

# Fostering Innovation to Respond to Top Challenges in Law Enforcement

## Proceedings of the National Institute of Justice's 2018 Chiefs' Panel on Priority Law Enforcement Issues and Needs

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### Key Findings

An expert workshop of law enforcement executives and researchers identified several high-priority needs with respect to challenges and issues facing law enforcement. According to the panel members, law enforcement should

- identify and assess the existing and proposed best practices for physical, mental, and emotional support opportunities for law enforcement officers, families, and agencies
- develop early identification and intervention systems that can help agencies and officers get ahead of potential problems
- conduct research to identify what the sources of stress are and their likely impact on officer health and wellness
- conduct research to identify how public-sentiment monitoring tools and services, along with appropriate law enforcement interventions, can best be used to improve police-community relations
- develop systems to automate and accelerate review of evidence and generation of reports
- conduct realistic street-level research into interaction skills that are rooted in the practical reality of how most law enforcement scenarios evolve
- conduct research to identify the sets of skills, abilities, and experiences that are most useful to have in today's policing environment
- develop a continually updated inventory of law enforcement information analysis tools. This process should also highlight gaps in the available tools.

On August 28 and 29, 2018, the Priority Criminal Justice Needs Initiative (PCJNI) hosted a capstone workshop attended by a group of the nation's top law enforcement executives. The purpose of the workshop was to identify and characterize issues facing law enforcement today, including both challenges and opportunities, and needs for innovation that, if pursued, might help resolve those issues. The panel discussed the fact that law enforcement is faced with serious challenges that often do not have ready solutions available through the short-term development of science and technology. That said, the panel reported feeling that the challenges were tractable through other means. However, addressing these challenges will take concerted and collective effort across the criminal justice community, which includes stakeholders from local communities, social service providers, vendors, and researchers. Such stakeholders need to be willing to consider substantial and systemic improvements to public safety and criminal justice: The panel suggested a potential national commission to revamp criminal justice in the United States. The panel noted that the resulting solutions generally will need to be tailorable to jurisdictions' needs, must be accepted as suitable and effective by officers in the field, and must be accepted as legitimate by the community as assessed within the contexts (ethics, values, and judgments) of consent-based policing. The panel discussed the following top themes and needs:

- Responding to technological changes
  - **Vendor power.** Panelists noted that there is a need for practitioners to direct the evolution of law enforcement technology, rather than innovation that is largely driven by vendors and their business models, as is too often the case now. They called for the development of standards for certifying vendors' systems on whether they meet genuinely practitioner-derived operational needs and whether they properly secure sensitive data.
  - **Video and other digital evidence.** Panelists noted that the proliferation of video and other digital evidence is putting major strains on agencies' technical and investigative capabilities. They also noted that the push toward reliance on video data perhaps should be slowed. They called for a combination of technical fixes—e.g., using artificial intelligence to help review, redact, and report on evidence—and policy fixes—e.g., developing best practices on how to release data to the public.
  - **Cybercrime.** Panelists noted that the rise in cybercrime is challenging agencies in two ways. First, agencies' systems are vulnerable, especially from now-emerging internet of things devices, and agencies need help identifying the most-pressing vulnerabilities and how to defend against them. Second, panelists noted great uncertainty in what state and local agencies reasonably could and should do to respond to cybercrime in their communities, given that many such incidents are transnational crimes and beyond the technical capacity of many departments.
  - **The rise of new drugs.** Panelists noted a pressing need for noninvasive field tests that can detect whether someone is impaired from marijuana and other drugs besides alcohol, even as they recognized the technical challenges in doing so.
- Protecting officers' safety and health
  - **A critically stressful environment.** Panelists noted that today's environment is becoming so complex and challenging, and has so many competing demands, that it is endangering officers' health, wellness, and effectiveness. As one panelist said, "All we need to do is be perfect at all times in a constantly changing world." Panelists noted that there have been more suicides than line-of-duty deaths recently. They called for developing early warning systems and best practices for physical, mental, and emotional aids for officers.
- Strengthening police-community relations
  - **A need for short-term improvements.** Panelists reiterated the criticality of improving police-community relations and trust. In the short term, they called for studying the utility of public sentiment-monitoring tools and associated interventions to improve trust, as well as improved, more-realistic interaction skills training.
  - **The need for longer-term reform.** To get at the underlying causes of distrust, panelists called for a systematic review of the criminal justice system and the roles of all of its stakeholders. The President's Commission on Law Enforcement and Administration of Justice (1967) was an important model for this.
- Enhancing training, development, and management
  - **What should agencies do and how?** Panelists called for help to overcome mission creep, identify what they should and should not do, and identify services that could be consolidated or regionalized externally.
  - **Bringing in officers of the future.** Panelists noted a need for research to identify the skills, abilities, and experiences that officers will find most useful in contemporary policing. These abilities should start with problem-solving and interpersonal interactions.
- Sharing and using information
  - **Barriers to information-sharing.** Panelists noted the ongoing need to overcome cultural barriers to sharing information (e.g., "territorial mindsets"). They suggested that a federal law to protect sensitive law enforcement information might help overcome these barriers because providers would know that their data would remain protected.
  - **Information overload.** Panelists called for research on the most promising practices and technologies to address the ever-growing flood of information affecting officers in the field and at the station.
- Navigating public-private boundaries
  - **Autonomous vehicles.** Panelists discussed uncertainties about how officers will direct self-driving vehicles (e.g., at intersections and crossings) and collect data from them (e.g., crash data) when needed.
  - **Social media investigations.** Panelists called for research to identify gaps and solutions—including legislative solutions—to ensure that operationally needed data requests (e.g., in support of major crime investigations) are handled appropriately.

- **Practitioner-researcher relationships.** Panelists called for improved relationships while conducting research and for improvements to make research results easy to find and use.

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## INTRODUCTION

The National Institute of Justice (NIJ) National Law Enforcement and Corrections Technology Center (NLECTC) PCJNI is tasked to assist NIJ to identify and assess the highest-priority technology needs of law enforcement, courts, and corrections agencies and identify potential solutions to those needs. The PCJNI is a partnership of the RAND Corporation, the Police Executive Research Forum (PERF), the University of Denver, and RTI International.

The PCJNI's needs assessment tasks have been carried out at multiple levels. Sector-level (law enforcement, corrections, courts) panels provide a wide characterization of priority needs for innovation across an entire community of practice. PCJNI reports on prior sector-wide panels for law enforcement include the following:

- *High-Priority Information Technology Needs for Law Enforcement*, which identified needs for innovation broadly related to IT and data (Hollywood, Boon, et al., 2015)
- *Visions of Law Enforcement Technology in the Period 2024–2034*, which is a futuring study in which participants were asked to envision possible paths ahead for law enforcement and what was needed to move down desirable paths and avoid undesirable ones (Silberglitt et al., 2015)
- *Fostering Innovation in U.S. Law Enforcement*, which provided a sector-wide view of law enforcement's priority needs for innovation (Hollywood et al., 2017).

Workshops focus on needs to address specific key technologies or problems facing the criminal justice community. PCJNI reports on prior law enforcement–relevant workshops include the following:

- *Digital Evidence and the U.S. Criminal Justice System*, which examined needs to acquire and use the rapidly increasing amounts of digital evidence (Goodison, Davis, and Jackson, 2015)
- *Using Future Internet Technologies to Strengthen Criminal Justice*, which examined needs to take advantage of opportunities and mitigate threats resulting from rapidly emerging internet-enabled technologies, including the internet of

things (IoT) and the semantic web (Hollywood, Woods, et al., 2015)

- *Using Future Broadband Communications Technologies to Strengthen Law Enforcement*, which examined needs for law enforcement to take advantage of emerging networking technologies effectively (Hollywood, Woods, et al., 2016)
- *Identifying Law Enforcement Needs for Access to Digital Evidence in Remote Data Centers*, which assessed needs for state and local law enforcement to effectively access data needed for investigations but that are stored in remote facilities, cloud services, or social media data centers (Vermeer, Woods, and Jackson, 2018)
- *Using Social Media and Social Network Analysis in Law Enforcement*, which assessed use cases, protections (e.g., security, privacy, and civil rights), and needs for innovation for law enforcement to use social media data and social network analysis methods and tools effectively (Hollywood et al., 2018a)
- *Using Video Analytics and Sensor Fusion in Law Enforcement*, which assessed business cases, protections, and needs for innovation for law enforcement to use video analytics and sensor fusion technologies effectively and safely (Hollywood et al., 2018b).

On August 28 and 29, 2018, the PCJNI hosted a capstone workshop during the fifth year of the initiative. In our previous law enforcement workshops, participants identified many individual needs. Our goal was to draw on the expertise of leading police chiefs and executives to focus on the most critical issues and needs for innovation. The panel did not attempt to recruit a representative sample of executives, nor should the results be considered representative of law enforcement practitioners' general opinions on technologies. Instead, the results reflect the expertise and experience of the panelists, similar to other blue-ribbon senior advisory panels. That said, panelists have a range of experiences in varying roles and different types of agencies. Panelists are listed in the text box.

The panel examined the following six overarching topics identified by PCJNI researchers from looking across the high-priority needs in previous reports:

- learning about, acquiring, and leveraging new technologies and dealing with technological change in society
- protecting officers, including both line of duty safety and officer physical and mental health
- strengthening police-community relations and building trust

## Workshop Participants

### **Richard Biehl**

Dayton, Ohio, Police Department

### **Jean-Michel Blais**

Halifax Regional Police

### **Jimmy Chapman**

Roanoke County, Virginia, Police Department

### **John Donohue**

New York Police Department

### **Chris Fisher**

Seattle, Washington, Police Department

### **Randall Hargus**

Fairfax County, Virginia, Police Department

### **Damian Huggins**

Nashville, Tennessee, Metropolitan Police Department

### **David Kurz**

Durham, New Hampshire, Police Department

### **Jonathan Lewin**

Chicago, Illinois, Police Department

### **Sean Malinowski**

Los Angeles, California, Police Department

### **Richard Myers**

Major Cities Chiefs

Newport News, Virginia, Police Department (formerly)

### **Leslie Parsons**

Washington, D.C., Metropolitan Police Department

### **Dinesh Patil**

Montgomery County, Maryland, Police Department

### **Gene Spaulding**

Florida Highway Safety and Motor Vehicles

### **Kevin Young**

New York Police Department

- addressing training, staff development, resource, and management issues
- balancing the drive to keep and share data with potential information overload
- navigating the boundary between the public and private sectors.

This report provides the results of the 2018 NIJ Chiefs' Panel, including

- summaries of the top issues and challenges facing law enforcement, as identified by the panelists, and the discussion about them
- a set of needs for innovation that, if addressed, would be most likely to remediate one or more of the challenges and improve key law enforcement outcomes as a result
  - as needed, we provide comments on discussions the panel had about the needs to provide context for researchers, technology developers, funders, and the law enforcement community
  - some of the challenges the panelists reported as the most pressing did not have identified priority needs for innovation. This did not have to do with the importance of the challenge—rather, it meant that the panel did not identify any ideas for innovation that they felt the U.S. Department of Justice could fund to address the challenge substantively with a limited time and budget.

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## METHODOLOGY

The 2018 Chiefs' Panel was subdivided into eight discussion sessions across a day-and-a-half meeting in Washington, D.C. Each of the first six sessions covered one of the overarching topics listed earlier. The seventh session was open, and we asked panelists to discuss challenges or opportunities that had not been discussed previously. In the final session, we asked the panelists for their conclusions about the results of the discussion over the prior day.

During each session, the panelists were first asked to identify top issues facing the field within each topic. These could be problems facing policing or opportunities to improve police practices. Panelists were also asked to discuss each issue, explain what it was and why it was important, and describe context about it. To kick off the discussion, some of the high-priority needs and issues identified in the previous law enforcement

panels noted at the start of this section were used to introduce each session. This list is included in Appendix C.

From there, panelists were asked to brainstorm needs for innovation. These needs are calls for specific ways ahead that could address each issue (e.g., something that could help alleviate a problem or leverage an opportunity). These needs could be science and technology–related or could relate to the development of new policies, practices, training, or research and evaluation.

Panelists were asked to assess the identified needs along two dimensions. The first dimension was the importance of the need to the field, which panelists rated on a scale from 1 to 9, where 1 was “low importance” and 9 was “high importance.” The second dimension was the feasibility of addressing the need from technical, resource, and operational perspectives (e.g., could we develop it? Could agencies afford it? Could agencies use it in practice?). Feasibility was also rated on a scale from 1 to 9, where 1 was “not likely to succeed or high-risk” and 9 was “likely to succeed or low risk.” We then computed expected value (EV) scores for each need by multiplying the two ratings together (see Figure B.1 in Appendix B for a fuller explanation of how the EV tiers were developed).

Panelists assessed the needs in three rounds. The first two rounds of ranking were done in each individual session—e.g., rating the set of needs identified in the “addressing training, staff development, resource, and management issues” discussion—and the last round of ranking was done across all the needs identified in all of the sessions. After the first round, panelists saw how all others rated the need and, where there was divergence in the ratings, they had brief discussions on why they rated the needs as they did. The discussions brought up points clarifying what the needs were and providing additional technical or operational insights. After hearing the discussions, the panelists rerated the need based on what they heard. Following the second round of voting, we used a clustering algorithm to group the needs into three tiers (Tier 1, high EV; Tier 2, medium EV; and Tier 3, lower EV). In the third and final round, panelists had the option to cast votes to move needs up and down tiers if they disagreed on how the need’s overall value had been classified.

Each need was assigned one to five stars, with five stars having the highest priority. Figure 1 shows how these stars are assigned conceptually. The star ratings are as follows:

- Five-star needs are the top-ranked needs out of the panel; in the table, they are highlighted in dark green. (In this

panel, there were three needs that had EV scores that were well above the others.)

- Four-star needs are Tier 1 needs with high EVs and are highlighted in green (e.g., high importance and high feasibility).
- Three-star needs are high-value needs and are highlighted in pale green (e.g., maximum importance scores but lower feasibility scores)
- Two-star needs are Tier 2 needs with medium EVs and are highlighted in yellow (these needs have a middling combination of importance and feasibility scores).
- One-star needs are Tier 3 needs with lower EVs and are highlighted in pale red (they have a comparatively low combination of importance and feasibility scores).

Needs with three or more stars (top-ranked, Tier 1, and high-value needs) are the high-priority needs for innovation that emerged from this panel.

The following sections summarize the discussion the panelists had on each topic. Each section first presents an overview of the topic, covering the panelists’ discussion points and priority needs related to the topic from past reports. Panelists’ names and identifying characteristics have been removed to ensure their anonymity. Each section then covers major themes on top challenges and opportunities facing law enforcement today, the needs for innovation associated with each theme, and each need’s priority. In call-out boxes we present the specific needs for innovation associated with each theme. The call-out boxes show the needs’ descriptions and star ratings, which are shaded according to the associated color in Figure 1. The final section starts with a summary of the top themes, sub-themes, and priority needs, and ends with conclusions drawn from the panel discussion in reaction to these findings.

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## RESPONDING TO TECHNOLOGICAL CHANGES

Because this research effort focused on needs for innovation, past panels have identified a variety of technological opportunities that could be valuable to law enforcement, including information technology, big data, artificial intelligence, sensors, robotics, and unmanned aircraft systems (UASs). However, they also highlighted barriers to departments acquiring and adopting new technologies and practices, including

- the development of use cases and meshing new tools with existing practices
- difficulties in acquisition processes
- cybersecurity and interoperability issues
- unintended consequences (e.g., floods of body-worn camera data challenging data management)
- citizen concerns about law enforcement technology use (e.g., UASs, social media data, facial recognition).

Technological change in society also has been a source of challenges raised by workshop participants, including digital evidence acquisition, new technology-enabled crimes, and novel illegal substances.

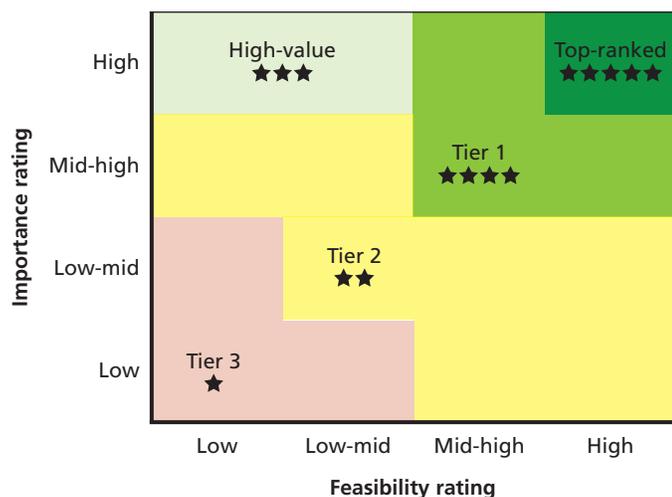
## Overview of Themes from the Panel Discussion

The panel discussion on this topic, and the subsequent identification of needs for innovation, can be subdivided into the following four key themes:

- Practitioners need to direct the evolution of law enforcement technology, rather than vendors and provider business models driving innovation, as is too often the case now.
- Law enforcement is increasingly challenged by growing volumes of video and other digital evidence. Specifically,
  - the proliferation of video evidence from all sources is causing major policy and resource challenges and perhaps should be slowed down
  - more broadly, policy and resource demands related to releasing data to the public are major challenges, and there is a need to find ways to reduce the burdens
  - new capabilities to train officers are needed to keep pace with emerging technologies.
- Law enforcement is increasingly challenged by the rise of cybercrime. Specifically,
  - law enforcement is not adequately prepared for cyber threats against its systems and equipment and is especially unprepared for emerging IoT threats
  - the roles of state and local law enforcement in combating largely transnational cybercrimes need to be determined.
- Law enforcement is facing both significant challenges and opportunities in physical forensics, including
  - a pressing demand for noninvasive field tests to detect impairment from a full range of emerging substances, although panel members appreciated the great technical difficulties in doing so
  - a set of questions about emerging biometrics forensics technologies that need to be addressed, such as real-world efficacies and needed civil rights protections, before these technologies can enter wider service.

Within each theme, needs are presented in priority order. High-priority needs are highlighted in green, with five-star (top-ranked) needs in dark green, four-star (Tier 1) needs in green, and three-star (high-value) needs in light green. Medium-tier needs are highlighted in yellow (Tier 2). Lower-tier needs are highlighted in red (Tier 3).

**Figure 1. Prioritization of Needs by Importance and Feasibility**



## Theme 1: Practitioners, Rather than Vendors, Should Direct the Evolution of Law Enforcement Technology

Panelists discussed the general theme that vendors have too much power in law enforcement technology. Specifically, they discussed the fact that technology providers have such an advantage in technical expertise and resources that it is often the vendors who set the requirements and directions of law enforcement technology.

**Market power.** Panelists noted that law enforcement typically constitutes a small percentage of larger vendors' business, while law enforcement is dependent on a few vendors. According to some panel members, once an agency commits to, for example, a specific vendor's records management system or communications infrastructure, that vendor has the power

to set its own standards and pricing. Handling and securing sensitive operational information (i.e., making that information sharable when needed but also ensuring that it is secured) were noted as specific problems for vendors' systems.

**Vendors' technology expertise.** The panel noted that beyond market power, vendors dominated in terms of technical know-how of the available systems. This problem has reportedly gotten worse over time: One panelist noted that agencies used to have mechanics who could modify police vehicles, but there was no equivalent for digital technology. Similarly, panel members reported believing that technology administration does not overlap much with most policing work, leading agencies to hire private contractors for their systems and devices and further reinforcing vendors' power to direct law enforcement acquisition or use of their provided technologies.

**Vendors defining law enforcement's technology needs.** As one panelist put it, vendors' market power and expertise often meant that vendors ended up telling agencies what they thought the agency needed, rather than agencies and practitioners defining their own requirements and having vendors meet them. As shown in the quote, panelists discussed a general need to have practitioners set technology needs instead.

Panelists described that practitioners need to find means to speak to vendors with a clearer, more authoritative voice, perhaps by having the field's own standards bodies and deliberative events (e.g., conferences, workshops) establish standards before agencies talk to vendors. Such events also would help agencies—especially small and medium-sized agencies—understand technology needs, rather than have them rely on vendors to tell them their needs.<sup>1</sup>

These new standards would establish minimum needs for any major law enforcement technology. Panelists also said that any such standards need to be narrowly focused, rather than cover too broad an area, which may not be useful to law enforcement agencies.

Some panelists reported thinking that perhaps NIJ should “fill this hole” by establishing uniform standards and certification schemes for various technologies in partnership with associations and industry because NIJ did this effectively with body armor. That said, panelists mentioned the downside that standards development, maintenance, and compliance testing programs are very costly. They also reported believing that the needs they developed to address this issue—i.e., standards for vendor processes to protect sensitive information, as well as standards for acquisition and operation of core technology systems—were too high-risk and limited to be high-priority

needs. Still, panelists seemed to agree that something substantive is required to help law enforcement practitioners set their own technology needs and directions.

“Find a way to get the great minds of policing who can identify and articulate the vulnerabilities in policing with the minds in technology who can plug those holes.”  
—Panel Member  
(paraphrase)

### Innovation Needs Related to the Evolution of Law Enforcement Technology

★★ (Tier 2)	<p><b>Issue:</b> It is difficult to ensure that vendors are following best practices with respect to their operational processes and the handling and securing of sensitive information.</p> <p><b>Need:</b> Develop standards for certification of vendor processes and systems.</p>
★ (Tier 3)	<p><b>Issue:</b> Vendors have excessive market power with regard to developing specifications and purchasing terms for law enforcement acquisitions.</p> <p><b>Need:</b> Work with standards organizations to develop and identify national standards for acquisition and operation of technology systems that are timely and responsive to the needs of agencies.</p>

## Theme 2: Law Enforcement Is Challenged by the Growing Volumes of Video and Other Digital Evidence

### *The Proliferation of Video Evidence from All Sources Is Causing Major Policy and Resource Challenges*

Panelists expressed a range of concerns about the rapid increase of law enforcement video from all sources, to the point of discussing whether law enforcement should rethink at least the rate of growth of video evidence. Issues included the trustworthiness and evidentiary value of video, as well as the high resource demands placed on officers as a result of its use.

**Trustworthiness of video.** Panelists noted that there is growing distrust of video evidence, including on juries. The panel noted that they are aware of emerging “deepfake” technology, which permits certain aspects of video to be falsified. A deepfake video, for example, could simulate a real-looking politician stating incendiary rhetoric on a video clip. (Vincent [2018] describes this technology and congressional concerns about it.) Several panel members said that they were aware of cases in which jury members stated that they simply did not trust a video because they thought the police might have faked it.

**Evidentiary value of video.** Panelists noted an increasing range of perspectives on the value and appropriateness of capturing and showing video evidence from body-worn cameras. One panelist noted that he or she quickly realized

### Innovation Needs Related to Video and Other Digital Evidence

☆☆☆ (Tier 1)

**Issue:** Time in station is going up because officers are spending more time writing reports and reviewing video evidence.

**Need:** Develop systems to automate and accelerate review of evidence and generation of reports.

NOTE: The panel did not identify needs for innovation directly related to the trustworthiness or real-world value of video evidence. They saw these as broader questions for the field.

that the videos shown on cameras often did not reflect the real situation experienced by officers (because of limited camera viewsheds and other limitations). Another panel member asked if body-worn camera video was really going to resolve the issue of problematic interactions between officers and those they contact. Panelists also noted local cases of community and civil rights activists shifting from supporting body cameras to being against them, on the grounds that they were violating community members’ privacy rights.

**High resource demands.** Panelists discussed the fact that the resource costs to collect and handle video evidence are likely to continue to increase in the future. They noted, for example, that reviewing video evidence so that the interpretation of events captured on video would hold up in court was taking an ever-larger share of officer time. There was also a discussion that despite vendors’ promises, artificial intelligence (AI) and other video evidence management tools have yet to reach sufficient maturity to provide much help to agencies. It was noted that police need video analytics to be good enough to recognize specific types of crimes in progress and provide enough data (e.g., high-resolution images, other sensor data) to be able to recognize the persons involved. The perception was that current capabilities to recognize the presence of people and vehicles or to estimate crowd density, for instance, were not sufficient.<sup>2</sup>

### *Policy and Resource Demands Related to Releasing Data to the Public Are Major Challenges*

Panelists noted that agencies are facing policy and resourcing challenges in responding to requests to release data to the public.

On the policy side, panelists noted a general difficulty managing policies for data release, retention, and management. Some panelists expressed a desire for national consensus on guidelines for law enforcement capture, use, retention, and release of data. This would be followed by assistance in helping

“Is this the route we *really* want to go down?” — Panel Member (paraphrase on the ongoing proliferation of law enforcement video and the demands associated with utilizing it)

## Innovation Needs Related to Releasing Data to the Public

☆☆☆ (High value)	<p><b>Issue:</b> It is difficult to develop and implement policies for managing digital data that could be publicly released (review, redaction, etc.).</p> <p><b>Need:</b> Develop best practices and national model policies for handling and releasing data collected by law enforcement.</p>
★ (Tier 3)	<p><b>Issue:</b> Public trust of law enforcement is lacking with respect to handling the security of data held by law enforcement (especially for victims).</p> <p><b>Need:</b> Develop best practices and standards for handling and securing public data held by law enforcement. (Security measures would, for example, ensure that video with sensitive details about victims is not made public.)</p>

agencies better understand the resulting policies for releasing data versus withholding those data. However, a key challenge to such national guidelines is the wide variation in state and local laws dictating retention and release that are currently in place. One point of concern was the growing call for officers filming or on video to be identified in video releases.

On the resourcing side, panelists said that the increasing volume of sensor data, especially video, was multiplying burdens on agencies. Some of these burdens had to do with storing large amounts of video (from body-worn cameras, surveillance cameras, etc.) and other data. Others specifically had to do with redacting video footage prior to release. Redaction of video (to blur faces of bystanders, for example), typically must be done manually, which is highly labor-intensive.

## New Training Capabilities for Digital Forensics Are Required

Panelists noted that training to keep law enforcement personnel at the forefront of digital forensic evidence acquisition and processing is critical. They noted that investigative demands require officers to capture data from many kinds of new devices (e.g., Android, Apple iOS, computers, tablets). Such devices may have different needs for evidence acquisition and processing that require specific training.

The panelists saw getting data from emerging autonomous vehicles to be a special challenge. They noted that investigators do not have the expertise or capabilities to download data from

## Innovation Needs Related to New Training Capabilities for Digital Forensics

☆☆ (Tier 2)	<p><b>Issue:</b> It is difficult to keep local policies current for handling digital forensic evidence.</p> <p><b>Need:</b> Work with standards organizations to inventory national standards for collection and handling of digital evidence, identify gaps, and work to fill them. (This was described as a precursor to creating improved trainings.)</p>
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vehicles directly—they would need to contact the manufacturer to acquire the data. In fact, some panelists noted that there is a challenge in simply stopping an autonomous vehicle without sensors to recognize law enforcement vehicles or police access to a “kill switch” to power down the vehicle.

## Theme 3: Law Enforcement Is Challenged by Increasing Cybercrime *Law Enforcement Is Not Prepared for Cyber Threats, Especially Threats from the Internet of Things*

The panelists discussed that law enforcement in general is not well prepared for cyber threats, especially those from IoT devices and sensors.

**Cybersecurity of existing systems.** Panelists noted that the current level of security of law enforcement information systems is not where it should be, given many agencies’ use of outdated technologies and a slow update cycle. The panel members also noted an ongoing need for baseline best practices and standards on information system security and privacy.

**Security of victim information.** A specific concern raised by the panel was ensuring the security of data that provide personal details of victims. Despite the great sensitivity of such data, panelists noted that there is not a regulatory basis to specify and ensure strong and uniform cyber protections for this information.

**Increasing risks from devices.** The panel discussed that the number of smart devices—starting with phones and tablets and including health trackers and embedded internet-enabled devices in cars and clothing—is growing. There also are increasing numbers of programs and apps being run on these devices, such as officer-installed apps with unknown data retention and cybersecurity protections. These, in turn, are increasing the “attack surface” of police departments—i.e., proliferating the number of ways in which hackers might attempt to attack an agency.<sup>3</sup> Panelists discussed that neither technological protections (controls to prevent officers from installing danger-

**Innovation Needs Related to Cyber Threats**

☆☆☆ (High value)	<p><b>Issue:</b> Law enforcement is generally unaware of the coming wave of vulnerabilities and opportunities from the explosive growth in the reliance on IoT devices, networks, and self-driving vehicles.</p> <p><b>Need:</b> Conduct research to identify the potential opportunities and impacts of cyber vulnerabilities and potential legislative and policy solutions. (This research should focus on IoT vulnerabilities but should include vulnerabilities in general.)</p>
★ (Tier 3)	<p><b>Issue:</b> It is difficult to investigate and police multijurisdictional cybercrimes using a traditional single geography jurisdictional approach.</p> <p><b>Need:</b> Explore the costs, risks, and benefits of establishing an international information-sharing system that can identify and highlight cross-jurisdictional cybercrime patterns based on local reports.</p>

ous apps, for example) nor training provided to information technology (IT) personnel or officers is currently sufficient.

**Data ethics risks.** Panelists also noted that as more and more data are moved online (e.g., it was noted that in five years, drivers’ licenses could be all-digital),<sup>4</sup> ethics-related risks of accessing or using data inappropriately also are increasing. Panelists noted general needs to consider such issues as who owns the data and the conditions and protections under which they can be used by law enforcement.

“Even if we could dedicate enough resources to fight cybercrime, how would we do it?”

— Panel Member (paraphrase)

**Law Enforcement’s Role in Fighting Cybercrime Needs to Be Determined**

The panel members noted that law enforcement today is not well prepared to deter and investigate cybercrime. As shown by the panelist’s comment, the panel raised more-fundamental questions about what state and local agencies’ roles in fighting cybercrime should be because most cybercrime cuts across national—and, more commonly, international—boundaries. A panelist noted that agencies were trying to fight largely transnational cybercrime using locally focused rules and resources that are inadequate. He or she also noted that it is hard to determine who is genuinely responsible to respond to cybercrime and invest in investigative resources.

It was noted that the current state of affairs often leads to victims of cybercrime being frustrated when their local agency has no means or resources to investigate incidents in which they were harmed. It was further noted that some agencies will not investigate fraud cases unless large dollar amounts are involved (\$100,000 and up was one figure noted) but that smaller losses could still be very serious for individuals, and local police inability to respond to cybercrimes could seriously damage police-citizen trust. It was further noted that the biggest losses typically are incurred by large corporations, and that it is unclear whether state and local law enforcement has any role to play with respect to those attacks. Panelists also discussed that total losses from many comparatively small-dollar attacks could be collectively huge, with hackers virtually guaranteeing a lack of attention from law enforcement if individual attacks stayed small.

Panelists noted that cybercrime is a broad, hard, global problem and that research is needed to determine where responsibilities should lie for dealing with different thresholds of attack and response. One potential approach is for local agencies to act as a combined educational and referral service for cybercrime, seeking to inform residents about the threat and

**Innovation Needs Related to Law Enforcement’s Role in Combating Cybercrime**

☆☆ (Tier 2)	<p><b>Issue:</b> It is difficult to investigate and police multijurisdictional cybercrimes using a traditional single-geography jurisdictional approach.</p> <p><b>Need:</b> Develop a framework for identifying which entities (international, federal, state, local, private companies, individuals, etc.) and what actions should be taken to begin to mitigate the rise in cybercrime.</p>
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ways to protect themselves and then referring victims to federal agencies or other resources.

The panel identified one need for this topic: research to develop a general strategy on which organizations should take the lead regarding various cybercrimes and how that would be determined. It was of middling priority to the panel (Tier 2), possibly trading off the growing importance of the area with the uncertainties about state and local agencies' roles to combat it.

## Theme 4: Law Enforcement Faces Challenges and Opportunities in Physical Forensics Technologies

### *Noninvasive Field Tests Are Needed to Detect Impairment from Marijuana, Opioids, and Other Drugs*

Panelists noted that there is a need for new field tests capable of assessing impairment and/or intoxication like the testing devices used for alcohol, but for marijuana and other drugs. These new tests should be noninvasive and able to determine the type of intoxication and level of impairment. The tests need to diagnose acute impairment or intoxication rather than merely the presence of the drug. For example, a person will test positive for THC up to a month after using marijuana, by which time any impairment will be long gone.

The panelists noted that developing these tests will be technically difficult. They also felt that the underlying legal and medical question—i.e., What constitutes impairment from various substances?—may be a more important research issue.

The panel identified two needs for this topic, one for basic research to identify what drug levels cause impairment, and one to develop the tests. Both were rated as high-value needs with great importance for the field. However, both were ranked as low (basic research) or middling (test development)

### Innovation Needs Related to Noninvasive Drug Field Tests

☆☆☆ (High value)	<p><b>Issue:</b> It is difficult to rapidly determine when a person is potentially impaired by drugs.</p> <p><b>Needs:</b> Conduct research to identify the levels of drug intoxication that lead to impairment. Conduct research to develop a noninvasive field test to determine the type and level of acute impairment.</p>
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value because panelists were skeptical about the practicality of addressing these major challenges with short-term research.

### Common Questions About Biometric Forensics Technologies Need to Be Addressed

**Common questions.** The panel discussed the ongoing increase in biometrics technologies that can be used to identify perpetrators of crimes. Panelists also noted that there are questions about these technologies that need to be addressed, such as

- how effective and reliable these technologies are in the real world
- whether the technologies should be reflected in, or have access to, Federal Bureau of Investigation (FBI) biometrics databases
- how much priority should be placed on using the technologies for certain types of crimes, given cost and reliability concerns
- what the civil liberties concerns are for the technologies
- what the public, practitioners, and courts should be educated about for each technology.

**Lack of understanding of rapid DNA.** According to the FBI, “Rapid DNA . . . is a term used to describe the fully automated (hands free) process of developing a DNA profile from a reference sample buccal (cheek) swab without human intervention” (FBI Laboratory Services, undated). One goal of the FBI’s Rapid DNA Initiative is to be able to return DNA profiles of arrestees, as well as matches to crime-scene DNA stored in an FBI database, within two hours (FBI Laboratory Services, undated).

In this area, panelists specifically focused on issues surrounding rapid DNA identification at the time of arrest. They

### Innovation Needs Related to Biometrics Forensics Technologies

☆☆☆ (High value)	<p><b>Issue:</b> The state of the art for the capture and use of biometric information is evolving quickly.</p> <p><b>Need:</b> Conduct independent research and evaluation to assess the current state of reliability for each technology.</p>
☆ (Tier 3)	<p><b>Issue:</b> The state of the art for the capture and use of biometric information is evolving quickly.</p> <p><b>Need:</b> Develop and market a criminal justice practitioner (law enforcement, labs, and courts) education campaign on biometric technology considerations and how and when to use each technology.</p>

noted a lack of education and understanding among the public, practitioners, and prosecutors about its real capabilities and effective use that should be remedied.

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## PROTECTING OFFICERS' SAFETY, PHYSICAL HEALTH, AND MENTAL HEALTH

Protecting officers' well-being has been one of the highest-priority objectives identified in previous panels, and notably in the sector-wide panels (Hollywood, Boon, et al., 2015; Hollywood et al., 2017). In these previous panels, various facets of officers' line-of-duty safety have been raised—specifically,

- personal protective equipment, including enduring body armor concerns
- sensors and positioning technology
- the unintended consequences of adding more technology to officers in the field.

In addition, officer physical and mental health apart from risks arising directly in police work have been prominent—specifically,

- mental health support concerns
- monitoring stress and health status in the field
- interventions to improve officer health.

The discussion and needs under this topic were captured by one major theme: Today's complex and challenging policing environment is endangering the health, wellness, and performance of officers.

### Theme 5: Today's Policing Environment Is Endangering Officers' Health, Wellness, and Performance

Panelists claimed that the number, complexity, and severity of current and emerging threats are increasing faster and faster. Challenges today's officers face include being overloaded with information, having to adapt to new technologies, dealing with social media influences and misinformation, and facing a high

level of scrutiny. Panelists also reported feeling that agencies and, hence, officers themselves did not have sufficient resources to respond to this environment.

These pressures, combined with a lack of resources, were seen as likely to have negative effects on officers' physical and mental health. During the panel, it was noted that the World Health Organization projected that depression would be the second-most common disability by 2020 in the general population, and these competing pressures were only adding to the already heavy burden on officers.<sup>5</sup> Panelists also noted that suicide resulting from stress is taking more officer lives than shootings in the line of duty.<sup>6</sup>

Panelists suggested that there is a need for better training and resources for officers to deal with these issues, and, as one panelist put it, training is needed on "how to work with [officers'] own minds." At the same time, panel members noted being aware of only a few studies that show what works to improve officer effectiveness in response to complex, stressful environments.<sup>7</sup> The panel thus discussed various types of research and dissemination that are needed, along with certain considerations.

**Nationwide assessment of officers' mental health.** Panelists stated that some form of national assessment for agencies and officers is necessary in order to diagnose the extent and nature of mental health issues currently challenging practitioners. They noted that the assessment needs to be national and representative and needs to take into account the potential of stigmatizing certain agencies by highlighting their burnout rates.

**Workforce and retention implications.** Panelists noted that resilience to stress has workforce and retention implications, and that there is a need to better screen new officers for resiliency and susceptibility to posttraumatic stress disorder.

**Support for smaller agencies.** Panelists asked about and discussed how a broader, forward-looking perspective on officer health from the assessment could be disseminated to more agencies. There was a special need to disseminate results to smaller agencies with fewer resources; panelists said that agencies that do not have the resources to deal with issues of officer stress are at greater risk.

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“Officers are required to be perfect in a dynamic environment.” — Panel Member (paraphrase)

## Innovation Needs Related to Officers' Health, Wellness, and Performance

★★★★★ (Top ranked)	<p><b>Issue:</b> Officer burnout and suicide are significant problems.</p> <p><b>Needs:</b> Identify and assess the existing and proposed best practices for physical, mental, and emotional support opportunities for law enforcement officers, families, and agencies. Develop early identification and intervention systems that can help agencies and officers get ahead of potential problems.</p>
★★★★★ (Tier 1)	<p><b>Issue:</b> The environment for policing has continued to become more complex and dynamic with respect to current and emerging threats (e.g., technology, information, social media, misinformation, mental health, levels of scrutiny, mass shootings, ambushes).</p> <p><b>Need:</b> Conduct research to identify what the sources of stress are and their likely impact on officer health and wellness.</p>

NOTE: Two of the top three highest-rated needs fell in this theme, which emphasizes its importance to the panel.

**Engagement with unions.** Panelists noted that those seeking to implement new health programs and technologies risked pushback from unions and other officer advocacy groups because of concerns that these assessments might jeopardize officers' privacy rights. It was noted that union leaders and officers need to be stakeholders and partners in any approach to improve officer health. It was also suggested that giving some resourcing and responsibility for officer health to the unions could be effective in some cases.

**The growing presence of women in law enforcement.** Panelists noted that the recommended assessments should reflect and support the growing presence of women in policing.

**Family involvement.** Panelists suggested that involving officers' families in new health strategies is more likely to change officer behavior. They also suggested that strategies should include identifying mental health professionals who are familiar with officer roles and responsibilities because they would be better able to work effectively with officers.

## STRENGTHENING POLICE-COMMUNITY RELATIONS AND BUILDING TRUST

Such events as the civil unrest and protests following officer-involved deaths in Ferguson, Missouri; Baltimore, Maryland; Staten Island, New York; Cleveland, Ohio; and Chicago, Illinois brought to the fore problems with relationships and trust between law enforcement agencies and the communities they serve. In the 2016 sector-wide Law Enforcement Advisory Panel, the participants rated the policing objective to "improve the public's trust of law enforcement" as the top priority out of eight objectives (Hollywood et al., 2017, pp. 36–37). However, there is some evidence that technological solutions employed to date, such as body-worn cameras, may not contribute to building trust (Goodison et al., 2017).

In previous workshops over the past four years, a variety of issues relating to police-community relations have been raised in this area, including

- public communications strategies
- the potential and challenges of increased transparency
- translation and cross-cultural issues
- implementation of community policing strategies
- procedural justice.

"Only a small portion of major crimes in the United States are reported and, of those reported, comparatively few crimes are solved, meaning that only a small percentage of victims receive justice through the criminal justice system." — Panel Member (paraphrase)

We discuss these issues in more detail in the following sections.

### Theme 6: A Systematic Review of the Criminal Justice System and the Roles of All Stakeholders in It Is Needed

Discussion on this topic began with comments that those concerned with trust commonly focus on bias in policing, but this is too myopic—the criminal justice enterprise needs a system-wide overhaul. Some panel members claimed that biased prosecution practices often were drivers of disparate outcomes, for example, and police could not resolve that issue.<sup>8</sup> Panelists noted that injustice was not limited to biased incarceration: Some remarked that only a small portion of major crimes in the United States are reported and, of those reported, comparatively few crimes are solved, meaning that only a small percentage of victims receive justice through the criminal justice system.<sup>9</sup>

From a broad perspective, panelists noted that law enforcement sometimes ends up doing the things it *can* do, not necessarily the things it *should* do, and that research is needed to identify actions that police should take but are not currently taking. More broadly, panelists noted that police tend to be treated as representatives of the U.S. government and that problems with police-community relations can translate into larger government-community relations challenges.

These points led to a discussion of the idea that the United States needs to revisit what justice is supposed to look like for all Americans, as well as what is needed to move the U.S. criminal justice system toward that goal. This, then, led panelists—echoing proposals made by others both inside and outside law enforcement—to call for a national commission on criminal justice to evaluate all of the activities of the criminal justice system from end to end for their effectiveness, fairness, legitimacy, and consistency. This commission would produce something like the report of the President’s Commission on Law Enforce-

#### Innovation Need Related to Systematic Review of the Criminal Justice System

☆☆☆ (High value)	<p><b>Issue:</b> It is unclear whether the justice system is truly doing its best to ensure justice for all.</p> <p><b>Need:</b> Support a call for a National Commission on Criminal Justice to evaluate the current state of criminal justice practices and the equity, efficacy, and legitimacy of the entire criminal justice system.</p>
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ment and Administration of Justice (1967) under President Johnson. Panelists who supported this need remarked that they were joining the call of many practitioner associations (e.g., the International Association of Chiefs of Police [2017]). The first challenge was the feasibility of chartering a commission given that this recommendation has been put forward at the national level for several years and has not been taken up. The second challenge was, given the national political environment of the past decade, whether the findings of a national-level commission focused on this issue would be accepted broadly enough to drive positive change.

### Theme 7: Better Strategies, Tactics, and Tools Are Needed to Improve Community Relations and Public Trust

Panelists discussed several issues under this theme, including looking at techniques and tools to improve community-police communications and techniques that could reduce officer-involved shootings. For an outside perspective, they also suggested looking at community-led ways to improve public safety without having to resort to traditional policing tactics.

#### Agencies Need Assistance in Improving Communication with Communities

Panelists noted a need for standardization, best practices, and technological tools to communicate effectively with communities. As an example, the panel members discussed how agencies increasingly will need to release data for transparency purposes and that agencies will need to put thought into how to release that data to give it the appropriate context.

**Anti-police hoaxes.** Panelists described local cases in which people took videos from incidents in other places and

#### Innovation Need Related to Improving Communication with Communities

☆☆☆☆ (Top ranked)	<p><b>Issue:</b> There is insufficient and unclear evidence supporting efforts to improve trust between the police and the community (e.g., body-worn cameras).</p> <p><b>Need:</b> Conduct research to identify how public-sentiment monitoring tools and services, along with appropriate law enforcement interventions, can best be used to improve police-community relations.</p>
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NOTE: This was one of the top three highest-rated needs, reinforcing the importance of this theme to the panel.

claimed that they reflected local events on social media and in so doing, argued that their local police were not giving an accurate account of what happened. Panelists did not identify a specific need to address this issue.

**Changes in public opinion.** Panelists asked about how police could identify situations in which there is tension building up so that they can respond proactively rather than reacting after an incident ignites that tension. Panelists discussed a specific technology to help improve communications: public-sentiment monitoring tools. Several participants mentioned a tool that conducts surveys over smartphones to assess residents' opinions about their safety and trust in police (Weichselbaum, 2018). Panelists reported thinking that this sort of tool could be very useful, but that agencies would need information on the tool's timeliness, accuracy, and cost (some expressed concerns that the cost would be too high for most agencies). There were also concerns about whether these tools would pick up meaningful shifts in public sentiment beyond those due to major events, and what agencies (and local districts or precincts) should do about such shifts.

### Agencies Need Research and Training on Reducing Bias and Use of Force

Panelists emphasized the importance of methods to reduce officer-involved shootings and officer bias resulting in disparate outcomes. They emphasized that such methods need to be realistic and reflective of how field contacts evolve in practice. Panelists further emphasized the need to redress implicit biases beyond "white officer/black suspect," which is the scenario typically considered. Panelists noted that reducing negative outcomes requires capabilities to communicate across cultures and cultural understanding. Panelists further suggested a need for "reality-based studies" that examine all major forms of potential bias and mechanisms for changing them.

### Innovation Need Related to Research and Training on Bias and Use of Force

☆☆☆☆ (Tier 1)	<p><b>Issue:</b> Public and agency responses to officer-involved shootings continue to erode levels of trust between law enforcement and the public.</p> <p><b>Need:</b> Conduct realistic street-level research into interaction skills that is rooted in the practical reality of how most law enforcement scenarios evolve.</p>
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### Agencies Should Go Beyond Traditional Policing Activities to Improve Community Safety

Some panelists suggested going beyond ways to improve trust between police and communities to consider how to promote trust within communities. This gave a rise to a discussion about what can be done to promote community-building and community social cohesion. Panelists discussed the idea that police could be called on to do much more than they should for a community. Instead, community members should be empowered to work to resolve problems on their own, in partnership with law enforcement, and use police as responders of last resort. Some referenced an earlier RAND study on police-community relations in Cincinnati as an example of what could be done with community partnership (Ridgeway et al., 2009).

### Innovation Need Related to Activities Beyond Traditional Policing

☆☆ (Tier 2)	<p><b>Issue:</b> Some communities already have problems with internal trust, which has a larger effect on police-community relations.</p> <p><b>Need:</b> Conduct research to identify the kinds of activities that agencies can engage in (or avoid) to assist with improving trust levels within a community (not just between law enforcement and the community).</p>
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"We are part of the fabric of the community, but we are not *the* fabric." — Panel Member (paraphrase; emphasis added)

## ADDRESSING TRAINING, STAFF DEVELOPMENT, RESOURCE, AND MANAGEMENT CHALLENGES

Several issues raised in past PCJNI studies come from resource constraints and related problems that limit departments' ability to

- foster leaders who are capable of navigating rapid technological and social change
- train officers as extensively as desired
- maintain sufficient staff to avoid evidence and other backlogs
- “keep current” on new approaches, practices, and techniques.

Given the breadth of this challenge, discussions have been similarly broad. These discussions included such topics as

- difficulty developing solutions relevant to departments of two to 2,000 officers
- models including regionalization of specialized resources or even department consolidation to gain a critical mass of resources and capability
- trade-offs between seeking to address solutions by increasing staffing and employing capital-based strategies, such as acquiring new technology.

### Theme 8: There Is a Need for Guidance on What Public Safety Agencies Should Do and How

#### *Agencies Need Assistance to Limit Mission Creep*

Panelists expressed concerns about the increasing demands on the kinds of services expected of police agencies. They noted that mission creep has happened for a variety of reasons, with police having become the default party responsible for a variety

#### Innovation Need Related to Limiting Mission Creep

★★ (Tier 2)

**Issue:** There are increasing demands on the kinds of services that law enforcement agencies are asked to perform competently.  
**Need:** Conduct research to identify the kinds of activities that agencies can engage in (or avoid) to in order to preserve resources and improve effectiveness for core missions.

of nontraditional services in many jurisdictions. Panelists admitted that law enforcement agencies can sometimes be their own worst enemies—being willing to take on jobs that are not within their traditional skill set and then facing problems to both train and resource for these nonstandard roles. It was noted that small agencies can be more flexible and not become locked into nonstandard roles once they are assumed.

Panel members noted that perhaps the biggest example of mission creep is dealing with the homeless. They discussed how a social problem with many causes and needed responses (e.g., mental health, substance abuse, other social service needs) is often hefted onto the police.

#### *Agencies Need Assistance to Determine Whether and How to Consolidate or Regionalize Certain Operations*

Panelists noted that one strategy to conserve resources is to consolidate or regionalize certain operations. Panelists discussed the idea that “back office” functions are ripe for consolidation; while community members may want their local officers to respond to local incidents, they generally do not care who handles forensics testing, dispatching, and other non–public-facing functions. At the same time, there were concerns about costs and risks from inappropriate or poorly executed consolidations. Panelists also noted that effective governance structures are needed to get buy-in from agencies.

“Police do lots of things competently . . . but we are not firefighters and we don’t sanitize wastewater. Different parts of government do that, and different parts of government need to retake some of the things we’re doing now.” — Panel Member (paraphrase)

### Innovation Needs Related to Consolidating or Regionalizing Certain Operations

★ (Tier 3)	<p><b>Issue:</b> There are opportunities and benefits from consolidating or regionalizing the “back office” operations across agencies (e.g., dispatch, IT).</p> <p><b>Needs:</b> Conduct research to identify the costs, risks, and benefits of efforts to regionalize and consolidate non–public-facing services. Identify best practices with respect to competing governance models and processes for regionalization of services.</p>
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### Theme 9: There Is a Need to Specify How to Select and Train Officers of the Future

#### Selecting Officers of the Future

Given the discussion about officers needing problem-solving and soft skills (either inherently or through training), panelists discussed whether there was a need for national standards on psychological qualities for officers. Panelists acknowledged that some agencies would ignore any national guidelines, on the grounds that they would not be told whom to look for. There also was pushback on whether developing nationwide guidelines was appropriate. Others suggested that there must be some basic tenets on qualities needed, providing for local nuance and other guidelines.

#### Innovation Need Related to Selecting Officers of the Future

★ (Tier 3)	<p><b>Issue:</b> There are differing opinions on the qualities that make the best police officer (e.g., hard skills, soft skills, trustworthiness).</p> <p><b>Need:</b> Develop national guidelines for the qualities that are most likely to make successful police officers and agency staff.</p>
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#### Training Officers of the Future

In considering the roles and skills to train for in preparing officers of the future, panelists noted that officers did not simply *enforce laws* in the strict sense, or at least they should not be doing so. Instead, panelists said that officers were primarily problem-solvers, with key roles that did not involve enforcing a law. However, it was noted that agencies do not hire or train for problem-solving skills. Panelists reported believing that police academies taught “hard skills” (e.g., weapons training, procedural training) well but spent little time training and testing recruits on “soft skills” (e.g., problem-solving, interpersonal interactions).

“When you pick up a phone to talk to your cell phone carrier, there are some general characteristics you expect in that call. Why can’t we define these characteristics of what you expect when talking to a police officer?” — Panel Member (paraphrase)

#### Innovation Needs Related to Training Officers of the Future

★★★★ (Tier 1)	<p><b>Issue:</b> There is insufficient information on the types of skills that a modern police officer should have, such as physical or hard skills; soft skills, e.g., empathy and communication; life experience; and technology skills.</p> <p><b>Need:</b> Conduct research to identify the sets of skills, abilities, and experiences that are most useful to have in today’s policing environment. (This need was discussed as a precursor to developing improved training programs.)</p>
★ (Tier 3)	<p><b>Issue:</b> Community service, auxiliary officers, and other nontraditional policing programs are an innovation that have been used with success in some agencies.</p> <p><b>Need:</b> Conduct an analysis of the costs, risks, and benefits of nontraditional policing programs.</p>

As one approach to partly address this broad issue, panelists discussed whether agencies should hire and train community service officers more broadly. Such officers would focus on noncriminal community interactions, be unarmed, and be deployed to a wider range of situations. Community service officers have the added benefit of being less expensive. Some panelists also noted that bringing in community service officers

would improve mentoring and training for other officers on community service skills.

### BALANCING THE DRIVE TO KEEP AND SHARE DATA WITH POTENTIAL INFORMATION OVERLOAD

Because of the centrality of information in police work, several PCJNI workshops have focused on data collection, storage, and use (e.g., Hollywood, Boon, et al. [2015]; and Hollywood and Winkelman [2015]). In general, panelists across the workshops have recognized the following opportunities and challenges for using data effectively:

- Agencies, especially smaller and resource-challenged ones, should have access to basic IT systems.
- There is an accelerating “flood of data,” ranging from body-worn camera footage to digital evidence from computers and smart devices, which has created cost and logistical problems.
  - This flood will potentially expand as IoT and smart vehicles provide new sources of law enforcement–relevant data
- Information overload is already a problem.
  - Information overload provides a special challenge to forensic and crime analysts.
  - There are limits in the ability of officers in the field to get the right information when they need it.

The Chiefs’ Panel members spent a limited amount of time talking about information-sharing and use for law enforcement, given prior PCJNI coverage of this topic. The panel discussion on this topic was consistent with discussions from earlier workshops and focused on two themes: (1) ongoing challenges in persuading agencies to share data and (2) helping officers deal with information overload.

#### Theme 10: There Is a Need to Overcome Barriers to Interagency Data-Sharing

Panelists discussed the idea that, in some cases, there is a territorial mindset characterized by reluctance to allow others to see “their data” even if it would be beneficial. The panel members discussed two substantive motivations that helped drive this mindset. The first was a lack of knowledge of what sharing information could accomplish—rather than vague calls

#### Innovation Needs Related to Overcoming Barriers to Data-Sharing

☆☆☆ (High value)	<p><b>Issue:</b> Even with recent initiatives, interagency and external data-sharing continues to be a challenge.</p> <p><b>Need:</b> Develop a federal law enforcement information protection law, because it might facilitate the sharing of information that is protected by other laws (e.g., HIPAA, FERPA). (The panelists thought that providing a legal guarantee on data protection might reduce data owners’ reluctance to share because of security concerns.)</p>
☆ (Tier 3)	<p><b>Issue:</b> Despite recent initiatives, interagency and external data-sharing continues to be a challenge.</p> <p><b>Need:</b> Collect and publicize “success stories” that occurred as a result of past successes with information-sharing.</p>

to share more information, panelists noted the value of disseminating evidence-based business cases to share specified types of information in specific ways. The second motivation was the concern that those receiving law enforcement–sensitive information would not protect it appropriately or that such sharing would violate federal data-protection laws (such as the Family Educational Rights and Privacy Act [FERPA] for student records or the Health Insurance Portability and Accountability Act [HIPAA] for medical data).

#### Theme 11: Officers Need Help to Address an Ever-Increasing Flood of Information

Panelists emphasized the value of both processes and tools to help officers prioritize and deal with the flood of information. They asked for assistance to inventory and assess existing processes and tools for managing information.

The panel’s two high-priority needs in this area directly reflect the calls for assistance, with one need on technologies and practices to manage information being pushed to officers, and another to create a living inventory of analysis tools that agencies could use as a reference when seeking to improve their information analysis capabilities.

## Innovation Needs Related to Addressing the Flood of Information

★★★★ (Tier 1)	<p><b>Issue:</b> Officers and agencies are often unaware of the tools, systems, and processes available to them.</p> <p><b>Need:</b> Develop a continually updated inventory of law enforcement information analysis tools. This process also should highlight gaps in the available tools.</p>
★★★ (High value)	<p><b>Issue:</b> There is a flood of information that is being pushed at or provided to officers and agencies on a daily basis.</p> <p><b>Need:</b> Conduct research to identify the most-promising technologies and practices to manage the flood.</p>

## NAVIGATING THE BOUNDARY BETWEEN PUBLIC AND PRIVATE SECTORS

Multiple PCJNI workshops have raised concerns about cases in which effective law enforcement was forced to rely on private-sector actors. Specific areas are crime in “private spaces,” which mostly focuses on social media and cybercrime, and reliance on private entities for data and the associated practical and cultural challenges. The following issues related to private interests intersecting with policing were raised:

- analytic and other tools—which could be used in criminal justice—being held as proprietary intellectual property by firms
- quality issues, where “good enough for a private application” may not be good enough for the law enforcement context
- contractual and other issues (e.g., firms claiming ownership of data) interfering with law enforcement requirements.

Previous efforts identified several activities that could help manage the boundary between police agencies and private-sector actors or technology providers. On the issue of analytic quality, including building capabilities for independent review of privately provided tools, panelists proposed law enforcement application to ensure that quality and accuracy were sufficient. Other proposals focused on building an infrastructure for more-efficient and -effective interaction between the public and companies for both real-time requirements (e.g., responding to crimes streamed on social media as they are being committed) and data-focused requirements (e.g., managing the various formats in which data are provided to law enforcement in response

to requests, managing the challenge of proprietary standards and formats for video that increase the complexity of utilizing such data for investigations and prosecution). Others addressed concerns about such emerging technologies as autonomous vehicles and about preparing to address the law enforcement issues such vehicles could create.

Panelists covered the following three very different themes in this discussion, but each theme focused on interactions between agencies and the private sector:

- considering how agencies will interact with autonomous vehicles and their vendors
- helping agencies interact with social media companies more effectively
- improving practitioner-researcher partnerships.

## Theme 12: Uncertainties About Law Enforcement Interacting with Autonomous Vehicles and Vendors Need to be Addressed

Because self-driving vehicles are becoming more common, panelists identified concerns about law enforcement interacting with self-driving vehicles and their vendors. Having information security standards for vehicle data and control was a major concern; panelists noted that laws are not very detailed on this issue and technology varies significantly.

Getting data from manufacturers in the event of a crash (or for another law enforcement purpose) was described as difficult. Requesting data from a manufacturer was reported to be filled with challenges, with changing data formats noted as a specific hurdle. One panelist described a situation in which a vendor was very happy to provide data showing that a self-driving vehicle was not at fault during a crash and wondered what would have happened had the data shown that the vehicle was at fault.

Panelists also noted uncertainties and challenges about how to direct a self-driving vehicle in a crash or crime scene in order to safely secure the scene.

Panelists discussed a potential need for a body that would review self-driving vehicle standards for technology and integration with law enforcement. This would need to be a federal body and likely would require legislative action to enforce standards. However, the panel members declined to specify a need for innovation to set up such a body. Ultimately, this issue did not rise to the level at which the participants articulated it

as a specific need; therefore, it was not included in the prioritization.

### Theme 13: Agencies Need Assistance in Order to Interact More Effectively with Social Media Companies

Panelists expressed frustrations in dealing with social media companies. They expressed concerns that part of the business model of such companies is showing that they are actively blocking law enforcement access to customer data and selling that fact to their customers. Panelists said that this results in agencies being locked out of evidence and is limiting legitimate and legal investigations. According to panelists, many of the companies involved have provided communications implying that they do not understand what the law or Constitution says with regard to privacy. Some panel members wondered whether law enforcement could use its bully pulpit to try to increase the willingness of firms to cooperate; calling out a lack of willingness to provide data (especially data involving such serious crimes as homicides) could cause reputational damage to the firms involved.

The panelists also discussed the feasibility of setting up public-private partnerships with mutual benefits for universities, industry, and the public sector in this effort. One panelist remarked that “it takes a lot of effort to shepherd those engagements—they are tough to nurture, tough to maintain, and tough to bring to a conclusion.” One approach was to seek out researchers who are employees of or partners with police departments.

“Someone needs to knock on [social media companies’] doors on our behalf, because we don’t have the bandwidth to do it ourselves.” — Panel Member (paraphrase)

### Innovation Need Related to More-Effective Interaction Between Law Enforcement and Social Media Companies

☆☆☆ (High value)

**Issue:** Agencies face several challenges with evidentiary data and algorithms from private entities (social media, automated vehicles, IoT, etc.).

**Need:** Conduct research to identify the legislative gaps in order to standardize when and how emergency or investigatory requests for data are handled by the private sector.

NOTE: The panel’s discussion focused on requests to social media companies and included automated vehicle and IoT providers as well. The panel members admitted being very skeptical about this need, given ongoing resistance from companies; this need had one of the lowest feasibility ratings.

The panelists mentioned that, in general, there is a need for research “translators” that straddle the law enforcement and commercial social media worlds. The panelists noted that longitudinal studies and short-term urgent studies on the scope of the problem of agencies being blocked from social media evidence are needed, as are potential solutions.

### Theme 14: There Is a Need to Improve Practitioner-Researcher Relationships

Panelists discussed issues of navigating researcher and practitioner boundaries as well. They noted a desire to organize and collate law enforcement research in a way that is easily searchable and consumable. They noted that NIJ and other organizations have heard the need for a “one-stop shop” for research before and that various research portals have been set up as a result of that need. That said, according to one panelist, “there is more information out there that is still hard to get,” and readers needed help not only with finding research but also in determining which results are “meaningful to me as a police chief [or other practitioner].” It is also important for those findings to be easily digestible. Panelists also requested indicators and filters on the quality and reliability of the research and findings.

Panelists noted that connections remain some of the most used sources of information, rather than portals, and that there is a need to build more and better relationships between researchers and practitioners.

## Innovation Needs Related to Improving Practitioner-Researcher Relationships

★★ (Tier 2)	<p><b>Issue:</b> Agencies have potential opportunities to engage in public-private partnerships that could provide mutual benefits to entities (universities, private industry, etc.).</p> <p><b>Need:</b> Work with professional organizations to increase the number of “translators” who are skilled at managing research projects that are designed to be timely and useful to law enforcement (e.g., LEADS scholars).</p>
★ (Tier 3)	<p><b>Issue:</b> There is an ongoing desire to organize and collate law enforcement research in a way that is easily searchable and consumable.</p> <p><b>Need:</b> Work with existing maintainers of relevant information to improve the accessibility and visibility of their repositories (e.g., podcasts, brief summaries).</p>
★ (Tier 3)	<p><b>Issue:</b> There is an ongoing desire to improve access to law enforcement research.</p> <p><b>Need:</b> Work with organizations like NCJRS to ensure that high-demand closed publications are converted to open access (e.g., by paying for them).</p>

## CONCLUSIONS

### Summary of Findings

In discussing the six topic areas, the panel identified 14 themes on top challenges and opportunities facing law enforcement, as well as 16 high-priority needs for innovation to help address those challenges. Table 1 summarizes the themes and associated needs.

The panel provided the most coverage of the new technologies and technological changes topic, identifying four major themes on the challenges and opportunities technological change is posing to law enforcement, along with six high-priority needs. However, the panel did not identify any priority needs to address the core challenge of vendors having too much control over the direction of law enforcement technologies.

Officer safety and health is notable for having three top-priority needs despite its focus on the single theme of officers facing increasing stress and hazards from today’s more complex operating environment. The panel emphasized the criticality of this theme, however, and of finding ways ahead to improve officer health and safety.

Panelists also emphasized the importance of overcoming challenges related to staff development and training. However, they also noted difficulties in identifying ready solutions to the

field’s staffing, training, and development challenges, with just one high-priority need.

Several top issues that emerged from the workshop lacked priority needs for innovation. These top issues can be prioritized for further consideration in terms of the types of innovations that might help:

- training on digital evidence
- determining state and law enforcement roles in investigating mostly transnational cybercrimes
- studying the efficacy of and needed protections for biometrics forensics technologies
- employing public safety and community-building strategies that are not police-centric
- overcoming agency mission creep
- providing assistance on when and how to consolidate operations
- selecting officers
- overcoming uncertainties on how officers will interact with self-driving vehicles (this theme had no associated needs for innovation at all, as well as no priority needs)
- improving practitioner-researcher relationships.

## How the Chiefs’ Panel’s Findings Build on the Results of Prior Studies

The Chiefs’ Panel members were asked to build their discussions, in terms of both general issues and specific needs, in response to the top themes and needs for law enforcement from prior panels, as captured in six overarching topical discussions. In this section, we examine how the panelists extended the results of these earlier panels.

### *Responding to the Challenges and Opportunities of Technological Change*

Prior PCJNI panels have identified a broad range of technological opportunities for law enforcement, predominantly in IT, AI, and autonomous vehicles. At the same time, prior panelists identified a range of challenges and barriers to successfully acquiring and using new technologies. Panelists also identified threats to law enforcement from new technologies, including digital evidence overload, technology-enabled crimes, and new illegal substances.

In the Chiefs’ Panel, members expanded significantly on the challenges and opportunities of technological change, starting with proposing the core theme that practitioners do

**Table 1. Themes and Priority Needs for Innovation**

Topic	Themes	High-Priority Needs
Using new technologies while responding to technological changes in society	<ol style="list-style-type: none"> <li>1. Practitioners, rather than vendors, should direct the evolution of law enforcement technology.<sup>a</sup></li> <li>2. Law enforcement is challenged by the growing volumes of video and other digital evidence. <ul style="list-style-type: none"> <li>• The proliferation of video evidence is causing major policy and resource challenges.</li> <li>• Policy and resource demands related to releasing data to the public are major challenges.</li> <li>• New training capabilities for digital forensics are required.<sup>a</sup></li> </ul> </li> <li>3. Law enforcement is challenged by increasing cybercrime. <ul style="list-style-type: none"> <li>• Law enforcement is not prepared for cyber threats, especially threats from the IoT.</li> <li>• Law enforcement’s role in fighting cybercrime needs to be determined.<sup>a</sup></li> </ul> </li> <li>4. Law enforcement faces challenges and opportunities in physical forensics technologies. <ul style="list-style-type: none"> <li>• Noninvasive field tests are needed to detect impairment from marijuana, opioids, and other drugs.</li> <li>• Common questions about biometric forensics technologies need to be addressed.</li> </ul> </li> </ol>	<ul style="list-style-type: none"> <li>• 2A. (★★★★) Develop systems to automate and accelerate review of evidence and generation of reports.</li> <li>• 2B. (★★★) Develop best practices and national model policies for handling and releasing data collected by law enforcement.</li> <li>• 3A. (★★★) Conduct research to identify the potential opportunities and impacts of cyber vulnerabilities and potential legislative and policy solutions.</li> <li>• 4A. (★★★) Conduct research to develop a noninvasive field test to determine the type and level of acute impairment.</li> <li>• 4B. (★★★) Conduct research to identify the levels of drug intoxication that lead to impairment.</li> <li>• 4C. (★★★) Conduct independent research and evaluation to assess the current state of reliability for each biometric technology.</li> </ul>
Protecting officers’ safety, physical health, and mental health	<ol style="list-style-type: none"> <li>5. Today’s policing environment is endangering officers’ health, wellness, and performance. Officer burnout and suicide are significant problems.</li> </ol>	<ul style="list-style-type: none"> <li>• 5A. (★★★★★) Identify and assess the existing and proposed best practices for physical, mental, and emotional support opportunities for law enforcement officers, families, and agencies.</li> <li>• 5B. (★★★★★) Develop early identification and intervention systems that can help agencies and officers get ahead of potential problems.</li> <li>• 5C. (★★★★★) Conduct research to identify what the sources of stress are and their likely impact on officer health and wellness.</li> </ul>
Strengthening police-community relations and building trust	<ol style="list-style-type: none"> <li>6. A systematic review of the criminal justice system and the roles of all stakeholders in it is needed. The President’s Commission on Law Enforcement and Administration of Justice (1967) is an important model of how to do this and perhaps should be repeated.</li> <li>7. Better strategies, tactics, and tools are needed to improve community relations and public trust. <ul style="list-style-type: none"> <li>• Agencies need assistance in improving communication with communities.</li> <li>• Agencies need research and training on reducing bias and uses of force.</li> <li>• Agencies should go beyond traditional policing activities to improve community safety.<sup>a</sup></li> </ul> </li> </ol>	<ul style="list-style-type: none"> <li>• 6A. (★★★) Call for a National Commission on Criminal Justice to evaluate the current state of criminal justice practices and the equity, efficacy, and legitimacy across the entire criminal justice system.</li> <li>• 7A. (★★★★★) Conduct research to identify how public-sentiment monitoring tools and services, along with appropriate law enforcement interventions, can best be used to improve police-community relations.</li> <li>• 7B. (★★★★★) Conduct realistic street-level research into interaction skills that is rooted in the practical reality of how most law enforcement scenarios evolve.</li> </ul>

Table 1—Continued

Topic	Themes	High-Priority Needs
Addressing training, staff development, resource, and management challenges	<p>8. There is a need for guidance on what public safety agencies should do and how.<sup>a</sup></p> <ul style="list-style-type: none"> <li>• Agencies need assistance to limit mission creep.</li> <li>• Agencies need assistance to determine whether and how to consolidate or regionalize certain operations.</li> </ul> <p>9. There is a need to specify how to select and train officers of the future.</p> <ul style="list-style-type: none"> <li>• Agencies need assistance with training future officers, especially in terms of identifying the top skills, starting with problem-solving and others outside of traditional enforcement.</li> <li>• On selection, there is a need to consider whether there is a core set of qualities that future officers need to have, with panelists realizing this may not be practical.<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• 9A. (☆☆☆☆) Conduct research to identify the sets of skills, abilities, and experiences that are most useful to have in today's policing environment.</li> </ul>
Balancing the drive to keep and share data with potential information overload.	<p>10. There is a need to overcome barriers to interagency data-sharing.</p> <p>11. Officers need help to address an ever-increasing flood of information.</p>	<ul style="list-style-type: none"> <li>• 10A. (☆☆☆) Develop a federal law enforcement information protection law, because it might facilitate the sharing of information that is protected by other laws (e.g., HIPAA, FERPA).</li> <li>• 11A. (☆☆☆☆) Develop a continually updated inventory of law enforcement information analysis tools. This process should also highlight gaps in the available tools.</li> <li>• 11B. (☆☆☆) Conduct research to identify the most-promising technologies and practices to manage the growing flood of information to officers.</li> </ul>
Navigating the boundary between public and private sectors.	<p>12. Uncertainties about law enforcement interacting with autonomous vehicles and vendors need to be addressed. These include how officers will direct self-driving vehicles and how officers will collect data from them (typically from crash scenes).<sup>a</sup></p> <p>13. Agencies need assistance in order to interact more effectively with social media companies.</p> <p>14. There is a need to improve practitioner-researcher relationships, both in conducting research and in making results easy to find and easy to use throughout the practitioner community.<sup>a</sup></p>	<ul style="list-style-type: none"> <li>• 13A. (☆☆☆) Conduct research to identify the legislative gaps in order to standardize when and how emergency or investigatory requests for data are handled by the private sector.</li> </ul>

<sup>a</sup> There were no high-priority needs associated with this theme.

not have adequate control of the evolution of law enforcement technology and that they need to find ways to better direct development to meet operational needs. They identified specific challenges and corresponding needs to address the growth of digital evidence, cybercrimes, and new intoxicating substances.

### ***Responding to Needs to Protect Officers' Safety, Physical Health, and Mental Health***

Protecting officers' well-being has been one of the highest-priority concerns in prior panels, with a special focus on needs to protect officers' mental health and physical health more broadly. Prior panels also identified specific needs to improve officer safety, including needs related to personal protective equipment, sensors, and avoiding dangers from new technologies.

The Chiefs' Panel reinforced this priority, with two of the top three needs for innovation falling under this topic: developing early intervention systems and identifying best practices for supporting the physical and mental health of officers and their families. Panel members also called for a nationwide assessment of top sources of stress on officers. The panelists provided further context by noting a top driver of risks to health and safety: that today's policing environment is becoming so complex and challenging that it is endangering officers' health, wellness, and performance. They also pointed out that efforts to improve officers' health need to provide additional resources to smaller agencies, engage with unions, reflect and support the growing presence of women, and fully involve and support officers' families.

### ***Responding to Needs to Strengthen Police-Community Relations and Build Trust***

Improving community relations and building trust has been one of the most important priorities in past panels; it was ranked as the top priority by the 2016 Law Enforcement Advisory Panel. For this priority, past panel members identified needs for innovation from help with community policing, procedural justice, and public communications strategies to help with language translation and cross-cultural issues.

The Chiefs' Panel reinforced the importance of this area but also expanded on it significantly. Some of the panel's themes and priorities directly extended to this topic. For example, one of the top-three needs from the panel was in this area: calling for research and evaluation of public-sentiment moni-

toring tools. This panel also called for research on improved training to reduce bias and uses of force.

Panel members then expanded what was needed under this topic substantially. They reported believing that, in order to fully address underlying relationship and trust issues, policing—and the criminal justice system more generally—needs a systematic review to conceptualize what justice should look like for Americans, as well as to determine what is needed to move the U.S. criminal justice system toward that goal. This systemic review needs to consider what police should do, and how, along with what they should not do.

### ***Responding to Challenges in Training, Staff Development, Resourcing, and Management***

Past panels have discussed many needs related to mitigating resourcing, training, recruiting, and retention shortfalls. As with the prior topic area, the Chiefs' Panel expanded on this topic substantially, suggesting a need for guidance on what public safety agencies should do and how—in part to help avoid mission creep by reducing demands for resources and staff in roles that are not critical. Panelists also discussed the benefits of specifying the knowledge and skills needed by officers of the future and better selecting and training them.

### ***Responding to the Challenge to Balance Data-Sharing with Information Overload***

The Chiefs' Panel did not spend much time talking about information-sharing, analysis, and usage issues and needs, given heavy coverage of this topic by prior panels (e.g., Hollywood, Boon, et al. [2015]). Instead, panelists focused on two areas. The first was identifying tools to mitigate information overload, starting with simply identifying what tools are currently available. The second area was overcoming ongoing barriers to interagency information-sharing, including a lack of knowledge on the operational value of sharing, as well as a need for better data protection guarantees that would address concerns about shared data being compromised.

### ***Responding to Challenges in Navigating the Boundary Between Public and Private Sectors***

Finally, past panels have identified shortfalls when law enforcement is forced to depend on private-sector actors. These shortfalls have included problems interacting with social media

and other technology companies to conduct investigations. Closer to home, such shortfalls have included problems with technologies provided by private-sector systems. Finally, past panels have identified problems with future systems, such as uncertainties about how officers will interact successfully with autonomous vehicles.

The Chiefs' Panel reinforced these priorities but also added a new one. Panel members reinforced ongoing concerns with autonomous vehicle interactions, including uncertainty about how to ensure that vendors provide data in the event of a lethal crash and, if they do provide such data, that the data are in a form that could be understood by investigators. They also called for creating liaisons between law enforcement and technology companies, as well as research to standardize when and how emergency and investigatory requests should be handled by both agencies and the technology companies.

The Chiefs' Panel's new priority in this area was to improve practitioner-researcher partnerships. Members discussed improving both personal relationships and the dissemination of research in ways law enforcement can more easily learn and use.

## Conclusions from the Panelists

Across the issues discussed and their corresponding needs, two overarching concepts came out of the discussion that spoke to the nature of innovation needed in law enforcement and the difficulty—but ultimate tractability—of the challenges and opportunities law enforcement currently faces.

### *Desirable Characteristics of Solutions*

First, the priority needs for innovation varied widely, from technological sensor development to analytics development to the development of common practices and policies. Despite this range of needs, panelists discussed desirable characteristics for solutions in two broad categories.

**Agility and Flexibility.** Panelists noted a need for agility and flexibility in whatever technologies are developed. They noted that the commercial tech industry will always move much faster than government acquisition, meaning that solutions will need to adapt to leverage actual technological progress. They noted that solutions also need to be scalable at different levels and uses—what works for a big metropolitan agency may not work for a small agency. Finally, they noted that agility is not just for hardware; policies and procedures

need to be flexible and adaptable to meet the needs of disparate agencies as well.

**Solution Acceptance.** Panelists noted that solutions will need to be accepted by both officers in the field and larger communities if they are to be used successfully. In some cases, especially successful solutions may bring unanticipated benefits; one panelist noted that seat belts are probably the most important safety innovation to date for both police operations and the public. Acceptance is required not only for technologies themselves, but also for policies and procedures.

More broadly, panel members discussed the idea that technology used by law enforcement must be legitimate within the contexts (ethics, values, and judgments) of consent-based policing in a democracy. Some technologies will not be consistent with these contexts, and those bars need to be accepted. As one example, a panelist noted that we could stop drunk driving by putting breathalyzer interlocks on all cars, but it was doubtful that communities would accept that regulation.

### *A Lack of Easy Solutions to Top Challenges*

Second, despite the range of innovation needs, the panel discussion reflected the reality that some of the most pressing challenges were not found to have easy, short-term paths forward, as shown by the challenges without associated high-priority needs for innovation. To summarize one panelist, for such sweeping issues as staffing and development challenges, public- and private-sector barriers, and vendors having too much control over the future of public safety technologies, there was little low-hanging fruit the panel could find.

However, all of the problems were thought to be tractable with collective effort by the criminal justice community, which includes not only traditional participants such as law enforcement, courts, and corrections, but also community stakeholders, agency service providers, and the private sector, all of which have important roles in helping improve public safety and justice. Without meetings and cooperation, panelists worried the result would be vendors and individuals creating independent efforts and systems that would not work together and likely would not be able to succeed.

Finally, some panelists noted that the presence of many major, complex problems and a lack of obvious simple solutions to them further reinforced the need for a national commission on criminal justice. Panelists noted that a presidentially chartered commission was neither required nor necessarily feasible or desirable, but something on that order of magnitude is nec-

essary. They noted that solutions to the major problems facing law enforcement likely involved systemic reforms that would need to be considered on a “national commission” level. Such an effort will need to ask the big questions about what justice currently looks like in the United States compared with what it should look like. The commission also would need to identify critical changes that should not be made.

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## TECHNICAL APPENDIX

This appendix provides technical details on the processes used to select panelists, prepare the agenda, discuss top challenges and opportunities, and develop and prioritize corresponding needs for innovation to address the challenges. The methodology used is similar to that employed in prior PCJNI studies. As a result, the text in this appendix is very similar to technical methods descriptions in prior PCJNI reports, such as Hollywood, Boon, et al. (2015) and Hollywood et al. (2017).

### Pre-Workshop Activities

The PERF led recruitment of the panel members by compiling lists of law enforcement executives who had been quoted at recent PERF conferences on related topics and/or were known for applying innovative (and, specifically, technological) solutions to modern policing problems. Additional potential invitees were recommended by NIJ and gleaned from presentations at other national conferences, with an emphasis on the annual International Association of Chiefs of Police Technology meetings. Given the scope of this workshop, searches were restricted

to law enforcement invitees without inclusion of the academic or private sectors (as we did for prior PCJNI workshops).

Our focus in recruiting members was to identify law enforcement executives on the leading edge of policing technology; we did not attempt to recruit a representative sample of executives. The results should not be considered as representative of law enforcement practitioners’ opinions on technology in general. Instead, this panel’s results are intended to reflect the expertise and experience of the panelists, which is similar to that of other blue-ribbon senior advisory panels. That said, the PCJNI did recruit panelists with a range of experiences in varying roles and different types of agencies.

Before the workshop, we reviewed prior studies on law enforcement, as mentioned in the introduction. We reviewed the top needs for innovation from these studies as well as top themes on the major challenges facing law enforcement, and we recognized that the top themes and needs from prior studies could be grouped into six broad topics for discussion. For each topic, we prepared bulleted lists of top needs from prior studies.

### Workshop Agenda

We prepared the agenda for the workshop to have one-hour structured discussions around each topic, with additional time to discuss previously unaddressed issues and needs. (After the meeting, we sorted the previously unaddressed issues and needs into the six discussion topics, which is why there is not a separate section on these in the agenda.) Table A.1 shows the workshop agenda.

During each discussion, panelists nominated and then discussed top issues facing law enforcement today, including both

**Table A.1. Workshop Agenda**

Day 1		Day 2	
8:30	Welcome and Introductions	8:30	Recap of Yesterday’s Activities
9:00	Topic 1—New Technology and Change	9:30	Topic 6—Public and Private Sectors
10:30	Break	10:00	Break
10:45	Topic 2—Officer Safety and Wellness	10:15	Topic 7—Other Issues Not Discussed
11:45	Lunch	11:30	Lunch
1:15	Topic 3—Community Relations	12:45	Out-Brief and Conclusions
2:15	Topic 4—Training and Management	2:00	Adjourn
3:15	Break		
3:30	Topic 5—Data		
4:30	Questions and Adjourn		

problems and opportunities. Panelists were asked to provide details and context on these issues, in order to describe them more fully for readers.

We then invited the panel to identify and refine needs for innovation, with each need reflecting a call for a way ahead to address a specific problem or opportunity. As noted, these ways ahead could relate to technology, policy, process, organization, evaluation, or any combination of these areas. Panelists then rated the needs using the methods described in the next section.

At the end of the meeting, panelists were asked to react to the prior two days of discussion and findings and provide top takeaways for readers. These takeaways were captured in the conclusions section of this report.

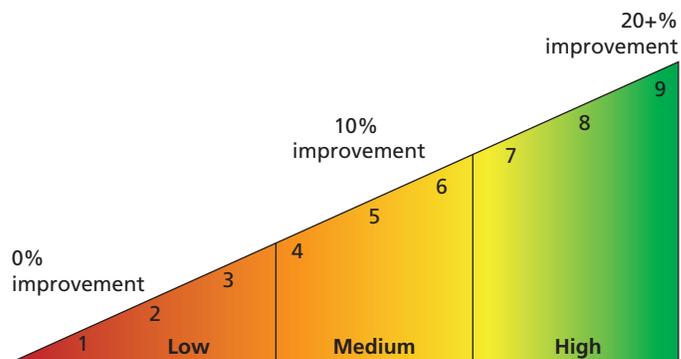
## Prioritization of Needs

Prioritization occurred in three rounds, the first two of which happened during the topical discussions. Panelists were asked to rate each of the needs for innovation along two dimensions. The first was the importance of the need to the field, which was rated on a scale from 1 to 9 (with 1 being low importance and 9 being high importance). Panelists were told that a rating of 1 implied that a solution would have little impact, while a 9 implied that a solution would reduce the impact of the problem being addressed by at least 20 to 30 percent. Figure A.1 shows a visual guide provided to the panelists on how the ratings mapped to perceived real-world improvements.

The second dimension was the feasibility of addressing the need from technical, resource, and operational perspectives (e.g., Could we develop it? Could agencies afford it? Could agencies use it in practice?). Feasibility was also rated on a scale from 1 to 9 (with 1 being not likely to succeed/high risk and 9 being likely to succeed/low risk). These scores roughly correspond to probabilities of success, with a 1 equaling roughly a 10-percent chance of success and a 9 equaling roughly a 90-percent chance of success. Panelists provided the ratings in real time using TurningPoint interactive polling devices.

Immediately after the first round of ratings, panelists saw bar charts of all ratings provided by the group. They then had the opportunity to discuss why they rated the need as they did. This often led to clarifications of what the need meant and what impacts it was likely to have in practice. The panelists then had the opportunity to change their ratings of the need based on what they heard. This constituted the second round of ratings for each need.

**Figure A.1. Guide for Rating Needs' Importance**



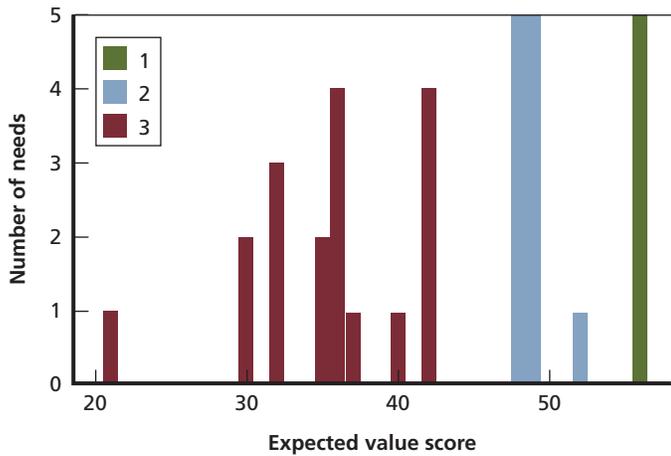
We then computed EV scores for each need from each participant by multiplying the two ratings together. Here, EV roughly translates to the expected benefit an effort to meet a need would have on a problem with respect to some measure of impact. For example, the maximum possible EV, resulting from two scores of 9, would be about a 27-percent expected improvement (30-percent impact if successful times a 90-percent chance of success). We then calculated an overall EV score for each need by taking the median of the individual EV scores. We clustered the needs' EV scores into three tiers using a hierarchical clustering algorithm with Ward's method to minimize the sum of the variances within clusters. We called the clustering algorithm using an R statistical system procedure (in R's "stats" library).

These three tiers roughly divide the needs into comparatively high, medium, and low EV groupings. The use of three EV tiers is manageable and provides a clear focus for decision-makers (e.g., the needs in the high-EV tier); it is also consistent with prior PCJNI studies. Figure A.2 shows a histogram of the needs' overall EV scores and their EV tier after the second round.

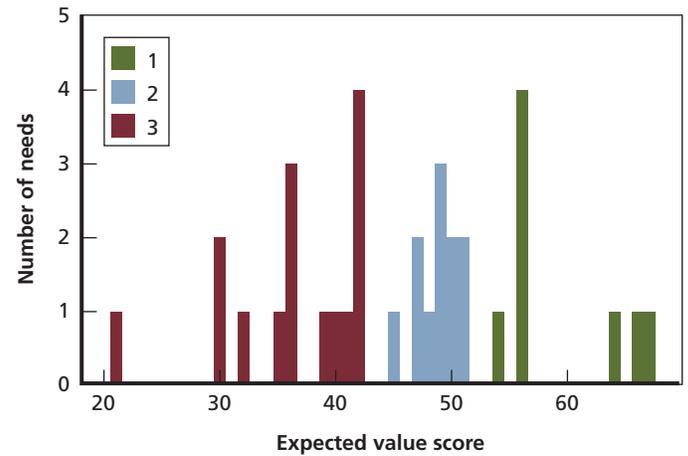
On Day 2, the panelists were given ballots showing all needs by their assigned tier. Panel members had the opportunity to vote needs up or down tiers if they felt that the needs' categorizations should change, despite the earlier ratings and clustering. Given the size of the panel, it took a strong minority of four votes to move a need between tiers. If at least four votes (up or down) were received suggesting that the need was not in the correct tier, the EV of the need was adjusted in proportion to the net number of votes received (i.e., if a need received three votes up and one vote down, it received two net votes up). The value of each vote to add or subtract to the need's EV was calculated based on the number of workshop participants divided by the full spread of EVs after Round 2 such that a "vote up" by every participant would move a need's EV from the lowest

Figure A.2. Breakdown of Needs' Expected Value Scores

Round 2



Round 3



value observed in Round 2 to the highest value observed (or vice versa to move a need downward). To move one tier (e.g., promotion from Tier 3 to Tier 2), a need's adjusted EV needed to get above the top value (for promotion) or below the bottom value (for demotion) of its original tier. To move two tiers (e.g., from Tier 3 to Tier 1), a higher bar was set—the need would have to make it into the observed range of EVs for that tier. As a result of Round 3 voting, four needs were promoted to Tier 1 and one need was demoted out of it, increasing the number of Tier 1 needs from five to eight.

In addition to tracking EVs, we also considered high-priority needs to include high-value needs, which had maximum importance ratings for the field despite having low-to-medium feasibility scores. In this report, the maximum importance ratings were those with a median score of 8. These can be thought of as high-risk, high-reward needs. There were eight high-value needs whose EVs were outside Tier 1. (Seven of the eight Tier 1 needs were high-value as well.)

Workshop Read-Ahead

We include the read-ahead given to panelists in advance of the Chiefs' Panel meeting to provide examples of needs that were given high priority in past PCJNI reports for law enforcement.

## Priority Criminal Justice Needs Initiative: Police Executive Workshop Read-Ahead

Supported by National Institute of Justice (NIJ), the Priority Criminal Justice Needs Initiative has carried out research to assess and prioritize technology needs across the criminal justice community. The fundamental goal is to enable innovation in the U.S. criminal justice community—from incremental changes in the way agencies do daily tasks, increasing their efficiencies and solving their current problems to transformational changes that make it possible for them to do entirely new things or accomplish objectives in new ways.

Below are some of the top ranked needs from law enforcement-related workshops. For a full review of these workshops, please visit: <https://www.rand.org/jie/justice-policy/projects/priority-criminal-justice-needs/publications.html>

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### Current Policing Overall (Law Enforcement Advisory Panels)

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Assess adequacy of resources for mental health response and treatment at the regional or lower level, and implications on law enforcement of current situation

Develop easy-to-use law enforcement-specific guidance on change management

Assessments of community policing implementations to determine which ones are more successful

Need to examine ways to better present to decisionmakers assessments of what is known and what the “most promising” options are, given uncertainty in the specific situation and prior evidence

Evaluation reports need to show information about when and where interventions and technologies are more or less effective—notably including qualitative and quantitative findings

Need a research repository that (1) makes it easy for law enforcement to find and understand research results relevant to a problem and (2) pushes out pressing results they need to know

Need research and measures to assess the effectiveness of different modes, methods, quality, and types of training integration. Key training topics include de-escalation, procedural justice, deployment of tactical gear, and incorporation of crime analysis capabilities

Need to develop and evaluate training curricula on how to handle problematic encounters specifically, covering and integrating persuasion, crisis intervention, physical, and weapons elements

Develop a taxonomy or set of categories and supporting information that can be used to evaluate individual trainings on their compliance with promising practices (approaches and content)

Academics need to work with practitioners to create documents and training that can be read and understood quickly and pushed out to the field

Develop a taxonomy or set of categories and supporting information that can be used to design individual trainings on their compliance with promising practices (approaches and content)

Examine and highlight the impacts of forensic backlogs on justice system processes and efficiencies

Work to develop forensic backlog reduction grants beyond what already exists for DNA backlogs

Examine the potential effects of “sharing arrangements” to optimize forensic analyst labor across state and local demands

Need to develop best practices and best practice business rules for body-worn camera video

Invite researchers and organizations (e.g., International Association of Chiefs of Police, PERF) to produce materials that raise the level of public information and increase the amount of context that the public and politicians have access to

Need to develop strategies and best practices for ensuring that the community has sufficient information about law enforcement activities and events

Develop best practices for integrating and using existing internal and community data for evaluating operational success

Study the risks and benefits of dispatch center consolidation

Have the U.S. Department of Justice publish a model interoperability language that can be readily dropped into requests for proposals for new records management systems. Language will need to support being configured for different sizes and types of agencies

Explore application of entity resolution technologies from private sector to criminal justice applications, to include assessing effectiveness and long-term costs of existing commercial tools

Research the locally optimal sets of questions (with branching) to gather the critical information and be able to dispatch law enforcement, fire, and emergency medical services

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### Current Policing Overall (Law Enforcement Advisory Panels)

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Need to examine ceramic and advanced technology effectiveness and cost in body armor

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Need a model policy for basic law enforcement use of UAS-type technologies

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Need to identify and publicize specific use cases for UASs (barricaded subjects, crime scene investigations) that have high utility and no privacy concerns

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Conduct research on the risks and benefits of UAS use in law enforcement

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### Future of Policing

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Need agents to help protect the chain of custody, as digital evidence receives metadata markups for semantic search and analysis

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Need to develop and/or assess wearable biomedical sensors to monitor officer health and safety. Sensors should monitor stress levels, fatigue, and injuries. Data could be used to dynamically shorten work shifts if fatigue levels are excessive

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Need to study using IoT sensors to better track officers inside buildings. Sensors should be both officer-worn and within the building (for example, proximity sensors). Tracking would help improve officer safety and could be used for opening doors and other applications

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Need to develop a system to search across multiple mug shot databases and other photo databases at the federal, state, and local levels

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Need research on the impact of information overload on law enforcement, courts, and corrections personnel, as well as the causes of distractions and potential solutions

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Need to develop technologies to provide situational awareness displays (annotated maps, "data mashups," and customized alerts) dynamically tailored to individual officers both in the field and at headquarters. Should automatically generate alerts when people of interest (such as parolees) have made contact with police

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Need educational materials for key web technologies, including internet-enabled sensors and actuators, entity analytics, data life-cycle management, video conferencing, translation, and tele-education. Materials might include training, trade show presentations, and workshops

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Need cost-benefit research to assess the return on investment on technology-related acquisitions and programs

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Need a common criminal history record, a common catalog for storing the records, policies governing access to the records, and business processes for ensuring that the records are up to date, correct, and consistent

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Need technologies to support data exchange across the criminal justice enterprise

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Need research on methods to disseminate innovative, promising practices across the large number of law enforcement agencies. Should include "change management" practices and practices for gathering and using lessons learned

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Need to improve training suitable for new technologies. Includes identifying and updating training needs, skill sets, and roles; tailoring training for people with different roles, levels, and backgrounds; and taking advantage of new educational technologies

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Need to develop technologies and processes to support data-sharing, including communications infrastructure, equipment standards, integrated data systems, and adaptable and upgradable systems

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Need research on recognizing and dealing with legal and policy constraints for information-sharing

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Need improved translation technologies to include dialect, indigenous languages, and cultural factors translation

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Need more research and development on ethics development in general

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Need to update law enforcement agency recruiting practices, including recruiting people with needed skills, updating screening and hiring mechanisms, and updating training academy processes for future network-enabled training environments

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## Digital Evidence

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- Expand available federal-level training at existing training schools to build knowledge across system
  - Integrate digital evidence practices into academy training—at least at the awareness or basic training level
  - Develop better prioritization or triaging methods or tools for cases and for what evidence to extract within cases (either for digital evidence examiners or potentially tools usable by officers in the field)
  - Develop regional models for building capability where small departments pay to fund common resources. Incentives could be created through grant mechanisms to facilitate this approach
  - Routinely update the training and tools available to examiners to ensure that they are using the current technology
  - Expand available federal-level training at existing training schools to build knowledge across the system
  - Utilize existing software tools for analysis of data sets like cell tower data. Examples exist that are web-based and can be bought on a case-by-case basis, but knowledge of what is available is limited
  - Departments must acquire in-house tools to process video evidence
  - Develop tools that allow more-narrow collection of data from devices to respect victim privacy while still meeting investigative or protective needs
  - Create a database or portal where law enforcement can access contact information, documentation, and training for accessing remote digital evidence
  - Develop standardized online training for investigators to assist with requesting evidence and data
  - Develop an information exchange system where investigators can share information on points of contact and the types of data collected by the devices and apps
  - Incentivize the research community to conduct activities that keep the knowledge base current (grants, conferences, etc.)
  - Develop an information exchange system where investigators can share information on points of contact and the types of data that are available via different providers
  - Develop standards that are easier for providers and investigators to comply with
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## Video Analytics

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- Conduct research and development on the technologies that will allow “semantic” searching of video (e.g., “show me all instances where a person with a pink shirt is walking down Main Street”)
  - Develop best practices and model contracts that consider architectures and application program interfaces that would facilitate system integration
  - Create a standardized list of objects and actions that would be most useful for law enforcement
  - Assess the benefits, costs, and risks of different processing models (on premises, government cloud, public cloud, etc.)
  - Develop standards to define what should be retained in an “audit trail,” which documents what has been presented to or viewed by an officer as well as why that particular information was presented to the officer (e.g., an explanation of the algorithm’s actions)
  - Integrate dispatch and routing with what is already “known” from video analytic systems
  - Assemble a group of “technical advisors” to help agencies and cities considering surveillance networks with analytics
  - Conduct research and development on law enforcement–specific activity detection models (e.g., traffic stops, make and model or other identifying factors for vehicles)
  - Develop algorithms to calculate location coordinates of objects in videos given camera coordinates and direction
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## Broadband

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Need to develop concepts, policy, and procedures for mutual aid networks in a post land-mobile-radio, FirstNet, or broadband era. Need to define the common roles, responsibilities, associated services and info needs, and log-on (authentication and granted permission) capabilities

Need to coordinate and integrate operational architecture components being developed (who needs what information with what attributes) by different groups (National Public Safety Telecoms Council, FirstNet, Global, etc.). Need to include concepts, policy, and procedures for mutual aid networks. Must explicitly consider data management, legal, and privacy concerns

Need to look at how data center or cloud models would work in future network topologies and when, in principle, data centers will need to handle huge amounts of data and may have scalability issues

Need better ways to do user authentication—easily for individual users such that if they leave their device behind it is locked, but also so that individuals from other agencies could use it

Need research on smart agents for officers in the field to help them get information they need while avoiding information overload

Need to develop processes (including training and staffing), automation filtering and tools, and procedures to help public-safety answering point employees prioritize incoming data and use data to support operations and avoid information overload

Need to explore the use of tethered drones to support rural communications and other areas that need additional communications

Need to leverage FirstNet work to develop a common set of policies and enabling mechanisms for prioritization and spectrum management

Need to explore use of dynamic routing mechanisms and tools that will allow devices to pick best available connection points and routes, accounting for user needs, available links, and spectrum and capacity availability

Need to explore what new “communications services” staff or revised training for existing IT staff will be needed to address future communications architectures. Need to develop new role descriptions and duties, staffing and training concepts for future public-safety answering point and operations center operations

Need antenna research to extend battery life, reduce interference, improve spectrum efficiency, improve throughput, and reduce size and improve form factors. Technologies include physical design, self-tuning, and integration into wearables and other form factors. Also needs to consider smart controllers for antennas (part of smart radios)

Need better analytics that automate much of the redaction work

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## Social Media

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Develop best practices for transparency with regard to use of social media and social network analysis and accompanying data

Conduct a review of the efficacy and acceptability of state and local privacy councils (one example is in Oakland, California)

Conduct periodic reviews of existing policy and procedure with the intention of codifying content and identifying potentially outdated guidance

Identify existing policies or develop new model policies for undercover social media investigations

Identify existing policies or develop new model policies for covert social media research

Need dialogue for an “accountability movement”—get to consensus on tools being used, quality assurance, protections against bias, and civil liberties protections.

Conduct a gap analysis on existing automated social monitoring tools to determine the shortcomings for criminal justice purposes

Conduct an independent review of commercial tools and techniques for social media and social network analysis

Develop software that performs partial extraction of relevant information in a format that can be easily compared

Develop easy-to-use, search engine–like functionality for large data sets in a variety of formats (text, images, video, etc.)

Develop model training curricula for social media and social network analysis (for all practitioner communities in the criminal justice system)

Establish a help desk–type system where investigators can be connected with other investigators who are “experts” in obtaining and extracting information from particular sources

Establish or fund a liaison that can be a source of knowledge on how to obtain usable information from specific sources (e.g., mobile phone companies, social media companies)

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## Full List of Themes and Needs from the Chiefs' Panel

In discussing the six topical areas, the panel identified 14 themes on top challenges and opportunities facing law enforcement and 35 needs for innovation to help address them (with 16 high-priority needs). Table A.2 summarizes the themes and associated needs, along with their star ratings.

**Table A.2. Summary of Themes and Priority Needs for Innovation**

Topic	Themes	Needs
Using new technologies while responding to technological changes in society	<p>1. Practitioners, rather than vendors, should direct the evolution of law enforcement technology.</p> <p>2. Law enforcement is challenged by the growing volumes of video and other digital evidence.</p> <ul style="list-style-type: none"> <li>• The proliferation of video evidence is causing major policy and resource challenges.</li> <li>• Policy and resource demands related to releasing data to the public are major challenges.</li> <li>• New training capabilities for digital forensics are required.</li> </ul> <p>3. Law enforcement is challenged by the rise of cybercrimes.</p> <ul style="list-style-type: none"> <li>• Law enforcement is not prepared for cyber threats, especially threats from the IoT.</li> <li>• Law enforcement's role in fighting cyber-crime needs to be determined.</li> </ul>	<ul style="list-style-type: none"> <li>• 1A. (★★) Develop standards for certifying vendor processes and systems as following best practices for operational processes and securing sensitive information.</li> <li>• 1B. (★) Work with standards organizations to develop national standards for the acquisition and operation of technology systems that are timely and responsive.</li> <li>• 2A. (★★★★) Develop systems to automate and accelerate the review of video evidence and generation of reports.</li> <li>• 2B. (★★★★) Develop best practices and national model policies for handling and releasing data collected by law enforcement.</li> <li>• 2C. (★★) Work with standards organizations to inventory national standards for collecting and handling digital evidence, identifying gaps, and working to fill them. (This need is a precursor to creating improved trainings.)</li> <li>• 2D. (★) Develop best practices and standards for handling and securing public data held by law enforcement.</li> <li>• 3A. (★★★★) Conduct research to identify the potential opportunities and impacts of cyber vulnerabilities (focusing on IoT devices, networks, and self-driving vehicles) and potential legislative and policy solutions.</li> <li>• 3B. (★★) Develop a framework for identifying which entities (international, federal, state, local, private companies, individuals, etc.) and what actions should be taken to begin to mitigate the rise in cybercrimes.</li> <li>• 3C. (★) Explore the costs, risks, and benefits of establishing an international cybercrime information-sharing system that can identify and highlight cross-jurisdictional cybercrime patterns based on local reports.</li> </ul>

Table A.2—Continued

Topic	Themes	Needs
	<p>4. Law enforcement faces challenges and opportunities in physical forensics technologies.</p> <ul style="list-style-type: none"> <li>• Noninvasive field tests are needed to detect impairment from marijuana, opioids, and other drugs.</li> <li>• Common questions about biometric forensics technologies need to be addressed.</li> </ul>	<ul style="list-style-type: none"> <li>• 4A. (☆☆☆) Conduct research to develop a noninvasive field test to determine the type and level of acute impairment.</li> <li>• 4B. (☆☆☆) Conduct research to identify the levels of drug intoxication that lead to impairment.</li> <li>• 4C. (☆☆☆) Conduct independent research and evaluation to assess the current state of reliability for each biometric technology.</li> <li>• 4D. (☆) Develop and market a criminal justice practitioner education campaign on biometric technology considerations how and when to use each technology.</li> </ul>
Protecting officers' safety, physical health, and mental health	<p>5. Today's policing environment is becoming so complex and challenging that it is endangering officers' health, wellness, and performance. Officer burnout and suicide are significant problems.</p>	<ul style="list-style-type: none"> <li>• 5A. (☆☆☆☆) Identify and assess the existing and proposed best practices for physical, mental, and emotional support opportunities for law enforcement officers, families, and agencies.</li> <li>• 5B. (☆☆☆☆) Develop early identification and intervention systems that can help agencies and officers get ahead of potential problems.</li> <li>• 5C. (☆☆☆☆) Conduct research to identify what the sources of stress are and their likely impact on officer health and wellness.</li> </ul>
Strengthening police-community relations and building trust	<p>6. A systematic review of the criminal justice system and the roles of all stakeholders in it is needed. The President's Commission on Law Enforcement and Administration of Justice (1967) is an important model of how to do this and perhaps should be repeated.</p> <p>7. Better strategies, tactics, and tools to improve community relations and public trust.</p> <ul style="list-style-type: none"> <li>• Agencies need assistance in improving communications with communities.</li> <li>• Agencies need research and training on reducing bias and uses of force.</li> <li>• Agencies should go beyond traditional policing activities to improve community safety.</li> </ul>	<ul style="list-style-type: none"> <li>• 6A. (☆☆☆) Call for a National Commission on Criminal Justice to evaluate the current state of criminal justice practices and the equity, efficacy, and legitimacy across the entire criminal justice system.</li> <li>• 7A. (☆☆☆☆) Conduct research to identify how public-sentiment monitoring tools and services, along with appropriate law enforcement interventions, can best be used to improve police-community relations.</li> <li>• 7B. (☆☆☆☆) Conduct realistic street-level research into interaction skills that is rooted in the practical reality of how most law enforcement scenarios evolve.</li> <li>• 7C. (☆☆) Conduct research to identify the kinds of activities that agencies can engage in (or avoid) to assist with improving trust levels within a community (not just between law enforcement and the community).</li> </ul>
Addressing training, staff development, resource, and management challenges	<p>8. There is a need for guidance on what public safety agencies should do and how.</p> <ul style="list-style-type: none"> <li>• Agencies need assistance to limit mission creep.</li> <li>• Agencies need assistance to determine whether and how to consolidate or regionalize certain operations</li> </ul>	<ul style="list-style-type: none"> <li>• 8A. (☆☆) Conduct research to identify the kinds of activities that agencies can engage in (or avoid) in order to preserve resources and improve effectiveness for core missions.</li> <li>• 8B. (☆) Conduct research to identify the costs, risks, and benefits of efforts to regionalize and consolidate non-public-facing services.</li> <li>• 8C. (☆) Identify best practices with respect to competing governance models and processes for regionalization of services.</li> </ul>

Table A.2—Continued

Topic	Themes	Needs
	<p>9. There is a need to specify how to select and train officers of the future.</p> <ul style="list-style-type: none"> <li>• Agencies need assistance with training future officers, especially in terms of identifying the top skills, starting with problem-solving and others outside of traditional enforcement.</li> <li>• On selection, there is a need to consider whether there is a core set of qualities that future officers need to have, with panelists realizing that this may not be practical.</li> </ul>	<ul style="list-style-type: none"> <li>• 9A. (☆☆☆) Conduct research to identify the sets of skills, abilities, and experiences that are most useful to have in today’s policing environment.</li> <li>• 9B. (☆) Develop national guidelines for the qualities that are most likely to make successful police officers and agency staff.</li> <li>• 9C. (☆) Conduct an analysis of the costs, risks, and benefits of nontraditional policing programs, such as community service officers and auxiliaries.</li> </ul>
Balancing the drive to keep and share data with potential information overload	<p>10. There is a need to overcome barriers to interagency data-sharing.</p> <p>11. Officers need help to address an ever-increasing flood of information.</p>	<ul style="list-style-type: none"> <li>• 10A. (☆☆) Develop a federal law enforcement information protection law, because it might facilitate the sharing of information that is protected by other laws (e.g., HIPAA, FERPA).</li> <li>• 10B. (☆) Collect and publicize “success stories” that occurred as a result of past successes with information-sharing.</li> <li>• 11A. (☆☆☆) Develop a continually updated inventory of law enforcement information analysis tools. This process should also highlight gaps in the available tools.</li> <li>• 11B. (☆☆☆) Conduct research to identify the most promising technologies and practices to manage the growing flood of information to officers.</li> </ul>
Navigating the boundary between public and private sectors	<p>12. Uncertainties about law enforcement interacting with autonomous vehicles and vendors need to be addressed. These include how officers will direct self-driving vehicles and how officers will collect data from them (typically from crash scenes).<sup>a</sup></p> <p>13. Agencies need assistance in order to interact more effectively with social media companies.</p> <p>14. There is a need to improve practitioner-researcher relationships, both in conducting research and in making results easy to find and easy to use throughout the practitioner community.</p>	<ul style="list-style-type: none"> <li>• 13A. (☆☆) Conduct research to identify the legislative gaps in order to standardize when and how emergency or investigatory requests for data are handled by the private sector.</li> <li>• 14A. (☆☆) Work with professional organizations to increase the number of “translators” who are skilled at managing research projects that are designed to be timely and useful to law enforcement (e.g., LEADS scholars).</li> <li>• 14B. (☆) Work with existing maintainers of law enforcement–relevant information to improve the accessibility and visibility of their repositories (e.g., podcasts, brief summaries).</li> <li>• 14C. (☆) Work with organizations like NCJRS to facilitate ensuring that high-demand closed publications are converted to open access (by paying for them).</li> </ul>

<sup>a</sup> No needs were identified in this category.

## Endnotes

- <sup>1</sup> Some examples of existing standards-making bodies and events pertain to information-sharing and safeguarding. These include the Global Justice Information Sharing Initiative, which is an advisory panel to the Attorney General that facilitates the development of information-sharing exchange standards, and the IJIS Institute, which is a membership organization of technology providers that supports developing and testing common information systems and standards (U.S. Department of Justice, Office of Justice Programs, undated; IJIS Institute, undated).
- <sup>2</sup> For example, test data sets for video analytics of human activity (e.g., the Activity, Event and Action Databases library maintained by Rensselaer Polytechnic Institute's Intelligent Systems Laboratory) to date have focused on the detection of basic activities like walking, running, throwing, entering and exiting a car, carrying an object, handing off an object, and assembling and dispersing (Intelligent Systems Laboratory, undated).
- <sup>3</sup> For a general characterization of vulnerabilities and threats from the IoT, see Abomhara and Køien (2015).
- <sup>4</sup> See, for example, Waltz (2018) for a discussion of experiments to replace drivers' licenses with smartphone apps.
- <sup>5</sup> This earlier projection of "by 2020" (e.g., Reddy, 2010) has been surpassed. The World Health Organization stated that depression was already the biggest global cause of disability in 2017 (World Health Organization, 2017, p. 5).
- <sup>6</sup> A Ruderman Family Foundation study found that, in 2017, 129 officers died in the line of duty and at least 140 committed suicide (Ruderman Family Foundation, 2018).
- <sup>7</sup> As a few examples of these limited studies, Patterson, Chung, and Swan (2014) reviewed 12 studies on stress management interventions for police between 1984 and 2008 and found that, collectively, the interventions failed to generate significant results. Violanti (1992) found that, based on self-reporting on a small survey (180 responses), distancing and problem-solving strategies helped reduce stress, whereas escape, avoidance, and self-control strategies did not.
- <sup>8</sup> This comment appeared to be referencing such studies as Rehavi and Starr (2014), which found that, *ceteris paribus*, African American defendants in federal courts were 1.75 times more likely to be charged with crimes carrying mandatory sentences than were white defendants.
- <sup>9</sup> This comment appeared to be referencing numbers from the Bureau of Justice Statistics (BJS) and FBI. As of 2015, BJS's annual household survey found that 47 percent of violent crimes and 35 percent of property crimes were reported to police. According to the FBI, 46 percent of the violent crimes and 19 percent of the property crimes were cleared in 2015 (Gramlich, 2017). Those estimates together contribute to rough estimates of about 22 percent of U.S. violent crimes and about 7 percent of U.S. property crimes being cleared.

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## The RAND Justice Policy Program

RAND Social and Economic Well-Being is a division of the RAND Corporation that seeks to actively improve the health and social and economic well-being of populations and communities throughout the world. This research was conducted in the Justice Policy Program within RAND Social and Economic Well-Being. The program focuses on such topics as access to justice, policing, corrections, drug policy, and court system reform, as well as other policy concerns pertaining to public safety and criminal and civil justice. For more information, email [justicepolicy@rand.org](mailto:justicepolicy@rand.org).

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## About This Report

On behalf of the U.S. Department of Justice, National Institute of Justice (NIJ), the RAND Corporation, in partnership with the Police Executive Research Forum (PERF), RTI International, and the University of Denver, is carrying out a research effort to assess and prioritize technology and related needs across the criminal justice community. This initiative is a component of NIJ's National Law Enforcement and Corrections Technology Center (NLECTC) System and is intended to support innovation within the criminal justice enterprise. For more information about the NLECTC Priority Criminal Justice Needs Initiative, see [www.rand.org/jie/justice-policy/projects/priority-criminal-justice-needs](http://www.rand.org/jie/justice-policy/projects/priority-criminal-justice-needs).

This report is one product of that effort. It presents the proceedings of an expert panel of law enforcement executives focused on characterizing top issues facing today's law enforcement agencies and on identifying and prioritizing needs for innovation to address those issues. This report and the results it presents should be of interest to leaders of law enforcement agencies, research and operational criminal justice agencies at the federal level, private-sector technology providers, and policymakers active in the criminal justice field.

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