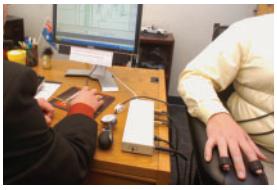
Fostering Innovation in Community and Institutional Corrections

Identifying High-Priority Technology and Other Needs for the U.S. Corrections Sector



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PRIORITY
Criminal Justice
NEEDS INITIATIVE

A project of the **RAND Corporation,** the **Police Executive Research Forum,** **RTI International,** and the **University of Denver**

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Preface

On behalf of the U.S. Department of Justice's National Institute of Justice (NIJ), the RAND Corporation, in partnership with the Police Executive Research Forum, 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 in criminal justice.

This report is one product of that effort, completed as a joint effort of the RAND Corporation and the University of Denver. It presents the results of the Corrections Advisory Panel, a group convened in fiscal year 2014 as part of the NLECTC Priority Criminal Justice Needs Initiative to identify current challenges and innovation needs in both community and institutional corrections in the United States. This report and the results it presents should be primarily of interest to organizations and individuals involved with technology planning, research funding, and product development related to the U.S. corrections sector. For broader policymaker and public audiences, it provides a window into problems identified with current corrections practice and possible solutions for improving corrections performance going forward.

Other RAND research reports of potential interest include:

- Lois M. Davis et al., *How Effective Is Correctional Education, and Where Do We Go from Here? The Results of a Comprehensive Evaluation*, Santa Monica, Calif.: RAND Corporation, RR-564-BJA, 2014
- Brian A. Jackson, *How Do We Know What Information Sharing Is Really Worth? Exploring Methodologies to Measure the Value of Information Sharing and Fusion Efforts*, Santa Monica, Calif.: RAND Corporation, RR-380-OSD, 2014
- Keith Gierlak et al., *License Plate Readers for Law Enforcement: Opportunities and Obstacles*, Santa Monica, Calif.: RAND Corporation, RR-467-NIJ, 2014.

The RAND Safety and Justice Program

The research reported here was conducted in the RAND Safety and Justice Program, which addresses all aspects of public safety and the criminal justice system, including violence, policing, corrections, courts and criminal law, substance abuse, occupational safety, and public integrity. Program research is supported by government agencies, foundations, and the private sector.

This program is part of RAND Justice, Infrastructure, and Environment, a division of the RAND Corporation dedicated to improving policy and decisionmaking in a wide range of policy domains, including civil and criminal justice, infrastructure protection and homeland security, transportation and energy policy, and environmental and natural resource policy.

Questions or comments about this report should be sent to the project leader, Brian A. Jackson (Brian_Jackson@rand.org). For more information about the Safety and Justice Program, see http://www.rand.org/safety-justice or contact the director at sj@rand.org. For more information about the NLECTC Priority Criminal Justice Needs Initiative, see http://www.criminaljusticeneeds.org.

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Summary

The agencies of the U.S. corrections enterprise manage offenders confined in prisons and jails (commonly referred to as *institutional corrections*) and those who have been released into the community on probation and parole (commonly referred to as *community corrections*). The enterprise is one of the three central pillars of the criminal justice system, along with police and the courts. The system is intended to protect the public by separating violent offenders from the community, deterring others from offending, and rehabilitating offenders for reintegration into the community upon release.

A Need for Innovation in Corrections

The U.S. correctional system is challenged by a variety of demographic, societal, and fiscal trends:

- *The size of the population under correctional supervision*. The sheer size of the population under correctional supervision poses a simple challenge of scale for the corrections sector, and the numbers involved are staggering. The United States has among the highest incarceration rate in the world, with nearly one out of every 100 adults in prison or jail (Glaze and Herberman, 2013). The corresponding rate for community supervision is even higher, with one in 50 on probation or parole—though some nations' lower rates for community supervision result from the absence of such a system rather than differences in use.
- *The changing characteristics of the correctional population*. Significant shifts in the characteristics of the populations of offenders—including an aging prisoner population, increased numbers of female offenders, populations with mental health conditions, and different types of disability—pose different challenges. Each population has different needs and requirements for facilities, staff training, and program implementation.
- *The high financial cost of corrections in a time of budget challenges*. The enormous growth of the correctional system has had a deep impact on state budgets. The corrections sector has been consuming a greater percentage of government budgets. In 2012, the National Association of State Budget Officers (NASBO) estimated that corrections accounted for approximately 7 percent of state general fund revenues (National Association of State Budget Officers, 2013). As a result, less funding is available for other key services, such as education and health care.
- *Inequities in the application of incarceration and its personal costs*. As part of the broader examination of the effect of the justice system on different racial and ethnic groups within the United States, corrections faces its own questions about the effect of current and past

incarceration policies. For a variety of reasons, rates of incarceration of ethnic minorities, particularly African-American males, are much higher than those of other groups, particularly whites. These differences have effects that reach beyond just differentials in the time that each group may spend incarcerated, given clear evidence that incarceration itself has significant and long-term effects on the individuals involved, including employment and health.

- *Corrections workforce demand*. Expanding numbers of offenders in custody and under supervision create increasing demands for corrections professionals. Difficulty in recruitment and high employee turnover make it difficult to meet staffing needs. In addition, although the majority of corrections officers and staff carry out their roles and duties ethically and faithfully, criminal and unethical behavior by a subset of the sector's membership poses important challenges. Though data are sparse, the reality of the problem is clearly demonstrated by findings that 2.8 percent of prison inmates and 2 percent of individuals in jails reported being sexually assaulted by a member of their facility's staff (Beck et al., 2013, p. 6).[1]
- *Poor outcomes on key corrections measures of effectiveness, notably offender recidivism*. Broad measures of recidivism across the country paint a troubling picture about the effectiveness of the correctional system on this important outcome. Published measures include estimates that between 30 and nearly 70 percent of released offenders will return to prison within three years (Durose, Cooper, and Snyder, 2014; Rhodes et al., 2012; Pew Center on the States, 2011).

Given these challenges, and the broader societal interest in enabling the corrections community to play its role more effectively, it is valuable to identify opportunities where changes in the tools, practices, or approaches of corrections could improve future performance. Indeed, the first step toward a corrections enterprise that is better positioned, resourced, and equipped to contribute to public safety involves mapping out the changes—that is, the innovations on current practices and approaches—that could lead there.

Building an Innovation Agenda for Corrections

In building an innovation agenda for corrections, the foundation is the substantial technology and practice base that makes up corrections today. Therefore, to build our agenda, we started by characterizing the current state of the art. This included constructing a taxonomy of corrections technology and practice and broadly characterizing which areas were already well covered by available products, practices, or corrections methods. The main categories within the resulting taxonomy are

1. *Facility operations and population services*, which covers technologies and practices related to running facilities, including architecture; infrastructure; logistics; physical security technologies; and processes and technology related to delivering products, education, and health care to in-facility populations

[1] These figures encompass the sum of the percentage of inmates reporting an incident involving a staff member and the percentage reporting multiple incidents involving both staff members and other inmates.

2. *Person-worn equipment and weapons/force*, which covers uniforms, protective and augmenting clothing, basic staff equipment, and both lethal and less-than-lethal weapons
3. *Information and communications*, which covers information technology systems; sensors, information collection devices, and laboratory testing tools; analytic and information management techniques and systems; practices and technologies related to information-sharing; and communication devices and techniques of all types
4. *Vehicles*, which covers ground, air, and water vehicles, as well as associated modifications and technologies
5. *Doctrine, tactics, management, and behavioral knowledge development and training*, which covers education and training of leadership, practitioners, and specialists; policy and legal innovation; and training technologies.

Figure S.1 shows these main categories and the first level of subcategories within the taxonomy. (The full taxonomies for both community and institutional corrections will be available in an electronic appendix to this report, given that they are difficult to present usefully in book form.) This picture of the status quo provided the context for turning toward the future of corrections and identifying innovation options that could improve performance going forward.

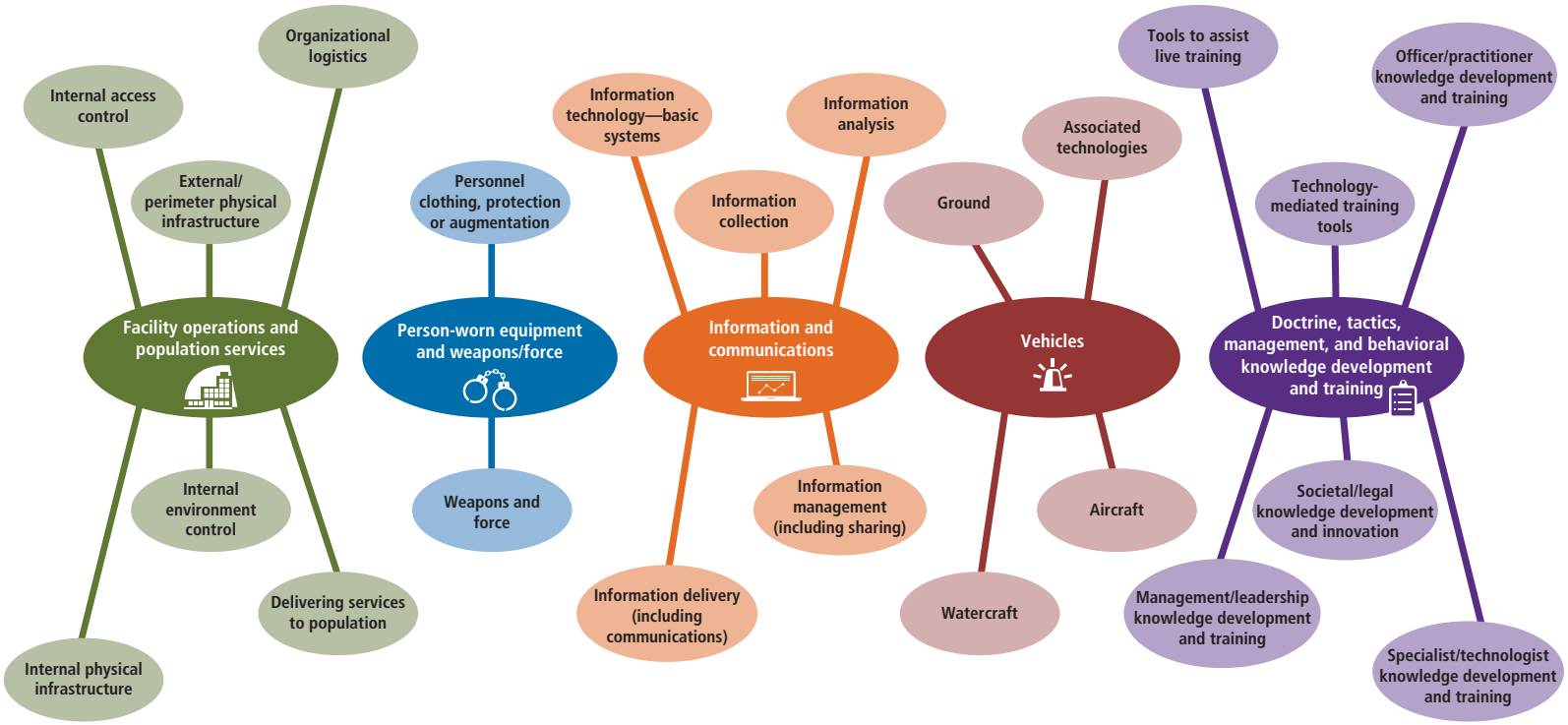
Identifying innovations that would be beneficial in the future is a challenge in all fields, not just corrections. The future is inherently uncertain, and so any effort to anticipate it and what technology, policy, or practice changes might best prepare organizations for it will always be similarly uncertain. Fields attempting to take on that challenge use a variety of methods, developing such tools as scenarios to examine multiple futures in detail, simulations that seek to analyze large numbers of possible futures simultaneously, expert elicitation methods that seek to combine the knowledge and intuition of individuals to build group estimates, and structured analytic processes that attempt to extrapolate from the present in different ways to understand how future conditions likely will, or will not, vary from those of today. For most real-world problems involving many organizations and more variables than can be reasonably or accurately projected, all such efforts involve a degree of subjectivity and produce varied results. Given irreducible uncertainty, there are no absolute right answers, so we must always judge the value of such projections in light of the process used to generate them and apply their results judiciously.

To identify components for our innovation agenda for corrections, we combined information and data from a variety of sources, culminating in a group elicitation activity to draw on the expertise of the corrections practitioner community. In addition to developing the taxonomy discussed above, the other elements were to

- Review available literature on corrections challenges, available technologies, and past assessments of technology and other needs to improve performance in the community.
- Convene a Corrections Advisory Panel of 25 community and institutional practitioners for a structured needs development and prioritization process.[2] We selected participants in the panel to cover the breadth of the corrections community, and the process to elicit their views systematically explored both current and potential near-term future problems

[2] A detailed description of the Corrections Advisory Panel and ranking process is provided in the appendixes to this report.

Figure S.1
Main Categories and Subcategories of the Criminal Justice Technology Taxonomy



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faced by the sector. Held over four days in RAND's Washington, D.C., metropolitan area office, the process identified more than 200 needs that were systematically ranked and prioritized.[3]

The result of these efforts is a set of prioritized needs, providing a menu of innovation options for addressing key problems or capitalizing on emerging opportunities in the corrections sector. The next two sections summarize the results, which we used to construct an innovation agenda for the sector overall.

High-Priority Innovation Needs for Community Corrections

In community corrections, the panel identified 19 top-tier needs. Table S.1 presents the needs, grouped by their main technology or practice taxonomy category. Looking at the high-priority needs, all 19 fall within the categories of *information and communications* and *doctrine, tactics, management, and behavioral knowledge development and training*.

Table S.1
Top-Tier Needs for Community Corrections

Category	Problem or Opportunity	Associated Need
Information and communications	Lack of effective validation techniques for risk and need assessment tools, limiting confidence in their use	Develop tools or components of case management systems that can dynamically update risk assessments and automatically validate and update risk assessment models. The tool should also identify anomalies in case management, such as signs of risk-score manipulation and anomalous churn.
		Develop simple risk models using easily observed indicators known to be correlated with recidivism that corrections officers can use in the field to assess offenders' risk at each meeting.
	Lack of dynamic, time-dependent risk assessment tools to provide solid predictive ability for high-risk offenders	Develop improved risk assessment models for recidivism that incorporate expanded variables and model types and can provide dynamic, near-real-time assessments of risk. For example, include indicators of ongoing cooperation with terms of supervision.
	Large caseloads, affecting quality of supervision delivered	Develop guidance to help evaluate numbers of cases versus actual workloads, specifically to include better methods to assess how much time should be spent on a specific case.
	Language differences and language knowledge of corrections staff, limiting supervision effectiveness	Develop affordable, portable, accurate, real-time, multilanguage *speech-to-speech* translators; technologies exist but need to be improved.
	Lack of information to appropriately allocate resources to high- and low-risk offenders	Develop models that can more accurately identify offenders on community supervision who require less supervision and resources, saving resources for higher-risk individuals.
	Lack of ability to detect deception by offenders during interactions	Develop affordable, portable, easy-to-use, and validated tools for determining whether a subject is being deceptive. Potential technologies to leverage include recognizing microfacial expressions, remote biometrics sensors, and P200 (brain waves).

[3] For our effort, we have used the generic term *needs* to describe not just something that corrections agencies need to solve an immediate problem (e.g., a technology or other solution to help reduce significant current recidivism rates) but also steps that could be taken to take advantage of a new opportunity that changes in technology or society has made available (e.g., the potential for mobile devices to play a role in supervising released offenders).

Table S.1—Continued

Category	Problem or Opportunity	Associated Need
	Data system interoperability problems among agencies who have useful data (and even within single agencies), limiting cross-agency sharing	Create gateways or centers that can translate and exchange corrections data between and among agencies' systems, *on a local level*.
		Need extensions to, dissemination of, and vendor requirements for the use of National Information Exchange Model (NIEM) Information Exchange Package Documentation (IEPD) guidelines in corrections.
		Create gateways or centers that can translate and exchange corrections data between agencies' systems and *state and nationwide databases*.
		Produce and disseminate affordable tools that query multiple federal, state, and local databases about people, places, and things and perform analytics on the results.
Doctrine, tactics, management, and behavioral knowledge development and training	Limited preparedness activities for large-scale incidents	Develop guidebooks and training materials on how to plan for and recover from a natural disaster from the community corrections perspective.
	Lack of effective validation techniques for risk and need assessment tools, limiting confidence in their use	Develop guidance materials that discuss which risk assessment tools are appropriate to use in which settings, and warn agencies against using risk instruments that were not developed for the intended purpose, are out of date, or were never validated.
	Release of more dangerous, higher-risk offenders into community monitoring as a result of prison and jail overcrowding	Assign increased and more-targeted resources to address changes in the population of offenders under community supervision (e.g., resources addressing more-frequent violations in this group of offenders).
	Differences in sanctions in response to infractions, producing inconsistency in holding offenders accountable	Develop a tool or matrix that reflects best practices and prior research on which sanctions should be applied to which type of violation and need.
		Develop or gather research on which type of sanction is most likely to produce a positive behavioral change in response to which type of violation and need.
	Lack of training for corrections personnel to address offender drug and mental health issues	Develop training programs for community corrections officers to work with offenders diagnosed with mental illnesses or exhibiting symptoms.
		Assemble a national information resource that provides virtual training and guides on how probation officers should work with mental health caseloads.
	Difficulties recruiting, hiring, training, and retaining corrections staff	Update training materials and software so that they are current, more realistic, and more interactive, and they provide visualization.

NOTE: Needs are grouped by their top-level taxonomy category. Full categorization of needs is included in Appendix D.

The top-tier needs focused on *information and communications* emphasize the importance of information to community corrections. These needs included various risk assessment tools to match offenders to resources and to make decisions about appropriate levels of supervision. The working group also highlighted a variety of data collection tools, focusing both on offenders (e.g., tools to effectively detect deception) and internally on corrections staff. Analysis tools for language translation and understanding Global Positioning System (GPS) tracking data were also flagged.

The remaining four top-tier needs for this category all focus on facets of information-sharing and data system interoperability. The goal is to allow access to information in national, state, and local databases across agencies and provide easy access to that data by practitioners. Discussion of these topics during the working group focused on the need for *integrated justice*, driven by the ability of practitioners and treatment providers to access records that can help guide supervision and service delivery. The current state was described as fragmented, with much data not being routinely tracked, problems transferring data from agency to agency, and basic information system limitations that made extracting data and using it very difficult at best.

In *doctrine, tactics, management, and behavioral knowledge development and training*, needs are flagged for community corrections leadership to inform preparedness efforts for natural disasters, guide the application of offender risk assessment tools, and develop resources to address the fact that higher-risk offenders are being released into community supervision due to changes in corrections practice and efforts to reduce prison populations. Although there is a deep literature on offender risk assessment regarding outcomes such as recidivism, violence, and particular offenses, the fact that this need rose into the top tier suggests that work to date has not sufficiently validated risk assessment tools to warrant the panel's confidence in their use. At the corrections officer or practitioner level, top-tier needs identified in this area included better materials for providing training overall and materials specifically addressing offenders with mental health conditions. The panel also identified needs for selecting and calibrating sanctions for offenders who violated the terms of their probation and parole (avoiding immediately sending all individuals back to institutions for any and all violations), indicating a requirement for knowledge development.

A key challenge of organizational innovation is providing training to staff members to update and improve both skills and practices over time. Technology can assist. Two of the three needs identified in training technology were top-tier, focusing on delivering information to the community overall (a national resource to provide virtual training) and to individuals through improved software tools.

High-Priority Innovation Needs for Institutional Corrections

Table S.2 presents the 29 top-tier needs for institutional corrections, categorized by their top-level technology and practice taxonomy categories. In institutional corrections, the top needs fell in three categories: *facility operations and population services*; *information and communications*; and *doctrine, tactics, management, and behavioral knowledge development and training*.

The working group identified three top-tier needs related to *facility operations and population services*. One focused on the recurring problem of contraband and the potential for visitation practices to help keep contraband out of corrections facilities. The second related to the new challenges associated with inmate access to technology—which is increasingly required for educational programs and reentry preparation—and providing appropriate Internet filtering for the corrections environment to address security and other concerns. For this need, solutions are

Table S.2
Top-Tier Needs for Institutional Corrections

Category	Problem or Opportunity	Associated Need
Facility operations and population services	Contraband coming into facilities *from visitors*	Change visitation practices (e.g., greater virtual visitation) to reduce opportunities for visitors to bring contraband into facilities.
	Inmate access to technology, creating internal security and management challenges (e.g., access to unauthorized content, gaming of systems for communication within the facility)	Implement stringent, already-available web filtering software to allow access only to specific Internet sites.
	Security concerns and risk from transferring inmates outside of a facility to receive specialized medical care	Use telemedicine to reduce the need to transport inmates out of secure facilities.
Information and communications	Inability to track incidents within a facility to detect patterns (e.g., in medical cases, complaints, or inmate grievances)	Develop automated data analysis tools to *rapidly* identify trends in internal data systems (i.e., without the lag involved in many centralized analytic processes), using improved CompStat methods for corrections.
	Contraband coming into facilities *by employees*	Develop tools to track contacts between inmate and employee phone numbers (though acknowledging that some countermeasures to such tools are already available).
		Work with staff and unions to address resistance to comprehensive monitoring and searching of employees.
	Contraband coming into facilities *at fence lines*	Develop better and more accurate video analytics technologies for fence line video monitoring.
		Use available infrared sensor–based fencing (e.g., FLIR Thermal Fence™) for perimeter security.
		Commercialize military-developed surveillance technologies for use in corrections environment.
		Develop cost-effective unmanned aerial vehicle (UAV) technology suitable for perimeter monitoring.
	Contraband coming into facilities *through logistics systems*	Develop higher throughput and cheaper scanning technologies to scan incoming logistical shipments to facilities.
	Contraband coming into facilities transported *by visitors, staff, or incoming inmates*	Develop a single overall scanning portal suitable for detecting all types of contraband for individuals coming into the facility (e.g., millimeter wave, including explosive trace detection) *at reasonable cost and a small enough footprint for use in existing facilities*.
	Increasing volume of camera data	Develop video analytics to do pattern and threat recognition with much-improved false-alarm rates (e.g., one or two per shift is about the maximum tolerable false-alarm level).
	Current video analytics insufficient to monitor inmate behavioral problems	Improve video analytics to better distinguish events (e.g., fights or gatherings), designed to prevent or separate inmate attempts to intentionally produce false alarms (adding biometrics could help).
	Inability to listen to more than a small percentage of inmate telephone conversations due to the labor intensity of monitoring	Develop automated tools for transcribing inmate telephone calls, enabling rapid (and accurate) keyword analysis and other pattern recognition.

Table S.2—Continued

Category	Problem or Opportunity	Associated Need
	Inability to listen to inmate calls in foreign languages	Develop automated tools for *translating* and transcribing inmate telephone calls, enabling rapid (and accurate) keyword analysis and other pattern recognition.
	Inmate use of social media inside facilities (e.g., via contraband cell phones) for communication	Adapt available automated tools for social media analysis of inmate activity to the needs of and constitutional concerns associated with use by corrections agencies (e.g., identifying links between inmates and corrections staff).
	Lack of situational awareness information for outside response teams coming to incidents in corrections facilities	Utilize video standards to enable real-time sharing of video during an incident (inside and outside) as needed, with sufficient security.
Doctrine, tactics, management, and behavioral knowledge development and training	Contraband coming into facilities *by varied routes*	Develop doctrine for implementing a systematic approach to contraband prevention so that improvements in security at one route do not simply displace transport to other routes.
	Contraband coming into facilities *by employees*	Develop and implement policies and practices to systematically search all employees coming into facilities.
	Poor resource coordination in real time at large-scale incidents, where success depends on using common resources effectively	Universally adopt Incident Command System (ICS) and National Incident Management System (NIMS) by all agencies.
		Hold a greater number of interagency exercises to build relationships among agencies and bolster preparedness.
		Develop and use cross-agency memoranda of understanding and common practices for large-scale incidents.
	Low agency budgets, restricting ability to implement currently known best practices	Continue federal efforts to research and evaluate criminal justice programs that work and can be broadly implemented.
		Implement a true justice reinvestment model to provide agencies access to a pool of funds to pay the start-up costs for new evidence-based practices or programs.
	Lack of training and staff resources to address inmate mental health issues	Develop comprehensive video-based training (updated regularly) to train staff on needs, medication, and other requirements to manage inmate mental health issues.
	Difficulty efficiently managing inmate populations across multifacility systems	Develop *policies and practices* to identify early the requirements for inmates' education, health, court, etc., to match them with facilities that can provide those services, avoiding the need for later transfer.
	Shift in prison population to jails (e.g., California realignment efforts), creating jail space management challenges	Develop new alternatives to incarceration, such as intensive monitoring for parts of the offender population (e.g., individuals convicted of driving under the influence).
		As appropriate, divert inmates to outside service providers (e.g., mental health treatment) rather than incarceration.

NOTE: Needs are grouped by their top-level taxonomy category. Full categorization of needs is included in Appendix E.

already available in the market, so the concern was implementation that was cost-effective and appropriate for corrections. The final need focused on the potential for technology—specifically, telemedicine—to avoid moving inmates out of secure facilities for care.

Another 15 top-tier needs from the institutional working group fell in *information and communications*. Eight of these 15 needs focus on contraband in facilities, further emphasizing that problem. These needs included detection and analysis techniques and technologies to address contraband coming in at fence lines, through logistics systems, and carried by visitors, offenders, and staff. The working group identified analytics needs to address increasing amounts of video data and to rapidly identify trends in internal data systems (i.e., translating existing administrative data into situational awareness that can be acted on, including the argument for a version of the management process CompStat in policing for corrections). Monitoring inmate communications was identified as a challenge, with needs for technologies to monitor and analyze calls *efficiently* and to deal with inmate populations speaking a variety of languages. Extending concerns about inmate communications, the working group also flagged tools for automated monitoring of inmate social media activities (in particular, to identify links between inmates and corrections staff that could detect staff misbehavior).

Finally, as was the case for community corrections, a significant portion (11 of 29) of the highly rated needs focused on *doctrine, tactics, management, and behavioral knowledge development and training*. These include needs at the management level, including doctrine for addressing contraband coming into facilities, emergency preparedness, and agency budget issues. For corrections officers, needs in this category included training for addressing offenders with mental health needs (similar to needs identified in community corrections) and practices to better manage inmates across multifacility systems. Unlike community corrections, the institutional corrections working group highlighted several broader societal or legal practices. They include developing legal alternatives to incarceration for some inmates to help address overcrowding and recommitting to justice reinvestment to provide correctional systems with the resources needed to implement promising practices to improve performance.

Looking Across Community and Institutional Corrections

Though there are clear and important differences between the community and institutional corrections environments, in an effort to build an innovation agenda for corrections overall, it is useful to identify common challenges and needs. Meeting such needs could contribute broadly to the performance of corrections in the United States across the board.

Looking across just the top-tier needs of both working groups, the needs clearly reflect the differences between the two areas—notably, the focus on information-sharing in the community corrections group (versus information collection and analysis for institutional corrections) and the focus on contraband in the institutional group. There were areas of commonality, however. Community corrections had several needs for improved offender risk assessment, and that issue was present in the institutional group in discussions of diverting offenders from incarceration to other correctional options. Both communities were concerned about emergency preparedness, though the nature of those concerns differed. Both also had needs for practitioner training and equipping their staff with tools to address offender populations increasingly made up of individuals with mental health conditions. And both—unsurprisingly in an era of tight municipal and state budgets—were concerned with saving money.

Our process of narrowing to a set of top-tier needs is useful to focus attention on the subset of needs that are potentially most valuable, but it does have the potential to miss other

commonalities that could usefully inform an innovation agenda. As a result, a second analysis asked whether there were needs that, while potentially high priority in one group, also appeared in the other group's set of lower-priority issues. If there were, such needs might be reasonably prioritized, given their potential for broader benefits across corrections.

Looking across the needs in this way, there were indeed lower-tier needs in one working group that rose to the top-priority tier in the other working group:

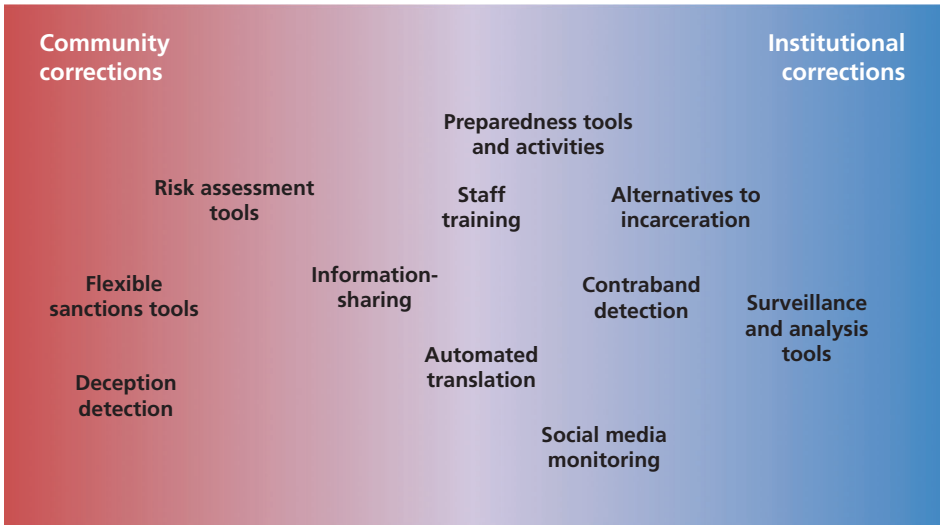
- Both groups had training needs that fell outside the top tier, including needs for alternative ways to deliver training (virtually, by video, without practitioners having to be pulled from their day-to-day roles) that could contribute to meeting the highest-priority training needs.
- Both groups identified a need for speech-to-speech and text-to-speech translation tools for supervision.
- A top-tier need in institutional corrections focused on monitoring social media; a similar need was identified but was ranked lower in community corrections.
- Addressing a lack of follow-through on justice reinvestment, meaning that corrections agencies lack the resources to pay the start-up costs for innovative practices, was flagged as a top-tier need in institutional corrections, and a similar concern was raised in community corrections but was ranked much lower.
- Though there were top-tier needs related to alternatives to incarceration, both groups had other lower-priority needs related to this topic, including the desire to manage certain prisoner groups, including the elderly, in nonsecure settings and the resource implications for community corrections agencies.
- The community corrections working group identified needs for handheld technologies to detect electronic devices and weapons at a distance. Though they ended up ranked below the top tier, these needs have commonality with several top-ranked technology needs in institutional corrections related to contraband prevention.
- Community corrections ranked information-sharing technologies in the top tier, and institutional corrections identified comparable needs, albeit ranked lower.

This crosswalk provides a counterpoint to viewing each wing of the corrections sector in isolation; importantly, needs that bridge both wings could have broader benefits nationally. Figure S.2 presents these identical or similar needs in graphical form, with the top-tier needs of both corrections components presented on a gradient between the two communities.

Looking at the figure as a map of an innovation agenda for corrections in the United States, the needs—and requirements to meet them—vary considerably:

- *Develop and improve technology*. There are difficult technology problems in this map, including both contraband detection on the institutional side and deception detection on the community side. While some technologies exist, such as video analytics to address sensor and other data, their performance is not meeting corrections requirements. The corrections enterprise needs new technologies that meet its specialized needs.
- *Adapt technology to the corrections environment*. The working groups expressed needs for technology that already exists but is not currently well suited for corrections. Social media monitoring tools—needed to address both inmate communication and interaction

Figure S.2
Priorities for Innovation Across Community and Institutional Corrections



NOTE: Horizontal placement illustrates commonality between needs (in all tiers) in the other component. The closer a priority is to the center of the chart, the stronger its dual benefit. Vertical placement is for spacing only.

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between inmates and corrections staff—have been developed for use in other contexts.[4] However, tools for corrections need to address the complexities of community and institutional settings (which have different needs and requirements), as well as sensitivities and legal concerns about monitoring that is intended to capture activity not just of offenders but of corrections staff as well.

- *Perform research and analysis*. Needs from both working groups require new knowledge to guide practice. For example, although alternatives to incarceration have been a focus for some time, the institutional panel highlighted the issue as pressingly important due to the growth of prison and jail populations today. Similarly, the community corrections side requires knowledge development to create tools to help match sanctions to infractions, not just to hold offenders accountable for their behavior but also to encourage better behavior.
- *Validate tools*. For community corrections in particular, there was a clear call for assistance in demonstrating that tools actually do what they say they do. Risk assessment has been a focus of research for many years, and a deep literature and varied tools attempt to predict offender recidivism, response to interventions and supervision, and so on. But panelists still had concerns that jurisdictions were using tools in unintended ways or tools that did not deliver on their promises. They had further concern that, given trends in corrections practice (such as budget constraints and increasing populations), it will become increasingly important to validate such tools before basing corrections decisions on them.
- *Change organizations' policies and practices*. For community corrections, the need for emergency preparedness focused on developing new tools and knowledge, but the institutional corrections working group called for changes in organizational behavior. Putting

[4] For example, Digital Stakeout and BrightPlanet's BlueJay are such products focused on law enforcement applications.

memoranda of understanding in place and carrying out preparedness exercises are things that an organization must do for itself. Policymakers and decisionmakers can build incentives into grant and other mechanisms to shape behavior, as they have for many years in the broader homeland security community, but outside forces can only facilitate—not execute—these innovations.

Conclusion: Collaborative Innovation for U.S. Corrections

The corrections sector, encompassing both the institutions charged with separating offenders from society as they serve their sentences and the organizations supervising parolees and probationers as they reintegrate back into society, plays a central role in the criminal justice system. Corrections today faces many challenges, including stresses from policy decisions that have led to significant increases in the number of individuals in custody and under supervision, questions about the effectiveness of rehabilitation efforts given high recidivism rates, concerns about shifting business models and the effects of privately operated prisons, questions surrounding the fairness of the justice system overall and corrections in particular, disproportionate effects on different racial and ethnic populations within the country, and resource constraints at all levels of government that limit the availability of funds and personnel to carry out its missions.

Nevertheless, the public has high expectations for corrections agencies to fulfill their role. All of the objectives identified in this study are part of that picture. Dangerous individuals who have been convicted of heinous crimes must be separated from society to deny them the opportunity to reoffend. When offenders are released into the community, the public has high—perhaps unrealistically high—expectations for supervising agencies to monitor their behavior, prevent their return to criminal activity by holding them accountable for their behavior, and facilitate their rehabilitation and reentry into society. And at the same time, the sector is expected to meet these objectives efficiently, while maintaining and advancing the quality and capability of corrections organizations and staff, meeting the needs of victims, and maintaining the health and safety of their staff, offenders, and the public.

Meeting all of these goals requires *innovation*—changes in technologies, policies, training, and practices—to enable better performance. But in a world of finite resources, not every need that might improve performance can be a priority. Focusing national efforts therefore requires making choices, which the prioritization exercise carried out by the advisory panel was designed to do. The top-tier needs in each working group represent the needs scored as most important by the group members, based either on their overall benefits or their expected value, including estimates of their likelihood of success. Looking across both high-priority and lower-priority needs provides an overarching view of community and institutional corrections, as well as the needs that have the greatest potential to contribute to the corrections sector overall. It should be noted that, as with all analyses of technologies and other areas that evolve rapidly, this agenda is a snapshot in time and is intended to be a jumping-off point for more and greater interaction with the corrections community as a part of the larger national goal of improving performance of the U.S. criminal justice enterprise.

Though assembling needs into an innovation agenda is a first step, improving corrections performance requires making changes to address those needs. Actually making innova-

tion happen for corrections in the United States can—and, in many cases, will—require the involvement of many actors and sectors beyond corrections agencies, including

- federal and other research development agencies, which provide funding to develop or pilot new technologies, training, or practices, thus contributing to the supply of potential innovations
- research organizations inside and outside government, which develop and evaluate new innovation options
- private-sector technology developers and providers, which develop their own technologies and commercialize prototype products of others' research into a form that can be broadly disseminated and adopted
- practitioner and other organizations, which define and disseminate practices and develop standards that help disparate organizations with differing levels of internal capacity to successfully choose and adopt new innovations
- training and technical assistance providers, which facilitate uptake of new innovations in the community and increase the chance that new technologies and practices will be adopted successfully.

The intended audience for this innovation agenda is therefore broad. Our goal to provide information to such a broad range of organizations means that the innovation agenda, as the name implies, is only a starting point and does not include everything necessary to fully inform their decisionmaking. Though the prioritization method applied here captures the potential value of meeting individual needs and the likely adoption of those needs by the community, it is silent on cost. This was intentional, given that the cost considerations of federal funders versus private-sector technology providers are quite different, and even the costs of meeting the same need could vary considerably. For example, what it would cost for a federally funded effort to meet a need *de novo* would presumably be vastly different from what it might cost a technology provider to modify and market an existing product, where only incremental change might be needed to address the corrections requirement. As a result, it is important both for us to acknowledge and for the reader to note that the broad aperture of this effort means that we do not provide all that is needed to support market analysis, technology portfolio design, or management decisions.

This agenda is therefore a first step, intended to contribute to the thinking of all the organizations and entities active in the corrections innovation system. Improving corrections performance will come out of the sum of their efforts, whether operating independently or in concert. The agenda is intended also to be only the first step in capturing the input of the corrections community, providing ongoing situational awareness of the needs and priorities to inform decisionmaking across this full system.[5] Doing so is critical because it is this system as a whole that will make it possible to implement technologies and practices to meet these needs and move from the problems and opportunities faced by corrections today to better performance for corrections tomorrow.

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[5] This report is a product of the first year of a continuing project funded by the National Institute of Justice focused on identifying and prioritizing the needs of the criminal justice community. As the project continues, we will explore alternative broader-based modes of collecting information from the community about needs and priorities. For updates on that effort and for individuals interested in participating in future efforts, visit the RAND Corporation's website on the Priority Criminal Justice Needs Initiative.

Acknowledgments

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Abbreviations

ASCA	Association of State Correctional Administrators
BJA	Bureau of Justice Assistance
CCTV	closed-circuit television
CED	conducted energy device
GPS	Global Positioning System
ICS	Incident Command System
IEPD	Information Exchange Package Documentation
MAS	managed access system
N-DEx	National Data Exchange
NLECTC	National Law Enforcement and Corrections Technology Center
NIEM	National Information Exchange Model
NIJ	National Institute of Justice
NIMS	National Incident Management System
PREA	Prison Rape Elimination Act
RFID	radio-frequency identification
TWG	Technology Working Group
UAV	unmanned aerial vehicle

CHAPTER ONE

Introduction

The agencies of the U.S. corrections enterprise manage offenders confined in prisons and jails and those released into the community on probation and parole. The enterprise is one of the three central pillars of the criminal justice system, along with police and the courts. The system is intended to protect the public by separating violent offenders from the community, deterring others from offending, and rehabilitating offenders for reintegration into the community upon release.

Indeed, the majority of individuals in the correctional system will be released from institutions back into the community, making the rehabilitative role played by both community and institutional corrections agencies of critical importance. Recent assessments of recidivism indicate that a significant percentage of released offenders will return to prison within a few years, which emphasizes the difficulty of that rehabilitative role and highlights a key challenge for corrections going forward (e.g., Durose, Cooper, and Snyder, 2014; Rhodes et al., 2012; Pew Center on the States, 2011).

The enterprise has also been challenged by demographic and fiscal trends and policy shifts that add stress to current facilities and approaches. The United States has an extremely large incarcerated population relative to other nations, driven by legal approaches that send more individuals to prison for increasing periods. At the same time, constraints in state and local budgets on the heels of the financial and economic crisis of 2007 to 2009 have put pressure on corrections organizations, just as on other criminal justice and public agencies.

A Need for Innovation in Corrections

Given these challenges, and the broader societal interest in enabling the corrections community to play its role more effectively, it is valuable to identify opportunities where changes in the tools, practices, or approaches of corrections could improve future performance. Indeed, the first step toward a corrections enterprise that is better positioned, resourced, and equipped to contribute to public safety involves mapping out the changes—that is, the innovations on current practices and approaches—that could lead there. What *innovation* means for organizations falls across a wide spectrum. They can make *incremental changes*, in which agencies can improve on current practices, become more efficient, and solve current problems, or *transformational changes*, which make it possible for agencies to do entirely new things or accomplish their objectives in new ways. Innovation across this entire spectrum is enabled by assessment and evaluation efforts that measure performance, identify problems, and discover emerging challenges or opportunities.

This need for innovation has been recognized for some time. Many existing initiatives, from the national to the local level, focus on identifying, implementing, and evaluating changes to seek efficiency and redeploy resources within the justice system to become more effective. Notable among these is the Justice Reinvestment Initiative by the U.S. Department of Justice, Bureau of Justice Assistance (BJA), which has developed tools to help state and local criminal justice organizations identify innovation opportunities in order to save resources that could be invested in other best practices to improve performance.[1] The broader and longstanding efforts of other agencies, including the National Institute of Justice (NIJ), BJA, and the National Institute of Corrections, have focused on identifying and implementing evidence-based practices and technological and practice improvements. These and other efforts seek to catalyze innovation not just within the corrections community but in the criminal justice enterprise overall.[2]

Considering Innovation in Corrections

How and when do organizations innovate? Innovation is often triggered by technological changes. For example, a new technology that could be adapted to help criminal justice agencies work better might create an innovation opportunity. Likewise, a shift in the way citizens and criminals use technology might force criminal justice agencies to innovate in response, or risk falling behind in their ability to protect the public. Changes in public perceptions about the appropriateness of different technologies for government and justice system use might trigger the need to change, in an effort to remain effective while maintaining public trust and legitimacy. Looking at corrections today, technological shifts are forcing change (e.g., changes in the Internet and mobile technology that complicate jail and prison environments), and new technologies are creating opportunities to improve performance (e.g., mobile and electronic monitoring technologies that could aid in community corrections tasks).

Technology often plays a part in innovation, but it is not the only approach for change. Organizational innovation can involve

- *new or better technologies*
- *changes in personnel training* that alter the way individuals use technologies or carry out their duties
- *changes in organizational policies and practices*, which can shape how tasks are done and either enable or hinder innovation by how they position an agency to respond to new challenges or opportunities.

Though sometimes one of these approaches is enough, innovation can (and often does) require all three.[3] At the same time, various agencies may elect to tackle the same problem using different combinations. For example, a multiagency information-sharing problem might be approached as a technology issue requiring new information technology systems, as an organizational policy and practice issue, or some combination thereof.

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[1] See, for example, discussion in Lachman et al., 2013; and Dwyer, Neusteter, and Lachman, 2012.

[2] For example, see discussion of efforts to implement evidence-based practices in community corrections in Crime and Justice Institute, 2009; or Taxman and Belenko, 2012.

[3] See Stone and Scharf, 2011, for a discussion of corrections technology innovation. Previous analyses, such as Moran and Lindner, 1985, have approached this issue from the perspective of how technological change can force changes in practice in corrections agencies.

Similarly, agencies often have many options that could help performance in similar ways. For example, given budget pressures on corrections organizations, there may be multiple ways to reduce costs (e.g., cutting facility energy usage or new staffing arrangements that reduce labor force requirements). Of the options that may help achieve the same or similar goals, those that are most attractive will depend on the following factors:

- *Effectiveness*. Are some options much better than others in achieving the goals?
- *Technical feasibility*. Are some simply easier to do than others, and therefore less likely to fail during development?
- *Likelihood the option would be fielded by the criminal justice community*. Do differing costs, complexity, or other barriers make some options more likely to be adopted by many agencies across the corrections community?

To innovate effectively today, criminal justice agencies need to know what options are currently available to them to solve today's problems or improve on current practices.[4] To innovate effectively in the future, a broader community—including practitioner agencies, the federal government, and technology providers—needs sufficient foresight to identify emerging problems and opportunities; combinations of technology, training, and policy that can address them; and which of those options we should pursue now so that the tools the criminal justice community will need to be effective in the future will be available.

Innovation in Corrections Involves Many Sectors and Organizations

Generating innovation in corrections practice can require the involvement of many actors and sectors beyond corrections agencies, including

- federal and other research development agencies, which provide funding to develop or pilot new technologies, training, or practices, thus contributing to the supply of potential innovations
- research organizations inside and outside government, which develop and evaluate new innovation options
- private-sector technology developers and providers, which develop their own technologies and commercialize prototype products of others' research into a form that can be broadly disseminated and adopted
- practitioner and other organizations, which define and disseminate practices and develop standards that help disparate organizations with differing levels of internal capacity to successfully choose and adopt new innovations
- training and technical assistance providers, which facilitate uptake of new innovations in the community and increase the chance that new technologies and practices will be adopted successfully.

[4] The research and evaluation literature describe a variety of models to give agencies a roadmap for identifying potential innovation opportunities; determining what stakeholders need to be involved when identifying changes, deciding among options, and implementing those changes; and assessing the results. Many of these efforts are what might be described as *bottom-up*, aimed at individual organizations or the justice systems in individual areas. Implementing and technical assistance literature around specific programs (e.g., the Justice Reinvestment Initiative) or focused on specific topics (e.g., Herz et al., 2012) are generally framed in this way. In this effort, we take a cross-cutting perspective—not top-down, but seeking to identify innovation options viewed as valuable across the corrections community.

The audience for this effort is therefore broad. We seek to identify technology (and related) needs and priorities that will help NIJ and other government agencies shape their research goals (because government research is a key part of what makes new technologies available in the future), that could help inform technology providers about their markets (because the private sector is a key player in getting technologies deployed and broadly adopted), and that will help agencies within the community understand both what is available now and what might be available tomorrow to help achieve their missions. As a result, we do not limit ourselves to individual agencies' missions or what would be practical for one type of technology provider firm or another; our goal is an integrated, comprehensive view.

Building an Innovation Agenda for Corrections

In pursuit of an innovation agenda for the U.S. corrections sector, this effort therefore sought to identify problems that prevent the sector from achieving its goals as effectively or efficiently as desired now, as well as opportunities where changes in technology, society, or practice could make it possible for the sector to perform better. We seek to provide the situational awareness about problems and solutions that is often critical for enabling innovation and, by doing so, help inform technology development and adoption in the community. This innovation agenda is needed, given the range of organizations and entities involved in promoting change in this sector, and it provides a way for different entities—researchers, large technology firms, small businesses active in related markets, trainers, and so on—to see the opportunities and challenges most relevant to their expertise and interests.

Identifying innovations that would be beneficial in the future is a challenge in all fields, not just corrections. The future is inherently uncertain, and so any effort to anticipate it and what technology, policy, or practice changes might best prepare organizations for it will always be similarly uncertain. Fields attempting to take on that challenge use a variety of methods, developing such tools as scenarios to examine multiple futures in detail, simulations that seek to analyze large numbers of possible futures simultaneously, expert elicitation methods that seek to combine the knowledge and intuition of individuals to build group estimates, and structured analytic processes that attempt to extrapolate from the present in different ways to understand how future conditions likely will, or will not, vary from those of today. For most real-world problems involving many organizations and more variables than can be reasonably or accurately projected, all such efforts involve a degree of subjectivity and produce varied results. Given irreducible uncertainty, there are no absolute right answers, so we must always judge the value of such projections in light of the process used to generate them and apply their results judiciously.

To identify components for our innovation agenda for corrections, we combined information and data from a variety of sources, culminating in a group elicitation activity to draw on the expertise of the corrections practitioner community. The main components were to

- Review available literature on corrections challenges, available technologies, and past assessments of technology and other needs to improve performance in the community.
- Develop a taxonomy of criminal justice technologies and practice, and use that taxonomy to sketch a picture of what is currently available in the sector.

- Convene a Corrections Advisory Panel of 25 community and institutional practitioners for a structured needs development and prioritization process.[5] We selected participants in the panel to cover the breadth of the corrections community, and the process to elicit their views systematically explored both current and potential near-term future problems faced by the sector. Held over four days in RAND's Washington, D.C., metropolitan area office, the process identified more than 200 needs that were systematically ranked and prioritized.[6]

The result of these efforts is a set of prioritized needs, providing a menu of innovation options for addressing key problems or capitalizing on emerging opportunities in the corrections sector. Our goal to provide information to such a broad range of organizations means that the innovation agenda, as the name implies, is only a starting point and does not include everything necessary to fully inform their decisionmaking. Though the prioritization method applied here captures the potential value of meeting individual needs and the likely adoption of those needs by the community, it is silent on cost. This was intentional, given that the cost considerations of federal funders versus private-sector technology providers are quite different, and even the costs of meeting the same need could vary considerably. For example, what it would cost for a federally funded effort to meet a need *de novo* would presumably be vastly different from what it might cost a technology provider to modify and market an existing product, where only incremental change might be needed to address the corrections requirement. As a result, it is important both for us to acknowledge and for the reader to note that the broad aperture of this effort means that we do not provide all that is needed to support market analysis, technology portfolio design, or management decisions. As with all analyses of technologies and other areas that evolve rapidly, this agenda is a snapshot in time and is intended to be a jumping-off point for more and greater interaction with the corrections community as a part of the larger national goal of improving performance of the U.S. criminal justice enterprise.

About This Report

This report presents the results of the Corrections Advisory Panel deliberations, captured in an initial corrections innovation agenda consisting of prioritized technology, policy, practice, and training needs. Chapter Two presents an overview of current challenges facing the corrections sector, framing the need for innovation. Chapter Three presents a map of the innovation landscape, offers a taxonomy of corrections technology and practice, and sketches the current state of the art in community and institutional corrections to provide the context for the needs identified by the panel. Chapter Four describes the needs generation process and provides a top-level view of the needs identified by the panel. Chapter Five presents the prioritization method and the innovation agenda. Chapter Six concludes, revisiting key themes and

[5] A detailed description of the Corrections Advisory Panel and ranking process is provided in the appendixes to this report.

[6] For our effort, we have used the generic term *needs* to describe not just something that corrections agencies need to solve an immediate problem (e.g., a technology or other solution to help reduce significant current recidivism rates) but also steps that could be taken to take advantage of a new opportunity that changes in technology or society has made available (e.g., the potential for mobile devices to play a role in supervising released offenders).

challenges for corrections going forward. Appendixes to the report identify the advisory panel members, describe the meeting, provide additional methodological detail on the prioritization and analysis methods, and present the full listing of needs from both community and institutional corrections in their entirety.

CHAPTER TWO

The State of Corrections Today

While crime has been broadly decreasing in the United States, the corrections enterprise remains a central component of the criminal justice system. The enterprise consists of a variety of institutions, programs, and services with a common, overarching goal: to manage persons accused or convicted of crimes. Persons under correctional supervision may be adults or juveniles, and supervision or management may occur in secure facilities such as prisons or jails (commonly referred to as *institutional corrections*) or in the community in the form of probation, parole, pretrial release, diversion programs, halfway houses, or residential treatment centers (commonly referred to as *community corrections*).

Across the country, there are corrections agencies at all levels of government (federal, state, local, and tribal), and the structure of the sector is not consistent across jurisdictions. Though corrections is primarily a function of government, correctional services are also provided across the country by nonprofit, for-profit, and faith-based entities, and privatization—delivery of government-funded corrections functions by for-profit companies—is playing a growing role.[1] As an example of this fragmentation, in California, probation is administered at the county level, but parole is a state function. In New Mexico, both probation and parole are administered at the state level. In general, most jails are operated at the county level and prisons at the state level, although there are exceptions and variations. For example, there are state jails in Texas, county prisons in Pennsylvania, and regional jails (across counties) in Virginia. Only six states are currently *unified*, meaning that prisons and jails are operated by the same state-level agency.

Much of the complexity of corrections stems from complex questions of purpose. The most-commonly stated goals of corrections are retribution, deterrence, incapacitation, and rehabilitation. These goals are often competing and conflicting, particularly for community corrections, which has dual responsibilities for protecting the public and providing services to the offenders under supervision. Major societal and political shifts during the 20th century have placed shifting levels of emphasis on these competing goals, and the resulting sentencing policy changes inevitably reshape the nature of corrections. The most notable shift occurred in the 1970s, when the strong emphasis on rehabilitation that existed for several decades was displaced in favor of a crime-control model. Combined with concerns about contemporary corrections programs' efficacy rehabilitating offenders raised by the Martinson report,[2] rising crime

[1] See, for example, Mason, 2012; or Austin and Coventry, 2001.

[2] Robert Martinson was a sociologist who, based on examination of available research at the time, published an influential article questioning the idea that it was possible for the corrections programs implemented at the time to serve a rehabilitative function (Martinson, 1974). The article was a pointed critique of program implementation and the research and evaluation

rates led in part to increased emphasis on incapacitation and deterrence (MacKenzie, 2001). Resulting changes in sentencing policy gave birth to more punitive measures, such as the so-called war on drugs, habitual offender laws, and mandatory sentences, and would eventually cause large increases in the correctional population, the effects of which are with us to this day.

Corrections today faces a range of significant challenges, growing out of current practice, resource and technical constraints, broader societal trends, and societal policy decisions whose effects cascade through the criminal justice system. Many of these forces come from outside the corrections sector. Innovations to address these challenges would help the practitioners in the community do their jobs, but they have broader societal implications as well.

Corrections today is high-cost, not only because of its effect on government budgets and the opportunity costs of funds spent on confining and supervising large numbers of people in the community, but also because of the costs to individuals who enter the system through various paths. These costs fall disproportionately on vulnerable and disadvantaged segments of American society. And without the resources to reduce that vulnerability or respond to disadvantage, correctional interventions have not proven to be particularly effective in changing behavior or preventing future crime.

In the remainder of this chapter, drawing on existing published literature and discussions with the advisory panel, we explore many of these challenges, laying the foundation for subsequent discussion of innovation in community and institutional corrections.[3]

The Size of the Population Under Correctional Supervision

The sheer size of the population under correctional supervision in the United States poses a simple challenge of scale for the corrections sector, and the numbers involved are staggering. Glaze and Herberman (2013) estimate that at year-end 2012, about 6,937,600 adults in the United States were under some form of correctional supervision. Of that number, an estimated 4,781,300 were supervised in the community serving a probation or parole sentence. Another 2,228,400 were estimated to be incarcerated in a jail or prison.

The United States has among the highest incarceration rate in the world, with nearly one out of every 100 adults in prison or jail. The corresponding rate for the fraction of the U.S. population under community supervision is even higher, with one in 50 on probation or parole—though some nations' lower rates for community supervision result from the absence of such a system rather than differences in use. In total, counting both the incarcerated and community supervised population, one in 35 people in the United States is involved with the correctional system.

The number of people under correctional supervision has increased dramatically over the past 25 years (Figure 2.1, bars). Compared with 1980, the population under supervision increased almost 400 percent at its highest point, and the population today is still 377 percent of the total in 1980 (Figure 2.1; Glaze and Parks, 2012; Glaze and Herberman, 2013).

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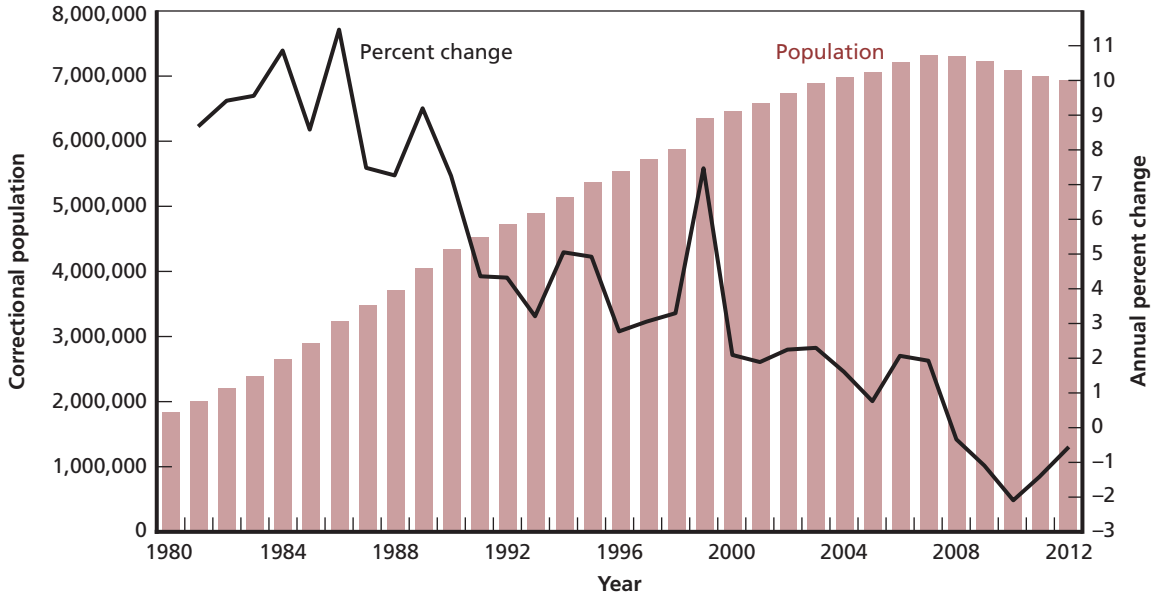
efforts attempting to assess their effects. However, as the review of the best available evidence at the time for the effectiveness of rehabilitative efforts in corrections for reducing recidivism, he stated that available evidence "gave very little reason to hope that we [the correctional system] have in fact found a sure way of reducing recidivism through rehabilitation" (p. 49).

[3] Other discussions of major current challenges and trends affecting corrections are available in Association of State Correctional Administrators (ASCA), 2013b; and Wickman, Mahoney, and Borakove, undated.

Figure 2.1
U.S. Correctional Population and Annual Percent Change, 1980–2012



SOURCES: Data from and figure based on Glaze and Parks, 2012, and Glaze and Herberman, 2013.
RAND *RR820-2.1*

These trends have been fueled by state and federal policy decisions. Even from approximately 1990 on, when crime rates overall declined in the United States, prison populations have increased.[4] While the speed of increase has been falling over the entire period (Figure 2.1, line plot), these increases reversed themselves only in the past few years, with modest declines in correctional populations.

These significant population increases have led to system overcrowding and major strains on corrections agencies and institutions. For institutional corrections, Carson and Sabol (2012) reported that in 2011, approximately one in five prison systems (including states and the federal system) had in-custody populations that exceeded 125 percent of their reported capacity. Another third of the systems had populations exceeding 100 percent of their reported capacity, and space in systems that were not technically overcrowded was scarce (Figure 2.2). Meanwhile, increasing populations in community corrections have led to increasing caseloads for probation and parole officers (DeMichele, 2007).

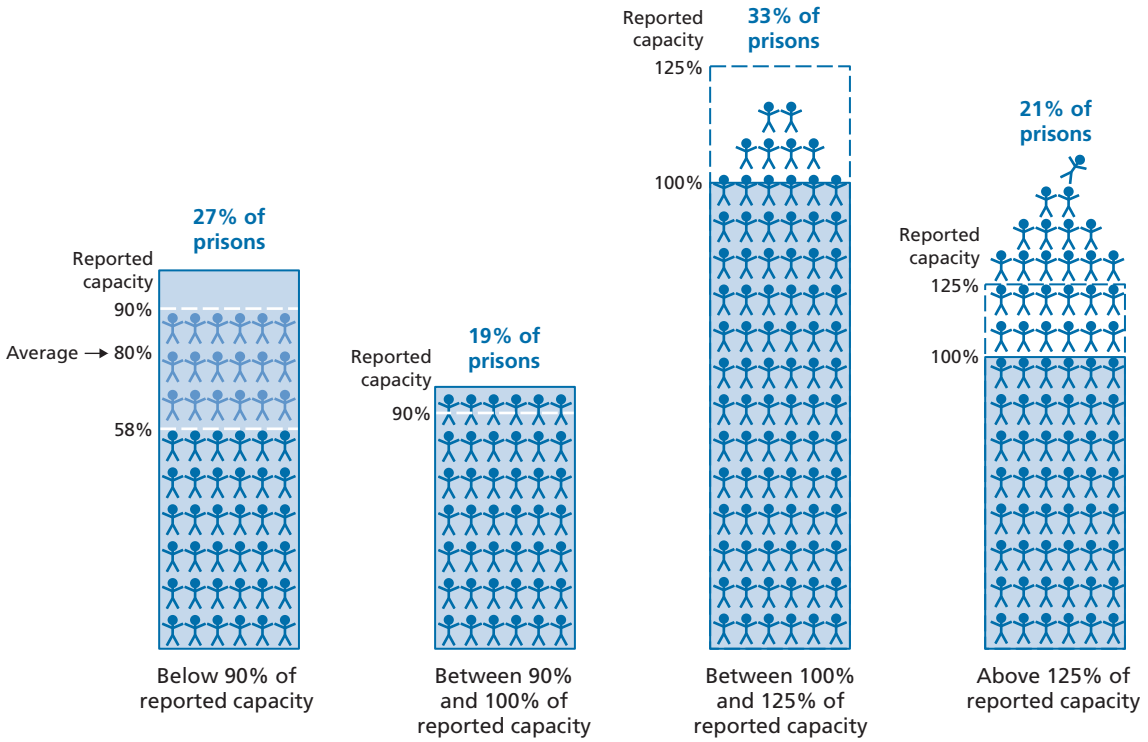
Changing Characteristics of the Correctional Population

In addition to challenges of volume, the U.S. corrections sector faces significant shifts in the characteristics of the offenders they are charged with managing, including increased persons with mental health conditions and disabilities, an aging prisoner population, and more female offenders.[5]

[4] See Rickman, 2013, for a comprehensive review of national and regional crime trends of the past five decades.

[5] See National Institute of Corrections, 2011, for a review.

Figure 2.2
Percentage of State and Federal Prison Systems Exceeding Reported Capacity, 2011



SOURCE: Figure based on Carson and Sabol, 2012. Assignment based on the average of the high- and low-capacity utilization percentages reported, for all states (n = 47) and the federal prison system (n = 1) for which data were available.

RAND *RR820-2.2*

Mentally Ill Population

The number of mentally ill persons under correctional supervision has increased dramatically over the past several decades. The Bureau of Justice Statistics estimates that 56 percent of state prisoners, 45 percent of federal prisoners, and 64 percent of jail inmates suffer from a diagnosable mental illness (James and Glaze, 2006). The increase is partly a function of overall population increases over the past four decades (including increases due to greater awareness and diagnosis) and partly related to such other drivers as the deinstitutionalization of state mental hospital populations beginning in the 1960s, overall reductions in the availability of treatment options, and limits in the long-term efficacy of available treatment options (The Sentencing Project, 2002). Nationwide, more than three times as many mentally ill people are housed in prisons and jails as in hospitals, according to a study by the National Sheriffs' Association and the Treatment Advocacy Center (Torrey et al., 2010), and "by all objective measures, correctional facilities in the United States have become the primary mental health institutions in the nation" (Adams and Ferrandino, 2008, p. 913).

It is estimated that 1 million people with mental illness enter or reenter the criminal justice system every year (Morrissey, Meyer, and Cuddeback, 2007), meaning that offenders with mental health needs are a challenge for both community and institutional corrections (Osher et al., 2012). Research suggests that "people with mental illnesses are overrepresented in pro-

bation and parole populations at estimated rates ranging from two to four times the general population" (Prins and Draper, 2009).

This situation presents many challenges. The mentally ill population requires significant additional resources for staffing, programming, and space (ASCA, 2013b).[6] Managing and supervising offenders with mental illnesses also puts new demands on staff and creates new training requirements. In addition, the mentally ill tend to be repeat offenders, have longer lengths of stay due to rules violations, present major management problems, and are more likely to commit suicide (Torrey et al., 2010). This is a particular challenge in institutional settings because suicide was the leading cause of local jail inmate deaths and was among the five leading causes of deaths in prison in all but two years between 2001 and 2010 (Noonan, 2012).

Aging Population

A second important trend is the "graying" prison population, which is growing at an alarming rate (Reimer, 2008). Approximately 16 percent of the national prison population is age 50 and older, and the population of prisoners age 55 and older is expected to increase more than threefold between today and 2030, far exceeding the total prison population growth rate (American Civil Liberties Union, 2012, p. i).[7] Part of this growth is due to the increase in inmates serving life sentences. As of 2012, there were 159,520 people serving life sentences in U.S. corrections facilities, an 11.8 percent rise since 2008. Indeed, one of every nine inmates is serving a life sentence (Nellis and Chung, 2013). Other factors include increases in lengths of incarceration due to determinate sentencing or truth-in-sentencing efforts, leading to offenders staying in prison well beyond the ages when statistics show individuals commit most crimes.

For corrections institutions, an aging prison population presents a variety of challenges.[8] While elderly offenders are not generally management problems, this group—like their general population counterparts—are susceptible to the chronic diseases and infirmities associated with age and require more intensive and diverse care than younger individuals. This creates a variety of specific needs for corrections agencies, including requirements to deliver increased medical services, specialized housing units to accommodate prisoners' medical and physical disabilities, and hospice units for dying inmates (ASCA, 2013b; Reimer, 2008).

The operational and budgetary implications associated with this trend are significant, including fueling the rising cost of prison health care. Not surprisingly, older prisoners are responsible for a disproportionate share of prison medical expenses. According to the American Civil Liberties Union (2012), the cost to house the average inmate is $34,135 per year, but it costs $68,270 per year to house an inmate age 50 or older. The Pew Charitable Trusts and MacArthur Foundation (2014) found that 39 states saw an increase in per-inmate health care spending between 2007 and 2011, with a median growth of 10 percent. Per-inmate spending

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[6] An examination of mental health services in prison facilities between 1988 and 2000 showed the tension between providing services to meet these needs and the expansion of the corrections sector. During that period, there was an increase in the number of facilities providing mental health services, but that increase was outpaced by the growth in total number of corrections facilities, meaning that the *percentage* of facilities providing services actually declined (Manderscheid, Gravesande, and Goldstrom, 2004).

[7] "In 1981, there were 8,853 state and federal prisoners age 55 and older. Today, that number stands at 124,900, and experts project that by 2030 this number will be over 400,000, *amounting to over one-third of prisoners in the United States*" (American Civil Liberties Union, 2012, p. i, emphasis added).

[8] See Human Rights Watch, 2012, for a review.

was 37 percent higher among the ten states with the largest share of inmates age 55 and older than the ten states with the smallest share of older inmates.

Female Population

The rapid growth of the female inmate population is also affecting the corrections landscape. While females are still incarcerated at far lower rates than males, the difference in those rates has been falling over time (Carson and Golinelli, 2013). Overall, more than 200,000 women are in jails or prisons in the United States, representing nearly one-third of incarcerated females worldwide (Walmsley, 2012). Additionally, recent data indicate that well over 1 million women in the United States are currently on probation or parole (Maruschak and Bonczar, 2013).

The sheer increase in the number of female inmates has created overcrowding in facilities dedicated to female prisoners. In California, for example, as of July 30, 2014, the state's three female facilities were operating at 162.9 percent of design capacity (California Department of Corrections and Rehabilitation, 2014). Female offenders also have needs that can differ widely from males. For example, women in prison suffer disproportionately from previous sexual or physical abuse and are more likely to have been addicted to drugs and to have a mental illness (Morash, Bynum, and Koons, 1998). Different management approaches and gender-specific programming are essential to achieving desired outcomes with this population.[9]

The growing female population also has operational implications in light of the Prison Rape Elimination Act (PREA), which contains restrictions against certain forms of cross-gender supervision. Agencies complying with PREA need adequate numbers of female officers to comply with the PREA requirements and to address the increasing female correctional population.

The High Financial Cost of Corrections

The enormous growth of the correctional system has had a deep impact on state budgets. Spending for corrections has risen steadily over the past three decades, outpacing the overall growth in state budgets (National Association of State Budget Officers, 2013). The corrections sector has been consuming a greater percentage of government budgets and, as a result, less funding is available for other key services, such as education and health care. According to some estimates, the total expenditure for state corrections in 2011 was $52 billion, representing approximately 7 percent of state general-fund dollars (National Association of State Budget Officers, 2013). Analyses at the Vera Institute of Justice have also shown that the total cost of corrections goes beyond corrections departments' line item budgets (Henrichson and Delaney, 2012):

> Staff from Vera's Center on Sentencing and Corrections and Cost-Benefit Analysis Unit developed a methodology to calculate the taxpayer cost of prisons, including costs outside states' corrections budgets. Among the 40 states that participated in a survey, the cost of prisons was $39 billion in fiscal year 2010, $5.4 billion more than what their corrections budgets reflected. States' costs outside their corrections departments ranged from less than 1 percent of total prison costs in Arizona to as much as 34 percent in Connecticut. (Vera Institute of Justice, 2012)

[9] See Van Voorhis, 2012, for a review of gender-specific approaches.

Though this population-driven increase has been significant over time, the correctional system has not been immune from the recent financial crisis that affected government budgets across the country. Examining resources allocated to corrections from 2006 to 2010, Subramanian and Tublitz (2012) showed overall growth in corrections budgets, but with a reversal in 2009 and 2010 as the effect of the financial crisis hit.

Looking within corrections budgets, expenditures fall in a variety of categories that represent very different potential foci for innovation. According to Stone and Scharf (describing data from 2007):

> While it is difficult to generalize about correctional budgets because of different definitions and fiscal reporting systems, the data for the 45 reporting correctional systems indicated that the largest expense categories are: custody/security costs (41.7%), inmate healthcare costs (14.2%), and administration costs (7.2%). Other categories were institutional services, physical operations, community programs, correctional industries, parole, probation, and construction. (Stone and Scharf, 2011, p. 175)

In an era of scarce resources, the high costs of current corrections practices represent both a driver of and a potential impediment to innovation. On one hand, new innovative technologies and practices could lower corrections costs, relieving some budgetary pressures. However, resource scarcity can be a barrier to adopting some innovations—particularly those with upfront costs, such as technology procurement.

Inequities in the Application of Incarceration and Its Personal Costs

As part of the broader examination of the effect of the justice system on different racial and ethnic groups within the United States, corrections faces its own questions about the effect of current and past incarceration policies (Mauer, 2011). For a variety of reasons, rates of incarceration of ethnic minorities, particularly African-American males, are much higher than those of other groups, particularly whites. Per 100,000 population in 2011, 3,023 African-American males were prisoners under state and federal jurisdiction, versus 478 for white males (Carson and Sabol, 2012). Thus, although racial minorities represent only about 37 percent of the U.S. population, they make up approximately 65 percent of the incarcerated population.[10] Studies examining how the risk of incarceration for minority versus white men accumulates over an individual's life demonstrate that the cumulative likelihood that a person will have been incarcerated by age 35 differs by almost an order of magnitude by race (Pettit and Western, 2004).

A significant portion of these differences in incarceration rate stem from criminal justice policies targeting the sale, manufacture, distribution, and use of illicit substances. The so-called war on drugs has affected racial and ethnic minorities and the socioeconomically disadvantaged much more than the general population. Iguchi et al. (2005, p. 48) report that between 1983 and 1998, the rate of individuals sent to prison for drug offenses increased more than seven times—from 12 to 88 per 100,000 adults, the majority of which was an increase in prison admissions of African-Americans. Similar disparities are apparent in juvenile justice systems, with some studies identifying stark differences in treatment for white and African-

[10] This figure comes from the "White alone, not Hispanic or Latino, percent, 2013" data point from the U.S. Census Bureau, 2014. See also Carson and Sabol, 2012.

American juveniles in the system for similar offenses (Iguchi et al., 2005, p. 51). For example, "Bridges and Steen [1998] found that probation officers' recommendations to courts were significantly more likely to attribute Black offenders' behavior to internal causes (i.e., emotional state or intention) and Whites' behavior to external causes (i.e., mitigating environmental factors or events,) even when controlling for criminal act and prior record" (Iguchi et al., 2005, p. 51). Policies defining sentences for drug crimes—notably the orders-of-magnitude difference between penalties for crack and powder cocaine, which was recently reduced (Davis, 2011)—have also had a disproportionate impact on African-Americans.[11]

Beyond the serious questions about fairness in the application of justice, incarceration also has significant and long-term effects on the individuals involved, including labor market, health, and other impacts (Iguichi et al., 2005; Western, 2002; Western, King, and Weiman, 2001). Conditions in corrections institutions can also engender victimization. Inmate surveys report significant levels of sexual victimization, with 4 percent of inmates in state prisons and jails and 3.2 percent in federal institutions reporting victimization by either other inmates or staff in the past year (Beck et al., 2013, p. 6). This problem is the focus of PREA, which levies requirements to reduce the likelihood of sexual assault in institutional settings.

Incarceration also has impacts on the larger community, magnifying the effects of inequity. For example, children of those incarcerated often end up in the foster care system (Wildeman, 2009; Freudenberg, 2002). Estimates made in 2008 indicated that more than 800,000 incarcerated individuals had minor children, totaling about 1.7 million children, or "2.3 percent of the U.S. resident population under age 18" (Glaze and Maruschak, 2008, p. 1). Though such circumstances affect all incarcerated individuals and their families, inequities concentrate the effects in areas of poverty and other forms of disadvantage, which can challenge such communities' long-term viability (Clear, 2007).

Inequitable sentencing is outside the purview of corrections agencies, but inequitable treatment of those convicted undercuts the legitimacy of the justice system.[12] Corrections agencies cannot solve the problem alone, but innovation could help reduce the chance that individuals are victimized inside the system; ensure that the application of corrections tools and sanctions is fair and impartial, from risk assessment to recommendations on violations of probation and parole; and make progress addressing the concentration of negative effects from incarceration for specific individuals and communities, through effective institutional- and community-delivered treatment and programing.

Corrections Agency Size and Capability Diversity

Because of differences in size, location, population served, and other characteristics, there is great diversity among corrections agencies. However, unlike in the law enforcement sector, where systematic census data describing agency characteristics are collected relatively frequently, systematic data on the corrections sector are less readily available. Bureau of Justice Statistics data on corrections facilities are available, but they were collected approximately a

[11] Policy changes—particularly state-level legalization of marijuana coupled with shifts in federal drug prosecution priorities—potentially create even more complex dynamics and challenges for individuals who spent time in prison, and thus bear the stigma and labor market effects, but were incarcerated for behavior that may now be legal.

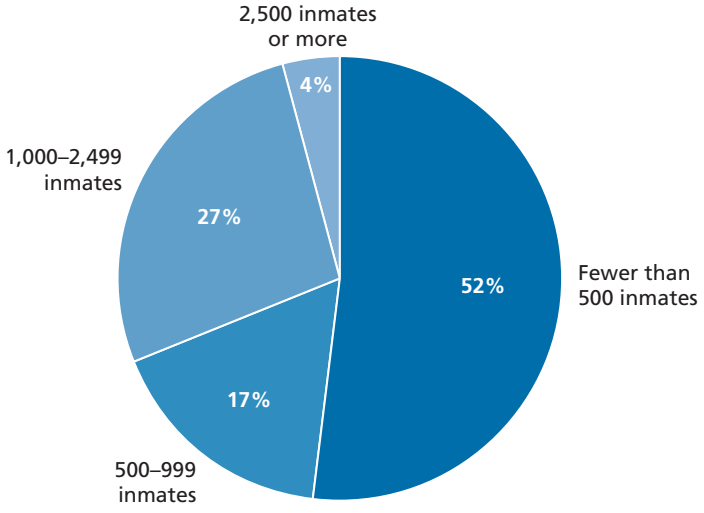
[12] See, for example, Bowers and Robinson, 2012; and Tyler, 2010.

decade ago (Stephan, 2008). Reviewing more than 1,800 corrections facilities at that time, the data paint a picture of institutional corrections facilities with widely varying populations (Figure 2.3). Though the survey does not provide distributions of the number of staff at each facility (a more relevant measure for considering organizations' capability to acquire and experiment with new innovations and to maintain internal technical capacity), it does report the inmate-to-staff ratios by state. That measure suggests significant differences in staffing, from between 1.9 and 7.1 inmates per employee and between 2.7 and 10.3 inmates per corrections officer (Stephan, 2008, Appendix Table 14). More recent data are available on segments of the institutional corrections community, such as tribal jails (Minton, 2014), all of which had fewer than 500 inmates. Jails can vary in size and complexity by orders of magnitude, "from fewer than ten beds to the Los Angeles jail system that held an average 14,671 inmates from January to March, 2011" (Ruddell and Mays, 2011, p. 107).

There is even less information available on community corrections agencies. The Bureau of Justice Statistics collects information on state parole agencies, most recently in 2006 (Bonczar, 2008). That effort collected data on 52 state agencies, which included parole agencies managed as part of departments of corrections, independent parole agencies, departments of community corrections, and county-based systems. Although a Bureau of Justice Statistics census of adult probation supervising agencies is under way at the time of this writing, no current systematic survey data are available on that portion of community corrections. Though not representative of the entire community, results of research surveys in the literature make it possible to sketch the diversity that exists among community corrections agencies in broad terms.

For example, DeMichele (2007) carried out a survey of probation and parole agencies via dissemination through the American Probation and Parole Association membership lists and

Figure 2.3
Distribution of Facility Size for State and Federal Institutional Corrections, 2005



SOURCE: Stephan, 2008.

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website, which obtained 228 responses with usable data.[13] It was not a representative sample, but the respondents included probation, parole, and combined agencies; jurisdictions that ranged in size from less than 10,000 to more than 300,000; and agencies where the number of officers ranged from between 1 and 25 (40 percent of the respondents) up to more than 200 (19 percent of the respondents).

Differences in jurisdiction, size, and staffing of agencies have significant implications for the types of challenges faced in carrying out corrections functions, the types of offenders that agencies are charged with supervising, the applicability and practicality of different options for improving corrections performance, the level of expertise and personnel that can be devoted to innovation and change activities, and the level of resources available to innovate, driven by the local tax base and governmental resources, as well as the varying priorities in different jurisdictions.

The structure of the corrections community is also a challenge for private-sector technology providers that might produce and market new products to corrections agencies. In addition to their varying levels of resources and capability, the agencies operate independently and therefore represent a fragmented market. Differences in needs can complicate product development and increase the costs of marketing. Therefore, to the extent that these challenges reduce the willingness of technology providers to operate robustly in the corrections sector, innovation can be held back.[14]

The Corrections Workforce

Corrections faces workforce challenges. Expanding numbers of offenders in custody and under supervision create increasing demands. Corrections agencies are having difficulty recruiting new staff and also are dealing with high employee turnover,[15] reflecting the broader labor market observation that younger workers are changing jobs more frequently, but also reflecting the specific challenges of corrections jobs. Gibbons and Katzenbach (2006) cite statistics that the average turnover in staff in prisons is 16 percent per year (and above 40 percent in states paying officers the least). Furthermore, "directors of systems remain on the job for no more than three years on average, and their rapid turnover destabilizes entire systems" (Gibbons and Katzenbach, 2006, p. 15). These directorial transitions can be driven by changes in political leadership, making some turnover an unavoidable effect of the democratic process. Attracting and keeping talented individuals is difficult, due to low wages in the sector, stresses of the job,[16] and comparatively low prestige compared with other criminal justice occupations (Gibbons and Katzenbach, 2006, p.70). In addition, as is the case in many fields, when experienced personnel retire, the sector risks losing expertise and knowledge that it needs to be effective (Stinchcomb, McCampbell, and Layman, 2006).

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[13] Given the nature of the web-based survey, the authors could not determine the response rate and characteristics of the sample.

[14] See Stone and Scharf, 2011, for a discussion of resource and market structure concerns regarding innovation in corrections technology in particular.

[15] In the ASCA survey of current issues in corrections, turnover in corrections staff and recruitment/retention was second on the list of priorities (ASCA, 2013b).

[16] See, for example, Spinaris and Denhof, 2013.

Although the majority of corrections officers and staff are dedicated to their missions and carry out their roles and duties ethically and faithfully, criminal and unethical behavior of a subset of the sector's membership poses challenges (Ross, 2013; Worley and Worley, 2011). Abuse of offenders and inmates in custody is a problem, and incidents of improper use of force undermine the legitimacy of the criminal justice system as a whole. Understanding the scope of problems that arise is difficult, as there is "real disagreement, and no data nationally, about how often force is used, how often it escalates, and how often it rises to the level of abuse" (Gibbons and Katzenbach, 2006, p. 31), as documented by the Commission on Safety and Abuse in America's Prisons. Illegal and unethical behavior by corrections officers, including problems with fraternization between staff and inmates or staff smuggling contraband into facilities for their own financial gain, undermines order and discipline in facilities. High-profile cases make headlines, tarnishing the reputation of the sector as a whole.[17] The reality of the problem is clearly demonstrated by findings that 2.8 percent of prison inmates and 2 percent of individuals in jails reported being sexually assaulted by a member of their facility's staff (Beck et al., 2013, p. 6).[18]

Outcomes

The correctional system pursues goals as varied as administering punishment and treating offenders' problems, but one of the primary desired outcomes is that, once released, an offender should not return to the system. That return is generally referred to as *recidivism* and defined as the rearrest, reconviction, or reincarceration of an offender within a given period—which is related to, but distinct from, the total number of offenders who commit new crimes after release. Though there are often differences in how jurisdictions and agencies measure their recidivism rate,[19] broad measures of recidivism across the country paint a troubling picture.

For example, Durose, Cooper, and Snyder (2014) tracked more than 400,000 state prisoners released in 2005. They found that 67.8 percent of those released were arrested within three years, and 76.6 percent were arrested within five years. In addition, 49.7 percent had a community supervision violation or arrest within three years that led to imprisonment, and 55.1 percent had one within five years. A 2011 study conducted by the Pew Center on the States in conjunction with ASCA produced similar results: 45.4 percent of inmates released from state prison in 1999 and 43.3 percent of those released in 2004 returned to prison within three years, either for committing a new crime or for violating community supervision conditions (Pew Center on the States, 2011). Rhodes et al. also found high recidivism rates upon examining offenders under community supervision after being convicted of a federal offense. During their three-year term of supervision, 30 percent of the offenders returned to prison—with close to an even split between rearrest for a new crime (16 percent) and revocation for violating the

[17] The Baltimore City Detention Center, where multiple inmates and staff have been charged with contraband smuggling and other illegal activities, is an extreme and well-publicized case illustrating this problem. See Toobin, 2014, for a description of the case.

[18] These figures encompass the sum of the percentage of inmates reporting an incident involving a staff member and the percentage reporting multiple incidents involving both staff members and other inmates.

[19] For example, what time periods and events are included in analysis and differing definitions between pretrial, prison, probation, and parole agencies.

terms of their supervision (14 percent; Rhodes et al., 2012). Over a five-year window, the total recidivism rate increased to 38 percent. High recidivism only increases the population that corrections agencies must manage and reflects poorly on the system's goal to rehabilitate offenders.

Corrections and Changing Technology

As is the case for many organizations, changing technology is a challenge for corrections agencies. Shifts in technology can threaten the viability of the systems and processes that corrections agencies use. For example, aging technological infrastructure can limit the ability to upgrade tools and practices—e.g., bandwidth constraints that make it impossible to add devices that rely on network connectivity. At the same time, externally driven demands for transparency (e.g., providing information on the Internet and responding to public records requests) can stress older paper-based systems or information technology infrastructure that is on the cutting edge of obsolescence (e.g., issue highlighted in ASCA, 2013b) and provide a driver to innovate.

Some novel technologies create new ways to support corrections missions, such as what electronic monitoring technology has done for community corrections (DeMichele and Payne, 2009). However, such changes can create unintended consequences, such as probation and parole officers getting an avalanche of electronic alerts from the systems (St. John, 2014); raise new concerns about offender behavior, such as how offenders might jam, block, or spoof the systems; and unreasonably inflate the public's expectations about what the technology can reasonably accomplish. Technologies can also enable new strategies for addressing the certainty of sanctions during parole or probation supervision, such as 24/7 alcohol monitoring programs (Kilmer et al., 2013; Kleiman and Hawken, 2013) or programs that allow computer monitoring that can detect supervision violations that might have previously gone unrecognized. However, such increased detection may come at the price of more violations of release, creating additional strains on population management and resource growth for institutional corrections.

But shifts in technology can create new opportunities for offenders as well. The increasing capability of mobile phones has complicated the issue of contraband phones within facilities because such devices now provide much more capability than just voice calls (Burke and Owen, 2010) and are driving prisons to explore not just ways to detect and keep out cell phones but managed access systems to control their use (California Council on Science and Technology, 2012). Other new technologies facilitate getting contraband into prisons; for example, small drones have been used to fly illegal drugs, phones, and other material over the wire at institutions (Newcome and Mullen, 2014). Offenders using social media to communicate within facilities, connect with staff, and send messages outside to family, associates, or victims poses a new challenge for maintaining order and discipline (CBS News, 2011). New designer drugs challenge drug-testing techniques for both community and institutional corrections agencies. Such shifts can create powerful drivers for innovation because they threaten corrections agencies' ability to achieve their goals, maintain security, and protect their staff.

Moving Forward

The variety of challenges faced by corrections today defines both the need for and potential targets for innovation. In recent years, the effects of the financial crisis on government budgets, coupled with questions about the value of incarceration as a component of crime prevention, have set the stage for reform. In addition, incarceration rates have increased as crime rates have fallen over the past decades, and there is uncertainty regarding the link between the two, emphasizing the need to reexamine the role and methods of corrections. This rate disparity also warrants asking fundamental questions about whether there are better ways to use resources more effectively, to better serve an offender population with increasingly complex needs, and whether there should be a rebalancing in the roles that society has asked the corrections sector to take on by default, particularly in the incarceration of substantial populations with mental health needs. The challenge going forward is to harness innovative approaches to reduce costs safely and humanely, create alternatives for costly incarceration, and best leverage the capabilities and tools available to community and institutional corrections agencies to achieve the varied objectives that society expects from the sector.

CHAPTER THREE

Corrections Technology and Practice Today

In building an innovation agenda for corrections, the foundation is the substantial technology and practice base that makes up corrections today. While correctional systems are not typically known for embracing change, a significant number of new tools were introduced to the field in the past several decades—though existing practices and requirements in the sector created friction that limited the speed and success of innovation efforts. As described by Stone and Scharf:

> During the past 50 years, widespread use of technology in correctional facilities has been somewhat atypical. Beginning in the early 1970s, prisons and jails were already employing a smattering of cameras, but it was rare for observation functions to be significantly automated. This pattern changed somewhat in the mid- to late-1990s fueled by both technological innovation and federal funding. Surveillance cameras, for instance, became significantly less costly, more capable, and required less maintenance. However, the ability to capitalize on these trends is limited by correctional practices or standards that still require "face to face" or "must see flesh" inmate-staff observation contact rules. Older, less sophisticated technology made it easier for inmates to deceive staff during observation checks. Newer technology can reduce this deception problem, but without policy changes it is unlikely to result in a meaningful correctional cost savings. (Stone and Scharf, 2011, p. 173)

In institutional corrections, significant surveys done in the late 1980s (Latessa et al., 1988; Travis, Latessa, and Oldendick, 1989) and mid-1990s (LIS, Inc., 1995) documented the spread of new technologies as jurisdictions constructed new facilities to accommodate expanding prison populations. During that period, technologies changed the nature of prison functioning and of prison construction and design. The transition moved many prison functions from being personnel-intensive to technology-enabled. From a period when corrections institutions were relatively basic facilities, the technology surveys in the 1980s and 1990s showed a correctional system in transition to the situation today, where facilities can be outfitted with technological tools for surveillance, internal access and movement control, infrastructure controls, and sensor systems for detecting movement within the facility and at the perimeter (see Zelnak and Goff, Jr., 2005).

The community corrections sector has advanced considerably over the years but still lacks the technology intensity of institutional corrections. Data from the mid-1990s (from the LIS, Inc., survey) paint a picture of community-based organizations modernizing their technology. Consistent with their mission, technologies for alcohol and drug assessment and communication among staff members (e.g., portable radios) were nearly ubiquitous. Electronic monitoring technologies were also in wide use, though agencies reported only middling satisfaction with their effectiveness. Computerization of the sector was also well under way, with computers

providing access to data for corrections officers working in the field. In the decades since, additional new technologies include electronic monitoring based on the Global Positioning System (GPS), electronic kiosks for offenders to check in with supervisors, and other techniques far removed from where probation and parole methods began (see DeMichele and Payne, 2009).

Along with the changes in technology, the sector has made shifts in practice, which were shaped by changes in societal approaches to crime and offenders, improved understanding of the effects of corrections efforts, and other drivers. This baseline capacity in the sector is the starting point for considering corrections in the future. In this chapter, we describe our taxonomy for considering corrections technology and practice, and then outline the current state of technology across select areas. Though not intended to be exhaustive, the discussion is intended to frame current corrections technology and practice and provide a starting point for considering improvements that innovation in technology, training, policy, and practice could enable.[1]

A Taxonomy of Corrections Technology and Practice

To provide a framework for organizing the many possible innovation options, the research team developed a taxonomy of corrections technologies and practice.[2] We did so in an effort to frame a set of categories that would capture the variety of ways that *corrections today* could change along the path to *tomorrow*. Innovations could come from developing new training or new technologies to help deliver that training cost-effectively. Innovation could be driven by using alternative technologies to perform specific tasks better or easier, such as replacing old-school keys and locks with increasingly sophisticated biometric and other access control systems. As a result, the framework had to be broad enough to capture multiple ways of performing corrections tasks because different options have their own inherent strengths, weaknesses, and implementation concerns, and these shape how big a role they could have in enabling corrections innovation.

The taxonomy was built by drawing on previous literature, websites that provide indexes of corrections products and services, lists of technology and other vendors from corrections-related conferences, and relevant private-sector materials. The five central categories within the taxonomy are

1. *Facility operations and population services*, which covers technologies and practices related to running facilities, including architecture; infrastructure; logistics; physical security technologies; and processes and technology related to delivering products, education, and health care to in-facility populations
2. *Person-worn equipment and weapons/force*, which covers uniforms, protective and augmenting clothing, basic staff equipment, and both lethal and less-than-lethal weapons
3. *Information and communications*, which covers information technology systems; sensors, information collection devices, and laboratory testing tools; analytic and information management techniques and systems; practices and technologies related to information-sharing; and communication devices and techniques of all types

[1] For readers familiar with the current state of corrections technology, the review in the second portion of this chapter may be an unnecessary introduction to the needs discussion in subsequent chapters.

[2] The basic taxonomy that was developed is being used in this research effort overall, which focuses on technology and innovation in criminal justice overall, not just corrections.

4. *Vehicles*, which covers ground, air, and water vehicles, as well as associated modifications and technologies
5. *Doctrine, tactics, management, and behavioral knowledge development and training*, which covers education and training of leadership, practitioners, and specialists; policy and legal innovation; and training technologies.

In each major category, different classes of technology and practice split into "branches," providing an overarching framework, and eventually terminate in "leaves" of example technologies that currently exist for corrections. Figure 3.1 shows the first of these branches for each taxonomy category. We identified the categories and example technologies from the literature and through iteration among subject-matter experts on the research team, and then vetted the results with the members of the Corrections Advisory Panel.[3]

Figure 3.2 provides a sample section of the complete taxonomy (populated with institutional corrections technologies), showing both the scope of the taxonomy and detail for one of the simpler portions. The full taxonomies for community and institutional corrections will be available in an electronic appendix to this report, both as an Adobe Portable Document Format (PDF) file and as an interactive web object.

The State of the Art Today—Sketching the Foundation for Corrections Innovation

To envision where corrections technology and practice might be tomorrow, the starting point is where it is today. The sector is supported by a technology provider and supplier community that delivers a broad range of goods and services to agencies. Standards and practices are in place, and ongoing research efforts aim to identify, evaluate, and present evidence for new practices that could improve performance, reduce costs, or achieve other goals. New technologies are in the pilot stage and are being used by some early adopter agencies. In addition, some new technologies aimed at potential corrections applications are in the experimental phase in academia and industry, awaiting sufficient development to bring them to market.

A comprehensive understanding of the current state of the art for corrections would require a snapshot of these very different sets of technology and knowledge and—given the potential for adaptation of technologies or practices from other sectors—a similarly wide aperture picture of the state of other relevant sectors as well. In the research supporting this work, we looked for any existing literature or analyses that already contained the necessary information. The closest available source was produced by Stone and Scharf (2011), who broke down technologies into three main classes based on their maturity and ability to produce cost savings for corrections agencies:

> *Mature Market Technologies* have an implementation history of at least 10 years. . . . Examples include: Computerized Commissary Management Systems (Administration), Inmate Trust/Banking Management (Inmate Support), Video Surveillance Systems (Security), and Video Visitation or Conferencing Systems (Security/Hybrid). All of these systems have

[3] During the panel meeting, members were encouraged to annotate and correct the taxonomy, fixing perceived mistakes and adding technologies or categories they believed we missed. A significant amount of input was collected this way, and the taxonomy modified as a result.

Figure 3.1
Main Categories and Subcategories of the Criminal Justice Technology Taxonomy

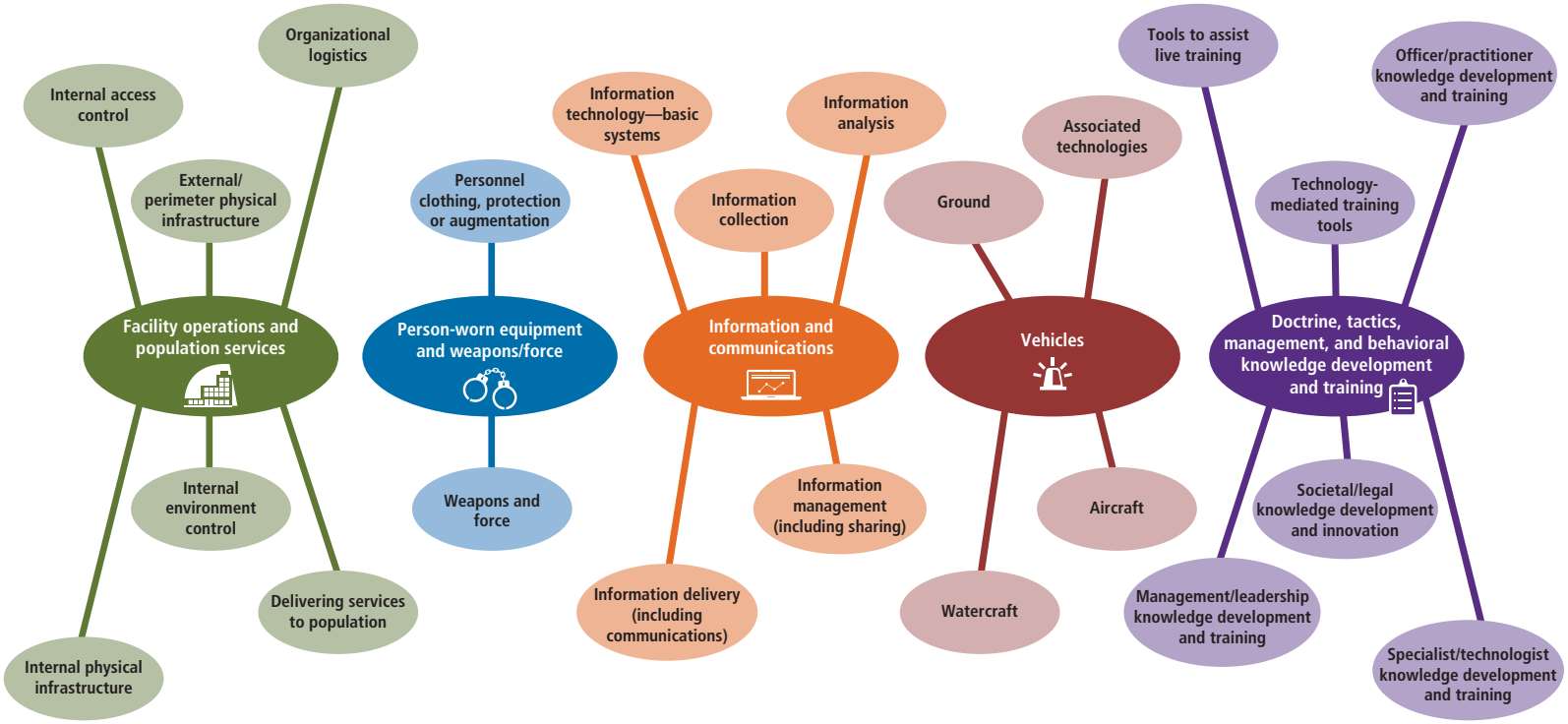

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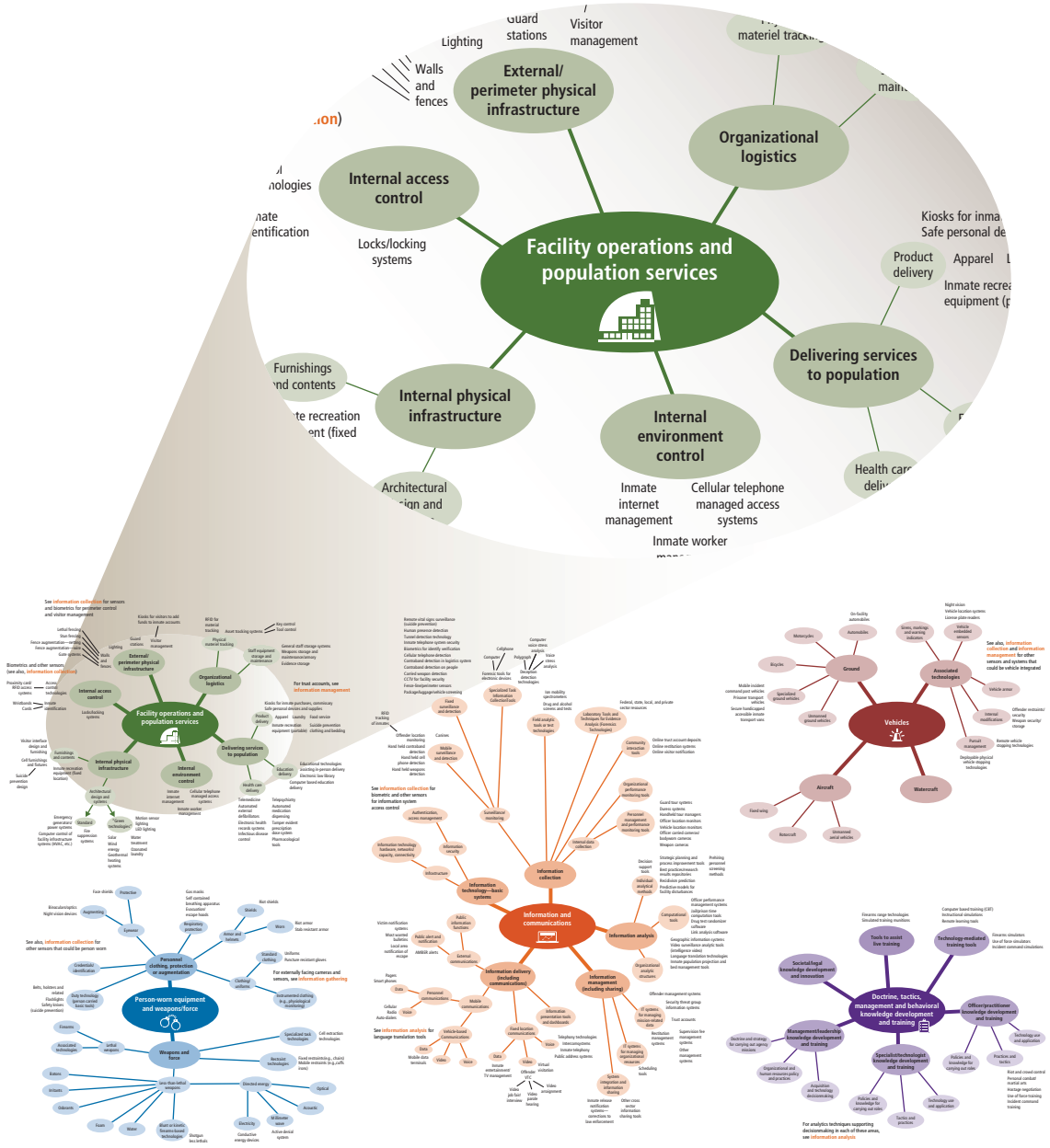
Figure 3.2
Sample of Full Taxonomy for Institutional Corrections Technology and Practice



RAND *RR820-3.2*

demonstrated their functionality in the field even though their ability to produce savings varies significantly.

Emerging Correctional Technologies have strong "pilot" bases in corrections with some adoptions by major correctional institutions . . . . Examples include: Integrated Criminal Justice Information Systems (Administration), Banking/Commissary Kiosks (Inmate Support), Integrated Perimeters System (Security), and GPS Community Correctional Care Monitoring (Security/Hybrid) . . . .

> *New Disruptive Technologies* have the potential to radically change correctional practices and, on occasion, dramatically reduce costs. Such technologies include: Bio[metric]-Identification Technologies (Administration/Security), Drug and Alcohol Community Monitoring (Security), and Inmate/Staff Radio-frequency Identification (RFID) Monitoring (Security). (Stone and Scharf, 2011, pp. 173–174)

While this source provided a starting point for thinking through the different levels of maturity for individual corrections technologies and practices, the breadth of their examination was not comprehensive enough for this effort, addressing only a slice of relevant corrections technologies. As a result, to provide a stronger foundation for later discussion of the innovation agenda, in the remainder of the chapter we discuss the state of the art of corrections technology and practice today. We use the taxonomy in Figure 3.1 to provide structure for the discussion. While an exhaustive discussion of existing technology is clearly not practical, a selective one can nonetheless provide a sufficient starting point for considering potential new corrections technologies and practice, the potential for broader adoption of existing ones, and potential adaptation of innovations from other sectors to benefit corrections.

Facility Operations and Population Services

For institutional corrections agencies in particular, the demands of facility operations and of delivering services to populations under supervision have resulted in a variety of technological changes over the past few decades. Some community corrections agencies also maintain some facilities, though they are less facility-intensive than institutional corrections.

External/Perimeter Physical Infrastructure

To maintain physical control of a facility and the individuals confined there, controlling the facility perimeter is central. Contemporary external perimeter security systems combine elements designed to deter, detect, delay, and respond to attempts to intrude upon or escape a corrections facility. External perimeter systems commonly use barriers, sensors, lighting, towers, and patrols, with technological systems reducing the number of staff necessary to maintain control (Atherton and Phillips, 2007).

Barriers are typically fences or walls, and some agencies use electrified fences as an effective deterrent measure (Hoffmann et. al., 1996). The electrified fence is positioned in the "no-man's land" between institutions' inner and outer fences. Razor wire is also widely used to augment the barriers. Sensors (technically under the *information and communications* category in our taxonomy) are key to detecting intrusion into the open area and attempts to defeat the fence by cutting or climbing. A variety of sensors are available, including vibration, taut wire, microwave, infrared, buried cable, on-fence motion sensors, electric field sensors, ported coaxial cable, and seismic sensors (SPAWAR Systems Center, 1998). Video cameras with motion detectors are also used to assess alarms.

Towers are common to older institutions and beneficial for providing excellent views of the perimeter in multiple directions. Towers are expensive to staff, however, so many agencies are moving away from this approach in favor of advanced sensors or electrified fences (Atherton and Phillips, 2007). Institutions perform patrols of the perimeter in a number of ways, most commonly using roving vehicles (usually a pickup truck or four-wheel-drive vehicle), although foot and canine patrols are also used (LIS, Inc., 1995, pp. 19–20).

Internal Access Control

Within a facility, access control serves both to confine inmates in residential units and to control travel inside the facility and across perimeter boundaries (e.g., when inmates are transported outside for services or court appearances). Positive identification is established for all new inmates. Traditional fingerprint processing is giving way to automated fingerprint identification systems and, more recently, other biometrics, such as iris scanning. These systems are leveraged later in the process to prevent erroneous releases (Sternstein, 2012).

For routine identification and movement management within a facility, agencies typically issue identification cards or bracelets upon inmate arrival. The cards or bracelets display the inmate's name, photograph, and descriptors. Bracelets are more common in jails and can be securely affixed to the inmate's wrist. In addition, bar codes may be incorporated into the wristband to track movement and streamline operations (Jackson, 2012).

Proximity cards and biometrics are used for staff access control (Atherton and Phillips, 2007). For example, some automated key control systems use fingerprint or hand readers to confirm identity before providing the officer access to the appropriate keys. Use of biometrics for internal access control functions is an emerging area; some agencies have adopted it, but use is not widespread.

Internal Physical Infrastructure

With the largest of corrections institutions functioning essentially as small cities, each has a wide range of physical infrastructure requirements to function. Design and architectural choices shape the internal environment, with best practices for the layout and structure of facilities to achieve security goals while also meeting other regulatory requirements. Facilities have all of the same system requirements for heating, cooling, plumbing, and other functions as noncorrections buildings or installations. Managing costs associated with facility functioning is a priority, given that resources allocated to pay for water and power could go toward other organizational priorities.

For this reason, many corrections agencies are exploring the benefits of "going green." Facilities can benefit greatly from sustainability-oriented technologies and strategies that reduce cost and increase efficiency of resource use. Many jurisdictions have set energy and water use reduction objectives and are implementing initiatives with great success (Feldbaum et al., 2011). Some low-tech approaches include recycling programs and gardens and farms to produce low-cost food. High-tech approaches include using renewable energies such as solar, wind, and geothermal to produce electricity and heat for the institution. Electronic controls on heating and air conditioning are becoming more commonplace as agencies strive to conserve resources. Motion sensor and other high-efficiency lighting are also being explored (Sheldon and Atherton, 2011). Though many infrastructure technologies and practices in corrections have matured over the past few decades, improving existing system controls is still an emerging area.

Other changes in internal physical infrastructure have been driven by the need to prevent inmate suicide, such as installing breakaway sprinkler heads and coat hooks and removing functional electrical outlets, and are now standard practice (Hayes, 2011).

Internal Environment Control

One part of maintaining security in corrections facilities is controlling the behavior and activities of the inmates that reside there. The challenge posed by some new technologies (discussed in Chapter Two) has led to development of countering technologies to maintain internal con-

trol in the face of inmate innovation. The most illustrative example of this is contraband cell phones, where measures to keep the devices out of facilities have had varied success.

One approach that a few states have adopted (Peteritas, 2012) is a managed access system (MAS), which basically provides a secure cellular umbrella over a designated area such as a prison (California Council on Science and Technology, 2012). Any cellular calls generated within the umbrella are momentarily held until it can be verified that the call is from an authorized phone. If it is, the call is passed through to the wireless network carrier as normal. If the call is being made from an unauthorized (contraband) phone, then it is not permitted to connect to the network.[4]

Another major area that challenges maintaining control of the internal environment is regulating inmate use of the Internet and other communication tools. Driven in part by choices about how to deliver education and other services (discussed below), facilities are providing access to the Internet (e.g., to take online courses) and email (e.g., for inmate-family communications). Control mechanisms to ensure that these channels are not used to access inappropriate content or pose security or other risks are being explored by some facilities. Examples include web filtering and moderated communications.

Organizational Logistics and Population Services

Extending the analogy of corrections facilities as small cities, managing internal logistics and the services delivered to the citizens of those cities involves a variety of technological and other systems. As with the management of facility infrastructure, goals of efficiency have driven change.

Institutional corrections agencies are beginning to offer inmates electronic access to services, primarily as a cost-saving measure but also in an effort to expose inmates to the types of technology they will encounter upon release (discussed above). Electronic law libraries are replacing their traditional, hard-copy predecessors, saving agencies money and allowing physical space within facilities to be repurposed (Clear et al., 2012).

Inmates have increasing access to touch-screen kiosks in housing areas, delivering services such as commissary transactions, appointment scheduling, staff requests, filing of grievances, video visitation, music and e-book purchases, and communication with approved persons and loved ones through controlled email. An emerging trend involves putting mini-tablets, modified for corrections and equipped to deliver these services, directly into inmates' hands (Railey, 2013).

Inmate health care is an area of service development that has grown more expensive with changing trends in the correctional population, and agencies are exploring technologies to reduce those costs. Telemedicine and telepsychiatry provide corrections institutions with excellent opportunities for cost-savings or cost-avoidance, provide inmates with access to high-quality care in a timely manner, and eliminate the risks (escape, introduction of contraband) associated with inmate transports to the community (Larsen et al., 2004). A growing number of agencies have implemented electronic medical records to improve productivity in this area (Goldstein, 2012).[5] Among the potential benefits are reduced administrative costs, shortened inmate encounter time, and increased quality of care.

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[4] See the *information collection* subcategory discussed later for more approaches to the problem that focus on detecting and seizing phones when they are in use.

[5] However, RAND research on electronic medical records has shown that productivity gains from implementation are not assured and depend on making other organizational changes to realize the potential benefit (Kellermann and Jones, 2013).

Agencies also use medication-dispensing systems, which automate the process of preparing inmate prescriptions. These systems reduce staff time, medication errors, and waste (Rundle, 2009). Because many corrections facilities do not have health staff available on a 24-hour basis, they are beginning to provide automatic external defibrillators to be deployed by corrections staff in cases of sudden cardiac arrest (National Commission on Correctional Healthcare, 1998).

Inmate health needs also shape logistical and service choices. For example, some products to prevent inmate suicide and self-harm are widely available, including smocks and blankets specially designed to not rip, fold, or be tied into a cord or fashioned into a noose (Hayes, 2013).

Person-Worn Equipment and Weapons/Force

Personnel Clothing, Protection, or Augmentation

During routine activities, most corrections officers carry or wear the basic tools of the trade, which include their uniform, boots, credentials, key clips, flashlight, puncture-resistant gloves, and handcuffs or flexible restraints. Bridging person-worn equipment and information collection tools, a trend of note is the recent interest in person-worn cameras as a way to increase transparency and officer professionalism and to provide documentation against false grievances or frivolous lawsuits (Villacorte, 2012). Tactical operations, such as cell extractions or emergency response to disturbances, require specialized equipment. Commonly available equipment includes helmets with face shields, corrections (stab/slash/puncture-resistant) body armor, gas masks, protective gloves, shields, restraints, and less-than-lethal weapons. Additional equipment may include elbow, forearm, shin, and knee pads. It is becoming best practice to document tactical operation incidents via video, and an officer is typically assigned a video camera for these purposes (Schwartz, 2009). Night vision technologies are particularly useful in disturbances or escape situations (Atherton and Phillips, 2007). During inmate transports, officers typically wear ballistic body armor, and during emergency operations such as a fire evacuation, a self-contained breathing apparatus may be available for staff, and evacuation hoods may be used for inmates.

Community corrections officers typically do not wear clothing with insignia as a standard uniform, although individual agency policy varies. In most cases, however, officers wear identifying clothing while in the field as a safety measure and may wear ballistic armor.

Overall, the market for most person-worn technologies is quite mature; many of the options are readily available for commodity purchase. Markets for augmenting and other instrumented clothing technologies are still emerging—for example, Google Glass and other wearable computers that could have useful applications for corrections.

Weapons and Force

While policies vary from state to state, lethal force is generally authorized only in cases where less-than-lethal options are ineffective and to prevent the escape of a convicted felon or to prevent a life-threatening assault (Atherton and Phillips, 2007). Lethal weapons (e.g., firearms and long guns, including semiautomatics) are generally used in prison towers, at perimeters, and during inmate transports. Community corrections officers, depending on their agency regulations and their peace-officer status, may carry firearms in the course of their duties. Generally speaking, parole officers are more likely to be authorized to carry a firearm than probation officers, and officers supervising adults are far more likely to carry a firearm than those supervising juveniles (American Probation and Parole Association, 2006). The scope of

the armaments industry both domestically and internationally means that most lethal weapon technologies for corrections are quite mature.

Less-than-lethal weapons, also known as less-lethal or nonlethal weapons, are widely used in corrections facilities. When officers need to use force to gain inmate compliance, these weapons reduce the risk of permanent injury or death. The most common less-than-lethal tools in use today are chemical agents such as oleoresin capsicum (pepper spray) and CS gas (tear gas), diversionary tools such as flash-bangs, and impact weapons such as batons and munitions, including bean-bag rounds or rubber projectiles (LIS, Inc., 2005; Atherton and Phillips, 2007). Some options combine approaches and allow for delivering a chemical agent via a projectile. There is a growing interest in using conducted energy devices (CEDs) in a variety of platforms. Examples include electrified shields for riot control or cell extractions, projectile devices that launch probes at a subject from a distance, and devices used in close-contact situations where the electrical contacts are pressed directly onto the subject (Police Executive Research Forum, 2009). Less-than-lethal weapons are less common in community corrections but are growing in response to changes in offender characteristics and corresponding officer safety concerns. Agencies typically use chemical agents, but more are exploring CEDs.

Restraints that limit offender movement are used to securely transport inmates or to control an offender's assaultive behavior toward himself or others. Restraints come in various forms to account for different situations and inmate security levels. Examples include steel or flexible plastic handcuffs, handcuff black boxes, leg irons, waist or belly chains, and chair, board, and bed restraints (Atherton and Phillips, 2007). Restraints in the form of masks, hoods, or shields are typically used to prevent inmate assault by biting or spitting. Electronic belt restraints are typically used in transportation or courtroom settings, and they are deployed by officers remotely and function as a CED. Restraints are less common in community corrections, but officers with arrest powers will typically carry steel handcuffs.

Information and Communications

Throughout the corrections sector, information and communications have been central areas for innovation in the past decades, with technology and practices to collect (e.g., sensors, laboratory tests, and data systems), analyze, manage, and deliver information to improve effectiveness. The full range of computer, sensor, and other information technology applied in corrections is very broad, so we will examine prominent examples in each area to characterize the contemporary baseline.

Information Collection

In community and institutional corrections, information collection tools are central to informing operations. Tools are focused both on offenders, as part of supervision or custody efforts, and on corrections agencies themselves to improve performance, safety, and efficiency.

In the *community corrections* environment, several information collection tools have been deployed to facilitate effective supervision. The use of electronic supervision tools to manage offenders is widespread and continues to grow. Agencies continue to look to technology as a viable alternative to incarceration and a cost-effective tool to support supervision. One early electronic solution emerged in the early 1980s: Agents began monitoring home curfews by leveraging an offender's telephone to determine whether he or she was home (DeMichele and Payne, 2009). Today, the options are diverse and many. While electronic home curfew monitoring is still in use, arguably the most powerful tool available is technology to physically track

offenders. Offender-tracking systems leverage navigational satellites and other terrestrial location technologies to locate and track movement (Brown, McCabe, and Wellford, 2007). Officers are able to restrict movement as needed by setting parameters for geographic areas that an offender may or may not enter. In addition, officers can set temporal controls that dictate the times of day that offenders can or cannot be in a certain location.

Other information collection technologies seek to automate the reporting process, particularly for lower-risk offenders. These technology-based approaches allow an officer, or even support personnel, to manage very large caseloads of low-risk offenders so that resources are available for the more intensive supervision of high-risk cases. Automated reporting kiosks are one example of this approach (Jannetta and Haberstadt, 2011). These kiosks are typically installed in probation offices and allow offenders to check in as an alternative to meeting with an officer. The kiosks are designed to be interactive and, during a check-in, they collect pertinent data from the offender, collect payments, and alert offenders of obligations, such as drug tests or court dates. Another established variation on this theme is automated telephone reporting, in which the offender may be contacted by the system at any time for a check-in (Klein, 2011). Emerging trends include Internet-based reporting and interviews via video teleconferencing, which can be particularly useful in supervising offenders in remote and rural parts of the country (Zastany, 2013).

One of the most common community corrections problems is offender alcohol use, and technological tools aim to provide more real-time monitoring to detect and deter such use. For example, ignition interlock devices are used extensively in cases of driving under the influence (Sprattler, 2009). These devices are installed on an offender's vehicle to prevent a driver who has been drinking from starting or operating the vehicle by requiring the driver to pass a breathalyzer test. Over the years, the sensors used in breathalyzers, as well as the platforms for testing, have evolved. Variations include home-based, and, more recently, portable breathalyzers. In addition to use by probation officers directly, such devices can be installed in an offender's home (or issued, in the case of the portable variation), and when prompted, the offender must provide a breath sample for testing. But one of the most significant innovations in corrections is remote alcohol monitoring. This approach detects alcohol as it leaves the skin through perspiration, allowing for continuous alcohol detection. Sensors on an ankle bracelet worn by the offender take readings throughout the day and report results wirelessly (McKnight, Fell, and Auld-Owens, 2012). Also now available are other portable devices that offenders can carry with them, which is less intrusive than continuous monitoring.

Further technologies focused on offenders in the community context include deception detection (e.g., polygraph tests and voice stress analyzers) and computer monitoring and forensic analysis for managing high-tech or sex offenders (Krueger, 2009).

Another of corrections' most widespread technological practices bridges both community and institutional components: drug testing. The general purposes of drug testing in corrections are to screen for recent use, to identify chronic users in need of treatment, and (like alcohol monitoring) to detect and deter ongoing drug use. In an institutional setting, drug testing can also identify the existence and level of a drug trade within the facility.

The criminal justice system began using drug testing in the early 1980s, and urinalysis emerged as the most appropriate method for reasons of both economy and accuracy (Robinson and Jones, 2000). While urinalysis remains the gold standard for drug testing, corrections agencies continue to explore alternatives that are less intrusive, gender-neutral, and less vulnerable to contamination or manipulation. Alternative methods include analyses of hair, sweat,

and saliva. Prescreening methods have also emerged as a way to identify offenders who may be impaired and should therefore be targeted for urinalysis. The primary methods in use today include pupillometry (measuring the pupil's reaction to light) and sleep pattern analysis (Farazi, 2011; Mandeville, 2005).

In the *institutional corrections* context, agencies use a wide variety of detection and surveillance technologies primarily to interdict contraband and prevent escapes. Beginning at the institution's perimeter, officers commonly use mirrors, inspection pits, and flexible snake cameras to search incoming vehicles (Atherton and Phillips, 2007). Cargo and vehicle x-ray systems may also be used. For outgoing vehicles, these technologies are employed in addition to "human-presence detectors," which can help identify escape attempts by inmates hiding in a large truck by detecting a heartbeat (Caramanis, 2000) or other methods (Klock, 2006). Similar technologies are applied to scan incoming mail. Such tools as walkthrough and handheld metal detectors are commonly used both at perimeters and inside facilities to search inmates, visitors, and staff (where authorized by agency regulations). Because contraband can be transported inside an inmate's body cavities, officers use orifice-scanning chairs with oral sensors, which can locate metallic objects hidden in body cavities. Advanced technologies such as backscatter imaging, millimeter wave, electric field tomography, thermal imaging scans, and low-dose radiation body scanning provide more comprehensive search capabilities.

Inside facilities, some of the most common forms of technology are video cameras and closed-circuit television (CCTV) systems (LIS, Inc., 1995). These systems are well established. Recent advancements include digital recording capabilities, which provide greater storage capacities and more-efficient searching and retrieval of footage. Video surveillance can be networked so that authorized users can access footage remotely. Intelligent video surveillance, though still emerging, is a promising technology that utilizes sophisticated analytics to identify events of concern, such as the type and direction of movement by individuals in defined areas, and alert officers (Krahnstoever, 2011). Other emerging technology includes remote monitoring of a suicidal inmate's vital signs so that staff can intervene quickly in the event of self-harm (Ashe et. al., 2012).

To detect cell phones inside a facility, tools include radio frequency detectors, which will detect a cell phone in the on and active mode, and nonlinear junction detectors, which look for the distinctive connection between disparate metals in an electronic device such as a cell phone. Portable body-scanning towers are currently marketed as metal detectors "optimized to detect cell phones" (ASCA, 2013a). When agencies recover contraband cell phones, they employ forensics tools for investigative purposes (Fox and Fox, 2011). Inmate communications on approved systems are also routinely monitored, with telephone systems generally having built-in security measures, such as three-way calling detection, call-forwarding detection, live-monitoring capabilities, and recording and keyword search capabilities. Emerging technology aims to identify inmate-to-inmate telephone calls across prisons by analyzing and matching call characteristics (Klein, 2012). Canine units also represent an information collecting technology that can be trained for several tasks. For example, canines are trained to detect drugs, tobacco, explosives, and cell phones and their accessories, and they routinely assist in fugitive searches, perimeter patrols, and crowd control (Atherton and Phillips, 2007).

In addition to being used to collect data on inmates or supervisees, some technologies are useful for collecting data on corrections agency operations. Radio-frequency identification (RFID) tracking, for example, is a promising—though costly for large deployments—approach for both corrections officer safety and inmate management (Hickman, Eisman, and

Davis, 2008). RFID allows for accurate tracking of movements within the facility so that the control center can send backup to an officer's location if needed. To manage inmates, RFID systems can conduct periodic roll call to augment formal counts, alert officers if two rival inmates are approaching one another, notify staff if an inmate is approaching or has entered an unauthorized area, and support post-incident investigations. Though applied in some places, RFID has not penetrated institutions broadly.

Other tools for collecting information on corrections officers include systems that monitor routine patrolling or rounds on cell blocks. These guard-tour systems consist of a handheld device assigned to an officer and a series of sensors around the cell block that can track an officer on a patrol. Other systems enable officers to call for help when needed. Duress alarms (which may be integrated into staff radios) vary from very basic to highly advanced. Basic systems consist of panic buttons positioned (covertly and overtly) in various areas within a facility. Staff in danger can press a button to generate a signal at the control center. The most-advanced systems leverage an extensive wireless infrastructure that pinpoints the alarm location and tracks the transmitter so help can be sent to the officer's location (SPAWAR Systems Center, 2003).

Information Analysis

In an effort to better track performance, guide agency decisions, and improve performance, a variety of information analysis tools have been developed for corrections. Faced with the challenge of effectively measuring and managing organizational performance, several agencies have sought to adapt the New York City Police Department's CompStat model for the corrections environment (Jannetta, 2006). CompStat uses routine tracking of key agency performance statistics (e.g., in the case of police departments, crime incidence in specific areas of the jurisdiction) to track performance, guide management decisionmaking, and promote accountability. While use of these approaches is not widespread, there are some notable examples, such as the New York City Department of Correction, New York City Department of Probation, Shelby County (Tenn.) Sheriff's Office, Idaho Department of Corrections, and California Department of Corrections and Rehabilitation.

There is growing interest in data-mining to better operationalize information that may be buried in various systems, sometimes across jurisdictions. For community corrections, social network analyses can reveal relationships between probationers and other felons, which may indicate a continuing criminal lifestyle. Use of these tools is not widespread, however. For institutional corrections, link-analysis software can identify patterns of interest, such as inmates who have common visitors and inappropriate connections between offenders and staff. Data-mining has also been leveraged to create models to assess an institution's "health" and predict the likelihood of a violent event (Siegel, 2010).

Agencies are also leveraging geographic information systems to improve data analysis, particularly for community corrections (Harries, 2003). Examples include analyzing the neighborhoods to which former inmates return to better assess reentry needs and requirements, as well as mapping where probationers live, work, and go to school, the crime rates in these areas, and the location and public transit accessibility of treatment and service providers. Geographic information systems are also being leveraged to help community corrections officers identify the most efficient route for conducting contacts in the field.

Analytic tools to support community-based offender tracking systems are emerging. Analytics can assist in crime scene correlation activities by matching offender location points with reported crime locations (Thomson, 2011). Further, agencies are just beginning to lever-

age analytics to efficiently sift through all of the location data that tracking systems generate so that officers may receive automated alerts when a tracked offender exhibits problematic behavior (Parker, 2013).

Other important information analysis functions include risk, needs, and responsiveness assessments for community corrections and pretrial and parole-release decision tools. The emerging trend is to incorporate near-real-time, dynamic factors (such as recent drug tests and missed appointments) into a more continuous assessment process (Goldkamp et al., 2009)

Information Management (Including Sharing)

Offender management systems are critical to operating a corrections agency and, to meet operational requirements, must accommodate a wide range of data sets. Depending on the agency, the offender management system may include a series of modules integrated into one system or structured as standalone, disparate information systems. Most systems maintain core-level data, such as offender demographics, conviction offenses, sentences imposed, risk assessments, classification decisions, and information about behavior after release (Bureau of Justice Statistics and ASCA, 1998). Specific applications beyond the core include needs assessments, medical services, treatment requirements, commissary, security-threat group, visitation records, investigations and discipline, fees and financial obligations, property inventory, sentence computation, interstate compact, staff scheduling, and human resources. Given the availability of database systems and similar records management needs in law enforcement and elsewhere, the market for offender management systems is quite mature, with a wide variety of commercial options.

Through these information systems, corrections agencies gather vast quantities of data. Because correctional supervision is relatively intense and may extend many years, corrections records represent the most extensive and complete record on offenders in the criminal justice system (Gattin et al., 2013). There is a growing appreciation for the richness and value of these data and a greater emphasis on sharing it across jurisdictional lines to improve public safety outcomes. Perhaps the best-known and utilized example of information-sharing across jurisdictions is the Interstate Compact Offender Tracking System, a web-based system that facilitates the transfer and supervision of probationers and parolees from one state to another.

A growing number of corrections agencies are participating in other national-level, standards-based information-sharing efforts. For example, the National Data Exchange (N-DEx), operated by the Federal Bureau of Investigation, provides criminal justice agencies with a platform for sharing, searching, linking, and analyzing information across jurisdictions. The system consists of a repository of criminal justice records submitted by agencies from around the nation and thus helps support investigations and bolster public safety.[6] The Regional Information Sharing Systems program, funded by BJA, also provides a variety of services and resources to criminal justice agencies through a network of six regional centers. The network enables member agencies to access millions of records and connect with disparate state, local, and federal systems. Specific information-sharing modules focus on areas such as criminal intelligence and investigations, officer safety, and gang activity. Plans are under way

[6] According to the most recent performance data that could be located for N-DEx to assess the extent of corrections use, "Nearly 4,000 agencies contribute data to N-DEx via 46 sources representing almost a billion persons, places, things, and events. These sources include seven regional systems, twenty state systems, nine local systems, three correctional systems, and one tribal system" (Federal Bureau of Investigation, 2013). The regional and state systems may include corrections information and provide access to corrections agencies beyond the three correctional systems identified.

to link some of these national-level systems to provide more-streamlined access to available data (ASCA, 2014).

Other information-sharing efforts are occurring on the state and regional levels. Understanding that criminals are not limited by geographic borders, neighboring state departments of corrections, such as Nebraska and Iowa, share information for intelligence and investigative purposes (*TechBeat* staff, 2004). And corrections agencies are beginning to play a more important role in support of the U.S. Department of Homeland Security's fusion centers. For example, in the Washington, D.C, metropolitan region, the District of Columbia has combined with Delaware, Maryland, New York, Pennsylvania, and West Virginia to share information about new arrests and offenders under community supervision so that a match and notification can occur if, for example, a probationer from New York is arrested in Delaware (National Criminal Justice Association, Governor's Office of Crime Control & Prevention, and National Governors Association, 2012).

Overall, corrections agencies are slowly engaging in information-sharing efforts, but there is substantial opportunity for improvement. Federal efforts such as the Global Justice Information Sharing Initiative endeavor to help hasten this process in order to achieve desired outcomes in public safety and offender reentry.

Information Delivery (Including Communications)

Analogous to other organizations, corrections agencies maintain communications infrastructure to support their staff. Radios, cellular phones, and various in-field data delivery technologies are available in the market, though the capabilities of individual agencies (e.g., small or large, rural or urban) can vary considerably.

Corrections agencies are exploring video teleconferencing for a variety of applications. It is well established in some areas and still emerging in others. For community corrections, an emerging trend is to deliver treatment services via video to offenders in remote, rural areas where resources are typically lacking (personal communication with Joe Budnick, Chief Probation Officer, Nebraska Judicial Branch, 2014).

For institutional corrections, using video technology to connect staff and inmates with external resources offers many advantages and is also particularly useful in rural areas. Video visitation is gaining traction in prisons and jails and is a promising means of connecting inmates with their support system (Loper and Coleman, 2014). While some agencies offer video visitation as a complement to in-person visits, a growing number of jails are moving to a video-only policy because it is cheaper and more secure. Significant efficiencies and cost savings can also be realized through video-arraignment hearings,[7] parole board hearings, and staff meetings and training. In addition, witnesses in parole hearings, particularly victims, can be spared the trauma of facing their attacker in person by testifying via video (Pittman, 2010).

A variety of technologies are also being used to communicate with the public. Many corrections agencies use their websites to inform and solicit help from the public about cases of interest, such as escapes, absconders, probation and parole violators, offenders who have removed their tracking devices, and so on. Agencies are also beginning to explore social media as a way to engage the public (Zastany, 2013). Moreover, automated systems that provide victims with timely notifications about important events, such as the custody status of an

[7] Some analysts have raised questions about the effect of video appearances on the quality of the justice process for defendants (Poulin, 2004).

offender, court or hearing dates, and transfers to community supervision, are well established (ASCA, 2011). And corrections institutions use a variety of systems to quickly notify local residents of an escape event. Some systems allow residents to receive notification automatically via email, phone call, or text message, and some older systems use sirens with distinctive tones.

Vehicles

Community corrections agencies generally use automobiles to travel to interact with offenders in the field and to appear in court. Automobiles may be outfitted with radio communications and "prisoner cages" to allow offender transport when necessary. Of note is the recent addition of license plate recognition technology to some community corrections vehicles, providing a capability typically associated with law enforcement to a corrections agency. Because these vehicles typically travel through high-crime areas, some agencies are using the technology to help recover stolen vehicles, with the ultimate goal of victim restoration (Ban, 2012). A decidedly low-tech approach is the use of bicycle patrols to provide officers with better mobility and increased opportunities for closer supervision of transient offenders in urban settings (Mirk, 2010).

Institutional corrections agencies use a wide variety of vehicles and associated technologies. Many agencies operate a fleet of specially constructed, secure inmate transportation buses and vans to move offenders as needed. These vehicles are typically outfitted with radio communications, and some have display panels that indicate perimeter detection zone alarms to allow for rapid response. Some agencies have integrated sensors (bridging the *information and communications* and *vehicle* categories of our taxonomy) to track vehicles via GPS technology as a tool for security, officer safety, and productivity; the technology can detect anomalies, such as a detour from an approved route, excessive speeds, or unexpected stops (Basich, 2011). Agencies may also maintain mobile emergency response command trailers to provide support during natural disasters or escapes (Texas Department of Criminal Justice, 2010).

As for emerging technology, agencies are beginning to explore the use of small drones to monitor prison grounds to help control contraband and prevent escapes (McLaughlin, 2014).

Doctrine, Tactics, Management, and Behavioral Knowledge Development and Training

Corrections has benefited greatly in recent years from a large and growing body of research on effective correctional interventions, which address practice at the management, specialist, and practitioner levels. In contrast to Martinson's pronouncement in the 1970s that "it wasn't clear if anything works" in rehabilitating offenders (Martinson, 1974), research beginning in the 1990s, collectively known as the *"what works" literature*, demonstrated empirically that programs that adhere to certain principles are more successful at reducing recidivism (Cullen and Gendreau, 2001; Aos, Miller, and Drake, 2006).[8] Armed with this knowledge, corrections agencies are putting these principles into treatment and supervision practice, realizing that they cannot continue to spend precious resources on approaches that have not proven to be effective. Central to research findings is that recidivism can be (reasonably) predicted through validated

[8] Aos, Miller, and Drake (2006, p. 3) reviewed evidence for different treatment regimens for a variety of offender types and showed that effects varied from no effect (for a variety of well-studied programs, including adult boot camps and surveillance-oriented intensive supervision programs) to more than a 30-percent reduction in recidivism (for cognitive behavioral therapy for low-risk offenders on probation).

risk instruments,[9] an offender's criminogenic needs can be identified through assessments, and, if these needs are addressed, offenders will be significantly less likely to return to prison (White, 2004). This new model requires organizational change and specific, perhaps new, skills for officers, including use of relevant assessment tools and such techniques as motivational interviewing, positive reinforcement, and cognitive-behavioral therapy (White, 2004). Treatment and supervision resources should be prioritized according to risk, with high-risk offenders warranting the lion's share. In fact, over-supervising low-risk offenders (e.g., in residential programs that might disrupt their community ties and expose them to higher-risk offenders) appears to increase recidivism (Lowenkamp et al., 2006; Lowenkamp and Latessa, 2005).

In the institutional context, significant effort has been devoted to understanding how to reduce recidivism by addressing factors, while offenders are incarcerated, that research has shown to be associated with criminality. For example, research has demonstrated that programs such as behavioral treatment for sex offenders and vocational education for the general inmate population result in substantial reductions in recidivism (Aos, Miller, and Drake, 2006; Davis et al., 2014). Furthermore, research has shown that training line officers to interact constructively with inmates and apply motivational techniques can also support and encourage inmate reentry efforts (La Vigne et al., 2008)

Other practice models currently in use address corrections activity from both community and institutional contexts, seeking to integrate approaches as offenders transition from incarceration to reentry. The Transition from Prison to Community Initiative developed by the National Institute of Corrections outlines key strategies and objectives in each phase—institutional, reentry, and community (Jannetta et al., 2012). The institutional phase focuses on initial risk and needs assessments, case planning, and programming. The reentry phase covers the period just prior to release and into the beginning of the community supervision period; the focus is on completing programming, reassessing risks and needs, identifying appropriate community-based services, and addressing immediate needs upon release. These immediate needs may include obtaining identification (e.g., a drivers license), housing, health care, and transportation (La Vigne et al., 2008). During the community phase, the focus moves to long-term stabilization while supervision gradually decreases. Understanding the value of community-based service providers in the reentry process, more corrections agencies are forming partnerships and collaborations to ensure that offenders have an established link to resources upon release.

In addition to focusing on delivering correctional services, a substantial foundation of evidence-based practice development has focused on managing corrections agencies more effectively and efficiently. For example, hiring and training corrections practitioners has been a challenge for the sector for some time. Newer tools, such as written tests and physical and psychological screening, help assess potential candidates and eliminate those unfit for the job. A growing trend is to use interactive, video-based testing in the hiring process (ASCA, 2013c). Such tests put the candidate in realistic corrections scenarios (played out on video) and then ask how he or she would respond, which can demonstrate natural instincts and predispositions about working in a corrections environment.

Delivering training effectively to both new hires and existing staff is a central component of efforts to increase professionalism and boost retention—but it can be costly. While the bulk

[9] See, for example, *The Economist* staff, 2014, for a review.

of training is still conducted in a traditional classroom format, there is a growing trend toward computer-based models, including online learning, simulations, and scenario-based video modules. For example, the major corrections associations have joined the Corrections Online Training Collaborative, a cooperative venture between the associations and a private online training company to deliver corrections training virtually, which has the potential to reduce costs (Hobbs, 2012). Interactive training tools allow staff to work through scenarios to help shape their judgment and decisionmaking or to develop specific skills, such as motivational interviewing, incident command, inmate interaction, effective verbal commands, and appropriate use of firearms and less-than-lethal weapons. Some agencies, such as the Pennsylvania Department of Corrections, have had success building their own training material (Fluck, 2005). One example is the Simulated Prison Environment Crisis Aversion Tool, which is a suite of training programs that use video clips depicting prison scenarios, followed by a series of questions. How the employee responds dictates the next video clip shown as the scenario unfolds.

Conclusion

The mission of corrections agencies is difficult and complex. Today, agencies are supported by a wide range of technologies and practices developed over several decades. These resources have been designed to help agencies meet their varied objectives more effectively, efficiently, and safely. Equally, if not more, important, agencies are applying the results of research and evaluation to inform more-effective interventions, better focusing efforts on improving outcomes and reducing recidivism. In many cases, technology is directly supporting evidence-based practices. However, despite the substantial technology and practice base that exists, the challenges faced by the sector as a whole define the need for innovation going forward, where the state of corrections today provides the foundation on which to build for the future.

CHAPTER FOUR

From Corrections Today to Corrections Tomorrow: Identifying Needs in Community and Institutional Corrections

In considering the potential to improve corrections performance through innovations in technology, policy, practice, or training, the goal is obviously to do better than we are today. But for a system so complex, how should we define *better*? In this chapter, we begin with that definition process, framing a set of overall mission and process objectives for corrections. We then discuss the process we used to generate needs with the Corrections Advisory Panel and think through innovations that could improve performance against those objectives, providing the building blocks for an innovation agenda for the sector.

Framing Top-Level Objectives for the Correctional System

To provide a basis for our innovation agenda, the research team developed a set of top-level corrections objectives—the big-picture goals that agencies are seeking to achieve. These objectives are components of the overall objective of corrections, which is to reduce crime by rehabilitating, incapacitating, punishing, and deterring offenders, ideally as efficiently as possible by minimizing the costs paid by and deleterious effects on society, victims of crime, corrections staff, and offenders. Once we created a baseline of top-level objectives, we vetted them with the Corrections Advisory Panel participants and made appropriate revisions. The resulting objectives are summarized in Table 4.1. Potential metrics associated with each objective were defined to make the objectives and definitions more tangible and facilitate applying the objectives to considering innovation options.

Our purpose in framing objectives was to capture the full range of goals that the corrections enterprise is charged with accomplishing, and to do so in a set of categories small enough to remain analytically tractable.

Four objectives focus on *mission outcomes*:

1. *Facilitate positive behavioral change* addresses the goals of both community and institutional corrections efforts to reform offenders and deliver services that allow them to successfully reenter society and not rapidly reoffend and return to the correctional system.
2. *Protect rights of victims/restoration* addresses activities of both institutional and community corrections agencies to ensure completion of required restitution and other efforts.
3. *Hold offenders accountable for their behavior* covers efforts to detect violations by offenders in both environments, such as violating the conditions of probation or breaking prison rules.

Table 4.1
Top-Level Objectives of the Corrections Enterprise

Objective	Definition	Potential Metrics
1. Facilitate positive behavioral change	Reduce recidivism by providing the services necessary to successfully reenter society	• Attendance, participation, and outcomes in treatment, employment, and education programs • Attitude change • Rate of recidivism
2. Protect rights of victims/ restoration	Improvements in the services provided to victims of crimes, such as restitution, resource referral, and offender status notifications	• Rate of restitution payment • Victim satisfaction with agency and services provided over time
3. Hold offenders accountable	Improved detection and enforcement of rules violation both in community and institutional settings	• Misconduct and violation rates and outcomes • Rate of positive drug tests • Percentage of restitution paid • Percentage of community service completed • Rate of failure to appear • Rate of use of force
4. Protect the public	Community corrections: services and monitoring that provide the appropriate level of supervision based on offender risk Institutional corrections: improvements to security systems and assessment/ classification tools to ensure the secure custody of dangerous offenders	• New crimes committed by offenders against the public • Number of escape attempts • Number of successful escapes
5. Save money and/or time	Reductions in cost of corrections operations and acquisition, while maintaining effectiveness	• Dollars and labor hours spent over time • Other performance effectiveness metrics to check for declines
6. Improve correctional competencies	Improvements to officer training, education, and readiness, particularly by incorporating evidence-based practices, such as efforts to strengthen cross-agency collaboration	• Number of events and exercises • Number of certifications • Test results showing that staff have achieved proficiency in particular areas
7. Improve officer/ offender health	Improvements to the physical and mental well-being of corrections staff and offenders	For staff: • Number of sick days, long-term leave days, and health-related departures For offenders: • Number of days offenders were ill or injured • Number of offenders receiving medical, dental, or psychological attention
8. Reduce officer/ offender casualties and injuries	Decrease in serious or fatal injuries to corrections staff and offenders from all causes (including suicide, attempted suicide, accident, assault, and use-of-force situations)	• Number of injuries and casualties for staff and offenders

4. *Protect the public*, in the community context, focuses on insulating the public from victimization during offender parole, probation, or reentry and, in the institutional context, focuses on successfully separating and confining offenders in corrections institutions.

The second four goals cover what might be termed *process measures* from a program evaluation perspective, focusing on the need for corrections organizations to carry out their

roles efficiently (Objective 5),[1] to maintain the effectiveness and skills of their workforce (Objective 6), and to protect the health (Objective 7) and safety (Objective 8) of both corrections officers and the offenders in their custody.[2]

In discussion with advisory panel members, there was relative consensus that these measures appropriately capture the overarching goals of corrections agencies. As a result, the most significant revisions were made to the goals to protect the public (where we added community corrections to a goal that had been solely institutional corrections–focused) and to improve organizational competencies (where we added a focus on "system competencies" to the original focus on training corrections officers). There was also some concern among the panel about the goals of protecting the health and safety of corrections officers being combined with that of inmates. We maintained this structure, however, because we need to use common measures across the larger criminal justice community,[3] and separating those goals would have allowed participants to reflect different priorities between protecting corrections officers and inmates when ranking innovation options.

Identifying the Building Blocks of the Innovation Agenda

Once we identified the primary objectives for corrections (in Table 4.1), the next step for building an innovation agenda was to identify what could be done in technology, policy, practice, and training to improve performance in those objectives. For our effort, we used the generic term *needs* to describe those building blocks, covering not just something that corrections agencies need to solve an immediate problem (such as a technology or other solution to help reduce significant current recidivism rates) but also steps that could be taken to take advantage of a new opportunity that changes in technology or society has made available (such as the potential for mobile devices to play a role in supervising released offenders).

We therefore define a *corrections need* as a well-defined and described action or technology that could contribute to improving performance.[4] Individual corrections needs thus represent the building blocks from which we can assemble an innovation agenda to improve performance across the eight objectives defined above. As discussed in the introduction to this report, a single problem or opportunity might be approached in different ways; therefore, an individual need can be associated with multiple objectives and problems.

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[1] See Stone and Scharf, 2011, for a discussion of technology and innovation in corrections focused on cost savings.

[2] These objectives were developed based on previous work focused on the law enforcement community (see Hollywood et al., forthcoming), with the intent of maintaining as much consistency in measures as possible across law enforcement, corrections, and courts.

[3] Because this effort to develop an innovation agenda for corrections is part of a larger effort covering the entire criminal justice community, we seek to maintain consistency in the measures used for each sector (law enforcement, corrections, and the courts). These four process measures on efficiency, competency, health, and safety are parallel to those used in earlier work examining law enforcement information technology innovation options.

[4] This definition is roughly equivalent to how previous NIJ technology planning efforts defined an *operational requirement*: "An operational requirement describes the tool or system, how it will be used, and the basic characteristics it must have to be effective" (NIJ, 2012).

Previous Efforts to Identify Corrections Needs

Given the long history of corrections in the United States and the substantial government, commercial, and societal interest in the performance of the sector, there is an existing literature on corrections needs that this effort builds upon. To provide a context for this effort, we reviewed several prominent examples from this literature. Efforts over the past two decades have focused on identifying the needs for innovation in corrections both writ large and for specific facets of performance:[5]

- The earliest corrections-specific effort to identify (technology) needs that we included in our literature review was published in 1995. The effort was based on a survey of 148 federal, state, and local corrections agencies, broken down as "48 adult prison systems, 44 large jails and jail systems, and 56 community-based corrections agencies" (LIS, Inc., 1995, p. 2). The survey asked agencies about their use of a wide variety of technologies and their level of satisfaction with their use. The survey captured comments respondents had about the use of technology and ways it could be improved, some of which mirrored issues that arose in advisory panel discussions essentially two decades later.
- The literature also describes past assessments of needs at the state level. For example, an assessment in Massachusetts in 2004 identified a long list of policy, practice, and technology issues across the criminal justice enterprise, including community and institutional corrections agencies (Massachusetts Governor's Commission on Criminal Justice Innovation, 2004). The report also had a direct focus on innovation, arguing for creating an innovations institute to bring together

  > representatives from all four areas of the criminal justice system (police, prosecution, post-release supervision and corrections) as well as action-oriented criminal justice researchers and other professionals knowledgeable about innovation. This Institute would foster understanding and adaptation of best practices in Massachusetts and elsewhere, work to create a continuous innovation norm for all components of the criminal justice system, and provide technical assistance in the areas of problem analysis and crime analysis and other areas as determined by the needs of criminal justice system practitioners. (Massachusetts Governor's Commission on Criminal Justice Innovation, 2004, p. 15)

  The needs identified by the effort ranged from legislative changes, practice changes in inmate classification and risk assessment, and an array of information-sharing improvements.
- Practitioner organizations also collect information from their members to provide insight into their views and priorities. For example, the ASCA June 2013 Current Issues in Corrections Survey included in its assessment several specific needs related to contraband, monitoring inmate activity within institutions, emerging legal and illegal substance use, and inmate classification concerns. Top needs from that survey included population man-

[5] Earlier efforts at identifying technology needs for corrections (often as part of broader efforts to assess needs across the criminal justice system) are available as well. For example, the Law Enforcement Assistance Administration carried out such an assessment project to identify potential projects for federal support in the 1970s (e.g., Law Enforcement Development Group, 1973). While there are parallels between current needs and these early efforts, changes in technology (particularly in computers and information systems) mean that much of their content is of limited relevance for contemporary needs assessment.

agement, inmate mental health, contraband cell phones, and compliance with the Prison Rape Elimination Act (ASCA, 2013b).

- In addition, some literature focuses on the needs of particular subsets of the corrections community. For example, Ruddell and Mays (2011) summarized a number of studies focused on small and rural jails, identifying needs regarding funding, staffing, inmate medical care, contraband, and overcrowding, among others.

In addition to publicly published analyses, NIJ has had a process for gathering technology and other needs from the practitioner community that was a forerunner to the current effort. The process used practitioner Technology Working Groups (TWGs) focused on identifying potential areas for focused research in specific technology areas.[6] Two of these TWGs focused on community and institutional corrections. Their most recent meeting was in 2013 and generated needs ranging from information collection and surveillance (e.g., low-cost mobile device forensic tools for community corrections) to management and leadership knowledge development (e.g., independent studies on the effect of video visitation on corrections operations).[7] Because members of these TWGs also participated as members of the Corrections Advisory Panel, the needs and priorities described in this report reflect the majority of those developed in the most recent TWGs.

Generating Corrections Needs with the Advisory Panel Members

As described in Appendix A, the Corrections Advisory Panel was divided into a working group for community corrections and one for institutional corrections. Each group worked through a structured needs generation process. Supported by information from the read-ahead materials and the initial panel brief-in, we held two sets of facilitated discussions (see agenda in Appendix B). The first was designed to identify problems and opportunities for corrections today. The second was intended to then frame various needs—technological, policy, practice, training, or other changes—that would contribute to addressing each problem or capitalizing on the opportunity. In practice, the boundary between identifying a problem or opportunity and generating a need was fuzzy, with discussion moving back and forth between the two tasks to some extent.

The core strength of these practitioner-focused efforts is that we can leverage the expertise of individuals who are directly involved in the tasks of interest. Doing so seeks to link the needs that are generated to the way things are "actually done" in practice, reducing the chance of producing recommendations that are impractical or not useful, and to discover needs that analysts looking from the outside might not. The central challenge in these processes, however, is that the needs generated are driven by the perspectives of the people involved, which can be

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[6] At the time of this writing, the NIJ website listed 20 TWGs: Aviation, Biometrics, Body Armor, Communications, Community Corrections, DNA Forensics, Electronic Crime, Explosive Device Defeat, General Forensics, Geospatial Technologies, Information-Led Policing, Institutional Corrections, Less-Lethal Technologies, Modeling and Simulation, Officer Safety and Protective Technologies, Personal Protection Equipment, Pursuit Management, School Safety, Sensors and Surveillance, and Weapons Detection (NIJ, 2012). The Law Enforcement and Corrections Technology Advisory Council also met annually to review the needs developed by the TWGs and recommend the top ten needs from across them (e.g., Law Enforcement and Corrections Technology Advisory Council, 2009). Needs from the TWGs were also published in other cross-cutting documents (e.g., NIJ, 2009).

[7] Community Corrections TWG Technology Requirements, dated February 25, 2013 (unpublished), and Institutional Corrections TWG Technology Requirements, dated February 22, 2013 (unpublished).

affected by the immediate issues they are facing in their own agencies and their specific experience and expertise.

Though building a broadly representative and diverse group of experts seeks to reduce the effect of such biases (Appendix A), it can also help to use structured methods to ensure a systematic approach. In our process, we used three "lenses" for the panelists to think through current corrections operations and potential needs:

- Consider a *typical day* at their agency (or corrections agencies in general) and an *unusual day* (e.g., major disturbance or natural disaster), and identify problems or issues that would arise in each case.
- Walk through the provided taxonomy,[8] looking for technologies or practices where there are problems with those currently in use, where new developments suggest opportunities for innovation, or where there are not commercially available products applicable to corrections environments.
- Examine each of the corrections objectives (Table 4.1) to identify issues affecting performance or opportunities to improve on each dimension.

We encouraged the working groups to consider a range of technology, practice, and other potential needs that might be associated with each problem or opportunity, because some might be amenable to multiple approaches. The goal was not to list every possible approach—because doing so would be analytically impractical—but to capture where there were multiple attractive options.

Reviewing the Needs Produced by the Corrections Advisory Panel

The Corrections Advisory Panel identified a large number of needs—just under 90 in the community corrections working group and just over 130 in the institutional corrections group. The full list of needs is included in Appendixes D and E, presented by the taxonomy categories in Figure 3.1. Though any of the needs identified by the panel might be a useful target for investment or activity by one of the many entities relevant to corrections sector innovation, moving from this large list to a more focused initial innovation agenda required systematically prioritizing the needs, which we describe in Chapter Five. The remainder of this chapter discusses some overarching observations on the identified needs, including those specific to the community and institutional corrections components.

What Were the Central Issues Driving Corrections Needs?

The discussion of needs within both working groups explored a wide range of topics and concerns in community and institutional corrections. Some of the most central issues are outlined below.

- Access to information—and the ability to use information effectively—was a concern in both working groups, especially troubles with database interoperability and coordination

[8] The version of the taxonomy presented in Figure 3.1 was revised based on input from the advisory panel members and is therefore not identical to the one used during the needs generation process. Because the revisions were relatively modest, however, the taxonomy presented is substantially equivalent to the one used.

between and among agencies. In addition, the panel noted problems delivering the appropriate and necessary information to corrections officers when and where they needed it.

- Differences in the capacity and capability of corrections organizations across the country, and how those differences shape needs, were central in discussion. In community corrections, this centered on the urban-rural divide and the very different challenges of agencies that have to monitor offenders over large geographic areas versus the more complex—but more compact—urban environment. In institutional corrections, differences in the budgetary, technical, policy, operational, and other circumstances of participants' home organizations led to very different conclusions about the value and practicality of specific technology and practice changes.
- Offenders with mental health needs represent a multifaceted challenge to the U.S. correctional system. In community corrections, shortfalls in staff training and organizational capacity make it difficult to address problems with mentally ill offenders, as well as address their needs in a way that increases their chance of successful reintegration and prevents rapid recidivism and reincarceration. Meanwhile, members of the institutional working group described their facilities as, at least in some cases, the *de facto* mental health system in their area—but lacking the resources and staff training to provide for individuals with mental health needs.
- Participants in both working groups raised concerns about maintaining and training the corrections workforce, as well as maintaining the safety, health, and wellness of officers who work in demanding and stressful environments.
- There are still demands for better information on "what works" in the corrections environment. Particularly given resource constraints in state and local criminal justice organizations (a theme that was prominent throughout the panel), it is critical to know how to adjust the dosage of programs for offenders (without jeopardizing efficacy) and make well-informed technology and other procurement decisions.
- New technologies and new business models create opportunities for the sector, but they also create challenges for decisionmaking. For example, a single technology—video visitation in jails and prisons, or video conferencing for community "supervision at a distance"—came up in discussion as a potential boon to institutional corrections, a challenge to controlling the information coming into institutions, a way to better serve the needs of some special needs populations (e.g., the hearing impaired), a way to save costs in different parts of the system, and, depending on how it was implemented in a facility, a case where private-sector business models could adversely affect prisoners and families if they have to pay to access the service.
- For institutional corrections, contraband coming into facilities remains a serious and multifaceted concern. Some new technologies and processes have helped, but whether it is from simply being thrown across fence lines or being smuggled in by visitors and staff, contraband is still a problem.[9]
- Both groups identified issues in corrections agencies that essentially represented barriers to innovation, such as limits of existing technology systems that make it difficult to add

[9] This concern echoes previous technology needs assessments for corrections, emphasizing the enduring nature of contraband problems. For example, in 1988, Latessa et al. flagged the need for improvement in technologies "to make them more effective in detecting drugs and contraband or preventing escapes" (p. 28). The issue of escape was not raised by the advisory panel members, however.

new capabilities, technology provider contracts that lock in and limit the activities and flexibility of agencies, and organizational inertia that impedes changing practices.

The panel identified multiple needs in each of these areas, often capturing multiple strategies for addressing a problem or challenge.

How Do the Needs Generated in Community and Institutional Corrections Compare?

To look across the needs produced by both working groups, we find it useful to summarize the needs in two different ways. These summaries provide a top-level snapshot of the areas that each group thought were important, identify ways that the two sets of needs are similar and different, and help identify differences in the way the groups executed the needs generation process.

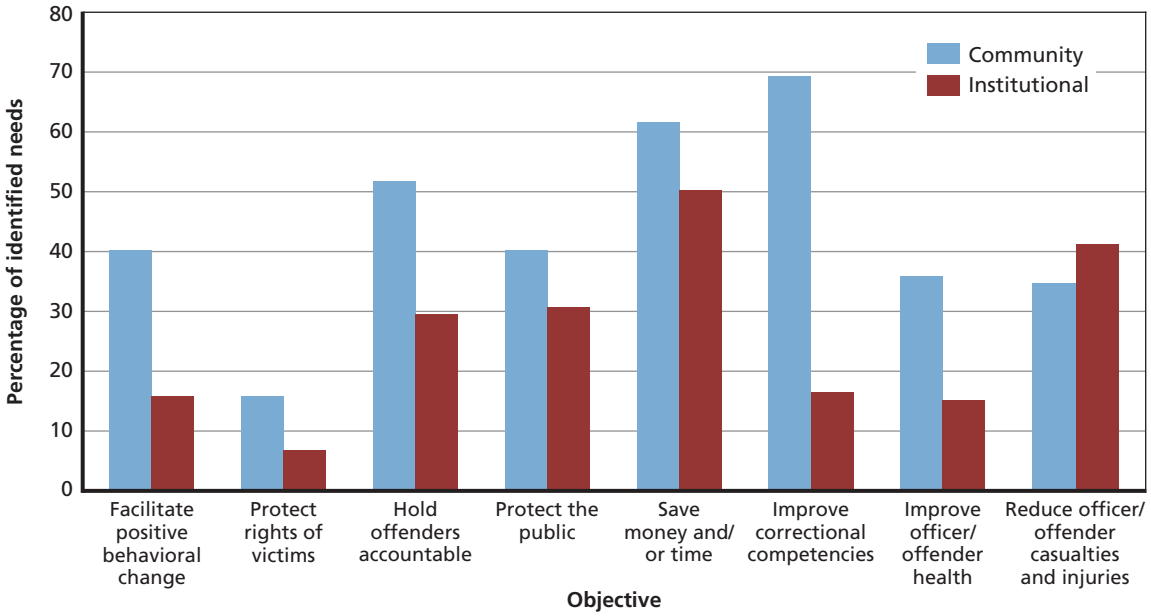
When we group the needs by the corrections objectives that each working group thought their needs would benefit, we see significant differences between the community and institutional corrections groups. This potentially indicates a difference in emphasis or in how the groups approached the needs generation process. On average, the community corrections group assigned needs as beneficial to a greater number of corrections objectives, assigning about three and a half objectives per need versus approximately two objectives for the institutional corrections group.

A central driver of this difference was the discrepancy in how many needs were identified as contributing to improving correctional competencies. The community corrections group assigned a large majority (almost 70 percent) of its needs to that objective, which was very different from the much smaller corresponding percentage in the institutional group. Figure 4.1 shows the percentage of needs flagged as contributing to each corrections objective, for both working groups. Single needs could—and often did—contribute to more than one objective (e.g., saving money while also protecting the public). As a result, percentages across the graph add to considerably more than 100 percent, with their values reflecting the groups' relative focus as they identified needs. Though such differences likely come in part from differences in the way the separate groups implemented the rating process (i.e., a greater tendency in the community corrections groups to associate needs with multiple objectives), they likely reflect the differences in priorities and goals of the two communities; for example, the large difference in needs viewed as contributing to facilitating positive behavioral change.

To further compare the working groups' products, each of the needs was categorized using the taxonomy categories discussed in Chapter Three. These categories fall along technological lines—e.g., separating different applications of information technology from interventions such as training and practice development—which provides a common structure for comparison. In some cases, a single need related to more than one taxonomy category and was linked to multiple points on the framework. This affected approximately 1 in 10 needs, with more in the community corrections set.

Figure 4.2 shows a top-level view of how the needs identified by each working group fell into the corrections technology and practice taxonomy categories. The bars in the figure are proportional in height to the percentage of the total needs in each category, with the columns of bars to the right showing successive breakdowns into subcategories of the taxonomy. Because the intent is to provide a view of the "needs forest rather than the trees," we show only categories or subcategories constituting 5 percent or more of the needs identified. Remaining categories that each make up less than 5 percent are summed and shown as *other*.

Figure 4.1
Percentage of Needs Contributing to Each Corrections Objective, by Working Group



NOTE: Percentages add to more than 100 percent because each need could be (and frequently was) assigned as contributing to multiple objectives.

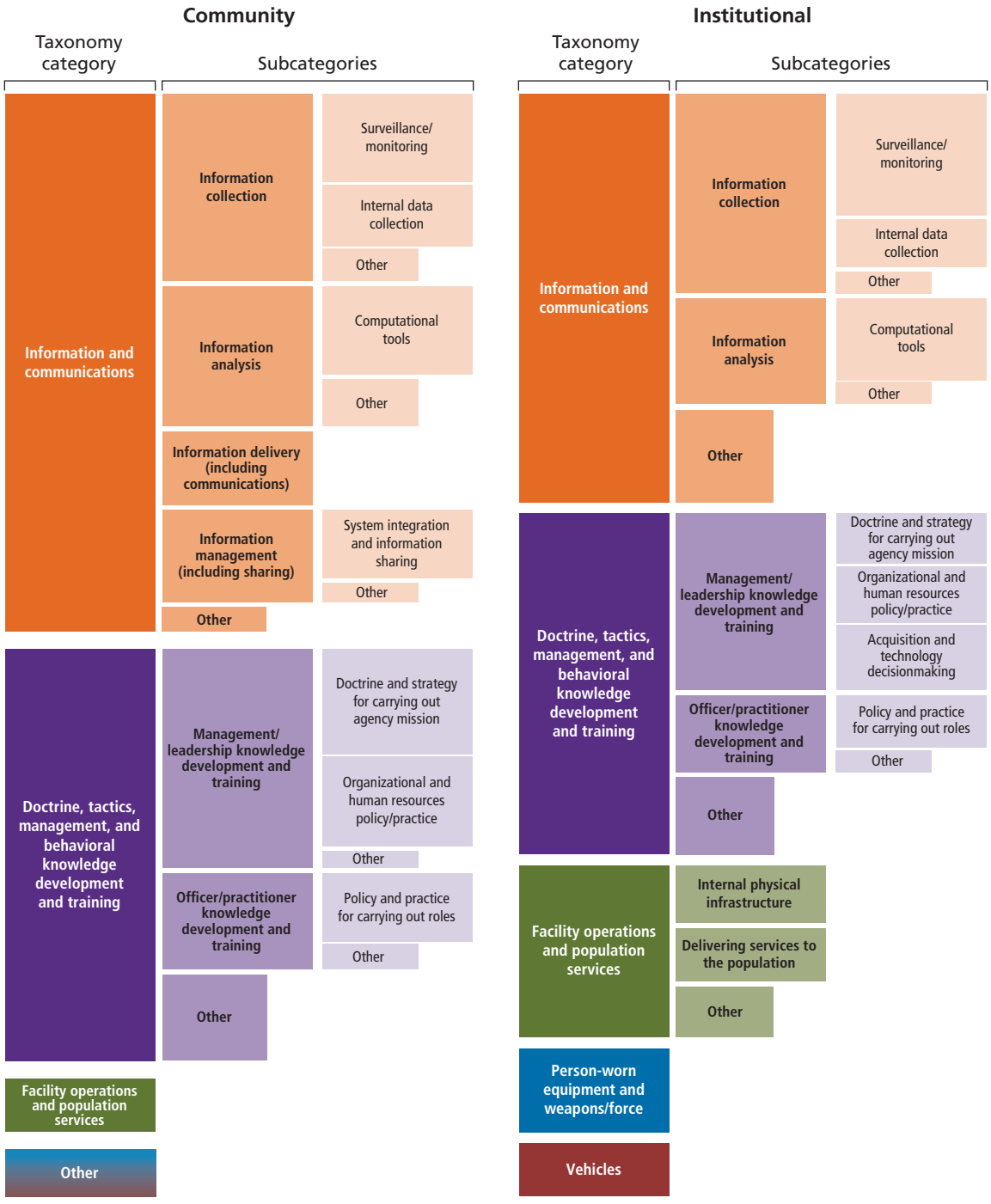
RAND *RR820-4.1*

Looking across both working groups' columns, there are similarities and differences. As might be expected, institutional corrections had greater representation of needs related to *facility operations and population services*, as well as *person-worn and weapons/force* technologies (e.g., protective equipment). Within both communities, however, there is strong representation of *information and communications* needs, with emphasis on *information collection tools and analytic techniques*. Both also have strong representation of needs in the *doctrine, tactics, management, and behavioral knowledge development and training* category—the part of the taxonomy capturing knowledge both to help do the job better and to aid decisionmaking and organizational management. It also is the category capturing needs that are largely not technological in nature.

Looking across the individual needs, both community and institutional corrections groups strongly called out needs regarding training. Of all the needs, 25 related to training in some way, with approximately two-thirds of those identified in the community corrections group. Some training needs were specific and functional, such as new ways to train corrections officers in use of force and weapons, since many agencies have lacked the resources to maintain those skills in their workforces. Others were problem-specific, such as training for dealing with offenders with mental health needs. Indeed, as noted earlier, offender mental health has affected each corrections component in different ways, with needs varying from managing information to inform treatment efforts to developing different models for delivering care, such as a "mobile mental health team" that travels to serve widely dispersed offenders in rural areas.

Other needs common in both community and institutional corrections included developing measures and metrics for assessing agency performance and defining data collection and analytics requirements to turn agency data into information that is usable for both organiza-

Figure 4.2
Percentage of Needs Related to Each Taxonomy Category and Subcategory, by Working Group



NOTE: The bars are proportional in height to the percentage of the total needs in each category, with the columns of bars to the right showing successive breakdowns into subcategories of the taxonomy. Categories labeled as *other* are the sum of the subcategories making up less than 5 percent of total needs.

RAND *RR820-4.2*

tional management and intervention in individual offender cases. A variety of common specialized technical needs included deception detection, new illegal drug detection tools, automated translation tools, various scanners and detectors for detecting weapons and other contraband materials, and policies for analyzing offender social media use.[10]

Conclusions—Corrections Needs Yesterday and Today

The needs generation process carried out by the Corrections Advisory Panel sought to systematically identify possible building blocks for an innovation agenda for corrections. Using three complementary approaches for examining current practices, technologies, and policies, working groups on community and institutional corrections identified a large number of needs across many areas. Many of the needs were technology-based, focusing on sensors, information technology, and other tools that could contribute to making corrections more efficient or effective. Some other needs were not for new or modified technology, focusing instead on doctrine and practice for corrections management and implementation.

Taking a broader view, it is unsurprising that there is commonality between the needs identified in our effort and those from previous efforts to assess innovation requirements for the corrections sector. For example, needs for technology-based training, systems for tracking and assessing inmate activities to match programs to their requirements, contraband detection, data-sharing between agencies, and better drug monitoring technologies were needs identified in 1995 (LIS, Inc., 1995, pp. 20–25)—and remain needs today. In a sense, such commonality should not be a surprise, because there are facets of corrections operations that will always be challenges—even as the details of the challenges shift over time. The drug monitoring technologies identified in 1995 were not focused on the same set of drugs that are of concern now, but the challenge of drugs either as contraband in institutional settings or as a key factor for community supervision is likely to be an enduring one.

Given a wide variety of identified needs that could address problems in corrections or represent opportunities to improve performance, the challenge in framing an innovation agenda is therefore one of focus: Of the many possible technologies, practices, and policies that could be a focus of agency attention, investment by federal research organizations, or targets of private-sector technology development, which represent the most attractive targets? Chapter Five addresses that challenge.

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[10] Some corrections agencies already use social media monitoring for community corrections (e.g., Sweeney, 2012).

CHAPTER FIVE

Prioritizing the Needs to Develop an Innovation Agenda for Corrections

All of the needs identified in our generation process represent potential targets for investment to improve corrections performance. Indeed, given the complexity of the corrections sector and the many organizations relevant to promoting innovation within it—including corrections agencies, government research and support organizations, private-sector firms, and nongovernmental organizations, among others—there may be individual needs on the list that match perfectly the roles and capabilities of a single organization and could be acted on immediately.

For an innovation agenda overall, however, such a long list of possible targets is daunting. To provide insight for organizations on where to focus first—or where to invest limited resources for the best return in improved performance—we must prioritize the needs. As a result, following the needs generation process and drawing on the expertise of the members of the Corrections Advisory Panel, we performed a structured prioritization process to identify the most valuable needs to include in an innovation agenda.

The Logic of Prioritizing Corrections Needs

We prioritized needs using a variation of the Delphi method,[1] a technique developed at RAND to elicit expert opinion about well-defined questions in a systematic and structured way.[2] In this case, the logic of the rating process was as follows:[3]

1. As described in Chapter Four, through group discussion, we linked each need to corrections objectives (Table 4.1), identifying which objectives filling the need would benefit. Some needs were identified as benefiting only one or a small number of objectives (e.g., a need that just saved money), while others benefited more.
2. However, while the corrections sector is seeking to achieve all eight of the objectives in Table 4.1, there is no reason to assume that each objective is equally important. For

[1] The web reference (RAND Corporation, undated) includes the formative RAND papers on the method and more recent applications of the technique to a range of policy problems.

[2] A more detailed description of the prioritization process is described in Appendix C of this report.

[3] It should be noted that previous efforts have sought to perform similar prioritization efforts focused on technology development objectives using other data sets (e.g., crime rate data). For example, Cooper, Dukovich, and Bouffard, 1998, attempted to do such a quantitative prioritization to calculate net present values for different technology options. Based on available information in the literature, it is not clear where the techniques were implemented and used, and for the present project, such strategies were not seen as practical, given the significant number of needs we expected to generate and prioritize.

example, in a world of sufficiently scarce resources, saving money might trump all other goals, while in a more ideal world, the mission objectives of protecting the public and facilitating positive behavioral change might be far above the others.[4] Reflecting the potential for objectives to be weighed differently, each individual member of the advisory panel prioritized the objectives by assigning swing weights to them, making it possible to compare their relative importance.[5]

3. Each individual then assigned rankings to each of the needs generated by their working group, which singly or in combination could be used to explore the relative attractiveness of the needs. Those rankings estimated:
   - *How much meeting the need could contribute to each corrections objective*; for example, some might improve facility security a great deal, but others only a little. The panel rated each need against each objective it was linked to on a scale of 1 to 9, where 1 meant that meeting the need contributed nothing to meeting the objective and 9 meant that meeting the need could result in a 20 percent or greater improvement in performance.[6]
   - *How technically difficult it would be to meet the need*; that is, while meeting some needs might require only minor adaptation of an existing technology, others might be very technologically difficult. The panel rated each need's chance of technical success on a scale of 1 (10 percent chance of succeeding) to 9 (90 percent chance of succeeding).
   - *Whether corrections organizations would actually use the solution or technology if it became available*; for example, the greatest innovation might not be used if it was too expensive or incompatible with important organizational policies, while other innovations might be rapidly picked up. The panel rated each need's chance of operational success on a scale of 1 (10 percent chance of being broadly adopted and used) to 9 (90 percent chance).

These three scales sought to capture the key components needed to calculate the expected value of a possible innovation—how valuable it would be multiplied by the probability it could be successfully produced and, if produced, would be used. Indeed, previous studies (LIS, Inc., 1995, p. 3) identified technologies that were rated highly for effectiveness by corrections agencies but had nonetheless been dropped from use by some organizations in the study sample, emphasizing that the potential value of a technology is not just about what it *might* do, but the likelihood that value will be realized in practice.

This ranking approach was designed to make it possible to compare needs across very different corrections objectives, and to capture scores for different feasibility measures. This was demanding on the members of the advisory panel, requiring ten separate rankings for each

[4] In prioritizing innovation objectives for corrections, in the ideal, values from different perspectives—corrections practitioners, policy decisionmakers, members of the public, and stakeholder groups—should be captured. As is the case quantitative cost-benefit analysis, capturing values from each of these perspectives is difficult (see Matthies, 2014). In this work, corrections practitioners performed the assessment and prioritization, but RAND is experimenting with broader participatory ways for doing needs generation and ranking.

[5] This technique is described in Appendix C.

[6] If an individual participant, upon additional reflection, decided that they disagreed with which objectives a need had been linked to by the group (in Step 1 of this list), they were free to rate the need during the scoring round, and a few participants did so.

need that their panel developed. In addition, our design choices did require compromises, and we should note two in particular. First, the anchoring of our ranking scale for benefit at 20 percent improvement in performance is an *upside truncation*; that is, any need that was viewed as potentially better than that (e.g., improving performance by 50 percent) would still be ranked only at a 9. We viewed this compromise as acceptable because the highest effect of criminal justice innovations where evaluations are available in the literature have fallen at or just above that range (see Hollywood et al., forthcoming). However, this results in an apparent devaluing of potentially revolutionary changes. Second, though our scales do include questions of cost implicitly (because cost is a factor in the likelihood of widespread adoption of an innovation), we did not estimate cost associated with each need. As discussed in the introduction, this means that the innovation agenda represents a starting point for such tasks as building business case estimates or constructing research and investment portfolios where costs must be considered explicitly.

Rather than simply taking the average of a group of experts' rankings, the Delphi method seeks to identify and explore differences among experts' responses. As a result, ratings are done in multiple rounds, with discussions in between focused on ratings where there were divergences among the group. For this effort, we performed two rating rounds on the corrections needs, with one intervening discussion spent primarily on cases with the most disagreement. Because each working group had either 12 or 13 members, there were a sufficient number of individual ratings to define reasonable distributions for each rating. The Delphi process used in this work builds on previous RAND work examining law enforcement information technology needs (Hollywood et al., forthcoming).

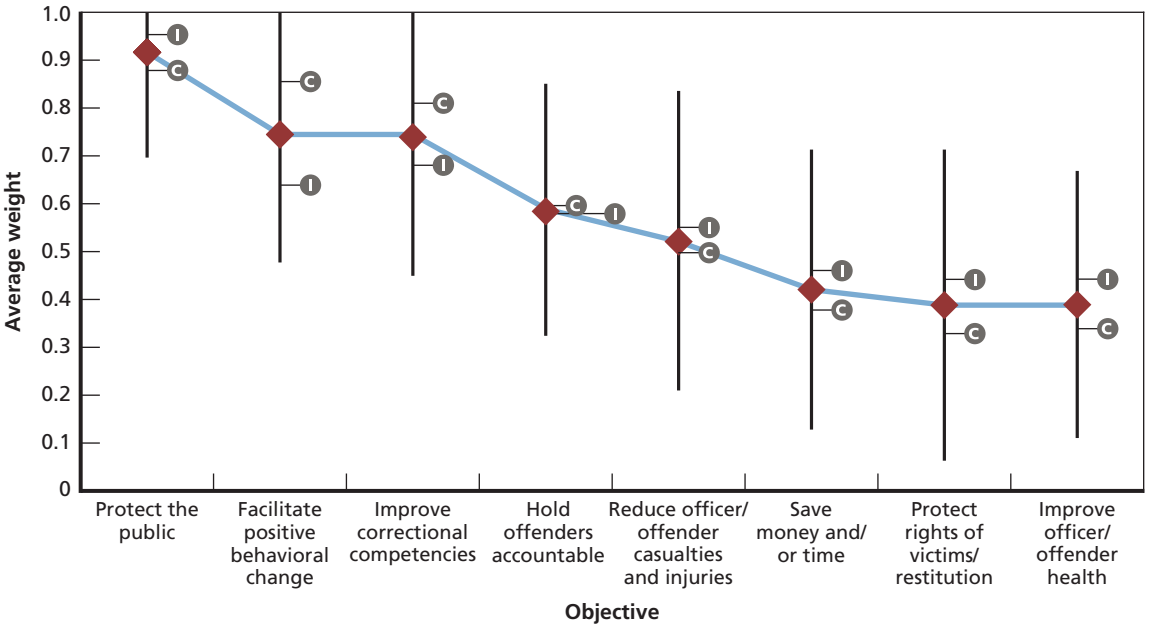
Prioritizing the Corrections Objectives

Each member of the Corrections Advisory Panel independently assigned rankings to each of the eight corrections objectives, both putting them in rank order and defining different separations between those rankings. For example, a participant who thought two of the objectives were much more important than all of the others could rank them first and second—and show that their importance was similar, or even identical—and then rank the third through eighth objectives much lower.[7] Because each participant ranked the objectives, we can calculate weights for the group as a whole and for the members of the community and institutional corrections groups separately.

The results of the objective prioritization are shown in Figure 5.1, ordered from the highest overall ranked objective (*protect the public*) to the lowest (*protect the rights of victims/restitution* and *improve officer/offender health*, whose average values were essentially identical). The height of the bars through each of the average weights (shown with red diamonds) shows the significant spread in the rankings; the bars show one standard deviation above and below the average. The rankings intersperse both mission success objectives (*protect the public* and *facilitate behavioral change* ranked highly) and process objectives (*improve correctional competencies* was ranked third). The rankings of the bottom three objectives (*save money and/or time*, *protect the rights of victims*, and *improve officer/offender health*) were very close to one another, indicating that the importance (or lack thereof) of those three objectives was nearly equivalent for the

[7] See Appendix C for more detail about swing weights.

Figure 5.1
Weighted Priority of Corrections Objectives



NOTE: Red diamonds show average prioritization across all members of the Corrections Advisory Panel. The vertical black bars indicate one standard deviation above and below the mean (truncated at a maximum of 1). Circles with C and I indicate the averages for the community and institutional corrections working groups, respectively.

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panel members. However, the difference between the ranks of the lowest objectives to the highest was only a little more than a factor of two and a third in importance.

Looking at separate averages for the working groups, there was reasonable agreement but some divergence. The largest split was on the ranking for *facilitate positive behavioral change*, where the members of the community corrections group ranked that objective considerably higher than the institutional corrections group.[8] There were modest splits among other objectives. However, even if we take each working group's rankings separately, the order of the eight objectives would change only modestly from the combined order.

Prioritizing Corrections Technology Needs

The effectiveness of expert elicitation processes such as the Delphi method relies heavily on the knowledge and capabilities brought to the process by the participants. In identifying and selecting the members of the advisory panel (listed in Appendix A), we sought to build a panel with representation from various geographic locations, agency sizes, and levels of technical expertise to provide a deep and broad knowledge base.

[8] In a survey of a convenience sample of community corrections professionals, DeMichele (2007) had the respondents do a similar exercise ranking the importance of different corrections objectives. The overall order of his (somewhat different) objectives was quite similar to that observed in the panel members. His objectives, in order from most to least important, were community safety, victim protection, offender monitoring, therapy and rehabilitation, holding offenders accountable, reintegration with community, and character or moral reformation.

We asked the participants to rank the value and probabilities of successfully meeting and adopting the different needs from the perspective of the overall corrections enterprise, informed by the knowledge and conditions of their agencies. The broad representation on the panel was designed to balance agency-to-agency differences, even as the participants sought to think broadly. In the rankings and subsequent discussion, we did see agency differences shaping individuals' perspectives. For some participants, the probability of adopting individual solutions for some needs was viewed as very easy, while the constraints that existed in other agencies (e.g., existing information technology infrastructure or standard approaches to tasks or functions) were viewed as high barriers to implementation. In contrast, for other needs, there was much more consensus around the value of meeting the need or the likelihood of success. Some differences were resolved through the discussion between ranking rounds, while others were not, especially those that stemmed from fundamental differences in views.

In addition, the challenge posed to the panel was a difficult one: We asked them not just to rate whether meeting specific needs would be useful, but to assess value against multiple objectives and estimate probabilities of success. Such judgments are difficult, and some participants questioned whether they knew everything necessary to rigorously assess each need. In the absence of a crystal ball that would let us see the future value and success of introducing particular technologies or changes in practice, there will always be uncertainty in any assessment. And given the diversity of needs captured in this analysis, it would require a technical expert of uncommonly broad expertise to comment authoritatively on each and every need.

Our response to this unsurprising issue is to present the results of the prioritization in multiple ways and, rather than focus on ordered lists of priorities—where uncertainties in respondent rankings could cause significant changes in how needs fell—we present the results as tiers of needs, determined by natural breakpoints in how the rankings were distributed. We identified a set of top-tier needs from each working group by ranking and plotting the scores for each need in two ways:

1. the expected value of meeting the need—calculated as a product of the need's benefits for each objective (weighted by the priority of the objective), the probability of technical success for meeting the need, and the probability of adoption
2. a score for the need that includes only its weighted benefits for each objective (i.e., ignoring the probability of success and probability of adoption).[9]

Arguably, the expected value is the better overall measure, but it may undervalue innovations that the panel believed were very valuable. Moreover, some panel members were concerned about their ability to appropriately estimate the probabilities of success and adoption, and whether uncertainties in their estimates could have an unobserved effect on scores. As a result, looking at needs using just the panel members' perceived benefits (the second measure, neglecting the probability terms) hedges against those effects and also helps identify needs that the panel believed were very important, even if they might be difficult to meet successfully. To identify top-tier needs based on both of these measures, we plotted each need's scores on each measure and identified natural breakpoints in the distributions (graphs are included in Appendix C).

[9] Appendix C describes these calculations and rankings in greater detail.

In addition to identifying top-tier needs, we cut the data to look for needs that were viewed by the panel as easy to implement and likely to succeed—often termed *low-hanging fruit* in the business literature. To identify these, we looked at needs that were ranked highly in the probability of both technical and operational success. We flagged needs as potential candidates if the product of multiplying these two rankings together was greater than 63—corresponding to ranking pairs of 7 and 9, 8 and 8, 8 and 9, or 9 and 9. Any needs that were not already captured in the top-tier needs described above were then included on a list of needs that could be attractive for action not because of the scope of their benefits but because of the apparent ease of addressing them.

High-Priority Innovation Needs for Community Corrections

In community corrections, there were 19 top-tier needs based on rankings by expected value and by weighted benefit (Table 5.1). There were five additional needs identified as potential low-hanging fruit (Table 5.2) beyond those already included in the top tier. For clarity of presentation in the tables, we have grouped the needs by their main technology and practice taxonomy category. The full list of needs and their tiers, with more-detailed categorization using our taxonomy, is included in Appendix D, Tables D.1 through D.5. Looking at the high-priority needs, all 19 fall within the categories of *information and communications* and *doctrine, tactics, management, and behavioral knowledge development and training* (shortened to *knowledge development and training* for ease of discussion).

The top-tier needs focused on *information and communications* emphasize the importance of information to community corrections practice. These needs included risk assessment tools to match offenders to resources and to make decisions about appropriate levels of supervision. Such tools are especially needed now that the population under community supervision has increased and prison overcrowding has led to the release of higher-risk offenders into the community (e.g., discussion in DeMichele and Payne, 2007). The working group highlighted a variety of data collection tools, focusing both on offenders—e.g., effective deception detection tools—and internally on corrections staff. Analysis tools for language translation and understanding GPS tracking data were also flagged.

The remaining four top-tier needs in this category focused on different facets of information-sharing and data system interoperability. The goal is to allow access to information in national, state, and local databases across agencies and provide easy access to that data by practitioners. Discussion of these topics during the working group focused on the need for *integrated justice*, driven by the ability of practitioners and treatment providers to access records that can help guide supervision and service delivery. The current state was described as fragmented, with much data not being routinely tracked, problems transferring data from agency to agency, and limitations of basic information systems that made extracting the information they contain and using it very difficult at best.[10]

In *knowledge development and training*, needs were flagged for community corrections leadership to inform preparedness efforts for natural disasters, guide the application of offender risk assessment tools, and develop resources to address the management of higher-risk offenders in community supervision. With respect to emergency preparedness, the literature is indeed quite sparse on community corrections, though resources are available that focus on prepared-

[10] Based on available information, it appears that initiatives were or are currently under way at ASCA that focus on several of these information-sharing concerns (see ASCA, undated).

Table 5.1
Top-Tier Needs for Community Corrections

Category	Problem or Opportunity	Associated Need
Information and communications	Lack of effective validation techniques for risk and need assessment tools, limiting confidence in their use	Develop tools or components of case management systems that can dynamically update risk assessments and automatically validate and update risk assessment models. The tool should also identify anomalies in case management, such as signs of risk-score manipulation and anomalous churn. Develop simple risk models using easily observed indicators known to be correlated with recidivism that corrections officers can use in the field to assess offenders' risk at each meeting.
	Lack of dynamic, time-dependent risk assessment tools to provide solid predictive ability for high-risk offenders	Develop improved risk assessment models for recidivism that incorporate expanded variables and model types and can provide dynamic, near-real-time assessments of risk. For example, include indicators of ongoing cooperation with terms of supervision.
	Large caseloads, affecting quality of supervision delivered	Develop guidance to help evaluate numbers of cases versus actual workloads, specifically to include better methods to assess how much time should be spent on a specific case.
	Language differences and language knowledge of corrections staff, limiting supervision effectiveness	Develop affordable, portable, accurate, real-time, multilanguage *speech-to-speech* translators; technologies exist but need to be improved.
	Lack of information to appropriately allocate resources to high- and low-risk offenders	Develop models that can more accurately identify offenders on community supervision who require less supervision and resources, saving resources for higher-risk individuals.
	Lack of ability to detect deception by offenders during interactions	Develop affordable, portable, easy-to-use, and validated tools for determining whether a subject is being deceptive. Potential technologies to leverage include recognizing microfacial expressions, remote biometrics sensors, and P200 (brain waves).
	Data system interoperability problems among agencies who have useful data (and even within single agencies), limiting cross-agency sharing	Create gateways or centers that can translate and exchange corrections data between and among agencies' systems, *on a local level*. Need extensions to, dissemination of, and vendor requirements for the use of National Information Exchange Model (NIEM) Information Exchange Package Documentation (IEPD) guidelines in corrections. Create gateways or centers that can translate and exchange corrections data between agencies' systems and *state and nationwide databases*. Produce and disseminate affordable tools that query multiple federal, state, and local databases about people, places, and things and perform analytics on the results.

Table 5.1—Continued

Category	Problem or Opportunity	Associated Need
Doctrine, tactics, management, and behavioral knowledge development and training	Limited preparedness activities for large-scale incidents	Develop guidebooks and training materials on how to plan for and recover from a natural disaster from the community corrections perspective.
	Lack of effective validation techniques for risk and need assessment tools, limiting confidence in their use	Develop guidance materials that discuss which risk assessment tools are appropriate to use in which settings, and warn agencies against using risk instruments that were not developed for the intended purpose, are out of date, or were never validated.
	Release of more dangerous, higher-risk offenders into community monitoring as a result of prison and jail overcrowding	Assign increased and more-targeted resources to address changes in the population of offenders under community supervision (e.g., resources addressing more-frequent violations in this group of offenders).
	Differences in sanctions in response to infractions, producing inconsistency in holding offenders accountable	Develop a tool or matrix that reflects best practices and prior research on which sanctions should be applied to which type of violation and need.
		Develop or gather research on which type of sanction is most likely to produce a positive behavioral change in response to which type of violation and need.
	Lack of training for corrections personnel to address offender drug and mental health issues	Develop training programs for community corrections officers to work with offenders diagnosed with mental illnesses or exhibiting symptoms.
		Assemble a national information resource that provides virtual training and guides on how probation officers should work with mental health caseloads.
	Difficulties recruiting, hiring, training, and retaining corrections staff	Update training materials and software so that they are current, more realistic, and more interactive, and they provide visualization.

NOTE: Needs are grouped by their top-level taxonomy category. Full categorization of needs is included in Appendix D.

ness for institutional corrections facilities. In contrast, there is a deep literature on offender risk assessment regarding outcomes such as recidivism, violence, and particular offenses (e.g., risk assessment for sex offenders). Given that this need rose into the top tier suggests that work to date has not sufficiently validated risk assessment tools to warrant the panel's confidence in their use—a need that becomes even more critical if more offenders with potentially greater propensities for violence are being released into community supervision (see, for example, Braga, Piehl, and Hureau, 2008).

At the corrections officer or practitioner level, top-tier needs identified in this category included better materials for providing training overall and materials specifically addressing the management of offenders with mental health issues, echoing other literature in this area (e.g., Osher et al., 2012; Baillargeon, Hoge, and Penn, 2010; Louden et al., 2012). The panel also identified needs for selecting and calibrating sanctions for offenders who violated the

terms of their probation and parole (avoiding immediately sending all individuals back to institutions for any and all violations), indicating a requirement for knowledge development.[11]

A key challenge of organizational innovation is providing training to staff members to update and improve both skills and practices over time. Technology can assist in doing so. Two of the three needs identified in training technology were top-tier, focusing on delivering information to the corrections community overall (a national resource to provide virtual training) and to individuals through improved software tools.

In addition to the top-tier needs, whose priority was driven by either their benefit or the combination of their benefit and their likelihood of success, we identified a set of other needs based solely on their likelihood of success (the low-hanging fruit). Though these needs were less important in the panel's assessment, they were viewed as easy to achieve and likely to be adopted. As a result, these needs could be candidates for limited investment or for near-term focus (Table 5.2).

The nature of potential low-hanging fruit is that the expected benefits of meeting the needs vary widely. Two of the candidates flagged here (to develop a device that could help monitor how much time officers spend per case and to develop applications for offenders' and probation and parole officers' smart phones) have expected values that fall just below the line for the top tier.

In contrast, some of these needs were marked as significantly contributing to only one corrections objective—e.g., developing guidance on how to market for corrections recruits was scored 8 out of 9 with respect to saving money and/or time for agencies, but it did not contribute to any other objective. Because our methodology intentionally ranks higher those needs that contribute to multiple objectives (e.g., a need that was viewed as contributing to every

Table 5.2
Potential Additional Low-Hanging Fruit Needs in Community Corrections

Category	Problem or Opportunity	Associated Need
Information and communications	Large caseloads, affecting quality of supervision delivered	Develop a device that could help monitor how much time officers spend on individual cases.
	Lack of leveraging mobile devices, which could enable alternative supervision modes	Develop applications (apps) for offenders' smart phones so that they can report compliance and track progress, validated by location services and facial recognition. Also develop companion apps for probation and parole officers to manage offenders. Such apps should integrate with records management systems to capture data.
	Information technology and policy and practices that leave data vulnerable to hacking or compromise	Develop guidebooks and training material for the probation and parole community on affordable and cost-effective means to deploy and use secure mobile computing technologies.
Doctrine, tactics, management, and behavioral knowledge development and training	Difficulties recruiting, hiring, training, and retaining corrections staff	Develop guidance on how to market for corrections recruits.
	Limited knowledge and training provided to officers on safety topics	Develop guidebooks and training on officer safety, to include a combination of hands-on and augmented reality training.

NOTE: Needs are grouped by their top-level taxonomy category. Full categorization of needs is included in Appendix D.

[11] There is some existing literature in this area, such as Carter, 2001; Wodahl et al., 2011.

corrections objective very modestly—ranked 3 across the board—would have a higher overall expected value than a need that contributed to only one objective at the top of the scale—ranked 9), it risks insufficiently highlighting needs that might be very valuable in niches of corrections practice. As a result, we have included in Appendix D a table of the top needs for each corrections objective—that is, the highest median expected value needs for each objective individually, irrespective of their overall ranking.

High-Priority Innovation Needs for Institutional Corrections

Table 5.3 presents the 29 top-tier needs for institutional corrections based on rankings both by expected value and by weighted benefit.[12] There were 21 additional needs identified as potential low-hanging fruit (Table 5.4) beyond those that were already captured in the top tier. The full list of needs and their tiers are included in Appendix E, Tables E.1–E.5. In institutional corrections, the top needs fell in three of the overall taxonomy categories: *facility operations and population services*; *information and communications*; and *doctrine, tactics, management, and behavioral knowledge development and training*.

The working group identified three top-tier needs related to *facility operations and population services*. One focused on the recurring problem of contraband and the potential for visitation practices to help keep contraband out of corrections facilities.[13] The second related to the new challenges associated with inmate access to technology—which is increasingly required for educational programs and reentry preparation—and providing appropriate Internet filtering for the corrections environment to address security and other concerns. For this need, solutions are already available in the market, so the concern was implementation that was cost-effective and appropriate for corrections. The final need focused on the potential for technology—specifically, telemedicine—to avoid moving inmates out of secure facilities for care (Larsen et al., 2004; Torres, 2010; Schaenman et al., 2013).

Another 15 top-tier needs from the institutional working group fell under *information and communications*. Eight of these 15 needs focused on contraband in facilities, further emphasizing that problem. These needs included detection and analysis techniques and technologies to address contraband coming in at fence lines, through logistics systems, and carried by visitors, offenders, and staff. The working group identified analytics needs to address increasing amounts of video data and to rapidly identify trends in internal data systems—that is, translating existing administrative data into situational awareness that can be acted on,[14] including the argument for a version of the management process CompStat in policing for corrections (Jannetta, 2006).[15] Monitoring inmate communications was identified as a challenge, with needs for technologies to monitor and analyze calls *efficiently* and to deal with inmate popula-

[12] The analysis of the institutional corrections needs resulted in a slightly greater number of top-tier needs than community corrections because of where the breakpoint fell in the distribution of rankings (Appendix C) and because of the spread of rankings, which brought additional needs into the top tier because of their high estimated benefits.

[13] For example, video visitation would provide fewer opportunities for contraband entrance because visits are virtual rather than physical (see Phillips, 2012).

[14] See, for example, Brennan, Wells, and Carr, 2013.

[15] See Surrette, 2005, for a review. Debus-Sherrill, La Vigne, and Downey, 2014, flagged lack of monitoring CCTV as an explanation for inconclusive effects of the technology on security incidents.

Table 5.3
Top-Tier Needs for Institutional Corrections

Category	Problem or Opportunity	Associated Need
Facility operations and population services	Contraband coming into facilities *from visitors*	Change visitation practices (e.g., greater virtual visitation) to reduce opportunities for visitors to bring contraband into facilities.
	Inmate access to technology, creating internal security and management challenges (e.g., access to unauthorized content, gaming of systems for communication within the facility)	Implement stringent, already-available web filtering software to allow access only to specific Internet sites.
	Security concerns and risk from transferring inmates outside of a facility to receive specialized medical care	Use telemedicine to reduce the need to transport inmates out of secure facilities.
Information and communications	Inability to track incidents within a facility to detect patterns (e.g., in medical cases, complaints, or inmate grievances)	Develop automated data analysis tools to *rapidly* identify trends in internal data systems (i.e., without the lag involved in many centralized analytic processes), using improved CompStat methods for corrections.
	Contraband coming into facilities *by employees*	Develop tools to track contacts between inmate and employee phone numbers (though acknowledging that some countermeasures to such tools are already available).
		Work with staff and unions to address resistance to comprehensive monitoring and searching of employees.
	Contraband coming into facilities *at fence lines*	Develop better and more accurate video analytics technologies for fence line video monitoring.
		Use available infrared sensor–based fencing (e.g., FLIR Thermal Fence™) for perimeter security.
		Commercialize military-developed surveillance technologies for use in corrections environment.
		Develop cost-effective unmanned aerial vehicle (UAV) technology suitable for perimeter monitoring.
	Contraband coming into facilities *through logistics systems*	Develop higher throughput and cheaper scanning technologies to scan incoming logistical shipments to facilities.
	Contraband coming into facilities transported *by visitors, staff, or incoming inmates*	Develop a single overall scanning portal suitable for detecting all types of contraband for individuals coming into the facility (e.g., millimeter wave, including explosive trace detection) *at reasonable cost and a small enough footprint for use in existing facilities.*
	Increasing volume of camera data	Develop video analytics to do pattern and threat recognition with much-improved false-alarm rates (e.g., one or two per shift is about the maximum tolerable false-alarm level).
	Current video analytics insufficient to monitor inmate behavioral problems	Improve video analytics to better distinguish events (e.g., fights or gatherings), designed to prevent or separate inmate attempts to intentionally produce false alarms (adding biometrics could help).
	Inability to listen to more than a small percentage of inmate telephone conversations due to the labor intensity of monitoring	Develop automated tools for transcribing inmate telephone calls, enabling rapid (and accurate) keyword analysis and other pattern recognition.

Table 5.3—Continued

Category	Problem or Opportunity	Associated Need
	Inability to listen to inmate calls in foreign languages	Develop automated tools for *translating* and transcribing inmate telephone calls, enabling rapid (and accurate) keyword analysis and other pattern recognition.
	Inmate use of social media inside facilities (e.g., via contraband cell phones) for communication	Adapt available automated tools for social media analysis of inmate activity to the needs of and constitutional concerns associated with use by corrections agencies (e.g., identifying links between inmates and corrections staff).
	Lack of situational awareness information for outside response teams coming to incidents in corrections facilities	Utilize video standards to enable real-time sharing of video during an incident (inside and outside) as needed, with sufficient security.
Doctrine, tactics, management, and behavioral knowledge development and training	Contraband coming into facilities *by varied routes*	Develop doctrine for implementing a systematic approach to contraband prevention so that improvements in security at one route do not simply just displace transport to other routes.
	Contraband coming into facilities *by employees*	Develop and implement policies and practices to systematically search all employees coming into facilities.
	Poor resource coordination in real time at large-scale incidents, where success depends on using common resources effectively	Universally adopt Incident Command System (ICS) and National Incident Management System (NIMS) for all agencies.
		Hold a greater number of interagency exercises to build relationships among agencies and bolster preparedness.
		Develop and use cross-agency memoranda of understanding and common practices for large-scale incidents.
	Low agency budgets, restricting ability to implement currently known best practices	Continue federal efforts to research and evaluate criminal justice programs that work and can be broadly implemented.
		Implement a true justice reinvestment model to provide agencies access to a pool of funds to pay the start-up costs for new evidence-based practices or programs.
	Lack of training and staff resources to address inmate mental health issues	Develop comprehensive video-based training (updated regularly) to train staff on needs, medication, and other requirements to manage inmate mental health issues.
	Difficulty efficiently managing inmate populations across multifacility systems	Develop *policies and practices* to identify early the requirements for inmates' education, health, court, etc., to match them with facilities that can provide those services, avoiding the need for later transfer.
	Shift in prison population to jails (e.g., California realignment efforts), creating jail space management challenges	Develop new alternatives to incarceration, such as intensive monitoring for parts of the offender population (e.g., individuals convicted of driving under the influence).
		As appropriate, divert inmates to outside service providers (e.g., mental health treatment) rather than incarceration.

NOTE: Needs are grouped by their top-level taxonomy category. Full categorization of needs is included in Appendix E.

Table 5.4
Potential Additional Low-Hanging Fruit Needs in Institutional Corrections

Category	Problem or Opportunity	Associated Need
Facility operations and population services	High resource, energy, and infrastructure costs	Implement a recycling program to reduce facility waste stream.
Person-worn equipment and weapons/force	Limitations in the effectiveness of available less-than-lethal technologies	Develop new and more-effective less-than-lethal technologies to reduce the level of force necessary.
Information and communications	High-pressure work environment, leading to staff mental health issues, including suicide	Develop tools to identify the "right" periods for individuals to occupy high-stress positions and for rotation out for decompression and recovery.
		Improve methods to identify individuals working in high-stress positions (e.g., mental health units) that should be rotated out for decompression time.
		Provide access to resources to address posttraumatic stress disorder and other issues that returning veteran workers bring to corrections jobs.
	Increase in population in protective custody (and inmate behavior to work the system to get into single cells if protective custody is not approved)	Develop a function within population or bed management systems to avoid putting the wrong people in the same cell; that is, develop improved and automated classification systems for inmates.
	Issues successfully implementing PREA requirements	Develop a standardized system for meeting the reporting requirements under PREA.
	Difficulty managing gang presence within facilities	Develop information collection tools to identify and track gang activities and members, coupled with policies and procedures to manage interactions of members using fewer staff and resources.
	Difficulty meeting the needs of special needs inmates	Develop reduced-cost video interpretation technologies for hard-of-hearing inmates.
	Lack of situational awareness information for outside response teams coming to incidents in corrections facilities	Deploy a secure system to deliver blueprint data to outside responders as needed in real time via mobile devices.
	Existing information technology networks that are not robust enough or do not have sufficient capacity to accommodate convergence of many security technologies requiring bandwidth	Add network features to prioritize network traffic from different security technologies to use available capacity efficiently.
Doctrine, tactics, management, and behavioral knowledge development and training	Technology providers of management and monitoring systems gaining contractual control or ownership of agency data, locking facilities to a single provider's products	Make changes in contracting policy to ensure data are owned and controlled by the corrections agency, and require (if needed) conversion to standard data formats at contract conclusion for use with alternative systems.
	New vendor-driven business models (e.g., video visitation, inmate email systems) conflicting with other system goals, even if they provide revenue to agencies	Develop policies to require vendors to ensure access to services to individuals who cannot pay for new modes (e.g., low-income inmate families who may not be able to afford remote video visitation costs).

Table 5.4—Continued

Category	Problem or Opportunity	Associated Need
	Apparent planned obsolescence of technology systems procured by agencies, forcing replacement (e.g., replacement parts for existing systems being phased out)	Make changes in procurement policy and practice to require sufficient contract terms that include service and maintenance.
	Proprietary features and architectures built into technology systems that lock agencies into single suppliers	Make changes in procurement policy and practice to structure contracts and require compliance with technology standards to prevent proprietary lock-in.
	Insufficient leadership training and succession planning to address retiring senior personnel	Develop succession planning and leadership development programs to groom the next generation of corrections leaders.
	High cost of in-person training for large numbers of staff	Develop models to make it possible to provide appropriate credit for training obtained elsewhere (e.g., at practitioner conferences) to meet training mandates.
		Develop better video training approaches, with content better meeting the needs of corrections audiences.
	Difficulty meeting the needs of special needs inmates	Provide improved staff training addressing common issues with elderly prisoners (e.g., mental health, dementia, Alzheimer's disease).
	Challenges to population management due to increases in protective custody requests (and other inmate strategies to qualify for single-bed cells)	Develop better procedures and requirements for requesting protective custody and decision tools for when inmates should be returned to the general population.
	High-pressure work environment, leading to staff mental health issues, including suicide	Train individuals in employee assistance programs so that they can better relate to a corrections environment and the rigors of the job.

NOTE: Needs are grouped by their top-level taxonomy category. Full categorization of needs is included in Appendix E.

tions speaking a variety of languages.[16] Extending concerns about inmate communications, the working group also flagged tools for automated monitoring of inmate social media activities (in particular, to identify links between inmates and corrections staff that could help detect staff misbehavior).[17]

Finally, as was the case for community corrections, a significant portion (11 of 29) of the highly rated needs focused on *knowledge development and training*. These included needs at the management level, including doctrine for addressing contraband coming into facilities, emergency preparedness,[18] and agency budget issues. For corrections officers, needs in this category included training for addressing offenders with mental health needs (similar to needs identified

[16] There is significant commercial activity and technologies on the market, but performance for corrections environments, where communicators might often deliberately speak in ways that would pose problems for the technology, was a concern.

[17] As with many of the technologies or practices aimed at corrections staff, participants flagged issues with employee acceptance as a potential barrier for adoption.

[18] Unlike community corrections, where the needs identified for emergency preparedness were general in nature, the institutional corrections group identified several implementation-focused needs, such as using the National Incident Management System (NIMS). This may reflect the greater availability of planning resources for institutional corrections (e.g., Schwartz and Barry, 2005).

in community corrections; see James and Glaze, 2006; Torrey et al., 2014; and Osher et al., 2012), and practices to better manage inmates across multifacility systems. Unlike community corrections, the institutional corrections working group highlighted several broader societal or legal practices. They included developing legal alternatives to incarceration for some inmates to help address overcrowding[19] and recommitting to justice reinvestment to provide correctional systems with the resources needed to implement promising practices to improve performance.

Looking deeper into the list of needs, we also identified potential low-hanging fruit in the institutional corrections environment, presented in Table 5.4. These needs may not have been rated as highly for value, but they were viewed as technically feasible and likely to be broadly adopted. Looking at how these additional needs fell across the taxonomy categories, there was a similar pattern of focus on *information and communication* and *knowledge development and training*. However, this set also includes a small number of needs related to *facility operations and population services* and *person-worn equipment and weapons/force*.

Facility operations and population services needs among these low-hanging fruit candidates included the potential value of recycling programs to reduce costs (e.g., Feldbaum et al., 2011). In *person-worn equipment and weapons/force*, the participants raised the need for better less-than-lethal technologies to reduce the level of force needed in inmate management situations. *Information and communication* needs in this set fell across a range of topics, including tools to help improve reporting issues with PREA, manage facility bed space effectively, manage staff stress (e.g., Finney et al., 2013; Lambert et al., 2012), and increase information technology network capacity to facilitate implementation of new security technologies. *Knowledge development and training* needs included several related to supporting leadership decisionmaking for technology acquisition, human resources and training, and inmate management.

As we did for community corrections, we filtered the data for needs that contributed to each corrections objective to identify the top-five needs for each objective. This identified needs that might contribute strongly to a single objective but were not ranked sufficiently highly on multiple objectives to make it over the cutoff as a top-tier need. These needs are included in Table E.6 in Appendix E.

Looking Across the Corrections Enterprise

Though there are clear and important differences between the community and institutional corrections environments, in an effort to build an innovation agenda for corrections overall, it is useful to find common challenges and needs. Making improvements to such needs could contribute broadly to the performance of corrections across the board.

Looking across the top-tier needs of both working groups, the needs clearly reflected the differences between the two areas—notably, the focus on information-sharing in the community corrections group (versus information collection and analysis for institutional corrections) and the focus on contraband in the institutional group. There were areas of commonality, however. Community corrections had several needs for offender risk assessment, and that issue was raised by the institutional group in discussions of diverting offenders from incarceration to other correctional options. Both communities were concerned about emergency preparedness,

[19] See, for example, Vera Institute of Justice, 2013; Austin and Jacobsen, 2013; and Heilbrun et al., 2012. Tapia, 2014, contains cost estimates of different community-versus-incarceration models, illustrating potential resource efficiencies.

though the nature of those concerns differed. Both also had needs for practitioner training and equipping their staff with tools to address offender populations increasingly made up of individuals with mental health concerns. And both—unsurprisingly in an era of tight municipal and state budgets—were concerned with saving money.

Our process of narrowing to a set of top-tier needs is useful to focus attention on the subset of needs that are potentially most valuable, but it does have the potential to miss other commonalities that could usefully inform an innovation agenda. Though we discussed general parallels between the two components' needs in Chapter Four, here we ask a more specific question: Were there needs that, while potentially high-priority in one group, also appeared in the other group's set of lower-priority issues? If there were, such needs might be reasonably prioritized, given their potential for broader benefits across corrections.

Looking across the needs more broadly, there were indeed lower-tier needs in one working group that rose to the top-priority tier in the other working group:

- Both groups had training needs that fell outside the top tier, including needs for alternative ways to deliver training (virtually, by video, without practitioners having to be pulled from their day-to-day roles) that could contribute to meeting the highest-priority training needs.
- Both groups identified a need for speech-to-speech and text-to-speech translation tools for supervision.
- A top-tier need in institutional corrections focused on monitoring social media; a similar need was identified but was ranked lower in community corrections.
- Addressing a lack of follow-through on justice reinvestment, meaning that corrections agencies lack the resources to pay the start-up costs for innovative practices, was flagged as a top-tier need in institutional corrections, and a similar concern was raised in community corrections but was ranked much lower.
- Though there were top-tier needs related to alternatives to incarceration, both groups had other lower-priority needs related to this topic, including the desire to manage certain prisoner groups, including the elderly, in nonsecure settings and the resource implications for community corrections agencies.
- The community corrections working group identified needs for handheld technologies to detect electronic devices and weapons at a distance. Though they ended up ranked below the top tier, these needs have commonality with several top-ranked technology needs in institutional corrections related to contraband prevention.
- Community corrections ranked information-sharing technologies in the top tier, and institutional corrections identified comparable needs, albeit ranked lower.

This crosswalk provides a counterpoint to viewing each wing of the corrections sector in isolation; importantly, needs that bridge both wings could have broader benefits nationally and could represent more attractive candidates for investments by federal funders or private-sector technology providers.

CHAPTER SIX

Conclusions: Fostering Innovation in Corrections

The corrections sector, encompassing both the institutions charged with separating offenders from society as they serve their sentences and the organizations supervising parolees and probationers as they reintegrate back into society, plays a central role in the criminal justice system. Corrections today faces many challenges, including stresses from policy decisions that have led to significant increases in the number of individuals in custody and under supervision; questions about the effectiveness of rehabilitation efforts, given high recidivism rates; concerns about shifting business models and the effects of privately operated prisons; questions surrounding the fairness of the justice system overall and corrections in particular; disproportionate effects on different racial and ethnic populations within the country; and resource constraints at all levels of government that limit the availability of funds and personnel to carry out its missions.

Nevertheless, the public has high expectations for corrections agencies to fulfill their role. All of the objectives identified in this study are part of that picture. Dangerous individuals who have been convicted of heinous crimes must be separated from society to deny them the opportunity to reoffend. When offenders are released into the community, the public has high—perhaps unrealistically high—expectations for supervising agencies to monitor their behavior, prevent their return to criminal activity by holding them accountable for their behavior, and facilitate their rehabilitation and reentry into society. And at the same time, the sector is expected to meet these objectives efficiently, while maintaining and advancing the quality and capability of corrections organizations and staff, meeting the needs of victims, and maintaining the health and safety of their staff, offenders, and the public.

An Innovation Agenda for the Entire Corrections Sector

Meeting all of these goals requires *innovation*—changes in technologies, policies, training, and practices—to enable better performance. In the ideal case, innovations can help achieve multiple goals simultaneously. For example, recent RAND analysis of the effects of correctional education programs showed that they have the potential to reduce recidivism and that the money spent to carry out the programs was more than compensated by reductions in the number of offenders who would have otherwise returned to prison, saving states and localities significant costs of reincarceration (Davis et al., 2013). However, in other cases, innovation requires new technologies or organizational practices, and in an era of tight budgets, the resources necessary to make these innovations possible can be scarce.

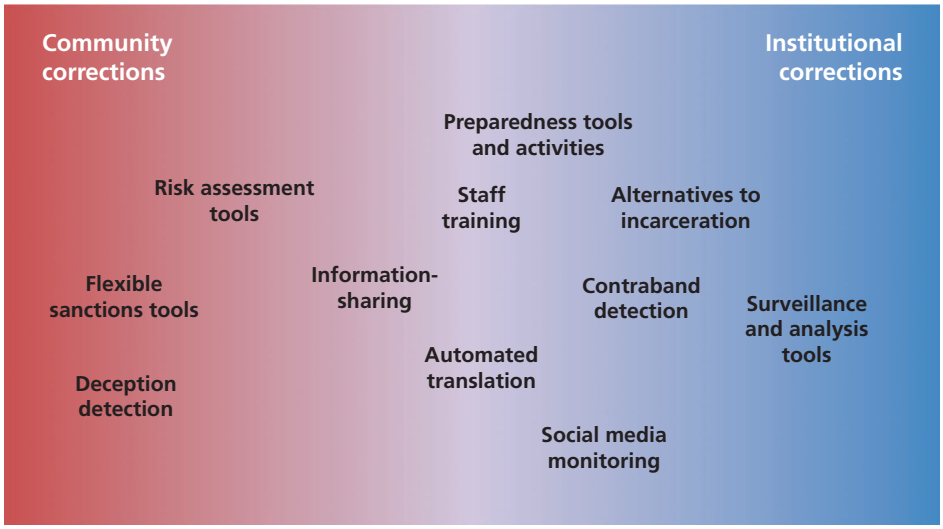
Focusing national efforts therefore requires making choices, which the prioritization exercise carried out by the advisory panel was designed to do. The top-tier needs in each working group represent the needs scored as most important by the group members, based either on their overall benefits or their expected value, including estimates of their likelihood of success. Looking across both high-priority needs and lower-priority needs—as we did at the conclusion of Chapter Five—provides an overarching view of community and institutional corrections, as well as the needs that have the greatest potential to contribute to the corrections sector overall.

Figure 6.1 presents these identical or similar needs in graphical form, with the top-tier needs of both components of corrections presented on a gradient between the two components, based on the presence of identical or similar needs (whether top- or lower-tier) in the other component. Staff training and doctrine issues—relating to both leaders and officers, specific topics (e.g., offender mental health issues), and alternative delivery of training—was the most common need across the two components. But other needs bridged community and institutional corrections as well, such as automated translation and information-sharing.

Innovation in corrections is also not always about new technologies or practices; in many cases, innovation can mean improving existing technologies, adapting technology from other sectors, or even simply adopting existing technology more broadly. This has been the case for some time, as summarized by Latessa and colleagues more than 25 years ago:

> With regard to future developments in correctional technology, our respondents expressed a desire for improvement in available technologies, especially management information systems, more often than they identified areas in need of any initial technological innovation. Many of the comments seemed to reflect a desire to adopt available technologies, such as improved identification procedures (retina and fingerprint scanning), rather than a feeling that these technologies needed to be created. (Latessa et al., 1988, p. 28)

Figure 6.1
Priorities for Innovation Across Community and Institutional Corrections



NOTE: Horizontal placement illustrates commonality between needs (in all tiers) in the other component. The closer a priority is to the center of the chart, the stronger its dual benefit. Vertical placement is for spacing only.

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The needs identified by our panel do include calls for new technology development, but as was the case then, adaptation is a key part of the mix. Indeed, looking at Figure 6.1 as a map of an innovation agenda for corrections in the United States, the needs—and requirements to meet them—vary considerably:

- *Develop and improve technology*. There are difficult technology problems in this map, including both contraband detection on the institutional side and deception detection on the community side. While some technologies exist, such as video analytics to address sensor and other data, their performance is not meeting corrections requirements. As a result, the corrections enterprise needs new technologies that meet its specialized needs.
- *Adapt technology to the corrections environment*. The working groups expressed needs for technology that already exists but is not currently well suited for corrections. Social media monitoring tools—needed to address both inmate communication and interaction between inmates and corrections staff—have been developed for use in other contexts.[1] However, tools for corrections need to address the complexities of community and institutional settings (which have different needs and requirements), as well as sensitivities and legal concerns about monitoring that is intended to capture activity not just of offenders but of corrections staff as well.
- *Perform research and analysis*. Needs from both working groups require new knowledge to guide practice. For example, although alternatives to incarceration have been a focus for some time, the institutional panel highlighted the issue as pressingly important due to the growth of prison and jail populations today. Similarly, the community corrections side requires knowledge development to create tools to help match sanctions to infractions, not just to hold offenders accountable for their behavior but also to encourage better behavior.
- *Validate tools*. For community corrections in particular, there was a clear call for assistance in demonstrating that tools actually do what they say they do. Risk assessment has been a focus of research for many years, and a deep literature and varied tools attempt to predict offender recidivism, response to interventions and supervision, and so on. But panelists still had concerns that jurisdictions were using tools in unintended ways or tools that did not deliver on their promises. They had further concern that, given trends in corrections practice (such as budget constraints and increasing populations), it will become increasingly important to validate such tools before basing corrections decisions on them.
- *Change organizations' policies and practices*. For community corrections, the need for emergency preparedness focused on developing new tools and knowledge, but the institutional corrections working group called for changes in organizational behavior. Putting memoranda of understanding in place and carrying out preparedness exercises are things that an organization must do for itself. Policy- and decisionmakers can build incentives into grant and other mechanisms to shape behavior, as they have for many years in the broader homeland security community, but outside forces can only facilitate—not execute—these innovations.

Beyond just the top-tier needs, the Corrections Advisory Panel identified a large number of other needs that could contribute to improving corrections performance. Those needs could

[1] For example, Digital Stakeout and BrightPlanet's BlueJay are such products focused on law enforcement applications.

represent useful targets for attention and investment by the many entities relevant to innovation in corrections. For example, a technology provider might find a need deeper in the list relevant to its expertise and product line, and it would need only to adapt an existing product to the corrections market. Emphasizing this point, our analysis also identified a set of low-hanging fruit candidates, where the perceived ease of meeting the needs made them stand out, even if the scale of their expected benefits did not. Such needs could be part of a larger investment portfolio (e.g., for a federal research funder or larger technology provider) combining more-difficult but higher-payoff needs with those that represent easier wins, particularly if meeting those needs does not require large investments or could apply technology and knowledge that already exists.

Looking Forward—Maintaining and Elaborating the Innovation Agenda

In considering the results of this, or any, effort that seeks to extrapolate from the present and anticipate the future, there are obvious caveats to keep in mind. To make it possible to draw on the expertise of the practitioner community, we chose to use an expert panel and elicitation process to generate the needs reported in this study. Though the 25 individuals who participated were carefully selected to represent various levels of experience, agency size, and other factors, it is unavoidable that the interests of an entire sector cannot be wholly captured in any small sample of panel participants. The deliberations of the panel touched on and explored differences that exist across the community, in part supporting that the selected participants did represent some of the diversity that exists in the U.S. corrections enterprise, but also emphasizing care in interpreting the results.

While ideas for innovation can be framed broadly, innovation is actually done at the agency level, where new technology, policy, practice, and training are actually implemented and their benefits realized. As a result, agency characteristics—such as large versus small, and urban versus rural—often determine the type, level, and likelihood of innovation. For example, some technology systems might be valuable and their implementation straightforward at a small agency, but at a large agency, implementing those systems would require organizational and personnel changes that would make it impractical. In contrast, tools that might be very valuable for an urban community corrections agency, with large numbers of offenders under supervision in relatively densely populated areas, might be of no value at all for a rural agency operating over great distances. Resource and capability differences among agencies can also shape the likelihood that specific innovations could be implemented successfully—or their implementation even attempted at all. These differences were clear in the discussions in our panels—and the ratings that members assigned—where a spread in judging the value and practicality of particular needs reflected real differences in the panelists' experience and agency context.[2] These differences represent a fundamental challenge in fostering innovation in a sector made up of thousands of separate facilities and agencies.[3]

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[2] Within the National Law Enforcement and Corrections Technology Center (NLECTC) system, NIJ supports the Small, Rural, Tribal, and Border Regional Center. In 2014, its mission was explicitly broadened to capture corrections agencies and court systems in addition to law enforcement.

[3] Based on the most recent data from the Bureau of Justice Statistics, which are nearly a decade old, there were 1,821 state and federal corrections facilities in 2005 (Stephan, 2008). This does not count local jails or most community corrections agencies.

It is also the case that the deliberations of a single advisory panel—even one guided by a methodology designed to systematically consider the full range of problems, issues, and opportunities in an area—will always be shaped by the individuals involved, creating a measure of subjectivity in the process. Furthermore, the results capture only the concerns and potential courses of action relevant at the time the panel was constituted. Though these realities mean that the results of panel processes should never be viewed as absolute ground truth, they nonetheless represent a useful measure of the requirements of the field that are informative, if only temporarily valid and relevant.[4]

In considering applying the results of this effort, it is also important to reiterate that the agenda we have defined, as its name implies, does not provide all the information necessary to fully inform decisionmaking for the various organizations relevant to corrections innovation. It is only a starting point, defining potential directions and identifying the subset of those directions that are viewed as potentially most valuable by the field. For example, as explained, our prioritization method is silent on the cost involved in meeting the identified needs. This was intentional, given that the cost considerations of federal funders versus private-sector technology providers are quite different, and even the costs themselves of meeting the same need could vary considerably. For example, what it would cost for a federally funded effort to meet a need *de novo* would presumably be vastly different from what it might cost a technology provider to modify and market an existing product, where only incremental change might be needed to address the corrections requirement. As a result, it is important both for us to acknowledge and for the reader to note that the broad aperture of this effort means that we do not provide all that is needed to support market analysis, technology portfolio design, or management decisions.

This agenda is therefore a first step, intended to contribute to the thinking of all the different types of organizations and entities active in corrections innovation. Improving corrections performance will come out of the sum of their efforts, whether operating independently or in concert. The agenda is intended also to be only the first step in capturing the input of the corrections community, providing ongoing situational awareness of the needs and priorities to inform decisionmaking across this full system. Doing so is critical because it is this system as a whole that will make it possible to implement technologies and practices to meet these needs and move from the problems and opportunities faced by corrections today to better performance for corrections tomorrow.

But in considering this innovation agenda and its potential role in helping to chart the future of corrections in the United States, it is also worthwhile to take a step back and take a wider view. Because the goal of this effort was to identify needs that might be addressed with definable improvements in technology, policy, or practice, our examination occurred at a relatively detailed level. Rather than fully capture the big picture (the "forest" view) of corrections policy in the United States, this work clearly built up from individual "trees" of problems, opportunities, and potential strategies in response to them.

The advisory panel identified some needs with much broader implications—including questioning how requirements for restitution affect the ability of offenders to successfully rein-

[4] This report is a product of the first year of a continuing project funded by NIJ focused on identifying and prioritizing the needs of the criminal justice system. As the project continues, we will explore alternative broader-based modes of collecting information from the community about needs and priorities. For updates on that effort and for individuals interested in participating in future efforts, visit RAND's website on the Priority Criminal Justice Needs Initiative.

tegrate into society and not return to prison (in the community working group) and the need to develop much broader alternatives to incarceration for categories of offenses or offenders (in the institutional working group). While some such changes made it into the top-tier needs, others did not, in part because of concerns about the likelihood of successfully achieving such fundamental change. As a result, the needs identified here represent a strong and varied agenda for improving performance in the correctional system as it exists today. However, as with any effort rooted in the present but looking to the future, it is useful to revisit fundamental assumptions about how prosecution, sentencing, and incarceration policies are achieving national goals, and the costs associated with the effort to do so. The largely incremental innovation agenda developed in this report provides a foundation for that effort, where elaboration and expansion of the agenda over time could provide a blueprint for more transformational change in corrections, making it possible to more effectively and efficiently pursue the objectives that society counts on the sector to achieve.

APPENDIX A

Corrections Advisory Panel Members

The membership of the Corrections Advisory Panel was selected to cover both community and institutional corrections and to balance representation among various geographic location (Figure A.1), roles within agencies, agency size, and level of technological knowledge and expertise.

The members of the panel are listed in Table A.1.

Figure A.1
Geographic Balance of the Corrections Advisory Panel

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Table A.1
Corrections Advisory Panel Members

Bob Anderson
Director
Madison County Community Corrections
Jackson, Tenn.

Dan Blanchard
Correctional Administrator
Utah Adult Probation & Parole
Salt Lake City, Utah

Todd Craig
Chief, Office of Security Technology
Federal Bureau of Prisons
Washington, D.C.

John Daugherty
IT Administrator
Montana Department of Corrections
Helena, Mont.

James Dzurenda
Commissioner
Connecticut Department of Corrections
Wethersfield, Conn.

Ed Harrison
Division Director & PIO
Orange County Probation Department
Santa Ana, Calif.

Donald Jeanson
Sergeant
Los Angeles County Sheriff's Department
Los Angeles, Calif.

Stephen Larsen
Senior Probation Officer
Suffolk County Probation Department
Yaphank, N.Y.

Roy McGrath
Lieutenant
Oregon Department of Corrections
Salem, Oreg.

David McKune
Director, Juvenile Detention
Johnson County Department of Corrections
Olathe, Kan.

Jay Miller
Correctional Operations IT Manager
Maryland Department of Public Safety &
Correctional Services
Baltimore, Md.

Merlin K. Miller
Program Administrator
Washington Department of Corrections
Olympia, Wash.

David Morrison
Director of Field Operations
Georgia Board of Pardons and Paroles
Atlanta, Ga.

William Nicklow Jr.
Captain
Pennsylvania Department of Corrections
Mechanicsburg, Pa.

Dennis Potts
Assistant Director
Harris County Pretrial Services
Houston, Tex.

Tom Rhodes
Assistant Chief Probation Officer
Monroe County Community Corrections
Bloomington, Ind.

Keith Smith
Security Operations Administrator
Arizona Department of Corrections
Phoenix, Ariz.

Timothy Smith
Major
Charleston County Detention Center
North Charleston, S.C.

Nicholas Stewart
Information Systems Coordinator
Arkansas Department of Community Corrections
Little Rock, Ark.

Darrin Tipton
District Administrator
Missouri Department of Corrections
Cape Giradeau, Mo.

Mike Touchette
Director of Facilities
Vermont Department of Corrections
Williston, Vt.

Victor Wanchena
Project Manager
Minnesota Department of Corrections
St. Paul, Minn.

George Weimann
Lieutenant
Broward County Sheriff's Office
Pompano, Fla.

Tom Williams
Associate Director
Court Services & Supervision Agency
Washington, D.C.

Robert Zastany Jr.
Principal Probation Officer
19th Judicial Circuit
Waukegan, Ill.

APPENDIX B

Corrections Advisory Panel Agenda

This appendix presents the implemented agenda of the Corrections Advisory Panel, held at RAND Corporation's Arlington, Virginia, office, May 19–22, 2014.

Monday, May 19, 2014		
8:45–9:30 a.m.	Welcome, overview, and introductions	Introductory session explaining panel process
9:30–10:20 a.m.	Brief-in on technology space and past needs assessments	
10:20–10:30 a.m.	Break	
10:30–11:45 a.m.	Discussion and prioritization of corrections objectives	
11:45–1:15 p.m.	Lunch break	
1:15–3:00 p.m.	Community and institutional corrections breakouts begin	Tasks: • Identify key problems/opportunities in the group's area of specialization • Start identifying requirements for achieving objectives/solving problems
3:00–3:15 p.m.	Break	
3:15–5:15 p.m.	Breakouts continue	Tasks: • Continue identifying key problems/opportunities and requirements
Tuesday, May 20, 2014		
8:45–10:15 a.m.	Breakouts continue	Tasks: • Begin developing operational needs and solution ideas • Align needs/solutions with corrections objectives
10:15–10:30 a.m.	Break	
10:30–12:00 p.m.	Breakouts continue	Tasks: • Continue developing operational needs and solution ideas • Continue to align with corrections objectives
12:00–1:30 p.m.	Lunch break	
1:30–4:00 p.m.	Breakouts continue	Tasks: • Continue developing operational needs and solution ideas • Continue to align with corrections objectives

4:00–4:15 p.m.	Break	
4:15–5:15 p.m.	Breakouts continue	Tasks: • Complete any final needs generation
Wednesday, May 21, 2014		
8:45–10:15 a.m.	Original breakouts reconvene	Tasks: • Begin Delphi exercise to prioritize generated needs
10:15–10:30 a.m.	Break	
10:30–12:00 p.m.	Breakouts continue	Tasks: • Continue Delphi exercise to prioritize generated needs
12:00–1:30 p.m.	Lunch break	
1:30–3:30 p.m.	Breakouts continue	Tasks: • Review initial prioritizations of generated needs • Discuss areas of consensus and disagreement • Continue Delphi exercise in light of initial prioritizations and discussion
3:30–3:45 p.m.	Break	
3:45–5:15 p.m.	Breakouts continue	Tasks: • Complete Delphi exercise
Thursday, May 22, 2014		
8:45–10:00 a.m.	Full group meeting and discussion	Tasks: • Present and discuss needs and solutions across breakout groups
10:00–10:15 a.m.	Break	
10:15–12:00 p.m.	Full group meeting and discussion continues	Tasks: • Identify cross-cutting themes across full session
12:00 p.m.	Adjourn	

APPENDIX C

Detailed Methodology

This appendix provides additional detail on the methodology and steps of the analysis described in the body of the report.[1]

Prioritizing Corrections Objectives

The panelists prioritized the eight corrections objectives using a technique known as *swing weights* (Von Winterfeldt and Edwards, 1986). This technique asks raters to consider each objective in succession, comparing the importance of each objective with the importance of the one that they rated immediately before it. The process starts with the raters identifying the most important objective—that is, if given one token that would allow a major improvement in their agency's performance, which objective would they choose to spend that token on? That initial objective is then assigned a value of 100 percent.

The raters are then asked to select their next choice (i.e., if they got a second token, where would they spend it)—but also to rate how much less important their second objective is compared with their first choice. If the second objective was half as important to the rater, they would enter 50 percent as the swing weight for that objective. The rater could enter any number from 0 to 100 percent, so if the second objective was equally important as the first one, they would enter 100 percent.

This process continues through all eight objectives, which each one rated compared with the one immediately above it. For example, a rater who thought all eight objectives were equally important would enter 100 percent for every one of them. A rater who thought one objective was more important than all the others would enter 100 percent for their first objective, then maybe 50 percent for the second (showing it was half as important), and then 100 percent for the remaining six objectives, indicating they were equally important as their second choice.

For each rater, the swing weights are converted to decimal values (1, 0.8, 0.2, 0.2, and so on), putting each rating of importance on a common scale, and the weights are then averaged across the group of raters to produce an average swing weight for each objective.

[1] The text in this appendix is based on Hollywood et al., forthcoming.

Prioritizing Needs

As described in the main text, each working group member rated the needs in their group on a scale of one to nine for benefit to each corrections objective, where nine corresponded to an innovation that would improve performance by 20 percent or more, and one corresponded to an innovation having no effect on performance. On the same scale, the members also rated probabilities of success for both technical reasons (was the innovation easy or hard?) and organizational adoption (if it was produced, would it be broadly picked up by corrections agencies?). We used a nine-point scale for the benefits judgments in particular to allow participants to make two *high-medium-low* judgments—that is, was the benefit of the need very high (falling in the 7–9 range), medium (4–6), or low (1–3)—and then make a second judgment on whether they thought it fell in the middle or on an extreme of the category (e.g., for a need that was in the 7–9 range, deciding it was a 7).

We then mathematically combined the benefit and probability of success scores to estimate the likely operational payoff (expected value) of satisfying each need. Here, *expected value* is measured with respect to both the operational benefit and probability of successfully fielding a technological breakthrough. Mathematically, the total expected value (EV) for a need is given by

$$EV_i = \sum_j (EV_{ij}) = \frac{\sum_j (w_j I_{ij} v_{ij} P_{1ij} P_{2ij})}{100}, \text{ where}$$

- w_j is the swing weight applying to objective j, I_{ij} is a 0–1 indicator for whether need i supports objective j, and the summation reflects the need's total value across all dimensions.
- v_{ij} is the estimated benefit (measured from 1 to 9) with respect to performance dimension j if a project to satisfy need i is successful. Here, 9 = a very significant change (20 percent or more improvement in a performance measure); 1 = no improvement. We defined the top of the scale based on analogies to previous criminal justice innovations that had major effects (e.g., broad deployment of practical body armor, hotspot policing in law enforcement) where measured effects were in this range.
- P_{1ij} is the estimated probability that a project will succeed *technically.* High scores occur if there are no major technical risks and the necessary knowledge or science is well understood.
- P_{2ij} is the estimated probability that a project will be *implemented by a large number of agencies.* High scores occur if there are no major operational, political, lifecycle cost, or cultural barriers to implementation.

In words, the equation says that a need's score is the sum of its expected values toward contributing to individual objectives. Each expected value is the operational benefit with respect to previous breakthroughs if an effort to meet the need is successful, multiplied by the probability that such efforts will be technically and operationally successful. Put another way, the score for a need is determined by how beneficial it will be in achieving one or more objectives, and how likely the need can be met and deployed into the corrections community successfully. High-priority needs tend to contribute to multiple objectives, make major potential contributions toward those objectives, and be comparatively low-risk, both technically and operationally.

We generated an overall expected value score for each need, combining the individual expected value ratings from the group members. To do so, we used the *median* of the individual panelists' scores as a need's overall score.[2] We divided the median product by 100 to normalize for the product of the two ratings for probability of success to convert them back into percentages.

Note that calculating expected values this way assumes linearity in the ranking scales. For example, it assumes that, from our top value of 9, associated with 20 percent improvement in performance for the objective, raters divided the scale below 9 linearly down to no improvement, for a rating of 1. This had the effect of truncating the benefit scale at the top (i.e., any need with an expected benefit of greater than 20 percent improvement would still only be rated a 9). We believed this was an appropriate methodological choice, because most innovations in criminal justice—when rigorously evaluated—have produced benefits below 20 or 30 percent, and this made it possible for participants to distinguish between more-incremental innovations.

We also used a measure for each need's benefits alone: the median of all panelists' rankings of the needs multiplied by the swing weights, not including the probability of success values. The corresponding equation for that weighted benefit (WB) calculation is:

$$WB_i = \sum_j (WB_{ij}) = \sum_j (w_j I_{ij} v_{ij}).$$

To identify top-tier (Tier 1) needs, we rounded the expected value measures for all needs to one decimal place and plotted them as a histogram for both working groups (Figure C.1). We identified natural breakpoints that fell significantly above the main distribution of needs. The breakpoint in institutional corrections was relatively clear, with 20 needs (the green bars) falling above it. There was less of a defined breakpoint in community corrections, with one point where only four needs would be included in the top tier. We included the two small distributions that were above the main body of data, bringing the initial top-tier total to 11. Initial assignments of second- (blue) and third-tier (red) needs were made based on other breakpoints.

As described in the text, some panel members expressed concern with their ability to judge the probability of technical success for identified needs. In part to respond to that concern, we created similar histograms using just the weighted benefits of the needs and used natural breakpoints in those distributions to determine whether additional needs should be brought into the top tier (Figure C.2). These produced different distributions with different breakpoints, thus identifying more potential top-tier needs (green bars). As a result, we promoted any needs that were not already assigned to Tier 1, and in Figure C.2 and Appendixes D and E, these promoted needs are identified as *Tier 1* needs*. Adding these needs to the top tier is also consistent with the desire to set ambitious innovation goals by including needs that are viewed as very beneficial but perhaps more difficult to achieve.

We selected the low-hanging fruit candidates, as described in the report, based on the median ratings across members of the panel for the probability of technical success and operational feasibility, including all needs rated with medians representing combinations of 7 and 9, 8 and 8, 8 and 9, and 9 and 9. Needs that were already captured by the Tier 1 and Tier 1* needs were removed from the list of potential low-hanging fruit.

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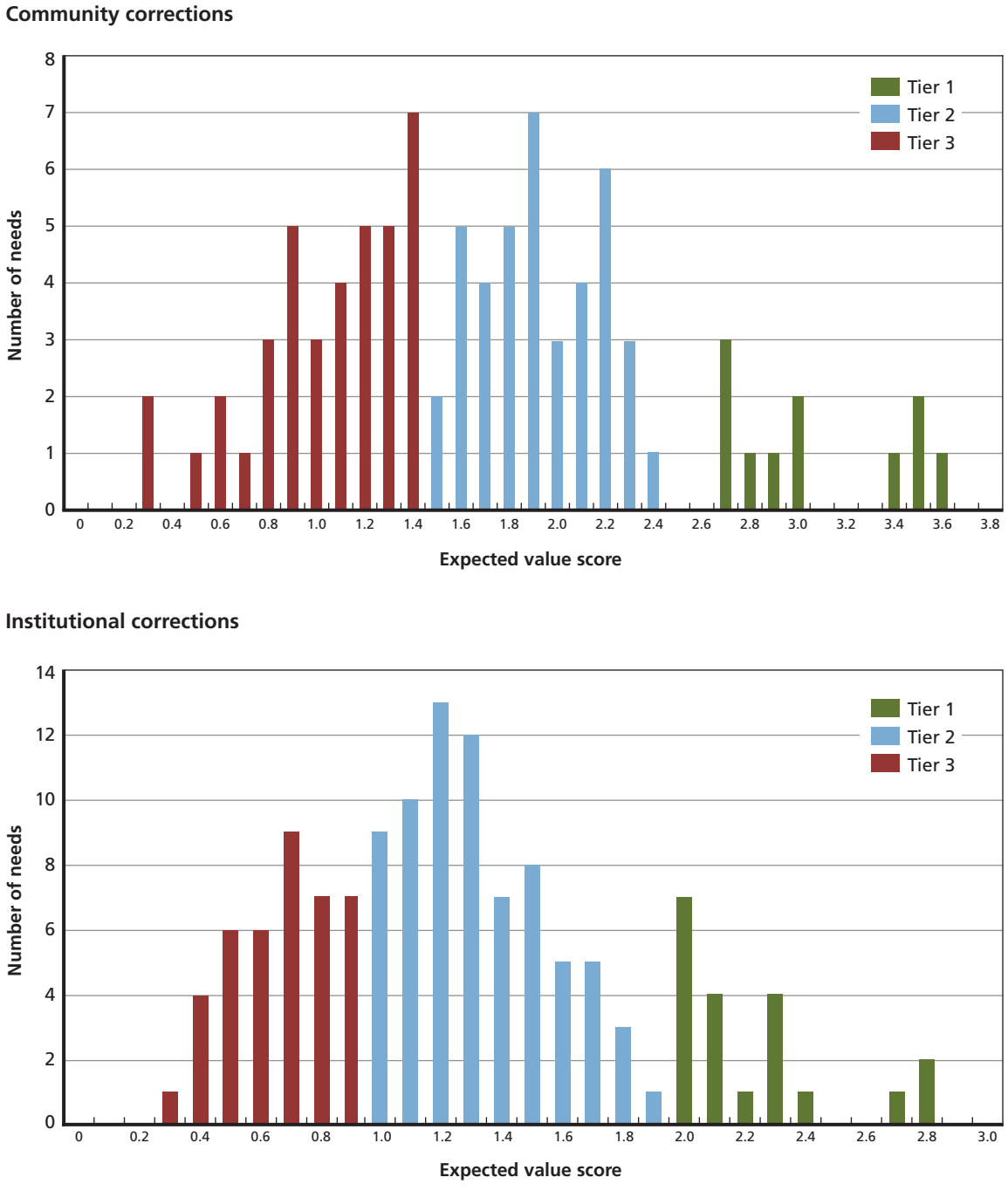
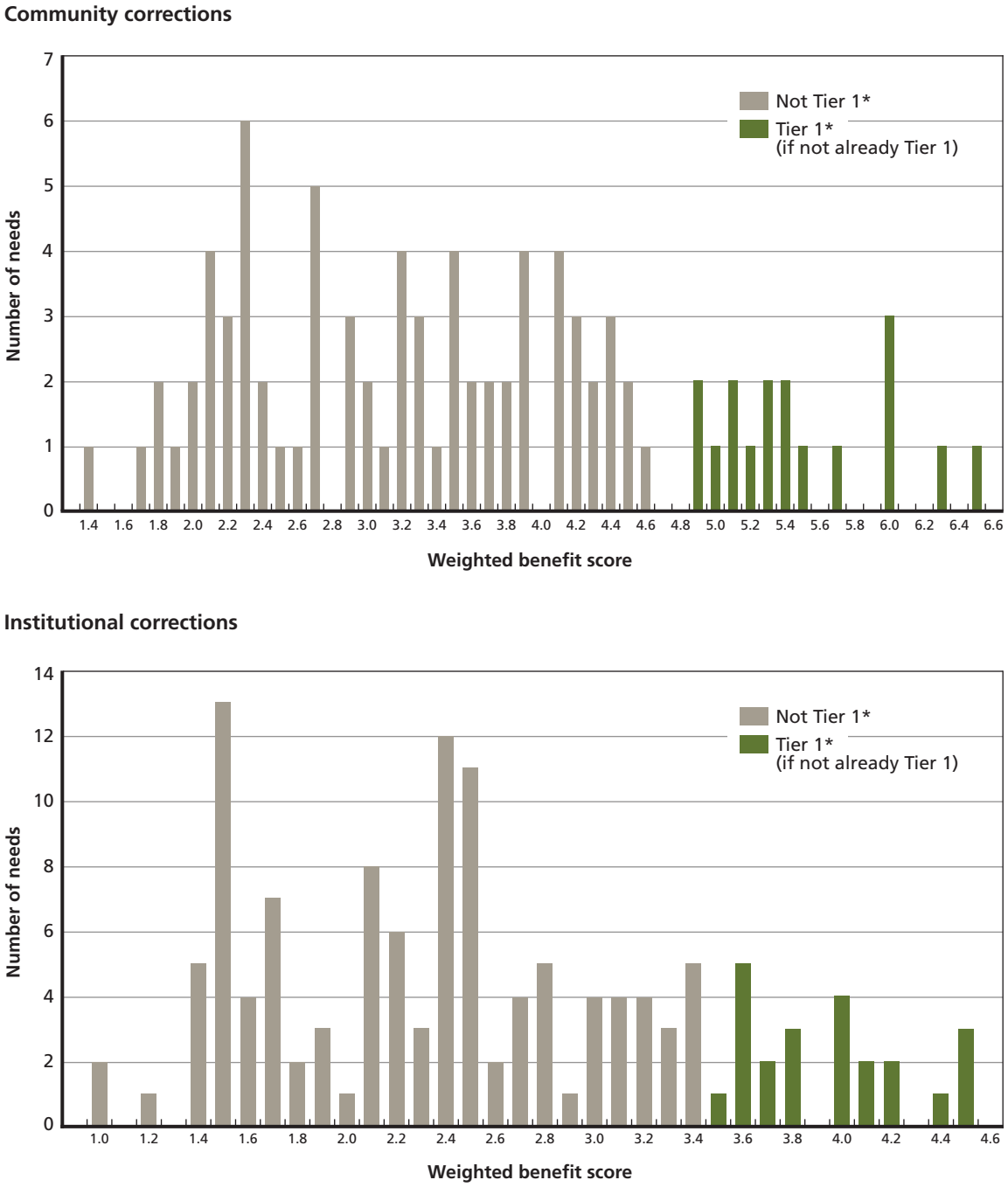
[2] The *median* is the score that has the middle rank (50 percent of scores are higher and 50 percent are lower) in the data. Medians were chosen because they are *robust*; they provide reasonable estimates of the center of the data even given outliers or atypical distributions. They do not require making any assumptions about the scores' underlying statistical distribution.

Figure C.1
Tiered Needs, by Expected Value



RAND *RR820-C.1*

Figure C.2
Tiered Needs, by Weighted Benefit



RAND *RR820-C.2*

APPENDIX D

Full List of Community Corrections Needs

This appendix presents the full list of needs identified in the community corrections working group, their ranking tier (1, 2, or 3, where 1* denotes a need that was promoted into the top tier based on its high perceived value, even if its probability of success was low), and whether they were potential low-hanging fruit (based solely on ease and likelihood of success). Following Tables D.1–D. 5 is a table of the top five needs ranked by expected value for each of the eight corrections objectives (Table D.6).

Table D.1
Facility Operations and Population Services Needs for Community Corrections

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
General	Residential restrictions on sex offenders, resulting in shortages in areas to house them	Develop models for affordable transitional housing and extended sex offender supervision that meet enhanced location restrictions and community concerns.[a]	3	
	Insufficient transitional facilities to house reentering offenders	Develop models for affordable transitional housing and supervision for offenders.	3	
Delivering services to population				
Education delivery	Competing financial demands on offenders result in compliance or other problems	Develop educational materials based on prior research to help offenders prioritize their financial obligations, to include prioritizing between restitution, child support, treatment costs, living costs, etc.	2	
	GPS-based victim protections schemes are ineffective	Produce a brochure for victims of domestic violence to explain the capabilities and limitations of GPS tracking.	3	
Internal physical infrastructure				
	Lack of best practices for how architecture can increase safety in existing corrections office designs and operations practices	Update and disseminate information on how to design or remodel corrections offices for the safety of both officers and offenders, to include sample designs and blueprints. Specific risks include defense against violent persons, bombs, and natural risks.	3	

[a] This need was associated with more than one subcategory, so it is listed more than once.

Table D.2
Person-Worn Equipment and Weapons/Force Needs for Community Corrections

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
Personnel clothing, protection, or augmentation				
Armor and helmets: Worn	Uncomfortable body armor, leading to non-use by officers	Develop cooler, flexible, more comfortable material that is bullet resistant to level 3 or greater.	3	
General	Potential technology opportunity in body-worn computers (e.g., Google Glass and related technologies) to improve effectiveness and efficiency of community corrections	Research and develop body-worn computers for community corrections officials, including both their effective and legal use.	3	

Table D.3
Information and Communications Needs for Community Corrections

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
Information analysis				
Computational tools	Large caseloads, affecting quality of supervision delivered	Develop a device that could help monitor how much time officers spend on individual cases.[a]	2	Yes
	Large caseloads, affecting quality of supervision delivered	Develop guidance to help evaluate numbers of cases versus actual workloads, specifically to include better methods to assess how much time should be spent on a specific case.	1	Yes
	Lack of effective validation techniques for risk and need assessment tools, limiting confidence in their use	Develop tools or components of case management systems that can dynamically update risk assessments and automatically validate or update risk assessment models. The tool should also identify anomalies in case management, such as signs of risk-score manipulation and anomalous churn.	1*	
	Language differences and language knowledge of corrections staff, limiting supervision effectiveness	Develop affordable, portable, accurate, real-time, multilanguage *speech-to-speech* translators; technologies exist but need to be improved.	1*	
	Language differences and language knowledge of corrections staff, limiting supervision effectiveness	Develop affordable, portable, accurate, real-time, multilanguage *text-to-speech* translators.	2	
	Lack of tools to utilize available information (including GPS tracking data), reducing effectiveness of supervision	Develop models and tools to assess anomalies in offender tracks (differences in routine patterns; anomalous cluster points of offenders) and correlate crime scene locations with offender tracking data (potentially building on the University of Oklahoma's offender tracking toolkit).	2	

Table D.3—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
	Inefficiencies in carrying out community corrections work	Mature and disseminate the NIJ-funded toolkit (Providence Plan; see, for example, Lucht and La Vigne, 2011) to perform optimal route planning and notification of nearby offenders for corrections officers. Work needs to include migration to mobile apps and development of a sustainable and affordable business model.	2	
	Ineffective GPS-based victim protections schemes	Develop affordable and demonstrated GPS jamming and shielding detection tools that can identify when an offender is trying to defeat tracking.[a]	2	
	Lack of positive reinforcement of good behavior (rewards) for offenders	Add features to case management systems to capture positive progress that can be used to provide rewards, as opposed to just violations and sanctions.	2	
	Difficult to rapidly, appropriately, and efficiently respond to public records requests	Develop a tool to help agencies redact protected information from documents returned in searches in response to public records requests.	3	
Individual analytical methods	Lack of dynamic, time-dependent risk assessment tools to provide solid predictive ability for high-risk offenders	Develop improved risk assessment models for recidivism that incorporate expanded variables and model types and can provide dynamic, near-real-time assessments of risk. For example, include indicators of ongoing cooperation with terms of supervision.	1	Yes
	Lack of information to appropriately allocate resources to high- and low-risk offenders	Develop models that can more accurately identify offenders on community supervision who require less supervision and resources, saving resources for higher-risk individuals.	1*	
	Difficulties recruiting, hiring, training, and retaining corrections staff	Develop quick, fast background checks on candidates for employment in corrections agencies that can identify and remove high-risk persons.	2	
	Lack of effective validation techniques for risk and need assessment tools, limiting confidence in their use	Develop simple risk models using easily observed indicators known to be correlated with recidivism that corrections officers can use in the field to assess offenders' risk at each meeting.	1*	
Information collection				
Field analytic tools or test technologies	Lack of affordable, noninvasive, gender-indifferent drug testing technology	Research and develop noninvasive gender indifferent drug testing technology. Potential technologies to leverage include that for saliva and fingerprint residue.	2	
	Lack of real-time tools to tell whether someone is currently impaired from cannabis or cocaine	Research and develop systems that can tell not just that a person has used cannabis or cocaine, but whether they are under the influence or impaired in real time.	3	

Table D.3—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
	Lack of drug testing technologies that keep up with rapid changes in synthetic drug materials	Develop technology allowing time-sensitive, cost-effective tests that can detect compounds that are molecularly modified variants of banned substances.	3	
Internal data collection: Organizational performance monitoring tools	No validated measures of effectiveness for community corrections agencies	Develop guidebooks and training on best practices to measure the effectiveness of corrections activities, to include identifying specific metrics elements in information systems.	3	
Internal data collection: Personnel management and performance monitoring tools	Large caseloads, affecting quality of supervision delivered	Develop a device that could help monitor how much time officers spend on individual cases.	2	Yes
	Lack of effective validation techniques for risk and need assessment tools, limiting confidence in their use	Develop tools or components of case management systems that can dynamically update risk assessments and automatically validate or update risk assessment models. The tool should also identify anomalies in case management, such as signs of risk-score manipulation and anomalous churn.[a]	1*	
	Lack of tools to provide in-field accountability of officers	Develop tools that monitor officers' activities and track performance, using inputs like GPS tracking devices.	2	
	Difficulties recruiting, hiring, training, and retaining corrections staff	Develop and disseminate screening tests on skills, aptitudes, and temperaments for corrections candidates.	2	
	Cumulative stress effects due to long-term assignments	Develop an evaluation tool to assess officer stress to provide appropriate support and resources.	2	
	Difficulties of recruiting, hiring, training, and retaining corrections staff	Develop and disseminate methods to identify problems and employment deficits and relate them to specific training requirements.	3	
Surveillance/ monitoring: Mobile surveillance and detection	Lack of long-term durability and functionality of tracking devices, including reduced data accuracy over time	Perform assessments of GPS and radio frequency tracking systems that include long-term reliability and maintainability.	2	
	Lack of capabilities of community corrections personnel to be effective first responders at incidents involving offenders, including both protecting their safety and preserving evidence	Develop technology for a handheld mobile device that can detect drug or substance residue on surfaces.	2	
	Lack of capabilities of community corrections personnel to be effective first responders at incidents involving offenders, including both protecting their safety and preserving evidence	Develop a handheld mobile device that can scan for materials in weapons at a safe distance (e.g., guns, knives).	3	

Table D.3—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
	Lack of capabilities of community corrections personnel to be effective first responders at incidents involving offenders, including both protecting their safety and preserving evidence	Develop a handheld mobile device that can scan for hidden electronic devices (e.g., cell phones, computers, portable hard drives, thumb drives).	3	
	Abundance of circumvention techniques for offender tracking and monitoring technology	Research and develop alternative tracking technologies that are resistant to jamming and tampering.	2	
	Ineffective GPS-based victim protection schemes	Develop affordable and demonstrated GPS jamming and shielding detection tools that can identify when an offender is trying to defeat tracking.	2	
Surveillance/ monitoring: Specialized task information collection tools	Lack of capabilities of community corrections personnel to be effective first responders at incidents involving offenders, including both protecting their safety and preserving evidence	Develop a low-cost field device that can extract data from cell phones and maintain chain of custody of the cell phone data.	2	
	Lack of capabilities of community corrections personnel to be effective first responders at incidents involving offenders, including both protecting their safety and preserving evidence	Develop a training curriculum, along with funding to support training, on how to respond to a crime scene and preserve physical and electronic forensics evidence.	3	
	Lack of ability to detect deception by offenders during interactions	Develop affordable, portable, easy-to-use, and validated tools for determining whether a subject is being deceptive. Potential technologies to leverage include recognizing microfacial expressions, remote biometrics sensors, and P200 (brain waves).	1*	
Information delivery (including communications)				
Fixed location communications	Reduction in contacts with offenders during monitoring, leading to greater noncompliance	Research (in a controlled experiment with analysis of return on investment) whether phone or web conference reporting by offenders is as effective as in-person sessions, and what factors make it more or less successful.	2	
Fixed location communications: Video	Resource constraints and challenges of rural agencies, increasing the difficulty in providing effective supervision	Research and evaluate how to provide treatment and other services to persons in remote rural areas. For example, put together a package of technologies, such as videoconferencing, that can provide treatment at a distance and evaluate the package to determine how well remote treatment works.	2	
	Resource constraints and challenges of rural agencies, increasing the difficulty in providing effective supervision	Develop teleconference portals to provide substance and other offenders with remote treatment.	2	

Table D.3—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
Information presentation tools and dashboards	Inefficiencies in carrying out community corrections work	Mature and disseminate the NIJ-funded toolkit (Providence Plan) to perform optimal route planning and notification of nearby offenders for corrections officers. Work needs to include migration to mobile apps and development of a sustainable and affordable business model.[a]	2	
Mobile communications	Continuing problems with radio interoperability, despite available technological solutions	Deploy patch trucks for radio networks that can filter, translate, and disseminate signals that different agencies can understand.[a]	3	
	Resource constraints and challenges of rural agencies, increasing the difficulty in providing effective supervision	Research on develop an improved communications architecture for rural areas.	3	
Mobile communications: Personnel communications	Lack of leveraging mobile devices, which could provide alternative supervision modes	Develop apps for offenders' smart phones so that they can report compliance and track progress, validated by location services and facial recognition. Also develop companion apps for probation and parole officers to manage offenders. Such apps should integrate with records management systems to capture data.	2	Yes
Mobile communications: Personnel communications: Voice	Continuing problems with radio interoperability, despite available technological solutions	Develop affordable multiband radios that are P.25 compliant.	3	
Information management (including sharing)				
IT systems for managing mission-related data	Challenges managing high-profile cases	Develop an ad-hoc, secure, time-sensitive portal to manage information about high-profile cases.	3	
	Difficult to rapidly, appropriately, and efficiently respond to public records requests	Develop a search tool to provide quick access to relevant data in response to public records requests.	3	
System integration and information-sharing	Data system interoperability problems among agencies who have useful data (and even within single agencies), limiting cross-agency sharing	Create gateways or centers that can translate and exchange corrections data between and among agencies' systems, *on a local level*.	1	
	Data system interoperability problems among agencies who have useful data (and even within single agencies), limiting cross-agency sharing	Need extensions to, dissemination of, and vendor requirements for, the use of NIEM IEPD guidelines in corrections.	1	
	Data system interoperability problems among agencies who have useful data (and even within single agencies), limiting cross-agency sharing	Create gateways or centers that can translate and exchange corrections data between agencies' systems and *state and nationwide databases*.	1	

Table D.3—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
	Data system interoperability problems among agencies who have useful data (and even within single agencies), limiting cross-agency sharing	Produce and disseminate affordable tools that provide for querying multiple federal, state, and local databases about people, places, and things, and perform analytics on the results.	1*	
	Incompatibilities in the interstate compact system (including juvenile and adult cases), hindering data-sharing	Standardize and expedite data-sharing, and reduce data redundancy with the Interstate Compact System, to include examining ways that core records are maintained either in an Interstate Compact Offender Tracking System or in an agency's system.	2	
	Lack of leveraging mobile devices, which could provide alternative supervision modes	Develop apps for offenders' smart phones so that they can report compliance and track progress, validated by location services and facial recognition. Also develop companion apps for probation and parole officers to manage offenders. Such apps should integrate with records management systems to capture data.[a]	2	Yes
	Continuing problems with radio interoperability, despite available technological solutions,	Deploy patch trucks for radio networks that can filter, translate, and disseminate signals that different agencies can understand.	3	
Information technology—basic systems				
Information security	Information technology and policy and practices that leave data vulnerable to hacking or compromise	Develop guidebooks and training material for the probation and parole community on affordable and cost-effective means to deploy and use secure mobile computing technologies.	3	Yes
Infrastructure	Difficulty uploading GPS monitoring data to corrections information systems, especially in rural areas	Develop portable transmission booster to enable upload and download of data from a specific rural location as needed.	2	
	Out-of-date computing resources at many agencies (size, speed, processing capability, communications, analysis) unable to provide needed capability	Utilize new procurement or business models that provide personnel with inexpensive but up-to-date commodity computing equipment that deals with reliability and ruggedness issues, either through ruggedization, leasing arrangements, or warranties.	3	

[a] This need was associated with more than one subcategory, so it is listed more than once.

Table D.4
Vehicle Needs for Community Corrections

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
Aircraft				
Unmanned aerial vehicles	Unmanned aerial vehicles (potential opportunity and challenge)	Research and develop techniques for using UAVs to surveil offenders and areas prior to engaging them, to identify potentially dangerous situations, and so on.	3	
	Unmanned aerial vehicles (potential opportunity and challenge)	Research counters to future uses of UAVs by offenders to surveil corrections facilities and persons.	3	

Table D.5
Doctrine, Tactics, Management, and Behavioral Knowledge Development and Training Needs for Community Corrections

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
Management/leadership knowledge development and training				
Acquisition and technology decisionmaking	Out-of-date computing resources at many agencies (size, speed, processing capability, communications, analysis) unable to provide needed capability	Utilize new procurement or business models that provide personnel with inexpensive but up-to-date commodity computing equipment that deals with reliability and ruggedness issues, either through ruggedization, leasing arrangements, or warranties.	3	
	Too few useful technologies for corrections marketed as commodities (e.g., at uniform cost and standardized specifications), complicating procurement	Develop new contracting vehicles and state- and national-approved item lists that allow bulk purchasing of key equipment at lower cost, and permit some reciprocity on approved lists across states. Examples include urinalysis tests (kits and lab work), radios, handcuffs, flashlights, computers, GPS and radio frequency trackers, and off-the-shelf and FBI-compliant records management systems.	2	
Doctrine and strategy for carrying out agency missions	Limited preparedness activities for large-scale incidents	Develop guidebooks and training materials on how to plan for and recover from a natural disaster from the community corrections perspective.	1	Yes
	Lack of effective validation techniques for risk and need assessment tools, limiting confidence in their use	Develop guidance materials that discuss which risk assessment tools are appropriate to use in which settings, and warn agencies against using risk instruments that were not developed for the intended purpose, are out of date, or were never validated.	1*	

Table D.5—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
	Residential restrictions on sex offenders, resulting in shortages in areas to house them	Develop models for affordable transitional housing and extended sex offender supervision that meet enhanced location restrictions and community concerns.	3	
	Release of more dangerous, higher-risk offenders into community monitoring as a result of prison and jail overcrowding	Assign increased and more-targeted resources to address changes in the population of offenders under community supervision (e.g., resources addressing more-frequent violations in this group of offenders).	1*	
	Weak evidence base for many current practices in community corrections	Develop a standard for what *evidence-based practice* means. Address the general theme that much of what is done in community corrections has not really been validated (or agencies are not aware of the validation).	3	
	Undefined and ineffective services for crime victims	Research best practices on meeting victim needs, relationships and organizational housing of victim advocates.	3	
	Lack of uniform and consistent protocols for bomb threats	Identify and disseminate a standard protocol for addressing bomb threats to avoid duplication of effort.	3	
	Challenges managing high-profile cases	Develop guidebooks and training materials on best practices for communicating with the media, such as training on briefings, the public information office, and media kit preparation.	3	
	Challenges managing high-profile cases	Develop, disseminate, and implement protocols (checklists) for addressing high-profile cases, to include how to contact media and important persons and to maintain awareness of case status and who has been contacted.	3	
	Lack of training and procedures to address active shooter, sniper, and hostage incidents	Develop guidebooks and training to limit the risk of, and to address, active shooter, sniper, and hostage incidents.	3	
Organizational and human resources policy and practices	Cumulative stress effects due to long-term assignments	Develop a guidebook of best practices on the effects of officer stress and methods to reduce it, based on prior research on stress and fatigue for law enforcement.	2	
	Resource constraints and challenges of rural agencies, increasing the difficulty in providing effective supervision	Develop a concept for and test a mobile mental health team to provide services in remote rural areas.[a]	2	
	No validated measures of effectiveness for community corrections agencies	Develop guidebooks and training on best practices to measure the effectiveness of corrections activities, to include identifying specific metrics elements in information systems. [a]	3	

Table D.5—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
	Inefficiencies in carrying out community corrections work	Carry out industrial engineering studies of what tasks can be reduced, automated, or delegated to noncorrections personnel.	3	
	Difficulties recruiting, hiring, training, and retaining corrections staff	Develop guidance on how to market for corrections recruits.	3	Yes
	Difficulties recruiting, hiring, training, and retaining corrections staff	Develop guidebooks and training materials on providing better incentives to retain corrections employees, including both compensatory and noncompensatory incentives.	3	
	Difficult to rapidly, appropriately, and efficiently respond to public records requests	Develop standardized legal guidance on how to reply to public records requests.	3	
	Built-in inertia against change, limiting innovation	Produce guidebooks and training on best practices to perform change management, including how to pace and implement multiple changes.	3	
	Direct intervention of political leaders in agency operations counter to established procedures or practices	Develop guidebooks and training materials to help agencies communicate with elected officials, to include successful use cases in dealing with political situations.	3	
Officer/practitioner knowledge development and training				
Policies and knowledge for carrying out roles	Differences in sanctions in response to infractions, producing inconsistency in holding offenders accountable	Develop a tool or matrix that reflects best practices and prior research on which sanctions should be applied to which type of violation and need.	1	
	Differences in sanctions in response to infractions, producing inconsistency in holding offenders accountable	Develop or gather research on which type of sanction is most likely to produce a positive behavioral change in response to which type of violation and need.	1	
	Social media (potential opportunity and challenge)	Develop guidebooks and training materials on monitoring social media; using social media to communicate with supervised offenders (both overtly and covertly); and pushing information to offenders and the public, potentially to leverage the International Association of Chiefs of Police Social Media Center and Court Services and Offender Supervision Agency social media efforts.	2	
	Lack of positive reinforcement of good behavior (rewards) for offenders	Produce a guidebook on best practices on positive incentives to reward positive behavior.	2	

Table D.5—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
	Lack of knowledge on coordinating resources for offenders before release and reentry	Produce guidebooks and training materials on how to coordinate prerelease planning with community resources, specifically to build relationships with the offender before release and alert officers to any major issues (e.g., requirements for mental health treatment).	2	
	Resource constraints and challenges of rural agencies, increasing the difficulty in providing effective supervision	Research the specific challenges and needs of community corrections officers in remote rural areas.	2	
Tactics and practices	Lack of training for corrections personnel to address offender drug and mental health issues	Develop training programs for community corrections officers to work with offenders diagnosed with mental illnesses or exhibiting symptoms.	1	Yes
	Limited knowledge and training provided to officers on safety topics	Develop guidebooks and training on officer safety, to include a combination of hands-on and augmented reality training.	2	Yes
	Undefined and ineffective services for crime victims	Develop a guidebook on best practices to provide for victim needs. Work on overcoming historic issues with victims not wanting to talk to corrections (less than 1% response rates on surveys).	3	
	Lack of capabilities of community corrections personnel to be effective first responders at incidents involving offenders, including both protecting their safety and preserving evidence	Develop a training curriculum, along with funding to support training, on how to respond to a crime scene and preserve physical and electronic forensics evidence.[a]	3	
Societal/legal knowledge development and innovation				
	Competing financial demands on offenders, resulting in compliance or other problems	Research the effects of state restitution and other sanction penalties on offenders and offender–corrections officer relationships. Research should identify the best formulas that trade off restitution needs and risks from offenders not being able to pay. It should also identify best incentives, payment plans, state versus offender pay-for-service models, and copay models.	2	
	Undefined and ineffective services for crime victims	Develop a guidebook on best practices to provide for victim needs. Work on overcoming historic issues with victims not wanting to talk to corrections (less than 1% response rates on surveys).[a]	3	
	Lack of follow-through of justice reinvestment	Write a document explaining and publicizing the impact of reducing prison populations yet not moving the saved money to community corrections to supervise the released prisoners.	3	

Table D.5—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
	Concern about the disclosure of corrections officer identities and other personal information	Pursue legislation to provide consistent descriptions, authorities, and abilities to use registered pseudonyms or otherwise protect the personal information of probation and parole officers.	3	
Specialist/technologist knowledge development and training				
Tactics and practices	Resource constraints and challenges of rural agencies, increasing the difficulty in providing effective supervision	Develop a concept for, and test, a mobile mental health team to provide services in remote rural areas.	2	
Technology-mediated training tools				
	Lack of training for corrections personnel to address offender drug and mental health issues	Assemble a national information resource that provides virtual training and guides on how probation officers should work with mental health caseloads.	1	Yes
	Difficulties recruiting, hiring, training, and retaining corrections staff	Update training materials and software so that it is current, more realistic, visual, and more interactive.	1	Yes
	Limited knowledge and training provided to officers on safety topics	Develop guidebooks and training on officer safety, to include a combination of hands-on and augmented reality training.[a]	2	Yes
Tools to assist live training				
	Lack of capabilities of community corrections personnel to be effective first responders at incidents involving offenders, including both protecting their safety and preserving evidence	Create a national training center for first-responder training for multiple disciplines, including corrections, along with funding to support officers attending that training. The center should provide both in-person and remote training.	2	

[a] This need was associated with more than one subcategory, so it is listed more than once.

Table D.6
Top Five Community Corrections Needs for Each Objective, by Expected Value

Objective	Category	Subcategories		Problem or Opportunity	Associated Need
Facilitate positive behavioral change	Information and communications	Information delivery (including communications)	Mobile communications: Personal communications	Lack of leveraging mobile devices, which could provide alternative supervision modes	Develop apps for offenders' smart phones so that they can report compliance and track progress, validated by location services and facial recognition. Also develop companion apps for probation and parole officers to manage offenders. Such apps should integrate with records management systems to capture data.
	Doctrine, tactics, management, and behavioral knowledge development and training	Officer/practitioner knowledge development and training	Tactics and practices	Lack of training for corrections personnel to address offender drug and mental health issues	Develop training programs for community corrections officers to work with offenders diagnosed with mental illnesses or exhibiting symptoms.
	Doctrine, tactics, management, and behavioral knowledge development and training	Technology-mediated training tools		Lack of training for corrections personnel to address offender drug and mental health issues	Assemble a national information resource that would provide virtual training and guides on how probation officers should work with mental health caseloads.
	Doctrine, tactics, management, and behavioral knowledge development and training	Officer/practitioner knowledge development and training	Policies and knowledge for carrying out roles	Lack of positive reinforcement of good behavior (rewards) for offenders	Produce a guidebook on best practices on positive incentives to reward positive behavior.
	Information and communications	Information analysis	Individual analytical methods	Lack of dynamic, time-dependent risk assessment tools to provide solid predictive ability for high-risk offenders	Develop improved risk assessment models for recidivism that incorporate expanded variables and model types and can provide dynamic, near-real-time assessments of risk. For example, include indicators of ongoing cooperation with terms of supervision.
Protect victims	Facility operations and population services	Delivering services to population	Education delivery	Ineffective GPS-based victim protections schemes	Produce a brochure for victims of domestic violence to explain the capabilities and limitations of GPS tracking.
	Information and communications	Information collection	Surveillance/ monitoring: Mobile surveillance and detection	Lack of long-term durability and functionality of tracking devices, including reduced data accuracy over time	Perform assessments of GPS and radio frequency tracking systems that include long-term reliability and maintainability.

Table D.6—Continued

Objective	Category	Subcategories		Problem or Opportunity	Associated Need
	Doctrine, tactics, management, and behavioral knowledge development and training	Officer/practitioner knowledge development and training	Tactics and practices	Undefined and ineffective services for crime victims	Develop a guidebook on best practices to provide for victim needs. Work on overcoming historic issues with victims not wanting to talk to corrections (less than 1% response rates on surveys).
	Doctrine, tactics, management, and behavioral knowledge development and training	Management/ leadership knowledge development and training	Doctrine and strategy for carrying out agency missions	Limited preparedness activities for large-scale incidents	Develop guidebooks and training materials on how to plan for and recover from a natural disaster from the community corrections perspective.
	Doctrine, tactics, management, and behavioral knowledge development and training	Management/ leadership knowledge development and training	Doctrine and strategy for carrying out agency missions	Undefined and ineffective services for crime victims	Research best practices on victim needs relationships and organizational housing of victim advocates.
Hold offenders accountable	Information and communications	Information analysis	Individual analytical methods	Lack of dynamic, time-dependent risk assessment tools to provide solid predictive ability for high-risk offenders	Develop improved risk assessment models for recidivism that incorporate expanded variables and model types and can provide dynamic, near-real-time assessments of risk. For example, include indicators of ongoing cooperation with terms of supervision.
	Information and communications	Information collection	Surveillance/ monitoring: Mobile surveillance and detection	Abundance of circumvention techniques for offender tracking and monitoring technology	Research and develop alternative tracking technologies that are resistant to jamming and tampering.
	Information and communications	Information analysis	Computational tools	Large caseloads, affecting quality of supervision delivered	Develop guidance to help evaluate numbers of cases versus actual workloads, specifically to include better methods to assess how much time should be spent on a specific case.
	Information and communications	Information delivery (including communications)	Mobile communications: Personal communications	Lack of leveraging mobile devices, which could provide alternative supervision modes	Develop apps for offenders' smart phones so that they can report compliance and track progress, validated by location services and facial recognition. Also develop companion apps for probation and parole officers to manage offenders. Such apps should integrate with records management systems to capture data.

Table D.6—Continued

Objective	Category	Subcategories		Problem or Opportunity	Associated Need
	Information and communications	Information management (including sharing)	System integration and information-sharing	Data system interoperability problems among agencies who have useful data (and even within single agencies), limiting cross-agency sharing	Create gateways or centers that can translate and exchange corrections data between agencies' systems and *state and nationwide databases*.
Protect the public	Doctrine, tactics, management, and behavioral knowledge development and training	Technology-mediated training tools		Lack of training for corrections personnel to address offender drug and mental health issues	Assemble a national information resource that provides virtual training and guides on how probation officers should work with mental health caseloads.
	Information and communications	Information management (including sharing)	System integration and information-sharing	Data system interoperability problems among agencies who have useful data (and even within single agencies), limiting cross-agency sharing	Create gateways or centers that can translate and exchange corrections data between agencies' systems and *state and nationwide databases*.
	Doctrine, tactics, management, and behavioral knowledge development and training	Officer/practitioner knowledge development and training	Tactics and practices	Lack of training for corrections personnel to address offender drug and mental health issues	Develop training programs for community corrections officers to work with offenders diagnosed with mental illnesses or exhibiting symptoms.
	Doctrine, tactics, management, and behavioral knowledge development and training	Management/ leadership knowledge development and training	Doctrine and strategy for carrying out agency missions	Limited preparedness activities for large-scale incidents	Develop guidebooks and training materials on how to plan for and recover from a natural disaster from the community corrections perspective.
	Information and communications	Information management (including sharing)	System integration and information-sharing	Data system interoperability problems among agencies who have useful data (and even within single agencies), limiting cross-agency sharing	Create gateways or centers that can translate and exchange corrections data between and among agencies' systems, *on a local level*.
Save money and/or time	Information and communications	Information management (including sharing)	System integration and information-sharing	Data system interoperability problems among agencies who have useful data (and even within single agencies), limiting cross-agency sharing	Need extensions to, dissemination of, and vendor requirements for using NIEM IEPD guidelines in corrections.

Table D.6—Continued

Objective	Category	Subcategories		Problem or Opportunity	Associated Need
	Information and communications	Information analysis	Computational tools	Inefficiencies in carrying out community corrections work	Mature and disseminate the NIJ-funded toolkit (Providence Plan) to perform optimal route planning and notification of nearby offenders for corrections officers. Work needs to include migration to mobile apps and development of a sustainable and affordable business model.
	Information and communications	Information analysis	Individual analytical methods	Difficulties recruiting, hiring, training, and retaining corrections staff	Develop quick background checks on candidates for employment in corrections agencies that can identify and remove high-risk persons.
	Information and communications	Information collection	Internal data collection: Personnel management and performance monitoring tools	Large caseloads, affecting quality of supervision delivered	Develop a device that could help monitor how much time officers spend on individual cases.
	Information and communications	Information management (including sharing)	System integration and information-sharing	Data system interoperability problems among agencies who have useful data (and even within single agencies), limiting cross-agency sharing	Create gateways or centers that can translate and exchange corrections data between and among agencies' systems, *on a local level*.
Improve capabilities	Information and communications	Information management (including sharing)	System integration and information-sharing	Data system interoperability problems among agencies who have useful data (and even within single agencies), limiting cross-agency sharing	Need extensions to, dissemination of, and vendor requirements for using NIEM IEPD guidelines in corrections
	Doctrine, tactics, management, and behavioral knowledge development and training	Management/ leadership knowledge development and training	Doctrine and strategy for carrying out agency missions	Limited preparedness activities for large-scale incidents	Develop guidebooks and training materials on how to plan for and recover from a natural disaster from the community corrections perspective.
	Doctrine, tactics, management, and behavioral knowledge development and training	Technology-mediated training tools		Lack of training for corrections personnel to address offender drug and mental health issues	Assemble a national information resource that provides virtual training and guides on how probation officers should work with mental health caseloads.

Table D.6—Continued

Objective	Category	Subcategories		Problem or Opportunity	Associated Need
	Information and communications	Information collection	Internal data collection: Personnel management and performance monitoring tools	Large caseloads, affecting quality of supervision delivered	Develop a device that could help monitor how much time officers spend on individual cases.
	Information and communications	Information management (including sharing)	System integration and information-sharing	Data system interoperability problems among agencies who have useful data (and even within single agencies), limiting cross-agency sharing	Create gateways or centers that can translate and exchange corrections data between and among agencies' systems, *on a local level*.
Improve health	Doctrine, tactics, management, and behavioral knowledge development and training	Management/ leadership knowledge development and training	Organizational and human resources policy and practices	Cumulative stress effects due to long-term assignments	Develop a guidebook of best practices on the effects of officer stress and methods to reduce it, based on prior research on stress and fatigue for law enforcement.
	Doctrine, tactics, management, and behavioral knowledge development and training	Officer/practitioner knowledge development and training	Tactics and practices	Lack of training for corrections personnel to address offender drug and mental health issues	Develop training programs for community corrections officers to work with offenders diagnosed with mental illnesses or exhibiting symptoms.
	Doctrine, tactics, management, and behavioral knowledge development and training	Officer/practitioner knowledge development and training	Tactics and practices	Limited knowledge and training provided to officers on safety topics	Develop a guidebook and training on officer safety, to include a combination of hands-on and augmented reality training.
	Doctrine, tactics, management, and behavioral knowledge development and training	Technology-mediated training tools		Lack of training for corrections personnel to address offender drug and mental health issues	Assemble a national information resource that provides virtual training and guides on how probation officers should work with mental health caseloads.
	Information and communications	Information collection	Internal data collection: Personnel management and performance monitoring tools	Cumulative stress effects due to long-term assignments	Develop an evaluation tool to assess officer stress to provide appropriate support and resources.

Table D.6—Continued

Objective	Category	Subcategories		Problem or Opportunity	Associated Need
Reduce casualties	Information and communications	Information delivery (including communications)	Mobile communications: Personnel communications: voice	Continuing problems with radio interoperability, despite available technological solutions	Develop affordable multiband radios that are P.25 compliant.
	Doctrine, tactics, management, and behavioral knowledge development and training	Officer/practitioner knowledge development and training	Tactics and practices	Limited knowledge and training provided to officers on safety topics	Develop a guidebook and training on officer safety, to include a combination of hands-on and augmented reality training.
	Information and communications	Information management (including sharing)	System integration and information-sharing	Continuing problems with radio interoperability, despite available technological solutions	Deploy patch trucks for radio networks that can filter, translate, and disseminate signals that different agencies can understand.
	Doctrine, tactics, management, and behavioral knowledge development and training	Officer/practitioner knowledge development and training	Tactics and practices	Lack of training for corrections personnel to address offender drug and mental health issues	Develop training programs for community corrections officers to work with offenders diagnosed with mental illnesses or exhibiting symptoms.
	Doctrine, tactics, management, and behavioral knowledge development and training	Technology-mediated training tools		Lack of training for corrections personnel to address offender drug and mental health issues	Assemble a national information resource that provides virtual training and guides on how probation officers should work with mental health caseloads.

NOTE: Table includes five top-rated needs for each objective. When the same need appeared twice in an objective's top five (because it had been categorized into two taxonomy categories), it is shown to be associated with only one taxonomy category.

APPENDIX E

Full List of Institutional Corrections Needs

This appendix includes the full list of needs identified in the institutional corrections working group, their ranking tier (1, 2, or 3, where 1* denotes a need that was promoted into the top tier based on its high perceived value, even if its probability of success was low), and whether they were potential low-hanging fruit (based solely on ease and likelihood of success). Following Tables E.1–E. 5 is a table of the top five needs ranked by expected value for each of the eight corrections objectives (Table E.6).

Table E.1
Facility Operations and Population Services Needs for Institutional Corrections

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
Delivering services to population				
Education delivery	External changes driving inmate access to technology, such as transition of General Educational Development (GED) test to computer-based administration, cost pressures pushing inmate education to technology modes, and need for online job searching prerelease	Develop performance measures to demonstrate that allowing inmate access to classes and information through tablet-based computers is effective.	2	
	External changes driving inmate access to technology, such as transition of GED to computer- based administration, cost pressures pushing inmate education to technology modes, and need for online job searching prerelease	Obtain computing platforms that are affordable and practical in the institutional corrections environment.	2	
	External changes driving inmate access to technology, such as transition of GED to computer- based administration, cost pressures pushing inmate education to technology modes, and need for online job searching prerelease	Develop alternatives that reduce staffing requirements for monitoring and controlling inmate use of technology.	2	
	Educational and entertainment suppliers that link available content to proprietary hardware, locking facilities to that supplier	Develop contracts and procurement practices that require the ability to use third-party material on systems designed to deliver educational and other content to inmates.[a]	3	

Table E.1—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
Health care delivery	Security concerns and risk from transferring inmates outside of a facility to receive specialized medical care	Use telemedicine to reduce the need to transport inmates out of secure facilities.	1	Yes
	Security concerns and risk from transferring inmates outside of a facility to receive specialized medical care	Insource specific medical delivery capabilities within facilities based on an analysis of the main drivers that lead to transporting inmates to outside providers.	2	
	High inmate health care costs	Develop practices and tools to identify inmates who are covered by other health insurance that can cover their medical care (e.g., private insurance, retiree insurance, VA), allowing cost recovery.	3	
	Difficulty meeting the needs of special needs inmates	Dedicate facilities for inmates with particular medical needs (e.g., dialysis, blind individuals) to more efficiently deliver required care.	3	
External/perimeter physical infrastructure				
	Contraband coming into facilities *from visitors*	Change visitation practices (e.g., greater virtual visitation) to reduce opportunities for visitors to physically bring contraband into facilities.	1	Yes
Internal access control				
	Inability to track and account for individuals within facilities	Use biometric check-in and check-out to provide an overall accountability solution at the facility level (though limits in the practicality of wide implementation likely mean it cannot provide full internal accountability).[a]	2	
Internal environment control				
	Inmate access to technology, creating internal security and management challenges (e.g., access to unauthorized content, gaming of systems for communication within the facility)	Implement stringent, already-available web filtering software to allow access only to specific Internet sites.	1	
	Inmate access to technology, creating internal security and management challenges (e.g., access to unauthorized content, gaming of systems for communication within the facility)	Deploy wireless Internet access systems that can better manage access by inmates.	3	
	Inmate ability to circumvent security and control features on electronic devices provided to them for education and other purposes	Develop a secure operating system for inmate electronic devices to limit circumvention opportunities.	2	

Table E.1—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
	High cost of implementing managed access to cellular phones, which helps reduce contraband phones	Evaluate approaches for scaled-down managed access (e.g., covering the areas where inmates are most likely to have or use the phones versus attempting to cover the entire facility).	3	
Internal physical infrastructure				
Architectural design and systems: Standard	Issues successfully implementing PREA requirements	Implement policies, procedures, and a budget to support changes in internal practices and architecture to become compliant.[a]	2	
Architectural design and systems: Green technologies	High resource, energy, and infrastructure costs	Implement monitoring technology on physical plant systems to reduce energy use.	3	
	High resource, energy, and infrastructure costs	Implement technological limits on the amount of water inmates can use in showers.	3	
	High resource, energy, and infrastructure costs	Develop retrofitting technology to make it easier for older facilities to adopt low-flow toilets and other technologies to save water.	3	
	High resource, energy, and infrastructure costs	Assess whether renewable and other alternative energy technologies provide cost savings to support agency decisionmaking.	3	
	High resource, energy, and infrastructure costs	Explore production of methane from facility waste streams as an alternative energy source.	3	
Furnishings and contents	Difficulty meeting the needs of special needs inmates	Develop technologies to retrofit cells to be compliant with the Americans with Disabilities Act at reduced cost, particularly for older facilities and smaller jurisdictions.	3	
	Difficulty meeting the needs of special needs inmates	Develop materials for soft cells (for acute psychiatric cases) that hold up to inmate abuse and are less costly.	3	
Organizational logistics				
Physical material tracking	Biometrics as an opportunity to improve asset tracking within facilities	Use biometrics for asset and inventory tracking, management, and control in facilities.	2	
General	High resource, energy, and infrastructure costs	Implement recycling program to reduce waste stream.	2	Yes

[a] This need was associated with more than one subcategory, so it is listed more than once.

Table E.2
Person-Worn Equipment and Weapons/Force Needs for Institutional Corrections

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
Personnel clothing, protection, or augmentation				
Clothing/ uniforms	High cost of puncture-resistant gloves	Develop lower-cost puncture-resistant gloves.	3	
Armor and helmets	Uncomfortable stab-resistant armor, leading to unwillingness to wear	Develop cooler and lighter stab-resistant armor while maintaining cost-effectiveness.	3	
	Uncomfortable stab-resistant armor, leading to unwillingness to wear	Provide grant funding to subsidize purchase of currently available armor with better comfort factors.	3	
	Wearable conductive-energy clothing (which administers a shock when wearer is touched by another person) as a potential opportunity for staff protection	Validate the performance of wearable conductive-energy clothing for officer protection from inmate contact.	3	
Weapons and force				
Less-than-lethal weapons	Limitations in the effectiveness of available less-than-lethal technologies	Develop new and more-effective less-than-lethal technologies to reduce level of force necessary.	2	Yes
	Limitations in the effectiveness of available less than lethal technologies	Develop better less-than-lethal technology to deal with large groups (e.g., during an evacuation outside the walls) usable by general corrections staff.	2	
Less-than-lethal weapons: Directed energy	Limited ability to manage inmate behavior with minimal force	Validate performance of prototype electric-shock-delivering gloves for physically managing inmate movement.	3	
Lethal weapons	Ongoing problems with administration of capital punishment	For states still using the death penalty, identify a correct and acquirable cocktail of drugs to humanely perform executions.	3	
	Ongoing problems with administration of capital punishment	For states still using the death penalty, identify alternative execution technologies to address supply issues for lethal injection drugs.	3	
Specialized task technologies	Insufficient barricade and cell extraction tools for rapidly entering cells without harming occupants	Develop portable, easy-to-use tools for cell extraction with low training requirements and low costs.	2	

Table E.3
Information and Communications Needs for Institutional Corrections

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
Information analysis				
Computational tools	Inability to track incidents within a facility to detect patterns (e.g., in medical cases, complaints, or inmate grievances)	Develop automated data analysis tools to *rapidly* identify trends in internal data systems (i.e., without the lag involved in many centralized analytic processes), using improved CompStat methods for corrections.	1	Yes
	Contraband coming into facilities *from employees*	Develop tools that make it possible to track contacts between inmate and employee phone numbers (though acknowledging that some countermeasures to such tools are already available).	1	Yes
	Increasing volume of camera data	Develop video analytics to do pattern and threat recognition with much-improved false-alarm rates (e.g., one or two per shift is about the maximum tolerable false-alarm level).	1*	
	Difficulty efficiently managing inmate populations across multifacility systems	Develop *analysis tools* to identify early the requirements for inmates' education, health, court, etc., to match them with facilities that can provide those services, avoiding the need for later transfer.	2	
	Contraband coming into facilities *at fence lines*	Develop better and more-accurate video analytics technologies for video monitoring of fence lines.	1*	
	Security concerns and risk from transferring inmates outside of a facility to receive specialized medical care	Insource specific medical delivery capabilities within facilities based on an analysis of the main drivers that lead to transporting inmates to outside providers.[a]	2	
	High cost of available tools for data analysis	Develop inexpensive data analysis tools that can be applied to large-volume, corrections-relevant data sets, including data sets from multiple agencies in varied formats.	2	
	Current video analytics insufficient to monitor inmate behavioral problems	Improve video analytics to better distinguish events (e.g., fights or gatherings), designed to prevent or separate inmate attempts to intentionally produce false alarms (adding biometrics could help).	1*	
	Difficulties calculating sentences, given varying requirements, changes, credits, and other issues during time inmate is incarcerated	Develop tools for calculating sentences, addressing initial sentencing, legal requirements, days for infractions and parole violations, and other changes made during time served.	2	
	Lack of solid data to justify staff requests in budget negotiations	Develop tools for linking staff scheduling information to analysis of staffing needs to better understand staff requirements and support resource requests.	3	

Table E.3—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
	High volume of data, much of it difficult to analyze, generating data overload and making analysis of not cost-effective	Develop robust data extraction tools suitable for cross-agency databases that *are inexpensive enough* to be available to corrections agencies.	3	
	Video analytics coupled with CCTV as a potential solution to tracking personnel and inmate movement, increasing staff accountability	Adapt existing technology to better address challenges of the institutional environment, including the presence of many comparably dressed people in poor lighting conditions.	3	
	Difficulty efficiently managing inmate transport	Develop analysis and scheduling tools for seat management on buses to improve transport logistics efficiency.	3	
Individual analytical methods	High-pressure work environment, leading to staff mental health issues, including suicide	Develop tools to identify the right periods for individuals to occupy high-stress positions and for rotation out for decompression and recovery.	2	Yes
	Increase in population in protective custody (and inmate behavior to work the system to get into single cells if protective custody is not approved)	Develop a function within the population or a bed management system to avoid putting the wrong people in the same cell; that is, develop a good classification system for inmates.	2	Yes
	Difficulty efficiently managing inmate populations across multifacility systems	Develop scheduling tools to move offenders more efficiently between facilities by mining data from bed management and other systems.	3	
Information collection				
Field analytic tools or test technologies	Difficulty collecting urine samples for drug screening	Develop and validate alternative tests (e.g., swabs) that could provide similar certainty to data obtained from urine tests.	2	
	Lack of drug testing technologies that keep up with rapid changes in synthetic drug materials	Develop a portable platform for testing new synthetic drugs in-house (to avoid having to send to an outside laboratory) for drugs that are changing rapidly.	2	
	Lack of drug testing technologies that keep up with rapid changes in synthetic drug materials	Rapidly develop tests for new drugs and disseminate the tests into practice.	2	
Internal data collection: Organizational performance monitoring tools	Issues implementing PREA requirements	Develop a standardized system for meeting the reporting requirements under PREA.	2	Yes
	Inability to track incidents within a facility to detect patterns (e.g., in medical cases, complaints, or inmate grievances)	Develop automated data analysis tools to rapidly identify trends in internal data systems (i.e., without the lag involved in many centralized analytic processes), using improved CompStat methods for corrections.[a]	1	Yes

Table E.3—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
Internal data collection: Personnel management and performance monitoring tools	High-pressure work environment, leading to staff mental health issues, including suicide	Improve methods to identify individuals working in high-stress positions (e.g., mental health units) that should be rotated out for decompression time.	2	Yes
	High-pressure work environment, leading to staff mental health issues, including suicide	Provide access to resources to address posttraumatic stress disorder and other issues that returning veteran workers bring to corrections jobs.	2	Yes
	Inability to track and account for individuals within facilities	Further develop current prototype sensor-based location systems (e.g., GLANSER [Geospatial Location Accountability Navigation System for First Responders] developed by the Department of Homeland Security) to increase their robustness and reduce their costs for corrections environments.	2	
	Inability to track and account for individuals within facilities	Work with staff and unions to address resistance to comprehensive tracking of employees in facilities.[a]	2	
	Grievances and lawsuits resulting from negative interactions between staff and inmates	In the absence of full CCTV coverage in facilities, deploy person-worn cameras to deter frivolous complaints and provide evidence to respond to complaints that are made.	2	
	Video analytics coupled with CCTV as a potential solution to tracking personnel and inmate movement through facilities, increasing staff accountability	Adapt existing technology to better address challenges of the institutional environment, including the presence of many comparably dressed people in poor lighting conditions.[a]	3	
General	High volume of data, much of it difficult to analyze, generating data overload and making analysis of not cost-effective	Change policies and practice to make it possible to automate data collection that is currently manual to conserve staff time for analysis.	2	
Surveillance/ monitoring: Fixed surveillance and detection	Inability to listen to more than a small percentage of inmate telephone conversations due to the labor intensity of monitoring	Develop automated tools for transcribing inmate telephone calls, enabling rapid (and accurate) keyword analysis and other pattern recognition.	1	
	Contraband coming into facilities *at fence lines*	Use available infrared sensor–based fencing (e.g., FLIR Thermal Fence™) for perimeter security.	1	Yes
	Contraband coming into facilities *at fence lines*	Commercialize military-developed surveillance technologies for use in the corrections environment.	1*	
	Contraband coming into facilities *through logistics systems*	Develop higher throughput and cheaper scanning technologies to scan incoming logistical shipments to facilities.	1	Yes

Table E.3—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
	Contraband coming into facilities *transported by visitors, staff, or incoming inmates*	Develop a single overall scanning portal suitable for detecting all types of contraband for individuals coming into the facility (e.g., millimeter wave, including explosive trace detection) *at reasonable cost and a small enough footprint for use in existing facilities*.	1	
	Inability to listen to inmate calls in foreign languages	Develop automated tools for *translating* and transcribing inmate telephone calls, enabling rapid (and accurate) keyword analysis and other pattern recognition.	1	
	High cost of current fence line cut detection systems	Validate performance of fiber-optic cut-detection systems in a corrections environment.	2	
	Biometrics as an opportunity to improve asset tracking within facilities	Use biometrics for asset and inventory tracking, management, and control in facilities.[a]	2	
	Difficulties tracking inmate identity for transfers (to court, etc.) to maintain secure custody	Develop a cost-effective application of biometrics to track inmate identity, supported by a local database to provide fast enough verification time to be practical.	2	
	Automated license plate recognition as a potential opportunity to detect visits to facilities by known bad actors (e.g., inmate gang connections)	Implement a demonstration project to assess the value of automated license plate recognition deployment as part of perimeter security (e.g., via cooperative efforts with police organizations).	2	
	Inability to track and account for individuals within facilities	Use biometric check-in and check-out to provide an overall accountability solution at the facility level (though limits in the practicality of wide implementation likely mean it cannot provide full internal accountability).	2	
	High intensity for staff of inmate suicide prevention procedures	Improve currently available sensor-based systems to reduce false alarms and countermeasure opportunities.	3	
Surveillance/ monitoring: Mobile surveillance and detection	Inability to track and account for individuals within facilities	*Reduce costs* of RFID tracking technologies where deployment is practical in the corrections environment.	2	
	Difficulty managing gang presence within facilities	Develop information collection tools to identify and track gang activities and members, coupled with policies and procedures to manage interactions of members using fewer staff and resources.	2	Yes
	Contraband coming into facilities *at fence lines*	Develop cost-effective UAV technology suitable for perimeter monitoring.[a]	1*	

Table E.3—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
	Inability to track and account for individuals within facilities	Further develop current prototype sensor-based location systems (e.g., GLANSER [Geospatial Location Accountability Navigation System for First Responders] developed by the Department of Homeland Security) to increase their robustness and reduce their costs for corrections environments.[a]	2	
	Video analytics coupled with CCTV as a potential solution to tracking personnel and inmate movement through facilities, increasing staff accountability	Adapt existing technology to better address challenges of the institutional environment, including the presence of many comparably dressed people in poor lighting conditions.[a]	3	
Surveillance/ monitoring: Specialized task information collection tools	Inmate use of social media inside facilities (e.g., via contraband cell phones) for communication	Adapt available automated tools for doing social media analysis of inmate activity to the needs of and constitutional concerns associated with use by corrections agencies (e.g., identifying links between inmates and corrections staff).	1*	
	Challenges assessing inmate truthfulness in investigations and other interactions	Develop deception detection tools that perform better and at affordable cost.	3	
Information delivery (including communications)				
Fixed location communications: Video	Difficulty meeting the needs of special needs inmates	Develop reduced-cost video interpretation technologies for hard-of-hearing inmates.	2	Yes
	Difficulty meeting the needs of special needs inmates	Develop technologies or other strategies to provide alternative modes of communication (e.g., video for visitation by deaf population) for special needs populations.	2	
Mobile communications: Personnel communications	Continuing problems with radio interoperability, despite available technological solutions	Develop and implement governance structures to address competing communications priorities of different agencies and sustain interoperability over time.	2	
	Limited information available to staff on inmate history, medication, etc. during interactions, reducing effectiveness	Develop mobile devices that securely deliver inmate information (identity for counts, medications, health status, etc.) as staff move around the facility.	2	
Information management (including sharing)				
IT systems for managing mission-related data	High intensity for staff of inmate behavioral management models	Develop technological inmate behavior tracking systems (e.g., a centralized and easy repository for staff to keep notes) that enables positive behavioral management at lower personnel and other costs.	2	

Table E.3—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
System integration and information-sharing	Lack of information-sharing between corrections and mental health agencies	Develop information-sharing technologies linking corrections agencies' systems to mental health agencies to allow timely notification of individuals with specific needs (mental health, substance abuse, housing, employment) so that care can be started or continued on entry or release.	2	
	Lack of situational awareness information for outside response teams coming to incidents in corrections facilities	Deploy a secure system to deliver blueprint data to outside responders as needed in real time via mobile devices.	2	Yes
	Lack of situational awareness information for outside response teams coming to incidents in corrections facilities	Utilize video standards to enable real-time sharing of video during an incident (inside and outside) as needed, with sufficient security.	1*	
	Data system interoperability problems among agencies who have useful data (and even within single agencies), limiting cross-agency sharing	Use data standards for information systems to ensure that independently procured systems from different agencies can export and share data.	2	
	High volume of data, much of it difficult to analyze, generating data overload and making analysis of not cost-effective	Develop a standards-based, readily available, low-cost system architecture to provide a starting point for agencies to link their data sets internally and with other agencies' systems.	3	
Information technology - basic systems				
Infrastructure: Information technology, hardware, networks/ capacity, and connectivity	Older and less-capable camera system infrastructure (e.g., low resolution of analog systems), limiting the ability to integrate new technologies	Replace pieces of older systems to become compatible with new technologies, and when designing new networks, include headroom for future technologies.	2	
	Existing information technology networks that are not robust enough or do not have sufficient capacity to accommodate convergence of many security technologies requiring bandwidth	Add network features to prioritize network traffic from different security technologies to use available capacity efficiently.	3	Yes

[a] This need was associated with more than one subcategory, so it is listed more than once.

Table E.4
Vehicle Needs for Institutional Corrections

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
Aircraft				
Unmanned aerial vehicles	Contraband coming into facilities *at fence lines*	Develop cost-effective UAV technology suitable for perimeter monitoring.	1*	
	Tethered UAVs as potential alternative for overhead surveillance at facilities	Validate performance of tethered UAVs as an alternative approach for overhead surveillance.	3	
Associated technologies				
Internal modifications	Side airbags not compatible with caging in inmate transport vehicles	Develop better safety technologies compatible with the hardware that needs to be in corrections vehicles.	3	
Ground				
Bicycles	Low durability of hybrid vehicles for perimeter patrol	Explore alternative modes of transport, such as bicycles, for perimeter patrol activities.	2	
Specialized ground vehicles	Traffic at downtown facilities, preventing standard perimeter patrol using traditional vehicles	Substitute golf carts or other smaller vehicles for perimeter units at such locations.	2	
	Low durability of hybrid vehicles for perimeter patrol	Use specialized vehicles that are better suited for perimeter patrol, but at reasonable operating cost (e.g., diesels are better, but too expensive).	3	
Unmanned ground vehicles	Ground-based robots as a potential opportunity for managing incidents	Develop ground-based robots with sufficient agility to navigate a trashed housing unit and sufficient stealth to be useful.	3	

Table E.5
Doctrine, Tactics, Management, and Behavioral Knowledge Development and Training Needs for Institutional Corrections

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
Management/leadership knowledge development and training				
Acquisition and technology decisionmaking	Contraband coming into facilities *by varied routes*	Develop doctrine for implementing a systematic approach to contraband prevention so that improvements in security at one route do not simply just displace transport to other routes.	1	Yes
	Technology providers of management and monitoring systems with contractual control or ownership of agency data, locking facilities to a single provider's products	Make changes in contracting policy to ensure data are owned and controlled by the corrections agency, and require (if needed) conversion to standard data formats at contract conclusion for use with alternative systems.	2	Yes
	New vendor-driven business models (e.g., video visitation, inmate email systems) conflicting with other system goals, even if they provide revenue to agencies	Develop policies to require vendors to ensure access to services to individuals who cannot pay for new modes (e.g., low-income inmate families who may not be able to afford remote video visitation costs).	2	Yes
	New vendor-driven business models (e.g., video visitation, inmate email systems) conflicting with other system goals, even if they provide revenue to agencies	Develop decision tools to structure the cost-benefit analyses of new service models that better weigh assessment of security and other implications against their potential revenue benefits.	2	
	Apparent planned obsolescence of technology systems procured by agencies, forcing replacement (e.g., replacement parts for existing systems being phased out)	Make changes in procurement policy and practice to require sufficient contract terms that include service and maintenance.	2	Yes
	Apparent planned obsolescence of technology systems procured by agencies, forcing replacement (e.g., replacement parts for existing systems being phased out)	Collect information during procurement and analyze tools to help predict the longevity of suppliers (e.g., submission of financials at time of bid).	3	
	Proprietary features and architectures built into technology systems that lock agencies into single suppliers	Make changes in procurement policy and practice to structure contracts and require compliance with technology standards to prevent proprietary lock-in.	3	Yes
	Educational and entertainment suppliers that link available content to proprietary hardware, locking facilities to that supplier	Develop contracts and procurement practices that require the ability to use third-party material on systems designed to deliver educational and other content to inmates.	3	
	High resource, energy, and infrastructure costs	Identify suppliers and explore contract opportunities for upgrading to more-energy-efficient technologies without initial costs (i.e., compensating a supplier over time with some percentage of energy savings).	3	

Table E.5—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
Doctrine and strategy for carrying out agency missions	Poor resource coordination in real time at large-scale incidents, where success depends on using common resources effectively	Universally adopt ICS/NIMS for all agencies.	1	Yes
	Poor resource coordination in real time at large-scale incidents, where success depends on using common resources effectively	Hold a greater number of interagency exercises to build relationships between agencies and bolster preparedness.	1	Yes
	Poor resource coordination in real time at large-scale incidents, where success depends on using common resources effectively	Develop and use cross-agency memoranda of understanding and common practices for large-scale incidents.	1	Yes
	Low agency budgets, restricting ability to implement currently known best practices	Continue federal efforts to research and evaluate criminal justice programs that work and can be broadly implemented.	1	
	Breakdowns in interagency cooperation for delivering inmate services (e.g., departments of transportation to provide driver's licenses before reentry to society; departments of health to deliver medical services)	Develop and use cross-agency memoranda of understanding and common practices for exchanging interagency information and coordinating services.	2	
	Issues implementing PREA requirements	Implement policies, procedures, and a budget to support changes in internal practices and architecture to become compliant.	2	
	Limited ways to alert the public about incidents at corrections facilities (e.g., escapes)	Link corrections to the federal wireless emergency alert system to provide alerts on corrections-related events.	2	
Organizational and human resources policy and practice	Contraband coming into facilities *by employees*	Develop and implement policies and practices to systematically search all employees coming into facilities.	1	Yes
	Contraband coming into facilities *by employees*	Work with staff and unions to address resistance to comprehensive monitoring and searching of employees.	1*	
	Inability to track and account for individuals within facilities	Work with staff and unions to address resistance to comprehensive tracking of employees in facilities.	2	
	Concerns about corrections workers abusing benefit programs like workers compensation or Family and Medical Leave Act	Provide risk management training for leadership and supervisors to educate them on the rules for these issues and provide tools to assess requests.	2	
	Insufficient organizational performance management systems	Share lessons learned about established and useful performance measures across the community so agencies can learn from each other.	2	

Table E.5—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
	Insufficient leadership training and succession planning to address retiring senior personnel	Develop succession planning and leadership development programs to groom the next generation of corrections leaders.	2	Yes
	Issues implementing PREA requirements	Recruit sufficient female staff to supervise female inmates.	3	
	Increasing staffing costs	Reduce roles within the agency filled by certified corrections officers.	3	
Officer/practitioner knowledge development and training				
Policies and knowledge for carrying out roles	Lack of training and staff resources to address inmate mental health issues	Develop comprehensive video-based training (updated regularly) to train staff on needs, medication, and other requirements to manage inmate mental health issues.	1	Yes
	Difficulty efficiently managing inmate populations across multifacility systems	Develop *policies and practices* to identify early the requirements for inmates' education, health, court, etc., to match them with facilities that can provide those services, avoiding the need for later transfer.	1	
	High cost of in-person training for large numbers of staff	Develop models to provide appropriate credit for training obtained elsewhere (e.g., at practitioner conferences) to meet training mandates.	2	Yes
	Difficulty meeting the needs of special needs inmates	Provide improved staff training addressing common issues with elderly prisoners (e.g., mental health, dementia, Alzheimer's disease).	2	Yes
	Difficulty meeting the needs of special needs inmates	Develop guidelines and best practices for inmate classification to help with housing and other service decisions for LGBTI inmates (with an emphasis on PREA compliance).	2	
	High intensity for staff of inmate suicide prevention procedures	Explore peer-facilitated suicide watch models where inmates supervise each other to detect suicidal behavior.	2	
	Challenges to population management due to increases in protective custody requests (and other inmate strategies to qualify for single-bed cells)	Develop better procedures and requirements for requesting protective custody and decision tools for when inmates should be returned to the general population.	2	Yes
Tactics and practices	Inmate abusive behavior that goads staff into an inappropriate response	Deliver training to prepare staff to respond to abusive and high-pressure situations (e.g., verbal judo).	2	
	Wellness challenges leading to early mortality for corrections staff	Perform evaluation to identify best practices for using meditation or other sight and sound interventions (relevant to inmates and staff) to reduce stress.	3	
Technology use and application	Wellness challenges leading to early mortality for corrections staff	Evaluate the effectiveness of tools that let staff track their fitness activities to identify their wellness benefits.	3	

Table E.5—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Ranking Tier	Low-Hanging Fruit Candidate?
Societal/legal knowledge development and innovation				
	Shift in prison population to jails (e.g., California realignment efforts), challenging jail space management	Develop alternatives to incarceration, such as intensive monitoring for parts of the offender population (e.g., individuals convicted of driving under the influence).	1	
	Shift in prison population to jails (e.g., California realignment efforts), challenging jail space management	As appropriate, divert inmates to outside service providers (e.g., mental health treatment) rather than incarceration.	1	
	Shift in prison population to jails (e.g., California realignment efforts), challenging jail space management	Work with the court system to set bail amounts that reduce the number of pretrial inmates held in custody, yet still managing risk.	2	
	Difficulty meeting the needs of special needs inmates	Make statute changes to provide different strategies for elderly prisoners outside of the institutional environment (e.g., medical parole, community release, hospice, nursing homes).	2	
	Low agency budgets, restricting ability to implement currently known best practices	Implement a true justice reinvestment model to provide agencies access to a pool of funds to draw on to pay the start-up costs for new evidence-based practices or programs.	1*	
Specialist/technologist knowledge development and training				
Policies and knowledge for carrying out roles	High-pressure work environment, leading to staff mental health issues, including suicide	Train individuals in employee assistance programs so that they can better relate to a corrections environment and the rigors of the job.	2	Yes
Tactics and practices	In the case of an accident, difficulties for emergency services to enter inmate transport vehicles due to security measures	Develop guidelines for emergency response agencies to prepare them to respond to fortified corrections vehicles (e.g., use hydraulic tools more often than for standard vehicles).	3	
Technology-mediated training tools				
	High cost of in-person training for large numbers of staff	Improve available computer-based training to reduce training costs and allow training at facilities rather than requiring staff to be pulled from their roles.	2	
	Low level of staff training in use of force/weapons and reduced number of weapon-certified staff due to training costs	Develop low-cost alternatives to being at a gun range to train on firearms and nonlethal weapons, such as appropriate simulations.	2	
	High cost of in-person training for large numbers of staff	Develop better video training approaches, with content that better meets the needs of corrections audiences.	2	Yes

Table E.6
Top Five Institutional Corrections Needs for Each Objective, by Expected Value

Objective	Category	Subcategories		Problem or Opportunity	Associated Need
Facilitate positive behavioral change	Doctrine, tactics, management, and behavioral knowledge development and training	Officer/practitioner knowledge development and training	Policies and knowledge for carrying out roles	Difficulty efficiently managing inmate populations across multifacility systems	Develop *policies and practices* to identify early the requirements for inmates' education, health, court, etc., to match them with facilities that can provide those services, avoiding the need for later transfer.
	Doctrine, tactics, management, and behavioral knowledge development and training	Management/ leadership knowledge development and training	Acquisition and technology decisionmaking	New vendor-driven business models (e.g., video visitation, inmate email systems) conflicting with other system goals, even if they provide revenue to agencies	Develop policies to require vendors to ensure access to services to individuals who cannot pay for new modes (e.g., low-income inmate families who may not be able to afford remote video visitation costs).
	Doctrine, tactics, management, and behavioral knowledge development and training	Societal/legal knowledge development and innovation		Shift in prison population to jails (e.g., California realignment efforts), challenging jail space management	Develop alternatives to incarceration, such as intensive monitoring for parts of the offender population (e.g., individuals convicted of driving under the influence).
	Information and communications	Information analysis	Computational tools	Difficulty efficiently managing inmate populations across multifacility systems	Develop *analysis tools* to identify early the requirements for inmates' education, health, court, etc., to match them with facilities that can provide those services, avoiding the need for later transfer.
	Information and communications	Information management (including sharing)	IT systems for managing mission-related data	High intensity for staff of inmate behavioral management models	Develop technological inmate behavior tracking systems (e.g., a centralized and easy repository for staff to keep notes) that enables positive behavioral management at lower personnel and other costs.
Protect victims	Information and communications	Information collection	Surveillance/ monitoring: Fixed surveillance and detection	Inability to listen to more than a small percentage of inmate telephone conversations due to the labor intensity of monitoring	Develop automated tools for transcribing inmate telephone calls, enabling rapid (and accurate) keyword analysis and other pattern recognition.
	Facility operations and population services	Internal environment control		Inmate access to technology, creating internal security and management challenges (e.g., access to unauthorized content, gaming of systems for communication within the facility)	Implement stringent, already-available web filtering software to allow access only to specific Internet sites.

Table E.6—Continued

Objective	Category	Subcategories		Problem or Opportunity	Associated Need
	Information and communications	Information collection	Surveillance/ monitoring: Fixed surveillance and detection	Inability to listen to inmate calls in foreign languages	Develop automated tools for *translating* and transcribing inmate telephone calls, enabling rapid (and accurate) keyword analysis and other pattern recognition.
	Information and communications	Information collection	Surveillance/ monitoring: Mobile surveillance and detection	Difficulty managing gang presence within facilities	Develop information collection tools to identify and track gang activities and members, coupled with policies and procedures to manage interactions of members using fewer staff and resources.
	Doctrine, tactics, management, and behavioral knowledge development and training	Management/ leadership knowledge development and training	Doctrine and strategy for carrying out agency missions	Issues implementing PREA requirements	Implement policies, procedures, and a budget to support changes in internal practices and architecture to become compliant.
Hold offenders accountable	Information and communications	Information collection	Surveillance/ monitoring: Fixed surveillance and detection	Inability to listen to more than a small percentage of inmate telephone conversations due to the labor intensity of monitoring	Develop automated tools for transcribing inmate telephone calls, enabling rapid (and accurate) keyword analysis and other pattern recognition.
	Information and communications	Information collection	Internal data collection: Organizational performance management	Inability to track incidents within a facility to detect patterns (e.g., in medical cases, complaints, or inmate grievances)	Develop automated data analysis tools to *rapidly* identify trends in internal data systems (i.e., without the lag involved in many centralized analytic processes), using improved CompStat methods for corrections.
	Facility operations and population services	Internal environment control		Inmate ability to circumvent security and control features on electronic devices provided to them for education and other purposes	Develop a secure operating system for inmate electronic devices to limit circumvention opportunities.
	Information and communications	Information management (including sharing)	IT systems for managing mission-related data	High intensity for staff of inmate behavioral management models	Develop technological inmate behavior tracking systems (e.g., a centralized and easy repository for staff to keep notes) that enables positive behavioral management at lower personnel and other costs.

Table E.6—Continued

Objective	Category	Subcategories		Problem or Opportunity	Associated Need
	Facility operations and population services	Internal environment control		Inmate access to technology, creating internal security and management challenges (e.g., access to unauthorized content, gaming of systems for communication within the facility)	Implement stringent, already-available web filtering software to allow access only to specific Internet sites.
Protect the public	Doctrine, tactics, management, and behavioral knowledge development and training	Management/ leadership knowledge development and training	Doctrine and strategy for carrying out agency missions	Poor resource coordination in real time at large-scale incidents, where success depends on using common resources effectively	Universally adopt ICS/NIMS for all agencies.
	Doctrine, tactics, management, and behavioral knowledge development and training	Management/ leadership knowledge development and training	Doctrine and strategy for carrying out agency missions	Poor resource coordination in real time at large-scale incidents, where success depends on using common resources effectively	Hold a greater number of interagency exercises to build relationships between agencies and bolster preparedness.
	Information and communications	Information collection	Surveillance/ monitoring: Fixed surveillance and detection	Inability to listen to more than a small percentage of inmate telephone conversations due to the labor intensity of monitoring	Develop automated tools for transcribing inmate telephone calls, enabling rapid (and accurate) keyword analysis and other pattern recognition.
	Facility operations and population services	Internal environment control		Inmate access to technology, creating internal security and management challenges (e.g., access to unauthorized content, gaming of systems for communication within the facility)	Implement stringent, already-available web filtering software to allow access only to specific Internet sites.
	Doctrine, tactics, management, and behavioral knowledge development and training	Management/ leadership knowledge development and training	Doctrine and strategy for carrying out agency missions	Poor resource coordination in real time at large-scale incidents, where success depends on using common resources effectively	Develop and use cross-agency memoranda of understanding and common practices for large-scale incidents.

Table E.6—Continued

Objective	Category	Subcategories		Problem or Opportunity	Associated Need
Save money or time	Doctrine, tactics, management, and behavioral knowledge development and training	Technology-mediated training tools		Low level of staff training in use of force/weapons and reduced number of weapon-certified staff due to training costs	Develop low-cost alternatives to being at a gun range to train on firearms and nonlethal weapons, such as appropriate simulations.
	Doctrine, tactics, management, and behavioral knowledge development and training	Officer/practitioner knowledge development and training	Policies and knowledge for carrying out roles	High cost of in-person training for large numbers of staff	Develop models to provide appropriate credit for training obtained elsewhere (e.g., at practitioner conferences) to meet training mandates.
	Doctrine, tactics, management, and behavioral knowledge development and training	Technology-mediated training tools		High cost of in-person training for large numbers of staff	Improve available computer-based training to reduce training costs and allow training at facilities rather than requiring staff to be pulled from their roles.
	Doctrine, tactics, management, and behavioral knowledge development and training	Technology-mediated training tools		High cost of in-person training for large numbers of staff	Develop better video training approaches, with content that better meets the needs of corrections audiences.
	Doctrine, tactics, management, and behavioral knowledge development and training	Management/ leadership knowledge development and training	Acquisition and technology decisionmaking	Apparent planned obsolescence of technology systems procured by agencies, forcing replacement (e.g., replacement parts for existing systems being phased out)	Make changes in procurement policy and practice to require sufficient contract terms that include service and maintenance.
Improve capabilities	Doctrine, tactics, management, and behavioral knowledge development and training	Management/ leadership knowledge development and training	Doctrine and strategy for carrying out agency missions	Poor resource coordination in real time at large-scale incidents, where success depends on using common resources effectively	Hold a greater number of interagency exercises to build relationships between agencies and bolster preparedness.
	Doctrine, tactics, management, and behavioral knowledge development and training	Technology-mediated training tools		Low level of staff training in use of force/weapons and reduced number of weapon-certified staff due to training costs	Develop low-cost alternatives to being at a gun range to train on firearms and nonlethal weapons, such as appropriate simulations.

Table E.6—Continued

Objective	Category	Subcategories		Problem or Opportunity	Associated Need
	Doctrine, tactics, management, and behavioral knowledge development and training	Officer/practitioner knowledge development and training	Policies and knowledge for carrying out roles	High cost of in-person training for large numbers of staff	Develop models to provide appropriate credit for training obtained elsewhere (e.g., at practitioner conferences) to meet training mandates.
	Doctrine, tactics, management, and behavioral knowledge development and training	Officer/practitioner knowledge development and training	Policies and knowledge for carrying out roles	Lack of training and staff resources to address inmate mental health issues	Develop comprehensive video-based training (updated regularly) to train staff on needs, medication, and other requirements to manage inmate mental health issues
	Doctrine, tactics, management, and behavioral knowledge development and training	Management/ leadership knowledge development and training	Organizational and human resources policy and practice	Insufficient leadership training and succession planning to address retiring senior personnel	Develop succession planning and leadership development programs to groom the next generation of corrections leaders.
Improve health	Information and communications	Information collection	Internal data collection: personnel management and performance monitoring tools	High-pressure work environment, leading to staff mental health issues, including suicide	Improve methods to identify individuals working in high-stress positions (e.g., mental health units) that should be rotated out for decompression time.
	Information and communications	Information analysis	Individual analytical methods	High-pressure work environment, leading to staff mental health issues, including suicide	Develop tools to identify the right periods for individuals to occupy high-stress positions and for rotation out for decompression and recovery.
	Doctrine, tactics, management, and behavioral knowledge development and training	Officer/practitioner knowledge development and training	Policies and knowledge for carrying out roles	Lack of training and staff resources to address inmate mental health issues	Develop comprehensive video-based training (updated regularly) to train staff on needs, medication, and other requirements to manage inmate mental health issues.
	Doctrine, tactics, management, and behavioral knowledge development and training	Specialist/ technologist knowledge development and training	Policies and knowledge for carrying out roles	High-pressure work environment, leading to staff mental health issues, including suicide	Train individuals in employee assistance programs so that they can better relate to a corrections environment and the rigors of the job.

Table E.6—Continued

Objective	Category	Subcategories		Problem or Opportunity	Associated Need
	Information and communications	Information collection	Internal data collection: Personnel management and performance monitoring tools	High-pressure work environment, leading to staff mental health issues, including suicide	Provide access to resources to address posttraumatic stress disorder and other issues that returning veteran workers bring to corrections jobs.
Reduce casualties	Doctrine, tactics, management, and behavioral knowledge development and training	Management/ leadership knowledge development and training	Doctrine and strategy for carrying out agency missions	Poor resource coordination in real time at large-scale incidents, where success depends on using common resources effectively	Universally adopt ICS/NIMS for all agencies.
	Doctrine, tactics, management, and behavioral knowledge development and training	Management/ leadership knowledge development and training	Doctrine and strategy for carrying out agency missions	Poor resource coordination in real time at large-scale incidents, where success depends on using common resources effectively	Hold a greater number of interagency exercises to build relationships between agencies and bolster preparedness
	Information and communications	Information analysis	Computational tools	Inability to track incidents within a facility to detect patterns (e.g., in medical cases, complaints, or inmate grievances)	Develop automated data analysis tools to *rapidly* identify trends in internal data systems (i.e., without the lag involved in many centralized analytic processes), using improved CompStat methods for corrections.
	Information and communications	Information collection	Internal data collection: Personnel management and performance monitoring tools	High-pressure work environment, leading to staff mental health issues, including suicide	Improve methods to identify individuals working in high-stress positions (e.g., mental health units) that should be rotated out for decompression time.
	Information and communications	Information analysis	Individual analytical methods	High-pressure work environment, leading to staff mental health issues, including suicide	Develop tools to identify the right periods for individuals to occupy high-stress positions and for rotation out for decompression and recovery.

NOTE: Table includes five top-rated needs for each objective. When the same need appeared twice in an objective's top five (because it had been categorized into two taxonomy categories), it is shown to be associated with only one taxonomy category.

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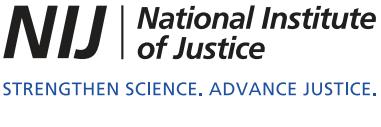
The agencies of the U.S. corrections enterprise manage offenders confined in prisons and jails and those who have been released into the community on probation and parole. The enterprise is one of the three central pillars of the criminal justice system, along with police and the courts. Corrections agencies face major challenges from declining budgets, increasing populations under supervision, problems of equity and fairness in administrating justice, and other concerns. To better achieve its objectives and play its role within the criminal justice enterprise, the sector needs innovation in corrections technology, policy, and practice. This report draws on published literature and new structured deliberations of a practitioner Corrections Advisory Panel to frame an innovation agenda. It identifies and prioritizes potential improvements in technology, policy, and practice in both community and institutional corrections. Some of the top-tier needs identified by the panel and researchers include adapting transcription and translation tools for the corrections environment, developing training for officers on best practices for managing offenders with mental health needs, and changing visitation policies (for example, using video visitation) to reduce opportunities for visitors to bring contraband into jails and prisons. Such high-priority needs provide a menu of innovation options for addressing key problems or capitalizing on emerging opportunities in the corrections sector. This report is part of a larger effort to assess and prioritize technology and related needs across the criminal justice community for the National Institute of Justice's National Law Enforcement and Corrections Technology Center system.



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