ANSI Homeland Defense and Security Standardization Collaborative (HDSSC)

Meeting Report:

A Roundtable on InterAgency Board for Equipment Standardization and Interoperability (IAB) Standards Needs

Report prepared April 2015

1.0 Background

The American National Standards Institute (ANSI) Homeland Defense and Security Standardization Collaborative (HDSSC) has as its mission to identify existing consensus standards, or, if none exist, assist government agencies and those sectors requesting assistance to accelerate development and adoption of consensus standards critical to homeland security and homeland defense. The Collaborative seeks broad engagement with the Department of Homeland Security (DHS), Department of Defense (DOD), National Institute for Occupational Safety and Health (NIOSH), National Institute of Standards and Technology (NIST), state agencies, and other relevant entities.

As part of that continuing effort, the ANSI-HDSSC convened *A Roundtable on InterAgency Board for Equipment Standardization and Interoperability (IAB) Standards Needs* on March 26, 2015, in Washington, DC. The meeting focused on a discussion of standards priorities identified by emergency response and preparedness practitioners from law enforcement, fire, and other public safety agencies.

2.0 HDSSC Co-chair Opening Remarks

HDSSC co-chairs Chris Dubay, National Fire Protection Association (NFPA), and Casandra Robinson, National Institute of Standards and Technology (NIST), opened the meeting.

Mr. Dubay welcomed attendees and thanked them for their participation. In his brief remarks he discussed how the HDSSC can help standards developers and users of standards work

together to meet the needs of the IAB community. He noted that last year's roundtable produced excellent work and collaboration and expected this meeting to be as impactful.

The participants were requested to introduce themselves. A list of attendees is attached in Appendix B.

3.0 IAB Opening Remarks

Tom Nolan, chief, Upper Merion Township Police Department, provided opening remarks on behalf of the IAB. Mr. Nolan began by describing the IAB as a trusted and authoritative, multidisciplinary volunteer working group of emergency preparedness and response practitioners. As such, the IAB is a unified voice for the responder community.

Mr. Nolan noted that a lack of standards was the reason for the formation of the IAB in 1998. Equipment and training capabilities are driven by the first responder community, and the effort to get the responder community to provide input in the standardization process is vital in order to have standards that address their needs. The IAB has been at the forefront of the need for standards for first responders and has always recognized and emphasized the value of standards.

Mr. Nolan ended by thanking the ANSI-HDSSC for its involvement in organizing this discussion and providing the opportunity for federal agencies, standards developers, researchers, manufacturers, and other stakeholders to come together to address issues in equipment and training standardization associated with all-hazards incidents.

4.0 Update on 2013 IAB Priorities

Casandra Robinson, NIST, provided an update on the 2013 IAB Standards Priorities:

1. Standardized equipment training program format
   - Being developed as ASTM WK46846 in ASTM Subcommittee E54.02
2. Performance standard for protective helmets
   - Published IAB helmets report: user needs and requirements
     Being developed as ASTM WK46152 in ASTM Subcommittee E54.04
3. Performance standard for protective shields
   - Published IAB shields report: user needs and requirements
   - Being developed as ASTM WK45341 in ASTM Subcommittee E54.04
4. Performance standard for tactical operation video cameras
   - Being developed as UL STP 3802 and NFPA is developing user guidance
5. Standard for robot operator self-evaluation and training program
   - ASTM planning to develop standard(s)

6. Standard test method for respirator fit test equipment
   - No activity; being kept in FY2014 list
7. Performance standard for explosive containment vessels
   - It was determined that procurement guidance published by DHS SAVER program meets this need.
8. Standard for public safety bomb suits – additional requirements
   - The Fire Protection Research Foundation is addressing this need. Casey Grant provided an update in the following agenda item.

5.0 Update on Bomb Suit Standard Additional Requirements

Casey Grant, Fire Protection Research Foundation, provided an update on requirements for a bomb suit standard, a 2013 IAB priority. Mr. Grant distributed an updated project prospective to attendees and provided an overview of the project and progress to date.

David Heaven, NBSCAB, provided background information on the history of bomb suits and the importance of blast overpressure protection. He discussed that not every bomb has fragmentation, but every bomb has blast overpressure, and the two major hazards of blast overpressure are (1) blast wave and (2) head acceleration relative to the body. Mr. Grant noted that an additional $40,000 is needed to continue the project.

Phil Mattson, DHS, recommended that an additional survey be conducted to determine the newest, most common type of bomb threat so that bomb suit standards will remain up-to-date to protect against new materials being used.

6.0 Lessons Learned

Michelle Deane, ANSI-HDSSC, led a discussion on lessons learned from the 2013 IAB Standards Priorities Roundtable.

Commenters indicated that the HDSSC process has been productive so far and has helped to get action on the IAB priorities. It was noted that more promotion of the standards development requirement would be helpful in gaining support and participation for individual projects, and transparency of the process would be beneficial. It was also suggested that the IAB Federal Agency Coordinating Committee be leveraged as a way to promote the priorities to federal agencies. Also mentioned was that manufacturers want to create products that meet end-user needs, but R&D is expensive, so the standard has to be set within a reasonable timeframe and not repeatedly modified.

7.0 Current IAB Standards Priorities

Casandra Robinson, NIST, provided an introduction to the IAB standards priorities, including an overview of how the list is developed and expanded. Ms. Robinson described the IAB process of

identifying standards priorities, which begins when an IAB member submits a recommendation for a standards need via an online form. The recommendation is then reviewed by the Standards Coordination SubGroup (SCSG), which then provides additional information including any requirements. The IAB then reviews the submitted needs and responds via survey, resulting in the IAB prioritized list. The list of standards priorities prior to 2013 is published on www.iab.gov.

Eleven standards needs were identified to the IAB in FY 2014. Some are a continuation and expansion of previously identified IAB standards requirements. Those needs were reviewed by the IAB based on their categorization and description, resulting in the IAB prioritized list. A summary of the eleven standards priorities is provided in Appendix C.

8.0 Path Forward

Casandra Robinson, NIST, led a discussion of the next steps in the process for assignment of the standards priorities, including any additional discussions that need to be arranged.

The following next steps were identified for each priority:

Priority 1: Standard test methods for robot operator evaluations – "Standard test methods in a box"	ASTM has developed standard test methods to characterize performance of robots under specified conditions and is planning to use the tests to characterize proficiency of the operator. NFPA and ASTM have had discussions on requirements for development, with NFPA viewing it from certification of training programs and operators. A joint NFPA and ASTM coordination meeting will be scheduled soon. Explore having a potential HDSSC workshop to identify certification requirements and additional test methods.
Priority 2: Product standard for personal protective equipment (PPE) for emergency medical services providers	NFPA and ASTM have standards in this area that need integration. It may be possible to include in revision to NFPA 1999, which is currently being revised. NIOSH has a suite of respirator standards that will work well with the other PPE. This appears to be more of an interoperability/integration issue than a standard issue.

	This could potentially be addressed within NFPA 1999. The authors put optional additional enhancements into NFPA 1994, and a similar approach could be taken with 1999 to allow the operator to select the level of protection needed for blood-borne pathogens and then add in other protections that are needed, such as ballistic protection. The user picks what they need. IAB and HDSSC will be contacted to provide user involvement as well as investigate input from users in the field, for example from the two major EMS conferences held each year.
Priority 3: Standard test methods for body armor designed for female wearers	Body armor worn by women is a new focus area within the National Institute of Justice (NIJ) body armor program. NIJ has developed a plan for addressing test methods to assess the features of armor designed and structured for women. NIJ will coordinate efforts in this area. NOISH has recently completed a study on firefighter full-body measurements for males and females that may provide data. Coordination with the latest DHS project responder is recommended.
Priority 4: Product standard for duty gloves worn by responders in a law enforcement and corrections role	The NFPA Standards Council will be discussing this, and NFPA will also discuss this with ASTM in May. A comparison of the IAB needs with NFPA 1951 glove requirements was done, and NFPA 1951 includes every criterion listed by the IAB. Comparing the NIJ test protocol with NFPA 1951 may also be a good idea. NIJ is not planning at this time to develop a performance standard for gloves but will assist with development of the standard. A project was done a few years ago to develop a law enforcement duty glove, and test data already collected can be provided.

Priority 5: Standard test methods for localization and tracking systems	An international standard, ISO/IEC 18305, is currently under development, with an expected completion date of 4Q 2015. NIST is planning test and evaluation events to assess products on the market for the purpose of validating the standard. A question was asked as to whether this standard could be applied to body-worn camera or in-car video systems. Dr. Moayeri replied that this standard is for indoor tracking systems only.
Priority 6: Product standard for body-worn video cameras used by public safety practitioners	UL (Tactical Ops Camera STP 3802) had a March 16, 2015, meeting and agreed to add body-worn video cameras into the standard being developed. NFPA may develop a selection, care, and maintenance guide.
Priority 7: Product standard for less-lethal conducted energy devices	IEC 62792 is a standard test method for characterizing electrical output of the devices, which could assist with development of the performance requirements. NIJ looked into this several years ago to get chief perspective, officer perspective, and medical perspective; developed a white paper and decided not to move forward with a standard. The DoD nonlethal weapons program (Quantico) has test data to share, and the DHS - CBP use of force center of excellence in Harper's Ferry may also have testing protocols and training programs to share. DHS has a seedling program looking at less-lethal force. Requirements gathered there may assist in performance requirements.
Priority 8: Product standard for less-lethal chemical devices	After characterization of a couple dozen models of OC ("pepper") spray, NIST developed a draft specification that could serve as a starting point. Several publications were published in peer-review journals. Work would be required on the chemical concentrations.

	The use of OC spray by law enforcement has dropped significantly since conducted energy devices came into use. CS spray is still routinely used. Action: Collect the reports and determine what has been done and what is still needed. It was suggested that there may be useful information in the *Textbook of Military Medicine*.
Priority 9: Product standard for less-lethal impact devices fired from a launching system	NIJ will investigate obtaining a 2007 report done by Washington State University (WSU) on test methods for impact projectiles.
Priority 10: Product standard for distraction devices (e.g., flash bangs)	This is one of the most dangerous pieces of equipment used by SWAT from a liability perspective, so there are not many manufacturers remaining. DHS Science & Technology (S&T) did some work on a pulsating light device called the "Dazzler," testing some prototypes. The device makes people feel nauseous, so it was considered for less-lethal purposes IAB needs to decide if there is need to move forward on this development.
Priority 11: Standard test method for respirator fit machines	Clarification from the IAB is necessary. There is quantitative fit testing (sensory) being done, not quantitative. OSHA covers acceptable types of fit test methods in the CFR. ANSI Z88.10 has fit test methods (how to run, not performance). IAB needs to decide if more research is needed, and may decide on a position paper.

Additionally, the ANSI-HDSSC website (www.ansi.org/hdssc/) will be revised to include a webpage on the priorities (2014 and 2015) and their current statuses, and will include links to relevant documents and committees (e.g., ASTM and NFPA). It will also include links to the relevant section of the IAB website (www.iab.gov).

9.0 Closing Remarks

The HDSSC co-chairs and ANSI thanked the participants for their thoughts and contributions to the discussions. It was noted that participants would be welcome to submit further ideas to the HDSSC director (mdeane@ansi.org) at any time.

10.0 Acknowledgements

Recognition and appreciation are due to the following:

- Casandra Robinson, NIST; Phil Mattson, DHS; and Chris Dubay, NFPA, for their leadership of this effort.
- All of the attendees for sharing their expertise and introducing key concepts utilized during the discussion.

Appendix A – Agenda

 **ANSI Homeland Defense and Security Standardization Collaborative (HDSSC)**	A Roundtable on: **InterAgency Board for Equipment Standardization and Interoperability (IAB) Standards Needs** **Agenda** **Thursday, March 26, 2015** **Location: FHI 360 Conference Center** **1825 Connecticut Avenue NW** **8th Floor** **Washington, DC 20009**

9:00am – 9:30am	**Registration Desk Opens (Continental Breakfast Available)**
9:30am – 9:45am	**Welcome & Opening Remarks** • Chris Dubay, HDSSC Co-chair, National Fire Protection Association • Casandra Robinson, HDSSC Co-chair, National Institute of Standards and Technology The HDSSC co-chairs will provide opening remarks about the HDSSC and the roundtable. Participants will be requested to introduce themselves.
9:45am-9:50am	**InterAgency Board for Equipment Standardization and Interoperability (IAB) Opening Remarks** • Tom Nolan, Chief, Upper Merion Township Police Department Chief Nolan will provide brief remarks about the IAB.
9:50am-10:15am	**Update on 2013 Priorities** • Casandra Robinson, National Institute of Standards and Technology Ms. Robinson will provide an update on the 2013 IAB Standards Priorities.
10:15am - 10:30am	**Update on Bomb Suit Standard Additional Requirements** • Casey Grant, Fire Protection Research Foundation Mr. Grant will provide an update on requirements for a bomb suit standard, which was a 2013 IAB priority.
10:30am-10:45am	**Lessons Learned**

	• Michelle Deane, ANSI-HDSSC Ms. Deane will lead a discussion on lessons learned from the 2013 IAB Standards Priorities Roundtable.
10:45am-11:00am	**Break**
11:00am – 11:30am	**Introduction to IAB Priorities** • Casandra Robinson, National Institute of Standards and Technology Ms. Robinson will provide an introduction to the IAB standards needs priorities, including how the list was developed.
11:30am-12:30pm	**IAB Standards Priorities (1-6)** 1. Standard test methods for robot operator evaluations – "Standard test methods in a box" 2. Product standard for personal protective equipment for emergency medical services providers 3. Standard test methods for body armor designed for female wearers 4. Product standard for duty gloves worn by responders in a law enforcement and corrections role 5. Standard test methods for localization and tracking systems 6. Product standard for body worn video cameras used by public safety practitioners A description of the standards need will be provided and there will be an opportunity for the participants to discuss the need and ask questions. Ms. Robinson, NIST, will facilitate.
12:30-1:15	**Lunch**
1:15pm-2:30pm	**IAB Standards Priorities (7-11)** 7. Product standard for less lethal conducted energy devices 8. Product standard for less lethal chemical devices 9. Product standard for less lethal impact devices fired from a launching system 10. Product standard for distraction devices (e.g., flash bangs) 11. Standard test method for respirator fit machines A description of the standards need will be provided and there will be an opportunity for the participants to discuss the need and ask questions. Ms. Robinson, NIST, will facilitate.
2:30pm-3:00pm	**Path Forward** • Casandra Robinson, National Institute of Standards and Technology Ms. Robinson will lead a discussion of the next steps in the process for assignment of the standards priorities, including any additional discussions that need to be arranged.
3:00pm	**Adjournment**

Appendix B – Roster of Attendees

Name	Organization
Christina Baxter	Combating Terrorism Technical Support Office (CTTSO)
William Billotte, PhD	National Institute of Standards and Technology (NIST)
Greg Cade	National Fire Protection Association (NFPA)
Duane C. Caneva, MD, MS	U.S. Customs and Border Protection (CBP), Department of Homeland Security (DHS) Office of Health Affairs (OHA)
Bert Coursey	National Institute of Standards and Technology (NIST)
John Cusick	Panasonic Video Solutions
Michelle Deane	American National Standards Institute (ANSI)
Bill Deso	Department of Homeland Security (DHS)
Chris Dubay	National Fire Protection Association (NFPA)
Patricia Gleason	Safety Equipment Institute (SEI)
Stephan Graham	U.S. Army Institute of Public Health
Casey C. Grant, PE	Fire Protection Research Foundation
Diane Haithcock	Underwriters Laboratories Inc. (UL)
Bill Haskell	NIOSH/NPPTL/IAB Equipment Subgroup
David Heaven	TSWG/NIJ Support, National Bomb Squad Commanders Advisory Board, Hazardous Devices Program Support, Inc.
Jeffrey Horlick	National Institute of Standards and Technology (NIST)
Kurt Kessel	L-3 Mobile-Vision, Inc.
Rob Kinsler	HP White Laboratory, Inc.
Jennifer Marshall	National Institute of Standards and Technology (NIST)
Phil Mattson	U.S. Department of Homeland Security (DHS)
Mary Mikolajewski	ASTM International
Carol Mintz	Federal Emergency Management Agency (FEMA)
Nader Moayeri	National Institute of Standards and Technology (NIST)
Tom Nolan	Upper Merion Township Police Department
David Otterson	NLECTC-National
Nicholas Paulter	National Institute of Standards and Technology (NIST)
Kirk Rice	National Institute of Standards and Technology (NIST)
Casandra Robinson	National Institute of Standards and Technology (NIST)
Debra Stoe	National Institute of Justice (NIJ)
Don B. Thompson, PhD	Center on Textile Protection and Comfort, North Carolina State University
Dave Trebisacci	National Fire Protection Association (NFPA)
Tom Nolan	Upper Merion Township Police Department
David Otterson	NLECTC-National
Nicholas Paulter	National Institute of Standards and Technology (NIST)
Kirk Rice	National Institute of Standards and Technology (NIST)
Ken Willette	National Fire Protection Association (NFPA)

Appendix C. Summary of IAB 2014 Standards Priorities

Priority 1: Standard test methods for robot operator evaluations – "Standard test methods in a box"

This item is a continuation and expansion of previously identified IAB standards requirements for response robot standard test methods, including the 2013 IAB priority for training, "Standard for Robot Operator Self-evaluation and Training Program." Many robot test methods have been published that can be adapted for use in operator training and evaluation programs.

The requirement for 2014 is two-fold:

1. Continue and expand test method development to address robots for vehicle-borne improvised explosive device (VBIED) response, for air deployment, and for water deployment. Both civilian bomb squads and military explosive ordnance disposal (EOD) specialists are currently focused on robots for responding to VBIEDs and have expressed a need for aerial observation robots and water-deployed robots.

2. Develop a standard describing (1) scenario-based drills for operator evaluation (based on published and developing robot test methods) and (2) instructions for building/configuring standardized apparatus to be used in performing the drills. The drill descriptions should have the necessary elements (e.g., performance checklists, time constraints, data sheets) to accurately evaluate robot operator capabilities in terms of situational awareness; maneuvering; terrain and obstacle negotiation; and manipulator strength, reach, and dexterity with an emphasis on VBIED applications. The instructions for building/configuring each apparatus would contain a bill of materials and tools, drawings, and assembly guidance so that each apparatus could be built and configured with the same result by any user of the standard. The instructions should also include guidance for packaging the apparatus in a portable container that could be easily shipped to civilian and military locations for training and evaluation. The resulting apparatus and packaging are referred to as "test methods in a box."

While improvised explosive devices (IEDs) continue to be of great concern, currently the focus has shifted toward VBIED response for both civilian and military bomb squads. The National Bomb Squad Commanders Advisory Board has identified the VBIED as the biggest threat to U.S. bomb technicians.

This project is not intended to replace regular scenario training and evaluations for robot operators. Instead, it will provide a means to objectively measure the skill level of a particular operator prior to performing more realistic operational tasks. This will also mesh with the new FBI Hazardous Devices School's Robotic "Mission Essential Task List" providing new operators with training prior to attending the basic robot school.

The ultimate objective is to encourage bomb squads to build and use the apparatus at their home training locations and promote use of mobile "test methods in a box" that can be shipped to regions for special events. Having this new standard could also support a program to build and deliver "test methods in a box" to individual agencies or bomb squads.

End-User Benefits: All military and public safety robot operators would benefit from these standards.

Related Standards: Many relevant standard test methods for response robots have been published by ASTM International.

Priority 2: Product standard for personal protective equipment for emergency medical services providers

Emergency Medical Services (EMS) providers respond to incidents involving injured or ill patients that must be treated and transported to the hospital. Those responders need protection against blood-borne pathogens, but because many incidents today involve hostile operatives, EMS providers also need protection against ballistics and other hazards. These responders need personal protective equipment (PPE) that has been demonstrated to meet their operational requirements and to also meet performance standards similar to those for law enforcement. The scope should address PPE worn (e.g., body armor) or carried (e.g., shields) by EMS to protect against ballistic and other hazard threats (including but not limited to infection control).

There is no comprehensive, integrated standard for EMS PPE to be worn when responding to medical emergencies in potentially hazardous or hostile environments (e.g., motor vehicle accidents, officer down, hostage rescue, hazmat exposure). EMS should select and wear PPE based on the expected environment that they are entering, not wear "all protection" to every incident. As an example, EMS may have to access a motor vehicle accident victim prior to fire or law enforcement arriving on scene and will be exposed to potential hazards (such as fire, blood-borne pathogens, cuts, punctures, abrasions), but they are likely only wearing a polyester shirt and pants. (Note: Traditional PPE in the hospital was for the protection of the patient, not protection of the provider. In the hospital setting, medical providers gear up for the expected condition, which is trauma. In the pre-hospital setting, that is not yet done.)

End-User Benefits: All EMS providers would benefit from having a product standard for PPE to protect against hazards expected during incident response.

Related Standards: NFPA 1999, NFPA 1951, NFPA 1992, NFPA 1994, NIJ Standard-0101.06, NIJ Standard- 0115.00

Priority 3: **Standard test methods for body armor designed for female wearers**

The performance of body armor for female officers has not been addressed by any published test methods. Many female officers have been surveyed and questioned about their body armor, and the majority report that their armor does not fit well and that they have issues with it in terms of abrasion, pain, etc.

There are currently no test methods for assessing body armor designed for females. Test methods are needed to assess:

1. Ballistic protection in terms of projectile penetration resistance and backface deformation.
2. Effect of air gaps behind armor. There is a recurrent discussion about the effect of air gaps between soft body armor and the body of the wearer that may occur due to the contour of the female form and poor fitting of armor to the body.
3. Effects of panel flexing on ballistic performance of shaped armor.
4. Coverage area, especially on the sides.
5. Ergonomics of shaped armor.

End-User Benefits: Female law enforcement, corrections, military officers, and any female responders wearing armor will benefit from having standard test methods for body armor designed for females.

Related Standards: NIJ Standard-0101.06

Priority 4: **Product standard for duty gloves worn by responders in a law enforcement and corrections role**

There is a need to develop a single standard containing performance requirements and test methods for protective gloves worn by law enforcement and corrections officers while on duty. Although there is an NIJ protocol for testing gloves, it was published in 1999, is out of date, and does not specify performance requirements.

At least the following criteria should be addressed:

- Dexterity and ergonomic requirements of officers
- Pathogen resistance
- Chemical resistance
- Cut resistance
- Tear resistance
- Puncture resistance, including needle stick
- Abrasion resistance
- Fire resistance for flash bang protection

End-User Benefits: Law enforcement, corrections, sheriff, and SWAT officers who wear protective gloves on duty.

Related Standards: Test methods exist to address many of the glove characteristics:

- NIJ Test Protocol 99-114 (1999), *Test Protocol for Comparative Evaluation of Protective Gloves for Law Enforcement and Corrections Applications*
- Standard EN 420: 2003, *General requirements for protective gloves*
- Standard EN 374: 2003, *Gloves giving protection from chemicals and micro-organisms*
- Standard EN 388: 2003, *Gloves giving protection from mechanical risks*
- ASTM D5151-99(2006), *Standard Test Method for Detection of Holes in Medical Gloves*
- ASTM F1671-13, *Standard Test Method for Resistance of Materials Used in Protective Clothing to Penetration by Blood-Borne Pathogens Using Phi-X174 Bacteriophage Penetration as a Test System*
- ASTM F1342-05, *Standard Test Method for Protective Clothing Material Resistance to Puncture*
- ASTM F1790-14, *Standard Test Method for Measuring Cut Resistance of Materials Used in Protective Clothing*
- ASTM D5712-10, *Standard Test Method for Analysis of Protein in Natural Rubber and its Products*
- ASTM D2582-09, *Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting*
- ANSI/ISEA 105- 2011, *American National Standard for Hand Protection Selection Criteria*

Priority 5: **Standard test methods for localization and tracking systems**

The capability to determine/estimate the location of an individual or an object inside a building, tunnel, mine, or similar environment has wide applicability in the responder community and is of interest to firefighters, law enforcement, emergency medical personnel, and the military.

Standard test methods are needed to allow performance of available localization and tracking systems (LTSs) to be assessed so that users are able to determine whether a given system meets their needs.

Requirements/Issues: The standard should address the following items:

- Localization accuracy, coverage and availability of the LTS inside buildings
- Latency

- Set-up time
- Robustness
- Susceptibility

In addition, a standardized test report should be included that will document the size and weight of the localization devices, their power consumption, battery life, the radio frequencies they use, features of the Graphical User Interfaces (GUIs), whether the system requires any infrastructure in the building to facilitate localization and tracking, whether it needs the floor plans of the building and global coordinates of the boundaries of the building, whether it needs training and calibration inside the building before the LTS could be used, etc.

End-User Benefits: Law enforcement, fire fighters, EMS, and military personnel would benefit from having standard test methods by which to assess performance of localization and tracking systems.

Related Standards: A draft standard is under development, *ISO/IEC Standard 18305*, but it should be evaluated to determine if it will meet the needs of responders in assessing available technologies.

Priority 6: **Product standard for body-worn video cameras used by public safety practitioners**

The field deployment of body-worn video camera systems by public safety practitioners (e.g., patrol, corrections, SWAT and other tactical responders) offers significant advantages in keeping officers safe, enabling situational awareness, and providing evidence for trial. A major issue with the use of body-worn video cameras is a lack of product standards, standard test methods, and operational standards.

Without such standards in place, practitioners lack adequate information to select the proper system that meets their requirements. The interoperability between systems and associated software also requires a set of standards. Further, such standards are instrumental in ensuring that evidence gathered from body-worn cameras meets courtroom standards.

Specifications that need to be addressed in a product standard include the following:

- Battery life, run time
- Video quality
- Night recording
- Recording limits
- Camera focal width (need wide field of view)
- Audio recording
- Camera placement

- Radio integration capability
- Downloading and storage of data (how it's done, time required, etc.)
- Propriety software
- Evidence requirements
- Encryption

End-User Benefits: Having a product standard would benefit law enforcement, corrections, sheriff, and SWAT officers who use body-worn video cameras.

Related Standards: NIJ Standards for law enforcement video equipment are under development, including standards for LPR systems, interview room recording systems, and in-car video systems. Some test methods could be adapted for body-worn cameras. UL has a performance testing standard for camera image quality that can be applied, *UL 2802*. UL has also undertaken development of a standard for tactical operations video cameras.

Priority 7: Product standard for less-lethal conducted energy devices

Performance requirements and test methods need to be developed to address the performance of conducted energy devices (CEDs) used by public safety practitioners. Three types of CEDs used by law enforcement and corrections are: (1) hand-held, (2) shield/baton, and (3) belt/band/sleeve.

While many studies have been performed on specific technologies to evaluate efficacy and, to some degree, evaluate the safety of these devices, there currently exists no standardized way to evaluate product performance prior to being marketed to agencies. Buyers must evaluate performance based on manufacturer claims and individual product performance demonstrations. No industry consensus standards or certification programs currently exist that would allow buyers and users of CEDs to make one-for-one comparisons between technologies or have some assurance that a technology has been through a minimum safety and efficacy evaluation.

For the three types of CEDs used, the expected operational outcome of each is identified as:

1. Hand-held CED: cause the subject to become compliant or temporarily (5 to 8 seconds) incapacitate the subject
2. Shield/baton: cause pain compliance
3. Belt/band/sleeve: temporarily incapacitate the subject

Examples of how CEDs are used in the field include the following:

- Corrections use stun batons as a warning
- Corrections use band/sleeves and stun belts for transporting and court appearances
- Law enforcement and corrections use shields for riot control and cell extraction
- Law enforcement, sheriffs, and corrections used hand-held devices for compliance and incapacitation of threatening or hostile subjects

The standard should address at least the following:

- Does the device do what the manufacturer claims? The performance requirement to address the operational outcomes could be something like "shall create and maintain *x* amount of voltage for 5 seconds."
- How do you know it is working? The CED must give some indication that it is functional.
- Battery life indicator
- Sights for aiming (e.g., laser)
- Resistance to dropping and impact
- Resistance to moisture from rain and high humidity

End-User Benefits: Standards for CEDs would benefit law enforcement, corrections, sheriff, and SWAT officers who use less lethal technologies and those who are engaged in the development and implementation of tactical operations procedures and related equipment.

Related Standards: There are currently no existing standards; however, a test method is under development by NIST through the International Standardization Organization (ISO).

Priority 8: **Product standard for less-lethal chemical devices**

Performance requirements and test methods need to be developed to address the performance of less-lethal chemical devices and their delivery systems. Several types of less-lethal chemical devices are currently in use, including OC (oleoresin capsicum) spray (i.e., pepper spray), CS (orthochlorobenzalmalonitrile) spray (i.e., tear gas), and smoke.

Several forms of chemicals are currently in use: solid, liquid, foam, and micro-pulverized. Typical dispersion methods include aerosol spray, non-pyrotechnic, burning, non-burning, and blast dispersion.

The standard should address at least the following:

- Performance requirements for each type of less-lethal chemical devices
- Safety mechanisms to protect the user
- Flash fire potential
- Dispersion methods
- Resistance to dropping and impact
- Resistance to extreme temperature

End-User Benefits: Standards for less-lethal chemical devices would benefit law enforcement, corrections, sheriff, and SWAT officers who use less lethal technologies and those who are engaged in the development and implementation of tactical operations procedures and related equipment.

Related Standards: There are currently no existing standards; however, NIST performed an evaluation of less lethal chemical devices and completed the following:

- Developed testing protocols for physical and chemical properties, as well as device performance
- Investigated physical and chemical properties of eleven commercial pepper spray products (≈1000 canisters)
- Drafted specifications for device properties have been developed (including physical, compositional, and operational specifications)

Priority 9: **Product standard for less-lethal impact devices fired from a launching system**

Performance requirements and test methods need to be developed to address the performance of less-lethal impact devices, such as polyurethane projectiles, plastic projectiles (e.g., Pepperball, FN), wooden batons, foam batons, and bean bags, fired from a launching system. The standard should not address the safety of the targeted individual/opponent.

The standard should address at least the following:

- Intended use (see examples below)
- Appropriate launching systems (single shot, over-under, multi-launcher, pump type; hand-held or shoulder-fired)
- Projectile type, materials, and number in cartridge

- Velocity – must meet manufacturer-specified velocity (Penn State did guide book on this, 2013)
- Accuracy
- Impact energy in foot-pounds (for pain compliance or Incapacitation)
- Effective range (minimum to maximum)
- Resistance to moisture from rain and high humidity
- Potential hazards
- Black powder/smokeless

Examples of how less lethal impact devices are used in the field include:

- Crowd control
- Targeting instigators
- Incapacitating threatening or hostile subjects
- Incapacitating suicidal subjects

End-User Benefits: Law enforcement, corrections, sheriff, and SWAT officers which use less lethal technologies. Specifically, officers engaged in the development and implementation of tactical operations procedures and related equipment.

Related Standards: There are currently no existing standards.

Priority 10: **Product standard for distraction devices (e.g., flash bangs)**

There needs to be a product standard developed for noise-flash diversionary devices (NFDDs), also known as distraction devices, flash bangs, or stun grenades, used by law enforcement and corrections officers.

Performance requirements and test methods need to be developed to address the performance of distraction devices used to disorientate and distract persons by producing a loud noise and a brilliant light.

Distraction devices may be divided into two categories:

1. Those that produce light and sound
2. Those that produce light and sound and eject either chemicals (OC/CS) and/or projectiles (rubber pellets)

Distraction devices may be divided into two body types:

1. Bursting canisters (single-use devices)
2. Non-bursting canisters (reusable/reloadable devices)

The standard should address at least the following:

- Construction: body material, venting
- Fuse type
- Candela: candle power of the flash
- Acoustic Sound (noise): blast overpressure and peak sound
- Fuse delay (from fuse initiation to device ignition)
- Emitted flash duration in seconds (burn time)
- Heat
- Fragmentation due to function (no fragmentation is acceptable)
- Projectiles (no unintended projectiles – e.g., fuse cannot become a projectile)
- Collateral effects (e.g., start of fire, disruption of vicinity)
- Propulsive movement
- One-time use vs. reloadable devices
- Safety considerations

End-User Benefits: Law enforcement, corrections, sheriff, and SWAT officers which use less lethal technologies. Specifically, officers engaged in the development and implementation of tactical operations procedures and related equipment.

Related Standards: There are currently no existing standards.

Priority 11: **Standard test method for respirator fit machines**

This test method was identified as an IAB priority for 2013 and continues to be a priority for 2014. Standard test methods are needed to assess the performance of respirator fit test machines. Responders who wear respirators are concerned that current testing is not sufficient, and they have questions:

- When fit test equipment is used, it gives a result, but what does that result mean?
- When routine calibration is done, what is the equipment calibrated to?

An example of a concern with current mask fit machines is that a mask could pass the fit test when it should have been failed due to such things as turning the head or an inconsistent interface between the mask and the machine.

The scope of the needed standard is to test the equipment used to fit respiratory protection to an individual. There are existing standards for programs and respirator fit methods but not for the fit test equipment.

End-User Benefits: All responders who use respiratory protection would benefit from having this standard test method.

Related Standards: Technology is currently in use, and no standard exists.