, as ranked by the focus group.

IT Support refers to quality and availability of technical support from the manufacturer.

In-house Maintenance refers to the refers to the ability to fix problems at the user's site, rather than having to ship a BWC to the manufacturer.

Charging Method refers to the type of connector used to charge the device, and how likely it is to require repair.

Training Services refers to the recurring training that is required to maintain a BWC and its sensors.

3.5 AFFORDABILITY

The focus group identified and defined three affordability criteria. They are listed below in descending order of importance, as ranked by the focus group.

Warranty refers to the terms, conditions, and cost of warranty service.

Training Costs refers to the costs per person for training or train the trainer courses.

Vendor Storage Flexibility refers to the cost and availability of potential changes in retention (and therefore storage) requirements during the lifetime of a contract caused by changes in legal requirement.

4.0 EVALUATION CRITERIA ASSESSMENT RECOMMENDATIONS

The focus group made recommendations on whether the evaluation criteria should be assessed operationally or by review of information from vendor-provided specifications. At the assessment, evaluators will assess operationally focused criteria based on hands-on experience using (or by inspecting the features of) the product. They will evaluate other specifications, based on product information provided by the vendor. Some criteria may be assessed by both methods.

Table 4-1 presents the focus group's assessment recommendations for the evaluation criteria.

Table 4-1 Evaluation Criteria Assessment Recommendations

Category	Criteria	Operational	Specification
Capability	Battery Life		✓
	CAD System Integration		✓
	Pre-Event Buffer	✓	
	Overall Durability	✓	
	Integration with Court System Evidence Requirements		✓
	Cellular Connectivity		✓
	Audio Quality	✓	
	Image Quality	✓	
	Remote Triggers	✓	
	IP Rating		✓
	Image Stabilization	✓	
	Operational Temperature Range		✓
	Motion Blur Mitigation	✓	
	Privacy Controls	✓	
Usability	Ease of Use of Controls	✓	
	Field Tagging	✓	
	Customizability of Triggers	✓	
	DEMS Integration		✓
	Classification Error Rate	✓	
	Ability to Use While Wearing Gloves	✓	
Deployability	Mounting Options	✓	
	Size	✓	
	Weight	✓	
	User Assignment	✓	
	Warranty		✓
	Training Costs		✓
	Vendor Storage Flexibility		✓
Maintainability	IT Support		✓
	In-House Maintenance		✓
	Charging Method		✓
	Training Services		✓
Affordability	Warranty		✓
	Training Costs		✓
	Vendor Storage Flexibility		✓

5.0 ASSESSMENT SCENARIO RECOMMENDATIONS

The focus group identified scenarios in which body-worn cameras would be (according to protocol) or would need to be (out of physical necessity) automatically activated as the basis for recommending three operational scenarios to assess the auto triggering feature. The assessment will also include an equipment familiarization/deployment operations scenario, described in section 5.1.

All scenarios will take place at a venue that has a conference room as well as the ability to accommodate the operational scenarios in a realistic environment. The procurement of additional equipment needed for use during this assessment, such as mannequins or patrol cars, will be coordinated between NUSTL, DAGER and the venue.

5.1 EQUIPMENT FAMILIARIZATION AND DEPLOYMENT PREPARATION

In a conference room setting, evaluators will begin the assessment of each body-worn camera and corresponding activation sensors in a familiarization session that includes an overview of features and specifications with the technology vendor. Specifically, instructional overviews of the camera, mounting options, manual triggering and video reviewing platform will be reviewed.

Following the overview, evaluators will have the opportunity to handle the cameras, actively manipulate buttons and prepare them for deployment, including customizing settings or adding accessories as available.

Evaluation criteria scored during this scenario will include: CAD Integration; Integration with Court System Evidence Requirements; Operable Temperature Range; IP Rating; DEMS Compatibility; Vendor Storage Flexibility; Warranty; Training Costs; In-house Maintenance; Training Services; Battery Life; Cellular Connectivity; Charging Method; User Assignment; and IT Support.

5.2 EMERGENCY LIGHT AND PROXIMITY AUTOMATIC ACTIVATION

In an outdoor environment, evaluators—grouped into teams---will don body-worn cameras on their standard uniform shirts. An evaluator team, split amongst two separate vehicles, will assess emergency lights and proximity sensors. One vehicle equipped with emergency lights and the auto-activation trigger for the camera being tested will be parked approximately 50 feet from a building. With their BWC turned on but not yet recording, an evaluator team in a will receive a radio call about a disabled vehicle. The evaluator will then turn on their emergency lights, drive to the scene, unbuckle their seatbelt, step out of the car and conduct a field interview of the occupants of the vehicle. A second vehicle will arrive on scene to test if their cameras are automatically activated by the proximity to the first evaluators' cameras. Once the scripted dialogue is completed the two sets of officers will return to their respective cruisers, stop their body-worn cameras, and tag the video with the nature and type of the incident.

The scenario will be repeated with the evaluators switching roles. After the scenario is completed, the evaluators will review the camera footage according to the vendor's specifications. Video review may occur directly on the camera's screen, on a mobile application or on a computer after the recorded files are uploaded.

Criteria to be evaluated in this scenario will include: Pre-Event Buffer; Remote Triggers; Ease of Use of Controls; Field Tagging; Customizability of Triggers; and Classification Error Rate.

5.3 UNHOLSTERING FIREARM AUTOMATIC ACTIVATION AND VISUAL ACTIVITY

In an indoor environment, evaluator teams will don their body-worn cameras on their standard uniform shirts and configure a holster with an activation sensor in the classroom. A series of silhouette and visual acuity targets will be affixed to various rooms within a building. The evaluators will stand at various distances depending on the target. Using a non-functional training firearm (clearly marked as such) and the appropriate holster with the activation sensor mounted, the evaluator will ensure their camera system is powered on, draw their firearm and acquire a target. The unholstering or drawing of the weapon should activate the camera system to start recording. The evaluators will say out loud what the poster depicts for later comparison to video footage. They will also test the functionality of any included privacy controls, such as mute buttons, by audibly announcing their intent to activate them, activating them, counting out loud to five, then disabling them. The evaluators will stop the recording and move to a new target station. The scenario will be repeated with the evaluators switching roles. After all target stations are complete the evaluators will review the camera footage.

Criteria to be evaluated in this scenario will include: Audio Quality; Image Quality; Image Stabilization; Motion Blur Mitigation; Field Tagging; Privacy Controls; and Ease of Use of Controls.

5.4 MOCK ROOM CLEARING SCENARIO

In an indoor environment, evaluators will don gloves, begin manually recording, then walk through the various stores of a mall, clearing the area of a potential active shooter. Evaluators will employ standard law enforcement room clearing procedures and will be instructed to describe the items they see aloud. Rooms will have varying degrees of lighting. Each room will have silhouette targets, color charts, and other signage. One room will have fog to impair visibility. Evaluators will continue this process through the remaining rooms in the scenario. After completing the room clearing, the evaluators will stop their cameras and tag their video with the nature and type of incident. The scenario will be repeated for each evaluator. All evaluators will then also review the camera footage.

Criteria to be evaluated in this scenario will include: Overall Durability; Size; Weight; Mounting Options; Audio Quality; Image Quality; Image Stabilization; Motion Blur Mitigation; and Ability to Use While Wearing Gloves.

6.0 PRODUCT SELECTION RECOMMENDATIONS

The focus group participants did not recommend specific products to assess but did recommend specific vendors for consideration, specifically Axon and Panasonic.

Participants identified the following considerations to guide product selection for a SAVER assessment of body-worn cameras with automatic activation. Table 6-1 summarizes the product selection criteria.

Table 6-1 Product Selection Criteria

Product Selection Consideration	Description
Commercial Off-the-Shelf	Commercially available (i.e., not a custom-built system).
Automatic-Activation Sensors	Camera can be paired with activation sensors (to turn on body-worn cameras) related to unholstering a firearm, activating emergency vehicle lights, or by computer aided dispatch.
Audio and Video Recording	Camera capable of recording audio along with video to document actions and interactions of the individual wearing the camera and those whom with they interact.
Pre-Event Buffer	Camera is capable of continuously but temporarily recording for at least 30 seconds prior to an activation.
Storage Capabilities	Capable of storing recorded video onboard the camera or on a cloud server for evidence management.
Anti-Tampering	Equipped with security functions to prevent the tampering or deletion of recordings (i.e., offers administrative controls for editing audio or video files).
Tagging	Offers the ability for users to tag video files either via the camera itself or via mobile application to associate footage with incidents for evidentiary purposes.

7.0 FUTURE ACTIONS

Focus group recommendations will be used to guide the development of the Body-Worn Cameras with Automatic Activation Assessment Plan and the selection of products for evaluation in the assessment. After the assessment is complete, the results will be available in the SAVER Document Library found at www.dhs.gov/science-and-technology/saver-documents-library.

8.0 ACKNOWLEDGEMENTS

NUSTL thanks the focus group participants for their valuable time and expertise. Their insights and recommendations will guide the planning and execution of the assessment as well as future SAVER projects. NUSTL also thanks their home jurisdictions – Fairfax County (Virginia) Police Department, Fort Lauderdale (Florida) Police Department, Gwinnett County (Georgia) Police Department, Lake Havasu (Arizona) City Police Department, Philadelphia (Pennsylvania) Police Department, Stanislaus County (California) Sheriff's Department, Tulsa (Oklahoma) Police Department, Tampa (Florida) Police Department and the Federal Law Enforcement Training Center (Georgia) – for allowing them to participate in the focus group.