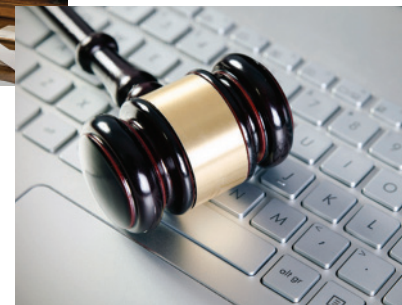


Fostering Innovation in the U.S. Court System

Identifying High-Priority Technology and Other Needs for Improving Court Operations and Outcomes



Brian A. Jackson, Duren Banks, John S. Hollywood, Dulani Woods, Amanda Royal, Patrick W. Woodson, Nicole J. Johnson

PRIORITY
Criminal Justice
NEEDS INITIATIVE

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

For more information on this publication, visit www.rand.org/t/RR1255

Library of Congress Cataloging-in-Publication Data is available for this publication.

ISBN: 978-0-8330-9535-0

Published by the RAND Corporation, Santa Monica, Calif.

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This project was supported by Award No. 2013-MU-CX-K003, awarded by the National Institute of Justice, Office of Justice Programs, U.S. Department of Justice. The opinions, findings, and conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect those of the Department of Justice.

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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 RTI International. It presents the results of the Courts Advisory Panel, a group convened in fiscal year 2015 as part of the NLECTC Priority Criminal Justice Needs Initiative to identify current challenges and innovation needs in the U.S. court system. This report and the results it presents should be of interest primarily to organizations and individuals involved with technology planning, research funding, and product development related to the U.S. court system. This is the second in a series of separate sector-level reports on corrections, courts, and law enforcement intended to inform NIJ's program and research planning. For broader policy-maker and public audiences, this report provides a window into problems identified with current court practices and possible solutions for improving performance going forward.

Other RAND research reports from the Priority Criminal Justice Needs Initiative that might be of interest include:

- Brian A. Jackson, Joe Russo, John S. Hollywood, Dulani Woods, Richard Silbergliitt, George B. Drake, John S. Shaffer, Mikhail Zaydman, and Brian G. Chow, *Fostering Innovation in Community and Institutional Corrections: Identifying High-Priority Technology and Other Needs for the U.S. Corrections Sector*, Santa Monica, Calif.: RAND Corporation, RR-820-NIJ, 2015.
- John S. Hollywood, John E. Boon, Jr., Richard Silbergliitt, Brian G. Chow, and Brian A. Jackson, *High-Priority Information Technology Needs for Law Enforcement*, Santa Monica, Calif.: RAND Corporation, RR-737-NIJ, 2015.
- Sean E. Goodison, Robert C. Davis, and Brian A. Jackson, *Digital Evidence and the U.S. Criminal Justice System: Identifying Technology and Other Needs to More Effectively Acquire and Utilize Digital Evidence*, Santa Monica, Calif.: RAND Corporation, RR-890-NIJ, 2015.

RAND Justice Policy

The research reported here was conducted in the RAND Justice Policy Program, which spans both criminal and civil justice system issues, with such topics as public safety, effective policing, police-community relations, drug policy and enforcement, corrections policy, use of technology in law enforcement, tort reform, catastrophe and mass injury compensation, court resourcing, and insurance regulation. 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 at Brian_Jackson@rand.org. For more information about the Justice Policy Program, see www.rand.org/jie/justice-policy or contact the director at justice@rand.org. For more information about the NLECTC Priority Criminal Justice Needs Initiative, see www.rand.org/jie/justice-policy/projects/priority-criminal-justice-needs.

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Summary

Society relies on the judicial system to play numerous roles. It is the link between law enforcement and the corrections system and serves as a check on their power over citizens. Beyond the realm of criminal law, the justice system adjudicates disputes, serving as a venue for negotiation and resolution of various issues, from defining the details of a contract that might affect only a handful of people to establishing and compensating harms affecting thousands or even millions of individuals. In playing these roles, courts from the federal to the state and local levels today are challenged by high caseloads and resource constraints that limit their ability to execute these roles effectively; concerns over security of court facilities; increasing needs to share information and collaborate via innovative models, such as problem-solving courts focused on substance abuse or mental health; racial and economic disparities in justice outcomes; increasing numbers of people seeking to navigate legal proceedings without representation; and technological changes that can be both boon and challenge to the functioning of the courts.

For the courts to adapt to these challenges and take advantage of new opportunities to improve their ability to play their critical roles, the court system needs innovation. Use of new technologies could result in better data management and sharing across the criminal justice system. Changes in policy could enable new approaches to address disparities or assist individuals who choose to represent themselves in court proceedings. Changes in practice could contribute to improving court security, while still maintaining public access to the proceedings and decisionmaking in the judicial branch of government.

As part of the Priority Criminal Justice Needs Initiative sponsored by the National Institute of Justice, the RAND Corporation and RTI International teamed up to identify current challenges and innovation needs in the U.S. court system. The goal of this project was to develop an *innovation agenda*—that is, to identify changes in technology, policy, and practice that could address problems faced by courts today or enable them to improve their efficiency and effectiveness going forward. To do that, we convened a Courts Advisory Panel, made up of judges, prosecutors, defense counsel, and court administrators from around the country. Through a structured brainstorming process, we asked them about the problems courts face today and, more importantly, what courts need to address those problems. Those “court needs” could include things courts themselves should do (such as use a new technology that is not currently being used), things researchers or technologists should do (such as evaluate whether a change in court practice is likely to be valuable), things government broadly defined should do (such as address funding constraints that limit the ability to innovate), and things the public needs to do (such as advocate for changes in law to address current roadblocks to better court performance).

The panel identified a large number of needs: The judge, attorney, and court administrator working groups together identified more than 130 needs. To move from that wide-ranging list to a focused innovation agenda for the court system, the panel members scored each need based on (1) how valuable it would be to the court system if met, (2) how technically straightforward it would be to achieve, and (3) whether it would be broadly adopted by courts if achieved. These scores made it possible for us to think about the needs and then organize them into three groups:

- *high priority*: the needs that were rated highly across all three measures
- *high value*: needs that might be very beneficial, but were rated lower on the other two measures because they were tough to accomplish
- *low-hanging fruit*: needs that were rated as easy to meet and would be broadly adopted, but scored as less valuable than other needs on the list.¹

These three groups of needs defined the innovation agenda that came out of the panel deliberations. This agenda provides potential building blocks for technology developers, research funders, or court systems to assemble a portfolio balancing investments that are valuable but risky with those that are less valuable but more certain, built around a core of the highest-priority needs that the panel viewed as both valuable and likely to succeed.

A Court Innovation Agenda Focused on Information and Communications Tools and Practices

The initial list of more than 130 needs identified by the panel covered a wide range, from technology and training to changes in legislation and shifts in funding models for the courts. In analyzing the list, we found that it was about equally split between (1) needs related to information and communications (including not just information technology but the application of data collection, analysis, and other tools) and (2) innovations in doctrine and knowledge, regarding the courts' governing policies and how the courts carry out their tasks; just a handful of needs were related to court facilities.²

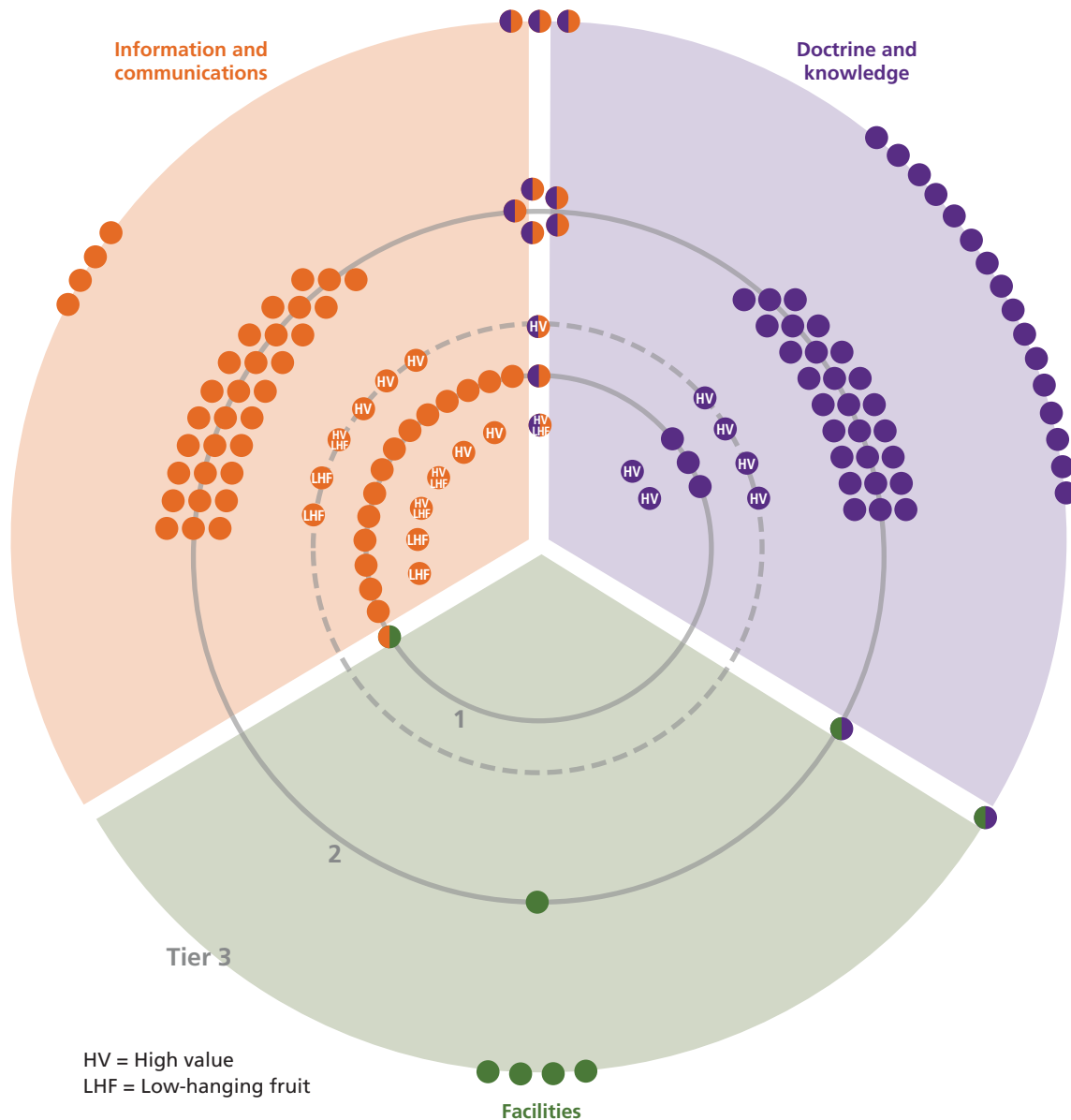
But when the panel scored needs based on value and feasibility, its priorities became much more focused. Figure S.1 shows how all the needs identified by the panel were prioritized, as well as those that make up the innovation agenda (the needs falling on or inside the dotted line at the center of the figure). The needs were first broken into three tiers based on the combination of their value and likelihood of success, and then needs meeting the definition of high value or low-hanging fruit were identified and pulled out.

The court innovation agenda is dominated by information and communications needs (orange icons, top left), which made up the majority not just of the high-priority needs (falling on and within the Tier 1 line at the center of the figure) but also of needs identified as high value (labeled HV in the figure) and low-hanging fruit (labeled LHF in the figure). Although

¹ These groups are not mutually exclusive.

² Some of the identified needs bridged these two categories, and so were included in both when we assembled the innovation agenda.

Figure S.1
Building the Court Innovation Agenda



NOTE: Needs on and inside the dotted line compose the innovation agenda.

RAND RR1255-S.1

many needs were related to doctrine and knowledge (purple icons, top right) were included in the full list, they were only a fraction of the eventual agenda.

Table S.1 presents the needs that constitute the innovation agenda, including all of those needs falling inside the dotted line at the center of Figure S.1. For needs that fell between categories (e.g., the single need falling between the facilities category and the information and communications category in the figure), we list the need twice in the table, once in each category. Corresponding to the dots in the figure, the far-right columns of the table identify how each need was grouped by the panel.

Table S.1
Needs Included in the Court Innovation Agenda

Category	Problem or Opportunity	Associated Need	High Priority	High Value	Low-Hanging Fruit
Information and communications	Shortfalls in the ability to notify individuals in the court building during emergencies	Adopt commercial alerting tools, which are available but not widely used.	◆		
	Reliance on technological systems for court functioning, which can create new concerns for continuity of operations when systems become overwhelmed or fail	Design systems with backup capabilities and prioritize technology support to focus on restoring critical systems when they go down. Develop, exercise, and implement response plans to address technology failure. ^a	◆	◆	◆
	Maintaining continuity of operations during natural or other events	Ensure that electronic and other court data have robust backups and that courts have sufficient control over the data storage to permit this.	◆	◆	◆
	More-complicated cases, more materials, and more third-party information as a result of technology, which is so integrated into the lives of defendants, victims, and police, creating challenges for both prosecutors and defenders	Examine technologies to help organize and analyze large volumes of more-complicated information. Though some commercial tools are available, courts need a better understanding of how new technology could help manage the effects of digital data on caseload and workload.	◆	◆	
	Vulnerability of electronic court documents and decision records to cyber threats	Define strategies and minimum standards for protecting the “virtual filing cabinets” that hold the court’s formal records, including requirements for different document types, consensus on what documents can be accessed anonymously, and appropriate use of such tools as encryption.	◆	◆	
	Dependence on third parties and their security capabilities (e.g., county server provider, cloud provider, open source technology tool provider) to protect data	Develop standards for evaluating the security of cloud storage providers to both inform decisions and assuage concerns.	◆		
	Inefficient and often ineffective paper-based processes for such tasks as victim notification and jury summons	Implement electronic communication and notification tools (commercial products already exist) to improve efficiency and effectiveness, and train prosecutors and others to use these capabilities while meeting legal requirements.	◆		
	Opportunity to more effectively communicate with jurors, staff, and victims by using available commercial systems, including open source tools, electronic modes of communication, and social media	Develop guidelines and disclosure requirements to educate court and public users about the value of these tools, as well as their caveats, and mesh them with the requirements of court procedures (e.g., electronic service of process).	◆		◆

Table S.1—Continued

Category	Problem or Opportunity	Associated Need	High Priority	High Value	Low-Hanging Fruit
	Heavy demands on court infrastructure as a result of the common requirement to appear in person	Evaluate the transactions and interactions that could be done from a distance over the Internet and could thus minimize people having to come to or move around court buildings to conduct business. Greater transaction automation could benefit both the court system and citizens in time and money saved.	◆		
	Current infrastructure that does not meet the technology expectations of new generations of court participants (judges, lawyers, and others)	Develop standard lists of basic technology that today's courtrooms should be equipped to handle, reflecting the different needs of different types of courtrooms. ^a	◆		
	Minimal or nonexistent wireless Internet and bandwidth in many court buildings	Make the investments needed to allow connectivity, and explore new technologies that make it easier to install wireless Internet in older court buildings.	◆	◆	◆
	Poor access to complete information to inform bail decisions	Develop tools that help judges effectively use available information—while limiting the potential for information overload—to inform bail decisions, helping maintain consistency across courts.	◆		
	Poor access to complete information to inform bail decisions	Foster stronger information-sharing between courts both within states and among neighboring states (including addressing differences between unified and nonunified systems) to better inform bail decisions.	◆		
	Due process concerns about remote appearances in judicial proceedings	Research which types of court interactions and hearings are not adversely affected by technology-mediated communication. Develop a consensus to address inconsistencies in different areas and to help resist institutional pressures to use technology when face-to-face contact is more appropriate or necessary.	◆		
	Limited resources for prosecutors and public defenders (e.g., not enough attorneys, too high caseloads)	Encourage greater use of teleconferencing and other tools to save time, but evaluate the results of these efforts (e.g., determine whether the same work can be done by video that can be done face to face).	◆		
	Authenticating electronic documents, which is more complex than for signed paper records	Develop centralized standards for authenticating electronic documents. Examples of implementation are available, but no practice is universally adopted.	◆		

Table S.1—Continued

Category	Problem or Opportunity	Associated Need	High Priority	High Value	Low-Hanging Fruit
	Concerns about data quality within the court system as a result of inconsistency in the way data are entered, limits in clerk knowledge, hiring of individuals without appropriate skills, and other factors	Develop data and process standards, and implement policies that incentivize and support their adoption and use, including joint organizations, legal and funding requirements, and statutory changes that limit the ability of individual courts to reject a data standard that does not conform to their processes.	◆		
	Concerns about data quality within the court system as a result of inconsistency in the way data are entered, limits in clerk knowledge, hiring of individuals without appropriate skills, and other factors	Train clerks who are entering data to provide enough detail and granularity to facilitate judges' tasks and activities, including descriptive file names and semantic context information to aid in locating information later.	◆		
	Required speed of court processes to meet the needs of litigants—particularly self-represented ones (e.g., getting a copy of an order to litigants before they leave the building)	Explore whether features of technology systems provide opportunities to better meet the timeliness goals of the justice system (versus just focusing on existing technology and what it can do).	◆		◆
	Backlogs in forensic laboratories and the slow processing of evidence delaying justice	Pursue statutory authority or court procedural rule authority for specialists to appear via video presence to increase efficiency of staff usage. ^a	◆		
	Focus within the court system on trials, which is inconsistent with the fact that the vast majority of cases are resolved through negotiation	Develop better tools to sort cases and match them with the process most likely to get them to an outcome efficiently and effectively (e.g., negotiation, trial, diversion, specialty court), including collecting data to inform the assessment by all parties (judge, counsel, citizens) involved.	◆		
	Continuing problems with bias in criminal justice outcomes for the poor and people of color, with technology potentially increasing those problems by excluding individuals who lack access or means	Collect data through electronic court information systems for better metrics and measures so that courts can hold themselves accountable for their performance and how that performance affects different segments of the population.	◆		
	Data compatibility problems as a result of different data formats and types of digital data	Define consensus formats and standards for digital data to be admissible in court.	◆		

Table S.1—Continued

Category	Problem or Opportunity	Associated Need	High Priority	High Value	Low-Hanging Fruit
	More-complicated cases, more materials, and more third-party information as a result of technology, which is so integrated into the lives of defendants, victims, and police, creating challenges for both prosecutors and defenders	Develop tools to help calculate workloads associated with discovery and analysis of larger bodies of information, to support arguments for changes to schedules, resources, or processes (e.g., open-file discovery models).		◆	
	Balancing security and privacy with public access	In the absence of redaction, develop better ways to protect some sensitive data, through access controls, encryption, or other tools.		◆	◆
	Problems with data accuracy and currency in interagency data-sharing systems	Develop a consensus among all participants in interagency data-sharing efforts about appropriate standards for data entry to ensure that information in the systems is correct from the outset. ^a		◆	
	Data compatibility problems as a result of different decisions made by different entities in the system, meaning sharing cannot happen (e.g., decisions made by different court components affect the defense, interacting with multiple law enforcement organizations affects the prosecution)	Make broader use of standards for information-sharing to allow compatibility (criminal justice coordinating councils are a potential model to drive change).		◆	
	Lack of understanding of the system effects of different policy decisions, ranging from increases in criminal justice capacity to pushes for efficiencies in the system	Develop analysis tools or entities responsible for assessing the implications of a wide variety of changes that can cascade through the criminal justice system—for example, changes to staffing (e.g., 100 more police officers) and changes to data exchange systems, which could help inform cross-agency decisions to upgrade (criminal justice coordinating councils are a potential model).		◆	
	Technology systems that are not always designed to capture unstructured data created in the practical process of court operation (e.g., notes on the case file about defendant needs, requirements for delay, annotations on exhibits at trial)	Design systems that are capable of capturing unstructured but important case data that are not official filings, and reengineer court processes to make it possible to capture the information.			◆

Table S.1—Continued

Category	Problem or Opportunity	Associated Need	High Priority	High Value	Low-Hanging Fruit
	Supporting pro se litigants	Use electronic tools (such as video and PowerPoint) to present information to both sides in a dispute (e.g., divorce, family, juvenile) that educates them on the process but does not cross the line into providing legal advice.			◆
Doctrine and knowledge	Reliance on technological systems for court functioning, which can create new concerns for continuity of operations when systems become overwhelmed or fail	Design systems with backup capabilities and prioritize technology support to focus on restoring critical systems when they go down. Develop, exercise, and implement response plans to address technology failure. ^a	◆	◆	◆
	Maintaining continuity of operations during natural or other events	Explore cases in which states or adjacent counties collaborate to back up each other's operations (examples exist that could serve as models).	◆		
	Maintaining continuity of operations during natural or other events	Develop more exercises and drills to determine likelihood of success, such as using red teams, performing testing, and actually operating from backup sites periodically to validate their effectiveness.	◆		
	Difficulties managing the trade-off between public access and maintaining sufficient court security	Define standards and performance measures for effective security for different types of courts and locations within a court to minimize intrusiveness for court participants, staff, and the public.	◆	◆	
	Backlogs in forensic laboratories and the slow processing of evidence delaying justice	Pursue statutory authority or court procedural rule authority for specialists to appear via video presence to increase efficiency of staff usage. ^a	◆		
	Vendor systems that try to simultaneously meet the needs of multiple stakeholders (e.g., judges, counsel, administrators), resulting in products that do not work well, driven in part by the court system's unwillingness to change its business processes	Create governance structures that limit the level of autonomy that elected judges can have; that is, dissuade individual demands for customization because of the threat that customization poses to data quality and system viability.	◆	◆	
	Court culture and precedent that impede reengineering to improve performance	Adopt business process reengineering in a formalized way, including tools for process documentation and reengineering, and match processes to the goals they are trying to achieve.	◆		
	Problems with data accuracy and currency in interagency data-sharing systems	Develop a consensus among all participants in interagency data-sharing efforts about appropriate standards for data entry to ensure that information in the systems is correct from the outset. ^a		◆	

Table S.1—Continued

Category	Problem or Opportunity	Associated Need	High Priority	High Value	Low-Hanging Fruit
	Limited resources for prosecutors and public defenders (e.g., not enough attorneys, too high caseloads), making it difficult or impossible to pursue new technologies or even do core functions like investigation	Address resource constraints because, while electronic tools can help, there are limits to the level of efficiency that technology can provide (e.g., counsel must truly understand the client file and physically get together to negotiate). Supporting assessments to quantify the limits of technology in achieving court goals would contribute to decisionmaking.		◆	
	Trouble engaging existing staff in innovation and change efforts, limiting the ability to implement new initiatives	Develop training tools or structures (e.g., a “court change academy”) to educate judges and court staff to manage organizational change, including its link to court goals and objectives—accepting that not all staff will be open to retraining and change.		◆	
	Large disparities in technological resources across court systems (in particular, some small offices have very little technological capacity) and among different agencies in the same jurisdiction (e.g., law enforcement versus court)	Continue investments to equalize technology capacity across the system, supported by criminal justice coordinating councils.		◆	
	Tendency of court systems to fund the acquisition of technology without fully addressing operations and maintenance costs	Modify planning and funding processes to ensure that operations and maintenance costs are captured in acquisition decisions and included in out-year budgets.		◆	
Facilities	Current infrastructure that does not meet the technology expectations of new generations of court participants (judges, lawyers, and others)	Develop standard lists of basic technology that today’s courtrooms should be equipped to handle, reflecting the different needs of different types of courtrooms. ^a	◆		

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

^a This need is associated with two categories and is included twice in the table.

From the needs that were rated highly enough for inclusion in our U.S. courts innovation agenda, we can identify several themes. We group individual needs into the following larger conceptual areas that we viewed as important for moving today’s court system into the future:

- *Leveraging opportunities for greater court efficiency while ensuring that technology serves justice goals.* Five of the top-tier needs could be reasonably grouped under the theme of seeking improved court efficiency through the use of technology. The use of teleconferencing as a way to save time for court participants was central in several of these needs. In addition, the potential of technology to improve the experience of court participants was the focus of more than one need, including evaluation of how more court transactions could

be done over the Internet to reduce the requirement that citizens always come to the court building. While panel participants recognized technology's potential in some areas, they were also cognizant of the need to understand and manage negative effects of innovation on the justice process. For example, one innovation agenda need that fell under this theme suggested using workload estimation tools to better understand the limits of technology for increasing efficiency while maintaining due process and other societal goals.

- *Improving security and emergency preparedness.* Six of the top-tier needs addressed concerns about the ability of courts to maintain security and to be prepared for emergencies and other incidents. With respect to security, the need for standards and performance measures for security at different locations and in different courts was called out to ensure that both security and public access could be maintained. Preparedness needs included the ability to alert individuals in court buildings during emergencies, greater exercising and drilling of courts to prepare for emergencies, and backup of court information to protect it from loss.
- *Improving quality and utilization of shared data in the justice system.* Reflecting the importance of information in the functioning of courts, five of the top-tier needs fell under a broader theme of the quality and utilization of data shared across the system. This theme includes needs related to standards and training for ensuring that data are captured appropriately and accurately and for authenticating data to ensure that the information is trustworthy. It also includes needs for more information-sharing between courts so that data cannot “fall through the cracks” between jurisdictions and for developing consensus formats for digital data used in courts to avoid incompatibility problems. Additional needs that were included in the agenda because they were rated as high value or low-hanging fruit also fell in this theme, including the need to adopt data standards and develop tools for understanding the cascading effects of changes across the justice system.
- *Strengthening analysis and use of data.* Four of the top-tier needs focused on the analysis and use of particular types of data, both to help courts work cases effectively and to better understand the courts' own functioning. These needs related to understanding the increasingly voluminous and complex data involved in some cases. Looking inward, the panel identified needs for tools and analytics to help courts manage their caseloads (e.g., to triage cases to different types of dispute resolution) and to understand the implications of their decisions (e.g., monitoring fairness and disparities in justice). The need for courts to adapt database tools that more fully capture the unstructured data generated in court processes and proceedings was considered to have a high probability of success, meriting inclusion in the innovation agenda as well.
- *Addressing concerns in maintaining and protecting the court record.* Because the court record must be maintained and the information in it protected from both manipulation and unauthorized disclosure, two record management needs rose to the top tier. These were cybersecurity concerns related to cloud storage and better ways to protect personal information of citizens in court records. Tools for better data protection appeared in both the high-value and low-hanging fruit lists.
- *Addressing basic technology shortfalls in today's courts.* Panel members raised a number of concerns about the technology infrastructure of today's courts and, therefore, their ability to innovate in ways that could improve effectiveness and efficiency. Two needs rose to the top tier: developing standard sets of technologies that courtrooms should be equipped with, so that participants can count on a baseline level of capability, and increasing invest-

ments to provide wireless and other connectivity in court buildings. Several of the needs rated as high value focused on basic shortfalls, including adapting funding models to appropriately address operation and maintenance costs of systems and providing technology to court participants to help equalize imbalances between courts, agencies, or parties to a dispute that call into question the integrity of the adversarial process for finding facts and reaching judgment.

- *Improving court technology acquisition processes.* Two needs related to improving courts' ability to acquire new technologies were prioritized, emphasizing the need for better governance in technology acquisition and for organizational innovation to take advantage of new technologies, rather than always requiring technology providers to adapt tools to the historical ways that courts have functioned.
- *Using technology for notification and public communication.* Beyond the need for public notification in the context of emergency situations, two other top-tier needs focused on the ability of court organizations to communicate with the public, whether via dedicated systems or via social media tools.

An Agenda Driven More by Adopting Existing Tools and Practices Than Developing New Ones

When considering how to implement the innovation agenda for courts, there is a significant difference between needs that can be met with current technology and practice and those that require developing new approaches or tools. Looking at the needs rated high priority, the vast majority can be implemented simply by adopting an existing technology or practice. Tools to alert the public already exist, so the need identified by the panel was to facilitate courts' use of them. Cloud storage for information is becoming ubiquitous, but the challenge was understanding the security and other issues associated with courts entrusting such firms and their systems with court records. Commercial technologies are already available for many tasks that are done in courtrooms (for example, the evidence presentation or court reporting technologies), so the need was to determine which of those technologies should be available so that stakeholders can know what to expect when they appear in court. Social media is a tool that so many members of the public use, and they increasingly assume that they should be able to communicate with government this way. However, courts need guidelines and materials to ensure that both they and citizens understand the implications of transmitting data related to court proceedings and cases via such channels.

When examining the list of high-priority needs, almost half can be addressed by courts adopting innovations that already exist—for data protection, communication, wireless Internet connectivity, and others—rather than requiring the development of anything new. Expanding the notion of adoption to include adapting technologies that exist in other sectors—for example, models for increasing transactions that can be done online, building tools for triaging caseload, and standardizing the authentication of electronic documents—captures much more of the innovation agenda. Unsurprisingly, the needs that were added to the innovation agenda as potential low-hanging fruit are predominantly needs that could be met by adapting existing tools or capabilities to the court environment.

But while many needs did focus on existing technology or practice, others called for new development or for research and analysis to create tools that were not seen as currently avail-

able. Judges and others need better tools to quickly parse and understand larger and more-complicated bodies of data related to cases, and to integrate data from multiple criminal justice systems to inform such actions as bail decisions. Requirements for information-sharing and system integration arose multiple times during panel discussions, emphasizing the common challenges in addressing some of the problems raised. Major progress toward standards and approaches for such interoperability has been made, but implementing them broadly is still a concern. Looking at the high-priority needs, perhaps one-third represent capabilities or tools that are new or are sufficiently different from existing tools to likely require significant development. For example, changes in governance structures that significantly affect judges' autonomy for technology acquisition would be a significant departure from the status quo in some court systems, and would almost certainly require significant effort to achieve. In addition, even where models already exist, the unique demands of the court environment may require development—for example, developing exercises for appropriately evaluating court security. The needs added to the agenda because of their potentially high benefits (even though they were viewed as less likely to succeed) largely require new development effort, from crafting analytical tools to understand the cascading effects of changes in the justice system to implementing entirely new training or educational structures to facilitate organizational change.

Fostering Innovation in the U.S. Court System

This effort, aimed at the national level, sought to frame an innovation agenda for the court system writ large. The value of the result will be driven by application and by how individual agencies or organizations use the identified needs to inform their choices about the future. Innovation happens at the organizational level, and so it is implementation that matters more than any promise of an idea on paper. In an effort to shape an agenda that would be useful across the diversity of court systems and broader stakeholder community, we assembled a panel that sought to capture that diversity—in roles, in home organizations, in geography, and in expertise. The panel's discussions included questions and concerns about the relevance of individual options to specific types of courts—for example, general courts versus specialty courts focused on drug issues or mental illness, large urban court systems versus smaller rural ones, and unified versus nonunified systems. Within the innovation agenda, there are potential solutions that are more or less relevant, easier or more difficult to implement, and so on depending on the nature of the court considering them. But those tensions can pull in different directions: A larger system might have more resources available to acquire new technology, but implementation might be more tractable in a smaller system that has less of an investment in legacy systems or fewer staff to train.

It is also important to frankly acknowledge that the deliberations of a single advisory panel—however carefully selected or guided by a methodology that sought to force its deliberations to be both comprehensive and systematic—will always be a partial representation of reality, and will inevitably be shaped by the expertise and experience of the individuals involved. As a result, this innovation agenda is a snapshot of a point in time and of the concerns and issues that were most salient to one convened group of experienced practitioners. It is also critical to remember that as the world shifts, such an agenda must evolve. As time passes, the value and challenges associated with past investments and initiatives become clearer, and new issues and opportunities may arise that necessitate revisiting past assumptions and conclusions.

Acknowledging the innovation agenda's limits, we hope that it can provide a starting point and contribute to the thinking of the varied organizations with needs and roles to play in court innovation. This effort has provided a set of high-priority needs that rose to the top of our panel's deliberations, as well as a broader—and much longer—set of innovation options that represent opportunities for courts and the organizations that interact with and support them. Reflecting the courts as both an actor and a venue that brings together entities across government, the private sector, and the general public, many of these needs reach outside the walls of the courthouse, creating potential benefits and requirements for many organizations and for society more generally. Pursuing these innovations is part of a broader program of improving national justice system performance through better coordination, information-sharing, and assessment to achieve the goals of appropriate, equitable, efficient, and effective administration of justice for the nation.

Acknowledgments

The authors gratefully acknowledge the members of the Courts Advisory Panel (whose names and affiliations are listed in Appendix A) for their willingness to give a substantial portion of their time and extensive expertise to this effort. Without their enthusiastic engagement and participation, the work reported here would not have been possible.

We would also like to acknowledge the National Institute of Justice program managers and staff who provided guidance and suggestions during all parts of the project. We specifically recognize Martin Novak and Steven Schuetz, who were most involved in this effort.

We would like to acknowledge our RAND colleague Karlyn Stanley for her contributions to earlier phases of this effort and her assistance in identifying and inviting members of the Courts Advisory Panel. Two anonymous peer reviewers from the National Institute of Justice and Geoffrey McGovern of RAND provided comments on the draft manuscript.

We would also like to acknowledge the contributions of Allison Kerns, Blair Smith, Eileen LaRusso, and Mary Wrazen to improving the language and presentation of the report.

Abbreviations

ABA	American Bar Association
CCTV	closed-circuit television
GJXDM	Global Justice Extensible Markup Language (XML) Data Model
NCSC	National Center for State Courts
NIEM	National Information Exchange Model
NIJ	National Institute of Justice
XML	Extensible Markup Language

Introduction

Within the criminal justice system, the court system plays a core role, serving as the link between law enforcement and corrections and as a check on the state's power over citizens. In civil justice, we rely on courts to adjudicate disputes and serve as a venue for negotiation and resolution of issues, varying from resolving disagreement over the details of contracts to establishing and compensating individual or collective harms. Although much of the public thinks of trials as the centerpiece of the court system (thanks, in part, to television crime shows), the reality is that much of the business of courts today is that of negotiation, through plea bargains in the criminal context or settlements of civil disputes before reaching trial.

While we speak of a U.S. court system, this label glosses over extreme diversity in the organization of courts from the federal level down to states and localities, and between general jurisdiction courts and specially designed courts that merge justice and social service roles for offenders with mental health, drug abuse, or other concerns. U.S. courts are also challenged by resource constraints, shifts in technology that put pressure on the justice process, and increasing numbers of defendants or litigants who lack sufficient representation or represent themselves. Furthermore, there are concerns that the laws on which the courts are administering judgments and the effects of court processes are producing racial, socioeconomic, and other disparities that undermine the ideals of equal justice under the law.

Considering Innovation in U.S. Courts

Within the context of the courts' importance and the challenges the system faces today, the fundamental question going forward is how courts can *innovate*—that is, make changes in technology, policy, and practice—to improve performance and find solutions to current problems. The research described in this report is part of a wider effort focused on that question writ large for the entire U.S. justice system, seeking opportunities where agencies within the sector (focusing on law enforcement, corrections, and the courts) can make changes to be better positioned for the future. In this effort, we view innovation broadly, including both *incremental changes*, where agencies improve on current practices, and *transformational change*, which makes it possible for agencies to pursue their objectives in new ways or make more-radical changes to the status quo. Innovation across this spectrum, from the modest to the potentially very ambitious, is enabled by assessment and evaluation to measure performance, identify problems, and discover emerging challenges or opportunities for change. For the broader community within and around the court system, the value of seeking innovative ways for courts to

function has been appreciated for decades, so the effort here is a contribution to the ongoing efforts of many organizations both inside and outside of government.¹

In thinking about innovation, technology is often the first thing that comes to mind. Frequently, the capabilities provided by a new technology are what make it possible to change how an organization or system does its job. But technology is not the whole story, and innovation may occur even with no change in technology at all. Changes in organizational policies or shifts in staff training can be the vectors for change as well. Even when technology is central, reaching the technology's full potential may require changes in other areas. Improving performance and solving problems are not always just about a new tool becoming available, but about how people use that tool to do something—and do it better. Often, there is more than one way to approach a problem or apply a new technology, and organizations therefore have to choose among these options and identify which would be most effective, likely to succeed, and feasible.

The central goal of this project is to explore the landscape of options for innovation in the court system—both options that may be available in the near term and more-ambitious, longer-term options that could require more effort to achieve but might pay off significantly. This effort could be viewed as an attempt to provide the situational awareness to court systems and to the organizations that serve them (as funders, technology providers, and others) about problems and potential solutions, which is often the starting point for innovation efforts.

This process of identifying innovations that could benefit a system is a challenge faced by organizations of all types, not just courts. And because the future will always be uncertain, identifying steps that should be taken today to prepare for that future will also be inherently uncertain. Thus, in the absence of a crystal ball, different fields have identified a variety of approaches for thinking about the future. These include, among others, scenario-based planning tools to examine multiple possible futures in detail, simulations that seek to analyze large numbers of possible futures, expert elicitation methods that attempt to leverage the knowledge and intuition of many individuals to build collaborative group estimates, and structured analytic efforts that try to extrapolate from the present in different ways. Each approach has its strengths and weaknesses, but all involve a degree of subjectivity and produce varied results. Consequently, we must always use the resulting forecasts and plans judiciously, and view them not as precise predictions but as approximate projections—though nonetheless useful for thinking through complicated organizational and policy problems.

To identify ideas for innovation in the court system, just as we have done for other elements of the justice system,² we combined information and data from a range of sources, culminating in a set of group elicitation activities with practitioners—judges, prosecutors, defense

¹ This effort specifically has benefited from both the published work and contributions of individuals and organizations in this broader community, including the Center for Court Innovation, the National Center for State Courts (NCSC), and the Center for Legal and Court Technology at the William and Mary Law School, among others. Innovation in courts has also been a focus of government research and technical assistance providers, such as the National Institute of Justice (NIJ) (the funder of this effort), the Bureau of Justice Assistance, and others that have contributed to supporting innovative efforts in the court system.

² See RAND Corporation, undated b, for associated research.

lawyers, and court administrative leaders—to draw on the knowledge of the courts community. The main components of the project were as follows:

- Review the published literature on current challenges in the courts, available technologies, and past assessments of technology and other needs aimed at improving court operations and effectiveness.
- Explore the technologies and practices that are currently available to the sector to provide a starting point for considering future innovation.
- Convene a Courts Advisory Panel for a structured needs development and prioritization process. The 41 members of the panel (listed in Appendix A) were selected in an effort to cover the breadth of the courts community, including individuals from varied types of courts, from different areas of the country, and with diverse technological expertise. The work of the panel included the following:
 - Respond to a pre-meeting questionnaire that asked about court priorities, major current problems or issues, societal technology changes that are creating challenges for courts, problems with technologies in use today, technology implementation problems, and concerns about harms that might occur as a result of court technology use.³
 - Using the results of that questionnaire as a foundation, attend a one-day, in-person workshop at the RAND Corporation’s Washington, D.C.–area office. The workshop featured a structured elicitation process to explore both current and potential near-term problems and opportunities for the sector and possible actions to take in response. Separate one-day workshops were held for judges, prosecution and defense lawyers, and court administrators. Collectively, the three groups identified more than 230 needs. The panel then systematically ranked and prioritized those needs based on the participants’ assessment of the overall value of each need, the likelihood of successfully meeting it, and whether the resulting solution or innovation would be broadly adopted if it were available.

The end product from these efforts is a prioritized list of court needs, or an *innovation agenda*, designed to be a menu of potential innovations to address key problems or capitalize on emerging opportunities for the U.S. court system. Our effort sought to identify options that would be useful to court organizations themselves, to identify changes they might want to make to their operations, as well as to entities in the private sector (because innovative tools are often developed and spread via the efforts of technology firms) and to government research and development funders (to inform investments of options that look valuable but may be too uncertain for court systems to pursue today).

³ Appendix B includes a full list of the questions asked in the pre-meeting questionnaire.

About This Report

This report presents the results of the deliberations of the Courts Advisory Panel, distilled into an initial innovation agenda. That agenda consists of prioritized technology, policy, and practice needs to improve court functioning.

To provide context for a wide range of potential users of the innovation agenda, Chapter Two presents an overview of the U.S. court system and a snapshot of current challenges, setting up the need for innovation in the sector. Chapter Three presents a snapshot of the current landscape of court technology and practice, using a taxonomy developed in the larger project that this effort is a part of to capture the full technology and practice landscape in criminal justice.

Readers who are already familiar with the court system, its current challenges, and the technological environment as it currently stands may wish to skip forward to Chapter Four, which describes the process of generating the needs and prioritizing them with the advisory panel; it then presents the resulting needs.

Chapter Five concludes the effort and discusses the innovation agenda that came out of the advisory panel deliberations. Appendixes to the report identify the advisory panel members and process, additional methodological detail, and the full list of needs from the panel.

The State of the U.S. Court System Today

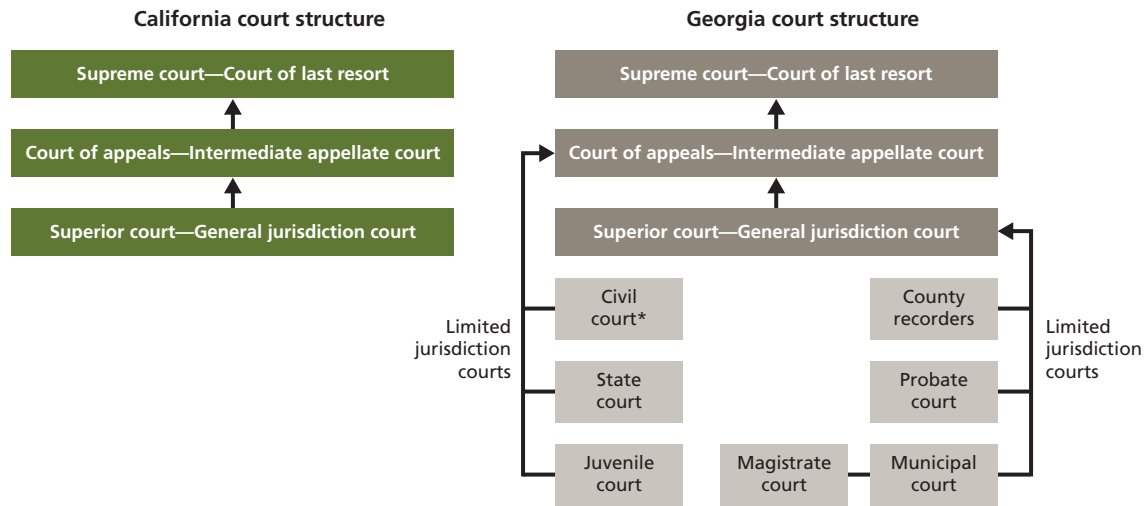
The court system is one of three main components of the U.S. criminal justice system, which also includes law enforcement and corrections. All three components have branches at the local, state, and federal levels, each exercising specific jurisdiction over criminal and civil matters as defined by law. Law enforcement and corrections focus primarily on criminal matters and ensuring public safety. The courts, however, are designed to resolve disputes related to family matters, child welfare, civil matters, and traffic and other citations—in addition to adjudicating criminal cases.

To speak of a single national court system ignores a great deal of diversity in court structure, organization, and activity. At the most basic level, U.S. courts are organized into federal and state court systems. Federal courts are organized in a three-tier hierarchy that includes district courts, appellate courts, and the U.S. Supreme Court. Federal district courts have jurisdiction over most civil and criminal federal cases, and federal courts of appeal hear appellate matters from district courts. The U.S. Supreme Court is the highest court in the country, and hears—among others—cases where there is a dispute over the interpretation of the Constitution. Cases heard by the U.S. Supreme Court generally come from federal appellate courts, but they may also come from state supreme courts.

In individual states, the court system is organized differently and according to the constitution and laws of the state. In addition to the three-tiered system found in the federal judiciary, state court organizational structures can include limited jurisdiction courts that preside over less-serious cases, such as misdemeanors, small claims, parking and traffic matters, and civil infractions. In state court systems, general jurisdiction courts preside over matters not delegated to lower (limited jurisdiction) courts and often hear serious criminal and civil cases, as determined by the severity of the punishment afforded by law, the seriousness of the allegation, or the dollar value of the case. Similar to appellate courts in the federal system, state intermediate appellate courts hear appeals of matters that were decided in limited or general jurisdiction courts. State courts of last resort, also known as state supreme courts, have authority over all appeals filed in state court.

Within each state, the organization of trial and appellate courts can be very different. For example, California has a simple structure going from superior court to court of appeals, with the California Supreme Court being the highest order. Georgia has a more complex system with multiple types of limited jurisdiction courts, some of which report directly up to the superior court, while others report directly to the court of appeals (see Figure 2.1). In an effort to facilitate more-uniform procedures within states, many state court systems are “unified,” allowing a single entity to guide administrative functions, make rules for court procedures, and provide fiscal support and oversight. According to NCSC, 26 states operate

Figure 2.1
Differences in Trial and Appellate State Court Structures in California and Georgia, 2011



*Civil court serves two counties in Georgia (Bibb and Richmond).

SOURCE: Malega and Cohen, 2013, p. 2.

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under such a unified system for operation, administration, budgeting, and/or supervision of all courts in the state.

The courts at different levels preside over different bodies of law or particular sets of issues and disputes. For example, federal courts preside over matters relating to federal laws or cases to which the United States is a party, while the state judiciary hears all matters relating to state law. State laws vary considerably from state to state, so acts that violate state law or disputes over certain matters in one jurisdiction might not be a matter for the state court in another. The majority of cases processed by state courts are traffic matters, which include noncriminal traffic and local ordinance violations. According to the Court Statistics Project maintained by NCSC, in 2014, participating states and territories (42) reported a total incoming caseload of 79.3 million cases, of which 57 percent were traffic matters, 19 percent criminal, 17 percent civil, 5 percent domestic relations, and 1 percent juvenile (LaFountain, Schaufner, Strickland, Holt, and Lewis, 2014). The most serious criminal matters—felonies—represent a small percentage of the cases that are heard in state courts. In 2006, it is estimated that state courts convicted 1.1 million people of a felony (Bureau of Justice Statistics, 2015). The largest proportion of those felony convictions were for drug offenses (33.4 percent), followed by property (28.4 percent), violent (18.2 percent), other (16.7 percent), and weapons (3.4 percent) offenses.¹

In contrast to what many in the public assume, most matters that come before courts are not dealt with through trials. Even trial or general jurisdiction courts rarely conduct trials. Data from state court records, prosecutor's offices, and the federal judiciary indicate that less than 5 percent of all felony charges are ultimately disposed through a trial (Rosenmerkel, Durose, and Farole, 2010; Perry and Banks, 2011). For example, in 2006, 94 percent of those convicted of a felony in state court entered a guilty plea. In 2007, prosecutors' offices reported 2.2 million convictions for cases charged as felonies, with just 3 percent of all felony disposi-

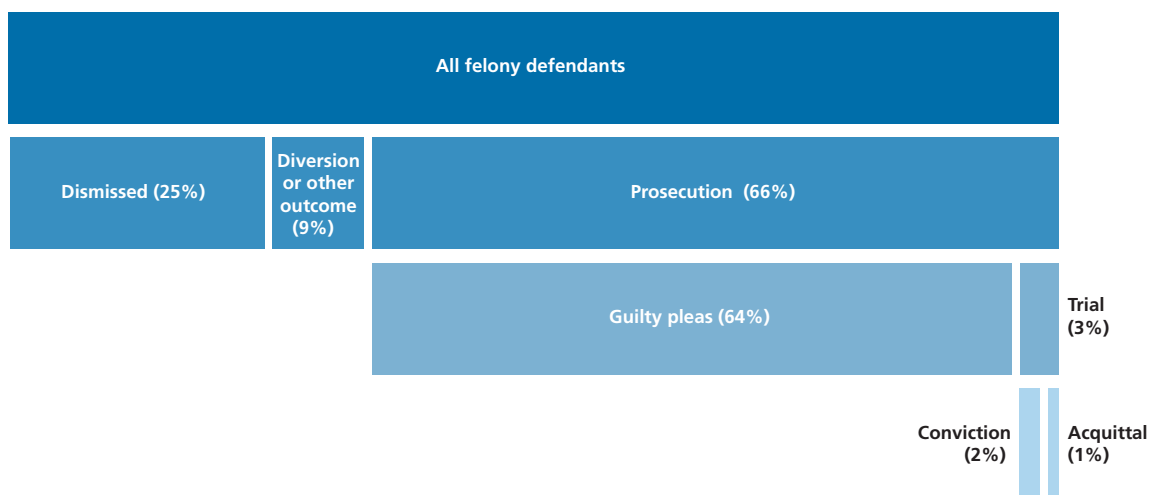
¹ The percentages in this paragraph do not sum exactly to 100 due to rounding.

tions adjudicated through jury verdicts. Typical processing for felony cases in state courts and the average proportion of felony cases processed through each function are represented in Figure 2.2.

The process from the time a complaint or request is filed through case disposition can require multiple steps and stages, including multiple appearances, hearings, and other case-processing functions related to discovery, arraignment, diversion, mediation, deposition, plea negotiation, and trial. The time and activities involved in individual cases differ, so the workload on the court system varies considerably between simple traffic matters to more-complex family, criminal, or civil matters. Most, if not all, case-processing components require considerable coordination between litigants, judicial officers, and other court staff, as well as other court stakeholders whose roles vary depending on the type of case and the point in the case process. For example, social service agencies may be extensively involved in family matters or domestic relations cases, while law enforcement and pretrial supervision agencies may be more heavily involved in processing criminal matters. Attorneys, including prosecutors, public defenders, and the private bar, play a significant role in criminal and civil matters, although pro se litigants (those choosing to represent themselves) represent a growing presence in the court system. These court actors, along with judges, primarily perform judicial court functions, which are concerned with applying the rule of law. In order to support case processing and these judicial functions, court actors also perform administrative functions. The court administrator is responsible for managing the overall operations of the courthouse, including back-office functions that help the system run smoothly and efficiently. Administrative functions include support for the court case management systems, as well as functions related to fiscal administration and management of human resources, information technology, juries, and court facilities.

Executing all of these functions involves considerable resources and staff inside the court system, and a much larger set of organizations and stakeholders outside it. According to estimates from the Bureau of Justice Statistics, justice expenditures in 2012 totaled more than

Figure 2.2
Typical Resolution of Felony Defendants Arraigned in State Courts in the 75 Largest U.S. Counties



SOURCE: Author analysis of Reaves, 2013.
 NOTE: Percentages do not sum exactly to 100 due to rounding.
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\$265 billion, with judicial and legal expenditures making up 21.8 percent of the costs (Bureau of Justice Statistics, 2012). In that same year, there were nearly 500,000 employees in the judicial and legal branches of federal, state, and local governments, including judges, court administrators, prosecutors, public defenders, law library staff, court reporters, bailiffs, security officers, and others. More than half of judicial staff were employed by local courts, with 36 percent employed by state courts and 13 percent by federal courts.

Today, the U.S. court system faces challenges and trends that stress its ability to pursue the goals society depends on it to achieve. Those stresses both provide the impetus for innovation and define the benefit of such innovation in an effort to address resource constraints, practical challenges, and fundamental concerns affecting what it means for the courts to function in today's fiscal, societal, and technological environment. The nature of the courts and their many stakeholders also shape the challenge of accomplishing that innovation, because changes made in technology, policy, or practice would affect not just the court administrator and judge who works in a specific court every day, but the lawyers who might come there occasionally to negotiate or try cases and the citizens who might enter the building only once in their lives. In the remainder of this chapter, drawing both on the published literature and on insights provided by members of our Courts Advisory Panel, we discuss some of the key trends and challenges faced by the courts today, sketching the drivers for innovation.

Key Trends and Challenges for the U.S. Court System

Given the importance of courts within the criminal justice system, there is a deep scholarly and practice-focused literature exploring the challenges that the system faces and changes in technology, policy, and practice that could improve court functioning. To provide a complement for this literature, and in preparation for our Courts Advisory Panel, we asked each of our panelists to identify the major issues or problems in courts today in five key areas: case preparation and presentation, case-level court information management, support for court hearings, facilities management, and people management. The goal was to get a snapshot of issues that were on the minds of practitioners from a range of courts and roles within the court system, and to capture challenges faced in areas as disparate as technology use and human resource concerns. Panelists could highlight as many or as few problems as they wished; most respondents identified three or four problems in each area, and most responses ranged from none to six (or, in a few cases, even more).² As a result, looking at the frequency with which an issue was raised—that is, how many of the panelists independently raised that issue—provides a measure of the breadth of concern about problems in each area.³ In the remainder of this section, we examine these trends and issues in more detail, drawing on the literature to supplement the issues raised by the panelists.

Court Caseloads and Resource Scarcity

Among issues raised by the panel, issues of caseloads and the required amount of staff to handle them were prominent. Concerning case preparation, panel members cited human

² We also asked respondents about a specific set of obstacles to implementing technologies in each functional area, discussed later in this chapter.

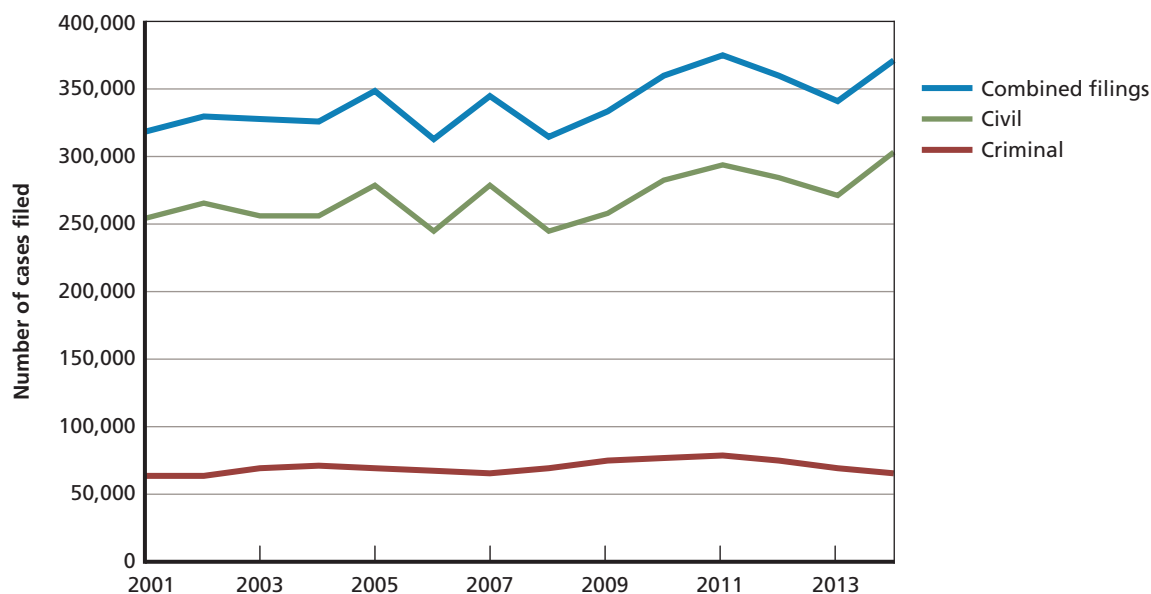
³ We tabulated the free-response data provided by the panelists to produce lists of issues raised in each area of court practice.

resource shortages among prosecution, defense, and public defender offices as a critical challenge to courts functioning effectively (cited by 47 percent of respondents).⁴ This workload concern spilled into the panelists' consideration of human resource management, with nearly two-thirds (64 percent) of the panelists citing resource and time constraints as limiting the ability to train court employees. That was the panel's top concern related to human resources.

Over the past few decades, court caseloads have increased considerably, although some of that increase has reversed in recent years. In the federal courts, total annual filings increased more than 25 percent between 1993 and 2013 (Transactional Records Access Clearinghouse Reports, 2014). Since 2000, there has been considerable variation from year to year, but based on data made available by the Administrative Office of the U.S. Courts, the trend has still been upward (Figure 2.3).

Available data on the volume of incoming cases reported by state trial courts actually showed a decrease of more than 12 million cases (11 percent) between 2008 and 2013 (see Figure 2.4) (LaFountain, Schauffler, Strickland, Holt, and Lewis, 2015). LaFountain and colleagues cited the effects of the Great Recession as a potential explanation for this drop, which resulted in state and local budget cuts, increases in filing and other court fees, and reductions in court operations (LaFountain, Schauffler, Strickland, Holt, and Lewis, 2014). To the extent that this is the case, while contributing to relieving pressure on court systems that have been dealing with high case burdens for many years, this raises potential questions about equitable access to justice for all populations. The use of alternative dispute resolution mechanisms (e.g., arbitration) could also be a contributor to caseload declines.

Figure 2.3
Cases Filed in U.S. District Courts, 2001–2014

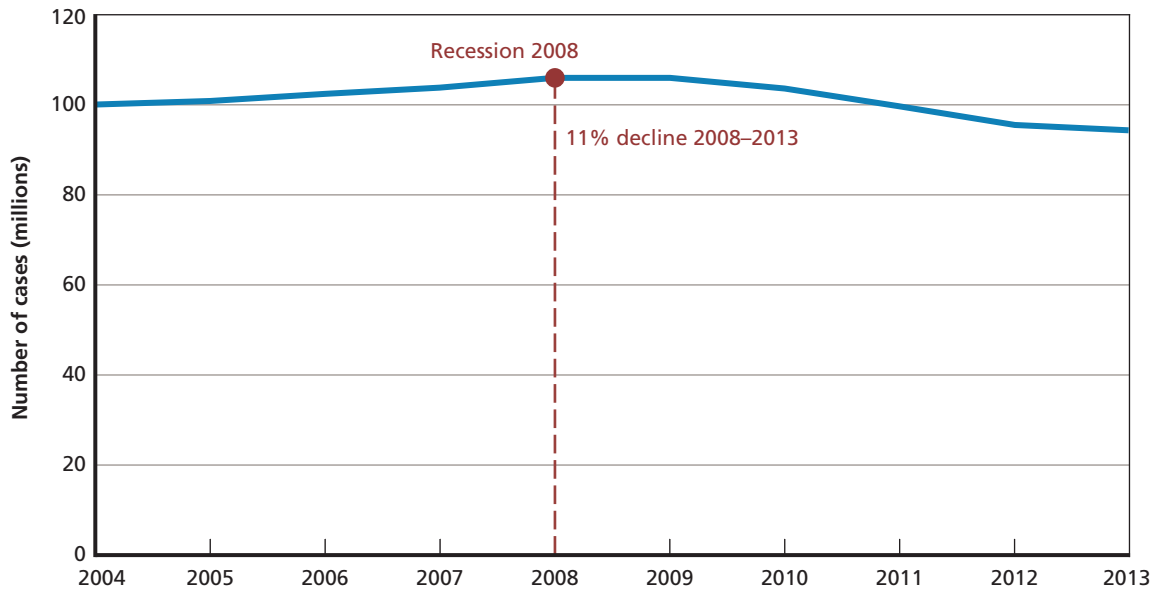


SOURCE: Administrative Office of the U.S. Courts, *Federal Judicial Caseload Statistics*, Washington, D.C., various years, Tables C and D-Cases.

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⁴ This issue was tied for fourth in frequency among all the issues raised by the panelists.

Figure 2.4
Number of Incoming Cases Reported by State Trial Courts, All States, 2004–2013



SOURCE: LaFountain, Schauffler, Strickland, Holt, and Lewis, 2015, p. 2.

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Increases in caseloads have not been matched with increases in workforces to successfully address them. On the federal bench, the number of judgeships has increased by only 4 percent from 1993 to 2013, while caseloads have increased by 28 percent. This has contributed to an increase in the median lengths of time to resolve cases, with the largest effect on civil matters (Transactional Records Access Clearinghouse Reports, 2014). According to NCSC, the number of trial court caseloads typically increases at an average of 1 percent per year, while the number of judicial officers typically increases at about 0.5 percent per year. This causes the average number of cases per judicial officer to increase in most years. The decline in total caseloads from its peak in 2008 has resulted in a decrease of about 100 cases per judicial officer, from the 3,515 cases in 2008 to about 3,415 in 2010 (LaFountain, Schauffler, Strickland, and Holt, 2012). Nontraffic cases per judge ranged from a low of 360 per full-time general jurisdiction court judge in Massachusetts to a high of 4,374 per judge in South Carolina (Bureau of Justice Statistics, 2013).⁵ Concerns about the labor force in the judicial system have been echoed in data that showed a 3.9-percent increase in total judicial and legal employees from 2000 to 2012. Although this period included declines in caseloads at the state level, federal court caseloads increased (see Figure 2.3); moreover, there was an 8-percent increase in total justice system employees, meaning that capacity in the court system was increasing at a slower rate than in the other branches of the system (Bureau of Justice Statistics, 2012). Staffing constraints and the resulting increase in caseloads has been particularly problematic in individual components of the judicial system, including indigent defense organizations (see Lefstein, 2011, for a discussion).

⁵ Criminal caseload clearance rates are increasing in most state courts, most likely because of declines in criminal caseloads. Of the 43 courts in 33 states that submitted data, 67 percent achieved clearance rates of 100 percent or more, and an additional 12 percent achieved a clearance rate of 99 percent (LaFountain, Schauffler, Strickland, and Holt, 2012).

Court Security and Preparedness

Our panelists cited concerns related to facilities management, including court security (mentioned by 42 percent of the participants). Emergency preparedness concerns came next, with 28 percent of panelists raising questions about the level of disaster preparedness and continuity of operations planning in courts. Concerns in these areas have also been explored in the literature: According to a study published by NCSC in 2013, the number of violent acts in court buildings has been increasing in recent years (Fautsko, 2013). By needing to be both secure and open to the public, courthouses offer an uncommon and complex security environment. Ensuring a safe environment while still maintaining a publicly accessible building requires unique security solutions. Some courts can have 1,000 people come through on a busy day. Ensuring that all people are screened appropriately and efficiently while keeping an accessible atmosphere is difficult. Levels of security and protection at individual courts vary considerably, and they often fall below what might be expected, given the national environment in the years since the September 11, 2001, terrorist attacks. The NCSC study examined a sample (77) of more than 225 court security assessments conducted by the organization since 2006. The cross-cutting analysis found that 86 percent of courts did not have a dedicated committee to support security planning, 92 percent had less than adequate or no closed-circuit television (CCTV) cameras, and 26 percent had no screening stations at entrances to make it possible to detect weapons or threats before they entered the facility (Fautsko, 2013). One underlying issue is the lack of funding available to purchase this security equipment, such as CCTV systems, X-ray scanners, and metal detectors.

Proliferation of Problem-Solving Courts

In addition to criminal, civil, domestic relations, juvenile, and traffic courts, most state court systems also include problem-solving courts (e.g., drug courts, mental health courts, veterans' courts), which can present unique challenges to court administration. The number and type of problem-solving specialty courts are dependent on the state. Some states, such as Texas, have problem-solving courts that focus on drugs, domestic violence, mental health, veterans, re-entry, teens, prostitution, and the homeless. Other states, such as Wyoming, Mississippi, New Jersey, and North Dakota, have only a drug court (Strickland, Schaufler, LaFountain, and Holt, 2015). The jurisdiction for problem-solving courts also varies (some statewide, some local).

Problem-solving courts are often grant-funded and follow rules and processes that are different from the routine operations of the rest of the court. Problem-solving courts rely on the rapid sharing of information between courts and outside treatment agencies, testing facilities, probation agencies, and social services. (Indeed, the topic of shortfalls in information-sharing was one of the top ten concerns raised by members of our advisory panel.) Many problem-solving courts also have privacy and nondisclosure requirements that dictate what should be maintained in general case management systems.

Recently, there have been increases in the number of mental health courts and veteran treatment courts. Mental health courts address the increase in the number of mentally ill defendants in the criminal justice system, with the goal of moving those with serious mental illness out of the criminal justice system and into community treatment without sacrificing public safety. In 1997, there were only two known mental health courts. As of 2010, there are approximately 250 (Steadman et al., 2011). Veteran treatment courts operate by diverting eligible participants so that their individual issues can be identified and treatment and services tailored to each person's specific needs. These courts serve veterans, soldiers, and active military

personnel, and they are not limited to a specific offense or issue, unlike some other specialty courts. The first survey of veteran treatment courts, conducted in 2012, found 114 in operation in 32 states, with 18 more in progress in nine states. The courts reported providing substance abuse and mental health treatment; academic and job training, skills, and placement; and housing, medical, transportation, and social support (Baldwin, 2013).

In our pre-workshop questionnaire, the Courts Advisory Panel raised issues and concerns relevant for such specialty court efforts. With respect to information management, 42 percent of the panel cited issues with sharing information across governments and across criminal justice agencies, particularly problems with system compatibility. The next-most common concerns, each mentioned by 22 percent of members, were about data protection (including privacy, confidentiality, and security) and the quality of the data entered in court (and other agency) information systems.

Racial and Economic Disparities in Case Processing and Outcomes

There is increasing concern in the United States about the fairness of the justice system, especially about the effect that bias—whether knowing or not—in the enforcement of laws, prosecution, and incarceration can produce in minority or economically disadvantaged groups. As discussed previously, challenges in caseload and resources stretch the public defenders whose role it is to represent individuals without the means to hire their own attorneys. However, while related to these challenges, concerns about balance and fairness go beyond simple questions of funding individual entities in the justice system—because the resources available to the state have the potential to overmatch the resources that all but the wealthiest individuals could use in their own defenses. Though not among the most frequently cited issues by the members of our advisory panel, this issue of balance between prosecution and defense in criminal matters was raised, emphasizing that the legitimacy of the adversarial process can be threatened if the field is tilted too far to one side.

Concerns about disparate effects on individual groups originate earlier than the courts—for example, in the use of aggressive “order-maintenance policing” in areas of concentrated disadvantage and crime.⁶ Such approaches have the potential to pull individuals into the criminal justice system early in their lives, producing effects that can be long lasting. From 1990 to 2009, the percentage of defendants charged with a public order offence increased from 7 percent to 13 percent, while the percentage of property defendants dropped from 34 percent to 29 percent (Reaves, 2013). Although national statistics on the racial makeup of those charged with ordinance violations are unavailable, recent federal investigations and changes in judicial charging practices have highlighted courts’ reliance on fees and fines, as well as the disproportionate effect that those practices may have on racial minorities and economically disadvantaged individuals.⁷

Similarly, economically disadvantaged defendants are disproportionately held in custody before trial, often because of an inability to pay pretrial bail. The intersection of disadvantage and race means that such effects can fall heavily on individual groups. For example, black men are often more likely to be held pretrial, even though their bail amounts are similar to bail

⁶ Order-maintenance policing, also called “broken-windows policing,” is intended to reduce crime through aggressive, proactive policing of less-serious offenses.

⁷ For example, these issues were prominent in the findings of the U.S. Department of Justice investigation of the criminal justice system in Ferguson, Missouri, in response to the shooting of Michael Brown (U.S. Department of Justice, 2015).

amounts set for whites. The inability to post bail can make it more difficult for individuals to fulfill work, family, and other obligations, which can magnify consequences of incarceration. As described earlier, 97 percent of federal criminal prosecutions are resolved by plea bargain, and the numbers in state courts are comparable (Mangino, 2014). Although plea bargaining can be a tool for court systems to save time and money, defendants who are detained pretrial may feel more compelled to plea bargain than those who are free pending case disposition, particularly if the plea allows them to be released from detention, creating an additional mechanism for disparities in the justice process.

Increasing Prominence of Pro Se Litigants

The U.S. court system was built around the process of attorney-represented litigants. *Pro se litigation*, or the act of representing oneself before a court instead of being represented by a lawyer, has drastically increased over the past decade, however. While national-level statistics are not readily available, examinations in individual courts have documented that the majority of some case types involve at least one pro se party. For some case types, more than three-fourths of cases involve self-representation (for a review, see Herman, 2006). It has also been suggested that increases in pro se cases (for bankruptcy in particular) have been driven in part by economic conditions in the wake of the Great Recession (Callanan, 2011). Courtrooms across the country have expressed frustration with incomplete courtroom pleadings and legal documents. From their perspective, self-represented litigants complain of being unable to file the proper documents as a result of a convoluted legal framework and a lack of understanding of “legalese.” Court practitioners suggested in our discussions that the expectations of pro se litigants are also shaped by what they have seen on court-focused television shows, where the judge often plays a much more interactive role than in traditional court processes.

Judges continuously face the challenge of maintaining their role as an impartial actor in the court process while simultaneously assisting self-represented litigants in providing the appropriate and important facts of their case. No national system exists to implement system-wide assistance for self-represented litigants. Each local court has its own form of self-help that is often not integrated with other courts throughout the state. These challenges—and court concerns about the appropriate way to assist such litigants—predate the recent increases in pro se litigants, with research and analysis going back more than a decade on these issues (e.g., Park, 1997; Goldschmidt, 1998).

Our panelists echoed these concerns. In our pre-workshop questionnaire, participants cited issues with pro se litigants’ ability to navigate the court process and the need to provide access to files and resources to assist them.

Courts and Changing Technology

Technology can play a role in helping courts perform their functions, but shifts in technology in both society and the criminal justice system can also create challenges for the court system. Given the central role of examining and processing information in the course of deliberating a case, the spread of information technology has increased the volume and complexity of many criminal and civil cases. Within commercial firms, the scale of electronic files and communication—from contract files to individual employee email—means that discovery in cases addressing business disputes or corporate behavior now must deal with larger and larger amounts of data (see, for example, Dertouzos, Pace, and Anderson, 2008; Baron, 2011). Even in criminal cases involving individuals, electronic data on portable electronic devices, in social

media accounts, or on cloud storage means that courts must have the capabilities and resources to manage and consider wider volumes of data (Goodison, Davis, and Jackson, 2015). New types of commercial technology—wearable devices, in particular—may increasingly become sources of information relevant to establishing facts in legal cases, similar to the use of information captured by monitoring devices in vehicles (Nini, 2015). The concerns raised about discovery in our pre-workshop questionnaire included the effect of e-discovery on the volume of data—and its varied effects on both the justice system and access to justice in the country. In considering the question of how shifts in modern technology have affected the court system, the ability to identify, preserve, and use video and other electronic evidence was one of the two most commonly cited concerns (33 percent of our panel respondents).

Shifts in technology also intersect with other challenges courts have faced for years. Managing juries and juror behavior and precluding defendants or others seeking to coerce or threaten witnesses have always been concerns—but in the modern technology environment, those concerns reach outward over the Internet, which provides individuals ready access to information and connectivity to communicate with people virtually (see, for example, Morrison, 2011; St. Eve and Zuckerman, 2012; Zimmerman, 2013).⁸ The availability of information and access via the Internet also shifts public expectations of the courts; for example, pro se litigants or jurors might expect certain resources and tools to be readily available to them in their roles. In the responses provided by our panel members, these issues came up in various ways, including that smart phones and other technologies (1) have increased public expectations for technological availability, (2) could threaten the trial process when jurors and others use those technologies to do their own research outside of what is presented in testimony, and (3) when those in the courtroom take photos or video of proceedings, could hurt the ability to secure court buildings and activities and could create privacy challenges for court staff and justice system participants.

Modern technologies have the potential to benefit courts—and given the importance of information to all phases of court deliberations, computers and related information technology are central to realizing that potential. Courts already use varied information systems, and evaluation research has demonstrated their benefits (discussed in Chapter Three), although our panelists raised concerns about the application of technology in key court activities, such as case preparation and court hearings. The panelists raised questions about problems in information-sharing among participants in the justice process—including judges getting information on offenders, or counsel getting full access to files (39 percent of respondents)—and related issues with breakdowns in discovery, its timeliness, and burdens given information volume (28 percent). Participants also cited problems with technology availability and training shortfalls that made it difficult to use the technology that is available (31 percent of respondents). Problems

⁸ Social media has become so prevalent that courts are creating rules governing its use by court staff, jurors, and those in the courtroom. Rules governing the use of social media vary by location, although most courts agree that court staff can, with some restrictions, use social media without compromising ethics. In 2014, 44.5 to 49 percent of respondents to a survey conducted by the Conference of Court Public Information Officers (2014) agreed or somewhat agreed that judges can use specific types of social media in their personal lives without ethics concerns, and approximately 63 percent said that court staff can use social media without ethics concerns. Use by jurors during a case is a concern, however. In a Federal Judicial Center survey of judges (sent to approximately 1,000 judges, with a 48-percent response rate), most had taken steps to prevent juror use of social media during trials (up to and including confiscating mobile devices during deliberation) (Dunn, 2014). Of the respondents to the survey, 33 (7 percent) reported detected instances of jurors using social media during trial or deliberations.

in court time management—driven by causes as disparate as scheduling challenges and participant delaying tactics—were also cited as hurting the ability of courts to function effectively (28 percent of respondents). These problems are either caused or exacerbated by information technology systems that are old and outdated, and by the absence of resources to upgrade or replace them (58 percent of respondents).

The issues posed by new technology can be particularly challenging when considering the unique court environment and its barriers to adopting and using new technologies (for a review, see Cabral et al., 2012; Martin, 2010). While courts now use multiple technologies to facilitate their operations, innovation can be challenging in the court system, given variation in court structures, administrative oversight, and funding mechanisms from state to state, jurisdiction to jurisdiction, and sometimes courtroom to courtroom. Our panelists brought up the age of court facilities and shortfalls in resources to modernize as concerns for both court facilities management overall (cited by 64 percent of our respondents) and the ability to successfully support court hearings (where 25 percent of respondents cited the inability of court infrastructures to support modern technological requirements).

But difficulties with innovation in courts come from far more than the age and construction of courthouses or civic buildings. Limits can come from budgetary constraints, lack of knowledge on available technology, and fear of a technology project failing. In both our pre-workshop questionnaires and panel discussions, all these factors were cited as limiting courts' ability to effectively deploy new technologies. Panelists specifically mentioned two types of technologies for which the lack of adoption was a real problem—video appearance technology (47 percent of the responding panelists) and new translation capabilities to support the wide variety of languages spoken in the United States (36 percent).

In our questionnaire, we asked our participants about the relevance of a specific set of barriers to implementing new technologies in five court functional areas (Table 2.1). From their responses, the clear picture is not one of concern about the potential benefits of using technology for different court functions (the percentage citing low benefits as a barrier to using technology never exceeded 14 percent of the participants in each functional area). Instead, the issue is adoption—centrally, the cost of doing so (with never less than 53 percent citing cost and the related issue of buy-in from court oversight and budgetary authorities as barriers), followed by concerns about human resources (50 percent or greater) and training (39 percent or greater).⁹ This is an area and set of challenges that have also been explored by others, where research has identified challenges for use of technology in the legal profession and in courts, ranging from its functionality and how the public will react to the perceived effect on individuals' rights.¹⁰

Adoption and use of new technologies by courts is also made more complex by the number of different participants in court processes, each of which has distinct needs and requirements. The functioning of courts involves judges, court administrators, clerks, attorneys, and case litigants. Each group has its own requirements for access to information, data that must be collected and managed, and actions to take to perform its role within the legal process. The

⁹ These issues were brought up in the free-response questions about problems facing courts as well. Respondents raised general concerns about the ability of public organizations to hire and retain staff with key knowledge and technical skills given pay and benefits levels (39 percent) and—driven partly by those challenges—concerns about insufficient levels of technical acumen in court system employees for effective technology use and innovation (31 percent).

¹⁰ See Lederer, 2004b; Wiggins, 2004.

Table 2.1
Percentage of Panel Respondents Citing Barrier as a Major Obstacle to Implementing Technology to Support Each Court Function

Adoption Barrier	Functional Area				
	Case Preparation and Presentation (%)	Case-Level Court Information Management (%)	Support for Court Hearings (%)	Facilities Management (%)	People Management (%)
Cost	69	81	53	67	58
Buy-in from judges	31	25	28	11	22
Buy-in from attorneys	14	8	28	8	6
Buy-in from administrators	17	28	22	19	31
Buy-in from court oversight or budgetary authorities	69	72	53	64	56
Infrastructure to accommodate technology	28	42	50	53	31
Human resources to manage and maintain the technology	64	64	61	50	64
Lack of training on use of technology	56	50	50	39	56
Offers limited improvement over current court practices	14	8	14	8	14

NOTE: Percentages are the percentage of respondents (n = 36) who identified each barrier as “major” in a multiple-choice question, with options “major,” “minor,” or “not an obstacle.” The full question is provided in Appendix B.

powers and responsibilities of these various actors also differ, with much responsibility for adopting new technology falling on court administrators—but being shaped by the desires and preferences of individual judges, counsel, prosecutors, and others. Actions by other segments of the criminal justice system can have an effect on courts as well. For example, it was noted during the panel that the increasing prevalence of body-worn cameras by police is resulting in increasing demands for courts and attorneys to manage and disseminate large volumes of digital video footage. A single 30-minute video can take up about 800 megabytes of storage (Newcombe, 2015), meaning that a court can easily be required to manage many terabytes of video per year. Technological change can also have different effects in different segments of the court system; for example, the use of technologies at trial can have implications for appellate review of trial proceedings (Lederer, 2000).

As cited previously in our panel results, challenges faced by court systems in building and maintaining internal human capital can also complicate innovation efforts. Societal shifts toward Internet connectivity (and public expectations for courts to make information available online) have created cybersecurity concerns that did not exist in legacy, “standalone” information systems. Many courts do not have dedicated information technology staff, and court information technology functions therefore fall to countywide (or other broader governmental) information technology staff. This separates technical capability from the court itself—where innovation requirements and constraints are best understood—limiting the drive toward and potential success of new technology adoption efforts, and making it more difficult for courts to address the demands of cybersecurity and other challenges.

Moving Forward

The court system faces significant challenges today, driven by factors as varied as system capacity constraints and the skills and capabilities of the participants in court processes. The outcomes of court processes—including racial and other disparities in those outcomes, which have gotten significant attention recently—are raising questions about whether courts are meeting the societal goal of delivering impartial justice for all. Structural innovations, such as problem-solving courts, are seeking to help address the range of challenges that find their way into courts—where substance abuse or mental health needs may push individuals into the criminal justice system—in an effort to get better outcomes not just for individuals but for society in reducing recidivism and the costs associated with incarceration, supervision, and criminal justice participation writ large.

Innovations in technology, policy, and practice could assist courts in improving performance and efficiency—and based on both the views of our panelists and available literature, there are opportunities for new innovations to address the significant challenges that courts currently face. But this is not an effort starting from a blank page. From records management systems to security tools, technological systems are already broadly used in courts across the country, and efforts have been under way for some time to identify and spread best practices for courts to achieve their goals more effectively. As a result, innovation to address challenges that courts face today must start with the baseline of technology and practice that currently exists. In Chapter Three, we turn to that baseline, describing courts today to provide our jumping off point for considering innovation in court systems into the future.

Court Technology and Practice Today

In considering the possible future of U.S. courts and the potential for innovations to improve performance, the path to realizing the potential of technology and meeting the challenges faced by the U.S. court system starts with the technology and practice environment as it exists today. As a result, in this chapter, we summarize the state of court technology, tools, and practice resources as they currently exist, to provide a starting point for considering an innovation agenda for the future.¹

A Taxonomy of Court Technology and Practice

As mentioned, this report is part of a larger research effort to assess and prioritize technology and related needs across the criminal justice community. Within that effort, the research team developed a taxonomy of criminal justice system technologies and practices. The goal of doing so was to provide a framework for both analyzing and organizing the many technologies that are relevant to criminal justice agencies—including, for the purposes of the project, courts, law enforcement, and corrections—and providing a structured set of categories that would capture the variety of ways these organizations could innovate to improve future performance.

The range of both existing technologies and potential innovations is broad. For example, for courts, innovations could come from establishing new methods to share information with various actors in the court system, and from developing new technologies to help share that information more securely. Technologies might also facilitate public access to the courts, by providing information about cases through electronic systems, ensuring access to legal research and norms for pro se litigants, and facilitating access to the courtrooms themselves through remote appearances. As a result, the framework has to be broad enough to capture all criminal justice system tasks and the multiple ways of performing those tasks in the court system, because different options have their own inherent strengths, weaknesses, and implementation concerns, and these shape how big of a role those options could have in enabling court innovation.

The taxonomy was initially built by drawing on literature and websites that provide indexes of criminal justice system and court products and services, lists of technology and other vendors from court-related conferences, and relevant private-sector materials. We initially developed and refined the taxonomy in research on the corrections sector (Jackson et al.,

¹ Readers who are already very familiar with the extent of technology and practice currently available to courts may wish to skip this chapter and go directly to Chapter Four for discussion of the innovation agenda.

2015) and on law enforcement information technology (Hollywood, Boon, et al., 2015), and we revisit the taxonomy in this work for application to courts.

There are five central categories within the taxonomy:

- facility operations and population services
- person-worn equipment and weapons/force
- information and communications
- doctrine, tactics, management, and behavioral knowledge development and training
- vehicles.

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 and practices that currently exist. In applying the existing framework to courts, only minimal modification to the taxonomy structure was needed, and the changes were made far out in the branches of the categorization (rather than in the main categories or subcategories).² In addition, one simplification was made, setting aside the *vehicles* category of the taxonomy. Although some court systems perform functions that involve vehicles (e.g., where security staff or sheriff’s officers involved in prisoner movement are organizationally members of the court), in this work, we excluded vehicles and vehicle-related concerns from the scope of court technology and practice. We feel these topics are sufficiently covered in previous work for the other criminal justice sectors (see, in particular, Jackson et al., 2015). Thus, Figure 3.1 shows the main categories and first subcategories (or branches) of the taxonomy for courts.

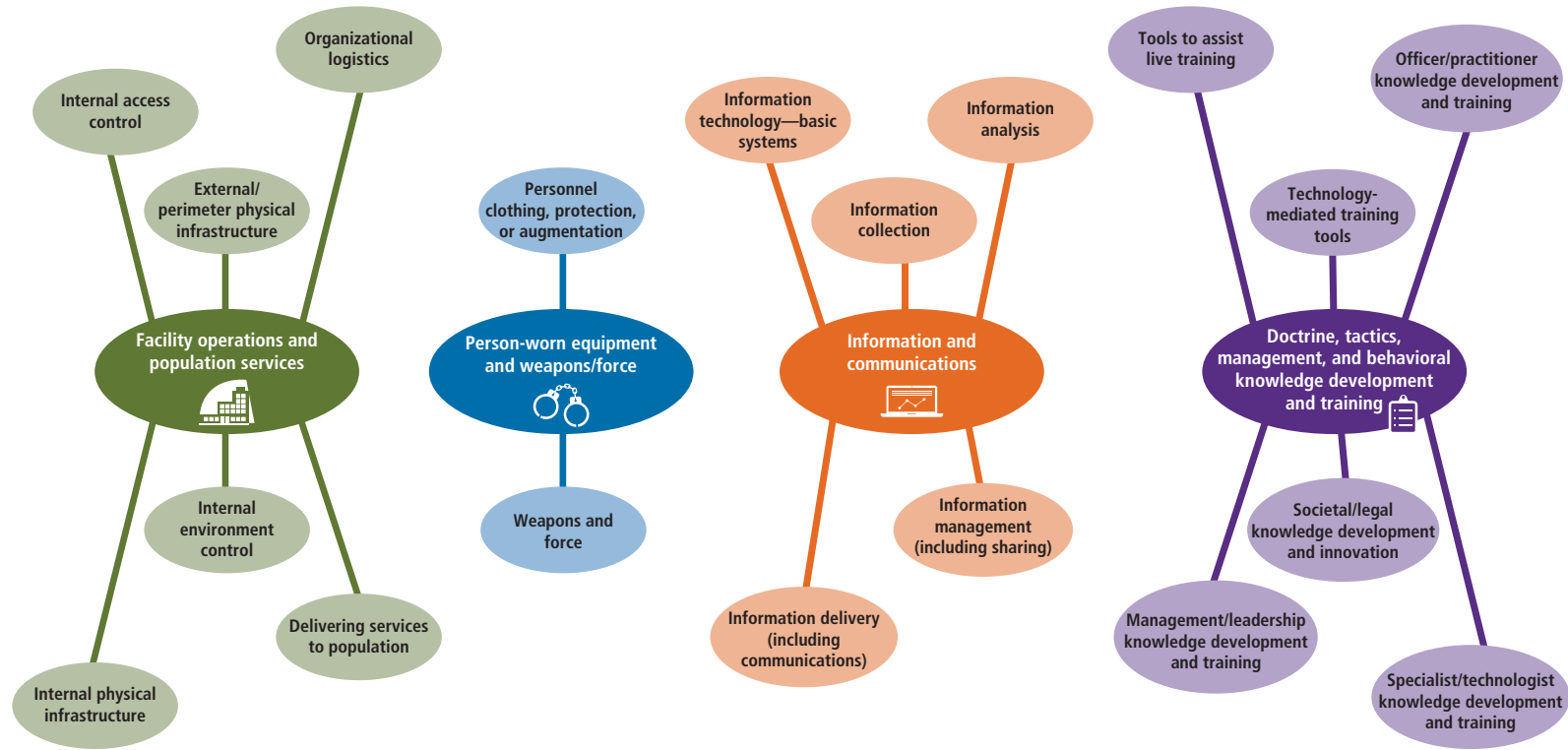
We populated the categories of the taxonomy with example technologies from the published literature, through a series of foundational interviews with experts in relevant court practice areas and through iteration among subject-matter experts on the research team. The goal was to provide a snapshot of current court technologies and policy or practice resources to serve as a starting point for considering potential future innovations. Figure 3.2 provides a sample section of the complete taxonomy (populated with court information management technologies), showing both the scope of the taxonomy and detail for one of the simpler portions—where the example technologies appear at the ends of each of the subcategory branches. The full taxonomy is 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 Court Innovation

Looking across the results of the review of current court technologies (Figure 3.2), it is clear that a wide range of technologies and approaches focus on *information and communications*, reflecting the importance of managing and applying data in court processes. Encompassing record-keeping, information-sharing, and data analysis tools, this category captures a significant fraction of all the examples identified in our search. Our *doctrine, tactics, management, and behavioral knowledge development and training* category captures knowledge and resources for

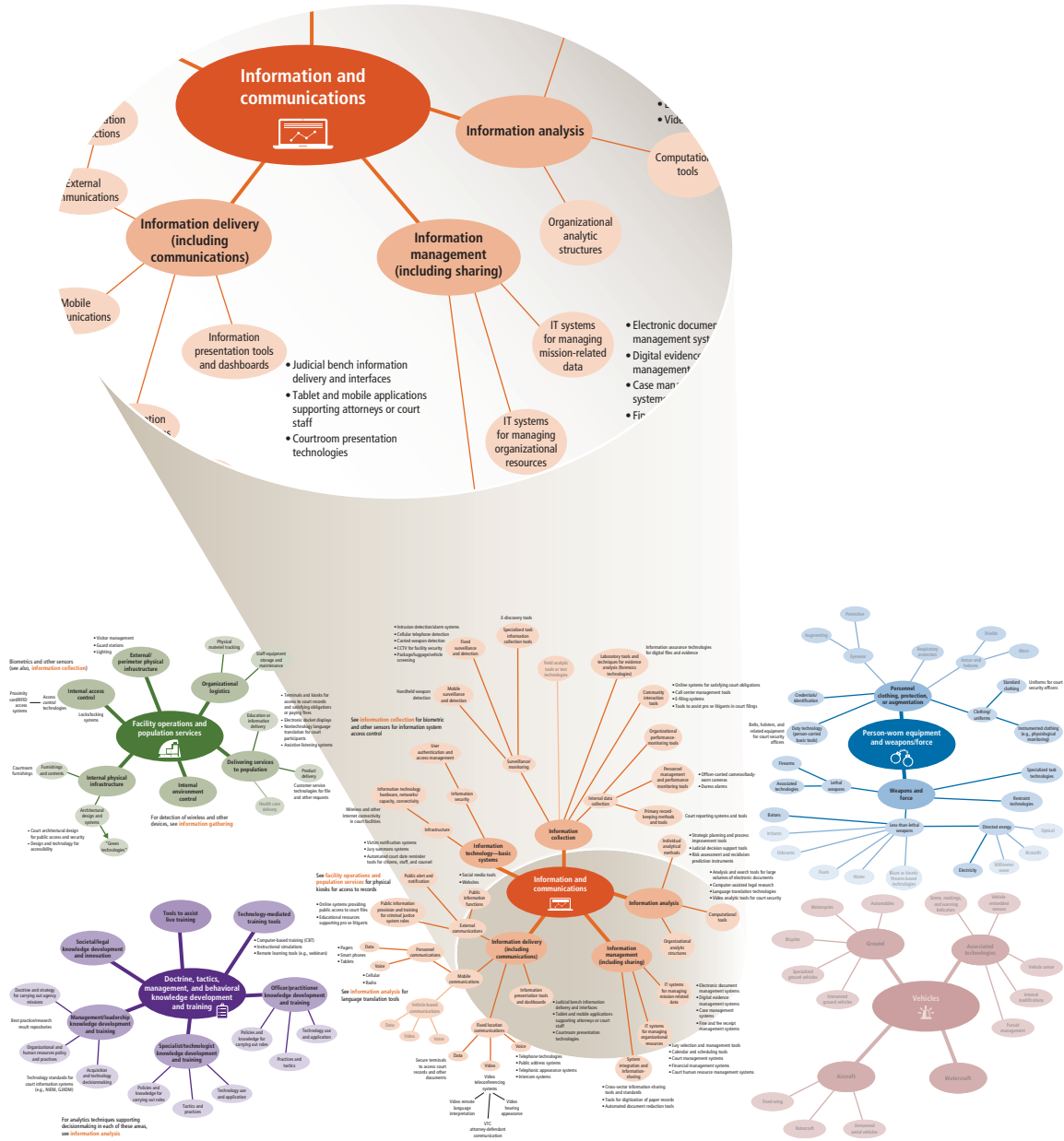
² New branches were needed to capture *primary record-keeping methods and tools* (which would include court reporting technologies) and *public information provision and training for criminal justice system roles* (e.g., tools and resources to provide access to court files for pro se litigants).

Figure 3.1
Main Categories and Subcategories of the Criminal Justice Technology Taxonomy Used in Examining Court Innovation



RAND RR1255-3.1

Figure 3.2
Sample of Full Taxonomy for Court Technology and Practice



RAND RR1255-3.2

advancing the skills and abilities of court actors, including judges, administrators, clerks, and other judicial employees. The remaining categories—*facility operations and population services* and *person-worn equipment and weapons/force*—contain fewer examples, reflecting less development of court-specific technologies and practices in those areas (and, potentially, reflecting overlaps with the corrections and policing sectors).

For characterizing the state of technology adoption in courts today, ideally, there would be survey data available that could provide a representative accounting of the technologies that the many types and levels of courts currently use. In contrast to some other parts of the criminal justice sector (specifically, law enforcement),³ such cross-cutting data are not readily available for court systems. Building such a picture is complicated by the many different stakeholders that “bring technology into the court”; that is, a comprehensive picture of technology in the court system includes not just systems that are acquired by court administrators and installed in court facilities, but also the technologies that prosecutors, private attorneys, other criminal justice practitioners, and even members of a jury might have and use during court activities.

Nevertheless, some survey data are available. The American Bar Association (ABA) produces an annual technology survey, based on email data from the association’s national membership of attorneys in private practice. The survey asks about what technology the courts provide to the attorneys and about their own use of technology.⁴ Further examples of available data include surveys of specific segments of the court system (e.g., Wiggins, Dunn, and Cort, 2003, which examines federal district courts), academic papers that examine use of technologies in specific sectors of the court system (e.g., Hanson, 2005, which examines appellate courts; Lederer, 2004a, and Dixon, 2011, which review technologies at trial; and Jenkins, 2008, which discusses use in law practice), surveys focused on specific technologies (e.g., Conference of Court Public Information Officers, 2014, which examines social media use), and surveys done within individual states. However, due to the designs of the surveys and their different focuses, none provides the overarching picture of court technology and practice that would be desirable for building an innovation agenda for the future.

In the remainder of this chapter, we unpack the state of the art of court technology and practice today in each of these main technology areas, drawing on the available survey data and published literature, as appropriate.⁵ We use the taxonomy in Figure 3.1 to provide structure for the discussion. By mining the inputs provided to us by our advisory panel members, we also highlight some of the most common issues with current technologies and practice. While an exhaustive discussion of existing technology is clearly not practical, a selective one can nonetheless provide a starting point for considering potential new court technologies and practice, the potential for broader adoption of existing ones, and the potential to adapt innovations from other sectors to benefit courts.

³ The periodic Law Enforcement Management and Administrative Statistics survey provides a national-level picture of use of technology (and other variables) for a sample of law enforcement departments across the country.

⁴ The annual ABA surveys are sent to a sizeable sample of the organization’s membership of attorneys in private practice (12,500 of 75,000). However, in the year of the survey examined for this study (2014), only a small, self-selected sample participated (between 700 and 900). Although respondents came from across the country, there were significant biases by state; for example, 8.7 percent of respondents to the Litigation and Courtroom Technology survey came from New York, 8.1 percent from California, and 7 percent from Illinois. As a result, while the data appear to be the best available on technology use in courts across the country, they must be interpreted with caution.

⁵ It should be noted that there is a literature describing court practice, technology, and innovation in other national contexts—for example, the use of information technology in European courts. We have largely neglected this literature given the U.S.-centric nature of this effort, even though lessons about innovation and technology adoption can be identified in other nations’ experiences (see, for example, Brooke, 2004; Borkowski, 2004; Macdonald and Wallace, 2004; and Giuffrida, 2004).

Information and Communications

Reflecting the fact that courts are themselves information-processing organizations—for example, they draw on information presented in case materials or at trial to navigate negotiations or make judgments—information and communications technologies are central for courts. These technologies have provided the opportunity for increased efficiency—for example, the capabilities afforded when using information technology–based court or case management systems compared with performing tasks in a paper-based system. In addition, the combination of different information and communications technologies with appropriate changes in policy and practice can enable the justice system to perform in qualitatively different ways and better and more efficiently achieve its intended goals. This is exemplified by an implementation in North Carolina:

This E-filing system allows victims to go through the entire process of obtaining an ex parte protective order from a non-profit domestic violence assistance center—the Alamance Family Justice Center. Now domestic violence victims with assistance from a Domestic Violence advocate can complete a complaint online at the center and submit it electronically to the Clerk of Superior Court’s Office. The clerk swears the victim to the complaint using a video phone, issues an electronic summons, and automatically indexes the complaint into the Civil Case Management System.

The system then forwards the complaint as well as a draft ex-parte order to a district court judge for hearing. The victim is allowed to appear before the judge in chambers via a webcam to provide testimony. If the ex parte protective order is granted, it is automatically transmitted to the Family Justice Center and printed for the victim. The order is also transmitted to the sheriff’s office where it is immediately available for service. . . . Once e-signed by a judge, law enforcement can view full orders as well as ex-parte orders on their laptops or mobile devices. Text messages with updated case status are also sent to the mobile devices of the registered parties.

Prior to the implementation of [the program], domestic violence victims had to travel to multiple locations to obtain a protective order. . . . Having to travel publicly to multiple locations, usually following a violent abuse incident, not only left the victim vulnerable to an additional attack, but also increased the risk that the victim would feel too vulnerable to follow through with seeking a protective order. Prior to the implementation of the E-filing system, approximately 12 percent of victims failed to complete the process once started.

Victims are also more comfortable relaying their testimony of abuse to the judge in a private, secure video setting rather than having to re-live these details in a packed courtroom as was the practice prior to the implementation of [the program]. . . . With the prior manual process involving multiple locations, it often took victims 10 to 12 hours to obtain a protective order. The process can now be completed in one or two hours depending upon judge availability. . . . With the former process, clerks and judges spent approximately three and a half hours per order. That time has now decreased to approximately 45 minutes per case. (McMillan, 2015)

In this section, we unpack the different types of information and communications technologies used in the court system and provide information available on the extent of current technology use.

Information Technology—Basic Systems

Today, the use of information technology within court systems is extremely common, with differences largely in how and how much those technologies are used. Although paper has certainly not disappeared from courts, information technology in elements of court processes has been widely adopted. The implementation of information technology systems in independent courts can be quite challenging and can be affected by the diversity of court structure and administrative models. For example, some courts are responsible for acquiring and maintaining their own information technology systems, while others rely on local, county, or even state capabilities. But use of information technology by individual stakeholders within the court system is advancing. The use of such technology by attorneys, for example, is nearly ubiquitous, with many on rapid replacement and upgrade cycles (Poje, 2014); moreover, attorneys' use of cloud computing platforms has become prominent (Black, 2014). Even if we focus on technology use just in the courtroom (where the compatibility of attorney technology and the court system would be the greatest concern), significant portions of the ABA survey respondents stated that, in courtrooms, they use smartphones (increasing from 69 percent of respondents in 2011 to 77 percent in 2014), laptop computers (decreasing from 50 percent to 46 percent), and tablet computers (increasing from 10 percent to 37 percent) (Poje, 2014; see also discussion in Heerboth, 2013). As discussed in Chapter Two, technology advances within society as a whole are increasing expectations for information technology capability in courts—and that capability is often found lacking. For example, wireless access is something that many in society now simply assume will be available in public areas. Yet, in the ABA survey of private attorneys, only 3 percent of respondents indicated that wireless access was provided for them to present video or audio data in the courtrooms, in their experience (Poje, 2014).

The advance of information technology use in courts and by court stakeholders has also brought the *information security* concerns that are endemic in the modern age.⁶ In the ABA survey, more than 13 percent of the responding attorneys reported that their firm had experienced a security breach, and more than a quarter of those answering cited negative outcomes, such as loss of client data, destruction of data, or downtime and other costs (Poje, 2014). Concerns also exist about new modes of information technology use, such as cloud storage. Approximately 30 percent of ABA respondents indicated that they were using the cloud to store legal data, but they also reported concerns about security and confidentiality, control over data, and other issues related to entrusting legal data to private companies for storage (Poje, 2014). Concerns about security were also raised repeatedly by our panelists and are a topic of focus by relevant organizations, such as ABA.⁷ Available data suggest that courts are putting *infrastructure* in place that allows authorized users to access court systems but that also protect those systems; examples include virtual private networks and secure email systems. In a 2013 survey of courts across the country, the Center for Legal and Court Technology found that 92 percent of their 63 responding courts were using some form of secure connectivity over the Internet (Center for Legal and Court Technology, 2013b).

Preparing these systems to recover from outage or disruption—from natural events, cyber attacks, or otherwise—is also a priority, but available survey data did not provide any insight into the level of disaster preparedness across the U.S. court system. The available literature pro-

⁶ Italicized phrases indicate a term from our taxonomy.

⁷ See, for example, American Bar Association Cybersecurity Legal Task Force, 2015.

vides case studies of the activities of individual systems or entities (e.g., State Bar of Michigan Judicial Crossroads Task Force, 2010; Flango et al., 2014), as well as resources providing system guidance on what is required to safeguard these systems (e.g., Birkland and Schneider, 2007), but little data are available on what courts are actually doing.⁸

Information Collection

In contrast to other components of the criminal justice system—where collection of new information is central to their roles—courts are generally focused on the intake and use of information that has already been collected; for example, courts consider and reach judgments based on evidence presented in a civil or criminal case. With respect to our taxonomy, the exceptions to this generalization are threefold:

- tools that collect information related to the security of the court and its facilities
- the intake of information from others, including the public (e.g., through e-filing) or participants in the court process (e.g., e-discovery by prosecutors or counsel)
- tools for capturing data on the court and its proceedings, including recording and reporting tools and practices.

The remainder of this section takes on the existing tools related to each of these areas,⁹ and presents the insights that are available on the extent of adoption in the court system.

Court Security

In considering tools for court security,¹⁰ relevant information collection technologies largely fall within the *surveillance/monitoring* and *internal data collection* categories of our criminal justice taxonomy. Detection technologies, such as CCTV and baggage and pedestrian screening tools, help monitor court facilities, exclude weapons, and control access. Other tools that provide the ability to collect and transmit information, such as duress alarms for judges or body-worn video cameras on security staff, also fall into this category. To evaluate how security was being implemented in courts, NCSC carried out a targeted survey on court security issues in state courts and reviewed court building assessments performed during 2005 and 2011. In its web survey of a variety of state court staff, point-of-entry screening (which includes these technologies) was flagged as the most critical need, and physical security systems and mail and package delivery screening were nearer the middle of that survey’s scale of criticality (Fautsko et al., 2013, p. 5-2). The performance of current point-of-entry screening (e.g., magnetometers, X-ray machines, and wand metal detectors), physical security systems (e.g., duress alarms and CCTV), and incoming mail and package screening were all rated between “good” and “fair” (Fautsko et al., 2013, p. 5-2). Not unexpectedly, there were large differences in security measures based on the size of the court facility (Fautsko et al., 2013, pp. 6-4–6-5.)

⁸ As will be clear in later chapters, this was an issue raised by our advisory panel.

⁹ For ease of presentation, rather than structure this discussion using our taxonomy categories, we structure it under general topics (court security, information intake, and court reporting and recording) and then, in the text for each topic, relate the functional areas to the categories in our comprehensive taxonomy.

¹⁰ Security-related infrastructure and facility technologies and practice are discussed later in this chapter.

Based on NCSC's review,¹¹ use of many detection technologies for security is far from ubiquitous. Thirty-eight percent of the courts did not use CCTV cameras for exterior security, 70 percent did not use CCTV for courtroom security, 26 percent had no equipment to screen individuals coming into the court building, 61 percent did not screen packages or mail, 47 percent did not have duress alarms at public transaction counters for employees to call for assistance, and 92 percent did not use CCTV at public transaction counters. In contrast, 96 percent of the examined courts had duress alarms at the bench (and 62 percent had them in judges' chambers) for judges to call for security assistance (Fautsko et al., 2013, pp. 7-1-7-16).

Information Intake

Recent years have seen a shift from paper files archived in a designated space in the courthouse to electronic files that are stored in an electronic records management system. With this transition, processes for court participants to submit materials to the court in electronic form—called *e-filing*—has become increasingly common (Carlson, 2004). E-filing also takes advantage of the Internet to eliminate the need for individuals to physically take documents to the court clerk's office. This practice has been adopted by federal courts and some state and local courts to increase the efficiency by which information is transferred and made available.¹² Case studies of individual courts have shown that the gains can be substantial, with e-filing being approximately 40 to 50 percent more efficient than paper submission processes (Burton, 2009, p. 48).

Federal courts have been the most avid adopters of e-filing systems thus far; 98 percent of these courts have the Court Management/Electronic Court Filing system in place to allow court participants to electronically file documents (Matthias, 2007). Currently, 49 of the 50 state court systems have some sort of e-filing in place, but only six states currently have e-filing statewide. Many jurisdictions do not have sufficient infrastructure to support remote electronic filings and may face other obstacles that prevent such filings.¹³ For example, a survey in 2010 of all courts in Ohio indicated that only 16 of the 371 courts (approximately 4 percent) had e-filing in place (Ohio Supreme Court, 2010). However, the ABA survey of attorneys is consistent with the other available data, as only 18 percent of respondents said that e-filing is not available in their state courts, and 26 percent indicated that it is not available in their local courts (Poje, 2014).

The other major area of technology and practice related to the intake of information by courts and court participants—often central in civil proceedings—is the acquisition and analysis of electronic information in case preparation, termed *e-discovery*.¹⁴ It is defined as

¹¹ NCSC identified a sample of 77 courts of different sizes, geographic locations, and other variables from the 255 court building assessments they had performed (Fautsko et al., 2013, p. 7-1).

¹² While it bridges our taxonomy categories covering information coming into the court and information being disseminated from the court, court provision of legal documents to stakeholders in electronic form has also become quite common. In the ABA survey, 71 percent of respondents indicated that they receive documents from courts in electronic form, and 83 percent submit documents to courts in this way (Poje, 2014).

¹³ Respondents to the NCSC e-filing survey in 2009 (which included a mix of general and specialized courts) indicated that just more than one-third of them had e-filing in place at that time, and much of the remainder had plans to offer it in the future. Less than 10 percent had no plans to do so at that time (NCSC, 2009). In responses to our questionnaire, a small number of panelists flagged lack of e-filing capability as an issue with current technology.

¹⁴ In responses to our questionnaire, panel participants flagged issues about the use, management, analysis, and integrity of electronic evidence as a significant problem with current technology.

any process in which electronic data are located, searched, secured, or found for the purpose of using that information as evidence in a civil or criminal investigation. E-discovery has a several-stage function that consists of identifying relevant electronic data (or documents), preserving them and placing them on a legal hold, collecting the preserved data, processing data with specialized software, reviewing the data's responsiveness to discovery, and producing the appropriate data to the opposing counsel.

With the advent of electronically stored information, e-discovery is necessary in increasing numbers of cases and can therefore require increasing amounts of court and counsel time and financial resources. In the ABA survey of private attorneys, approximately 40 percent of the respondents indicated that their firm had participated in a case that involved e-discovery (Poje, 2014). With the proliferation of electronically stored information, discovery has become more burdensome and expensive. In an effort to reduce the burden associated with reviewing such information, software tools are now used to search through the vast amounts of data and documents and produce a smaller set that may be responsive and relevant to a specific case. One study of cost data from 57 large-volume e-discovery productions found that 73 percent of e-discovery costs were spent on document review. Computer-categorized document review techniques, such as predictive coding, identify at least as many documents of interest as traditional eyes-on review with about the same level of inconsistency—but with the potential of reducing the hours that attorneys must spend by about three-quarters (Pace and Zakaras, 2012; Barry, 2013). This analysis technique does not appear to be broadly utilized currently, however, with only 14 percent of the respondents to the ABA survey indicating that they have ever used it (Poje, 2014).

Court Reporting and Recording

Because of the importance of keeping a record of court proceedings to use during other proceedings or negotiation, during the implementation of judgments, and during review and appeal, information collection via *court reporting systems and tools* is ubiquitous. Documenting what occurs during court proceedings falls to the court reporter, who is responsible for recording the proceedings exactly as they occur, as well as capturing latent aspects of speech, such as lengthy pauses or emphases placed on certain words and phrases. Court reporters record legal proceedings in real time and, depending on the technology used, may translate their recordings immediately for use by the judge and attorneys (using Computer Assisted Real Time software) or store them for use at a later date. Court reporters also transcribe the record for parties that request a transcript, or if a case is being heard by an appellate court.¹⁵

As technology has advanced, the process of court reporting has become much more efficient, now providing court room actors with real-time access to the proceedings. The advent of digital stenograph machines, in conjunction with Computer Assisted Real Time software, allows court reporters to record what is being said in the courtroom using shorthand, which can then be translated in real time and transmitted as readable text to different monitors throughout the courtroom. Such software is commonly available: In a survey of federal dis-

¹⁵ There are reported challenges associated with documenting case records (Conference of State Court Administrators, 2009). Challenges include the availability of stenographers and the efficiency at which the court may obtain case transcripts from stenographers. Oftentimes, a case transcript may be produced only by the reporter who recorded the case, due to variations in reporter notes. This system prevents the courts from reallocating resources to prevent transcript request backlogs. The Conference of State Court Administrators reports that this delayed access of transcripts invariably translates to negative consequences for other court practices, such as prolonging the time it takes for judges to hand down decisions.

trict courts in 2002, 81 percent reported it was available, although a much smaller percentage (31 percent) indicated that it was always available in all courtrooms (Wiggins, 2004). More-sophisticated versions of such software can make transcript-in-progress tools available to court participants. According to the APA survey of attorneys, this technology is not widely adopted, however; the prevalence of reporting equipment that delivered a real-time transcript to court monitors or to lawyer laptops ranged between 12 and 15 percent for the former and between 15 and 23 percent for the latter (Poje, 2014). However, the technology may be more common in some subsets of courtrooms: A 2002 survey of federal courtrooms indicated that 26 percent had a “real time transcript viewer annotation system” permanently installed, and a larger percentage (74 percent) had access to the technology (Wiggins, 2004). Another practice, known as “voice writing,” is the process of repeating what is spoken in the courtroom into a “voice-silencer mask.” Using voice-recognition software packages, the verbal audio is transcribed in real time into text that may be viewed locally on courtroom monitors and edited later.

The current economic pressures and the increasing difficulty of finding qualified court reporters has led to the adoption of digital court reporting practices. These include using audio and video recording devices to capture court proceedings without the need for a court reporter to be physically in the courtroom. Remote recording is possible with this technique, and is sometimes done from a centralized monitoring station that is connected to the courtroom via a single network.¹⁶ There are benefits to using digital recording methods to document cases for official records, including enhanced accuracy, enhanced searchability, ease of access, and more-efficient transfer and storage. Some features that assist in these efficiencies include automatic start times, sound enhancing techniques, ability to continue recording while playing back a portion of the record, multichannel recording options, and video technology. Digital recording systems may also be integrated with teleconferencing systems that allow for court participants to appear remotely.

Advances in court reporting technology also provide an opportunity to integrate with other technologies. Digital recording methods allow courts the opportunity to integrate their digital recording software with their case management systems to add further convenience to interested parties and ease of access to case records. Standards for the use of digital recording in courts have been developed to support their adoption (Suskin, McMillan, and Hall, 2013). Use of video recording has also been suggested to support not just the efficiency but the effectiveness of appeal processes, because video captures more of the context of the process than transcripts and other paper-based records (Delehandy et al., 2014; Lederer, 2000). Comprehensive recent data on the extent of adoption of digital recording are not available, but in a 2002 survey of federal courtrooms, 18 percent reported being equipped with digital audio recording capabilities (Wiggins, 2004). In a more recent survey of Ohio courts, 82 percent reported having implemented digital recording technology (Ohio Supreme Court, 2010).

Information Analysis

Given the variety and scope of information that can be relevant to individual cases, *analytical methods* that help courts and participants analyze that data and make decisions have potential benefits. Such tools can be based on analysis of historical data to inform judgments about a specific case or individual (e.g., risk assessment) or computational methods that help analyze data sets in the course of argument or deliberation. *Judicial decision support tools* cover tools

¹⁶ However, digital recording and transcription of proceedings may also be done by reporters in the courtroom.

intended to support a judge's decisionmaking, workflow, and information management. Going beyond the capabilities of a case management system (discussed in the next section, Information Management), these tools are used to access current and prior case information, and they "include applications, equipment, and resources that enable judicial decision making, research and document creation, and the execution and issuance of orders" (Joint Technology Committee, 2014, p. 2). These tools provide judges with more-effective technological means of accessing case records, ruling on filed motions, electronically signing documents, flagging case events, and scheduling and presiding over hearings and trials. Flexible docket organization allows judges to organize cases on dockets into prioritized categories—for example, cases with private attorneys, all cases with interpreters, and all self-represented litigants. Such tools can be matched to the sometimes very different needs of judges for high-volume courts (traffic and arraignment dockets) versus those in multiple-event courts and problem-solving courts (Joint Technology Committee, 2014). However, in spite of discussion in the literature about the potential for these tools, we could not find any data on the extent of their adoption.

Risk assessment and recidivism prediction instruments intended to inform decisions on criminal pretrial release or posttrial sentencing have received significant attention. These instruments are designed to measure offender criminal risk factors and assess specific types of needs (and potential responsivity to intervention) to inform choices about incarceration, diversion, or other programmatic assignment. By combining data from an individual's criminal history with other factors—such as antisocial personality patterns, procriminal attitudes, substance abuse, procrime social supports, poor relationships, school/work failure, and lack of prosocial recreational activities (which might be altered through intervention)—these tools seek to predict future criminal behavior. Such assessments have evolved considerably over time in an effort to improve performance (Council of State Governments Justice Center, 2014).

According to a Pew Center on the States report (2011), risk and needs assessment instruments can be used by courts to "help make pretrial bail and release decisions [and] sentencing and revocation decisions and to set conditions of supervisions" (p. 2). Use of such tools is viewed as relatively common, although detailed data on adoption were not identified in our review—likely, in part, because of the many applications of risk assessment tools (e.g., from basic service provision through sentencing and release). The Marshal Project reports that "there are more than 60 risk assessment tools in use across the U.S." (Barry-Jester, Casselman, and Goldstein, 2015). Nationwide, about 40 percent of pretrial service programs have systems that automatically calculate a defendant's risk level (Pretrial Justice Institute, 2012). Monahan and Skeem (2014) describe four states that have adopted these tools significantly in criminal sentencing: Missouri, Pennsylvania, Utah, and Virginia.

There is less evidence in the literature of specific *computational tools* designed to assist court participants in analyzing significant volumes of information.¹⁷ With the advent of the Internet, legal research has moved online in the form of databases, such as LexisNexis and Westlaw. These databases are broadly used and provide capability over paper-based research approaches. Some computational tools are related to other systems (e.g., searching and other capabilities built into electronic document management systems or e-discovery tools).

¹⁷ Some future-oriented work is exploring how computational tools could replace some elements of the court system—for example, in adjudicating disputes (Mowatt, 2015).

Information Management

Because courts are information-processing organizations, managing data is core to what they do. This includes managing information during current cases (whether in negotiation or trial), as well as managing the court record over time. Furthermore, managing data related to court operations (e.g., scheduling the court docket, identifying and impaneling jurors) is core for staff and leaders involved in court administration. As has been shown in other areas of government and the private sector, effective information management (especially using information technology, or IT) can provide significant benefits in efficiency and effectiveness. Within courts, such management can support judges in making well-informed rulings quickly. It can also allow courts, criminal justice agencies, and community agencies to collaborate, improve services, and solve community problems. In our taxonomy of criminal justice technology and practice, court information management includes *IT systems for managing mission-related data* (e.g., court case management and digital evidence storage), *IT systems for managing organizational resources* (e.g., staffing, scheduling, and financial management), and *system integration and information-sharing* (e.g., cross-sector sharing efforts).

IT Systems for Managing Mission-Related Data

To carry out court operations and achieve the goals that society demands, courts must manage large amounts of data. In the modern age, such information management is generally viewed as being done with computers and other information technology. Indeed, use of such tools in courts is widespread, but paper has not disappeared. In its 2009 survey on e-filing, NCSC asked respondents to identify the medium for the official record in their courts, and slightly more than half of the respondents indicated that it was still paper (NCSC, 2009).¹⁸

One of the most critical information management tasks performed by courts is caseflow management, which is the overall process of moving cases from the point of filing to disposition, including actions on behalf of the judge and clerk. A *case management system* may be limited to a specific court (e.g., criminal, traffic) or may contain information from multiple courts in the jurisdiction. The system can provide court staff who have been granted access with information on the pending case process, as well as past cases involving the defendant. The National Consortium for State Court Automation Standards provides functional standards for case management systems that handle civil, domestic, criminal, juvenile, and traffic cases. The purpose of functional standards is to “identify what the [case management system] should perform, leaving the question of how the system should accomplish those functions to the designer” (Matthias, 2010, p. 175). The full scope of functions for caseflow management bridges our categories of managing the data that the court is using (mission-related data) and managing the data on the court’s own staff and resources. The case management standards cover

- case initiation and indexing
- docketing and related record-keeping
- scheduling
- document generation and processing
- calendaring
- hearings
- disposition

¹⁸ The survey had 109 respondents from a variety of general and specialized courts. Of those, 54 answered the question on the medium of the official court record (NCSC, 2009).

- execution
- case close
- accounting (including front counter, cashier, back office, and general ledger functions)
- security
- management and statistical reports. (NCSC, 2001a, pp. 2–3)

The link to accounting functions can also enable caseflow management systems to perform tasks related to *fine and fee receipt management*—that is, collecting and managing payments from individuals interacting with the court, which was previously done by staff cashiers.

Case management systems are broadly used by courts, although we could not find any national-level estimates. A 2010 survey indicated that in all Ohio courts, “all cases were being input into a case management system” (Ohio Supreme Court, 2010, p. 2). However, broad adoption does not necessarily equate to satisfaction with the capabilities that are currently available. Our advisory panel members expressed concerns about the age of current information management systems and lack of resources to upgrade them.¹⁹ They also raised concerns that the design of such systems is not always well matched to the business processes of the courts.

Related to but sometimes distinct from case management systems, *electronic document management systems* manage court information in electronic form. Tied to e-filing (discussed previously), an electronic records management system can help all participants in the justice process (including law enforcement and corrections agencies) get access to the information needed to perform their roles,²⁰ with the added automated search and other features available with electronic files. In combination with e-filing, such systems can provide efficiencies by streamlining processing of documents, eliminating printing and mailing, and reducing physical time spent in court facilities. These technologies also play roles for counsel in managing information in preparing cases. In the ABA survey, attorneys reported the use of information management tools for their practices, with approximately 30 percent reporting availability of deposition and transcript management software at their firms (Poje, 2014). A subset of electronic document management is *digital evidence management*, which requires storing evidence collected from mobile devices or computer networks in a way that maintains authenticity and chain of custody (Goodison, Davis, and Jackson, 2015).²¹

For courts with legacy paper-based filing systems, the transition to electronic document management can involve considerable effort to convert physical files into electronic form. But doing so can reduce storage costs. Various approaches for scanning or photographing documents can be used to convert paper records to electronic files. Afterward, software can recognize text, assist in redacting sensitive information, and manage the data. Although some applications of this technology (e.g., converting historical files) would be time limited, other applications could be ongoing, given the continued use of paper or physical submission of some materials or evidence. The extent of adoption of these technologies is not clear, but in the survey of Ohio courts, 51 percent of the courts had some type of imaging technology to convert paper records to electronic form (Ohio Supreme Court, 2010).

¹⁹ One-third of the panel members called out this problem in our questionnaire when asked about problems with current technologies used for information management.

²⁰ Such access is not a certainty, however, given residual interoperability concerns for information systems across criminal justice agencies. Our panelists raised interoperability and compatibility problems among information sources as the most common concern with current technologies used for case preparation.

²¹ There are a variety of systems on the market that focus on this specific application.

IT Systems for Managing Organizational Resources

Information technology also plays a role helping courts manage data related to their own operations. As is the case in many governments and businesses, organizational needs include *human resource management systems*; in courts, this is often a function of the court administrator. *Financial management systems* to support effective budgeting, financial planning, and management are also relevant to individual courts and court systems. Application of technology in this area has advanced from spreadsheets on personal computers to data systems that can provide administrators a broader picture of operations on a day-to-day basis (National Association for Court Management, 2013). Courts have specific requirements for *calendar and scheduling tools*, needing to maintain docket schedules and track activities for the many participants involved in the potentially large number of cases active at any time. The use of information technology in managing court operations—using automated docketing or case management tools—began to spread among courts more than three decades ago. Hanson (2005) describes this process in the appellate court system as being driven by the needs of court administrators to more efficiently manage court processes, particularly in courts with high volumes of cases.

Courts that involve juries have another organizational management challenge: dealing with the process of identifying, summoning, and then managing potential and impaneled jurors (see Center for Jury Studies, undated). Almost two-thirds of courts are using automation software systems to run their jury operations (NCSC, undated d). A *jury selection and management tool* is a software program that provides support for selecting jurors randomly, assigning and managing jury panels, and managing claims to pay jurors. These programs often are pre-configured for local, state, and federal requirements. Additionally, they often maintain exemptions and provide efficient check-in processes in order to streamline the juror system. These tools also allow for last-minute recorded information pertaining to trials to be delivered to the prospective jurors (NCSC, undated d). According to a 2014 survey, 63 percent of respondents indicated that they use an automated jury management system (Ohio Jury Management Association, 2014).²²

System Integration and Information-Sharing

Courts may have effective internal case management and electronic records management systems, but to support effective case preparation, those systems also need to be populated with timely and accurate information from law enforcement investigations, evidence from forensic labs, and documentation of discovery and plea negotiations between the prosecution and defense. *Cross-sector information-sharing tools* can support court outcomes by providing relevant and accurate information to ensure fair and impartial decisionmaking. Such cross-sector sharing of data can support the use of other tools (e.g., risk assessments that depend on accurate criminal history data). Compatibility between the records management systems of prosecutors, courts, law enforcement, and other agencies can facilitate effective information-sharing between these systems and can aid in case preparation. Incompatible systems can lead to duplicate data entry, erroneous or missing information, and delays resulting from information transfer and translation. Such sharing is supported by standards (discussed below) that define information structures and technological characteristics to allow systems to communicate with one another.

²² The source reported the total number of respondents to the survey, but it did not report a response rate.

The State Court Organization survey by NCSC provides some information on the state of information-sharing among parts of the court system. The most recent survey, conducted in 2011, measured whether the court information exchange had the ability to send or receive information with 17 defined entities, such as criminal history repositories, state departments of justice, law enforcement agencies, various court actors (public defenders, prosecutors, and private attorneys), corrections agencies, and other state or local government agencies (e.g., motor vehicle administration, vital statistics, departments of education, and departments of health). According to data available from the 49 U.S. states and territories responding to the State Court Organization survey, 42 have a statewide information exchange that shares information electronically, and 39 have the capability of sending or receiving information with at least one external entity in real time. Of the 42 respondents that shared information electronically, 13 reported that all information exchanges were electronic (i.e., no information was exchanged via paper). Twenty-four responding courts solely or predominantly used real-time information exchange, 13 solely or predominantly used Extensible Markup Language (XML) information exchanges, and one used real-time and XML exchange evenly.

Sharing information within the criminal justice system requires navigating information security requirements and protecting the privacy of personal information that may be included in law enforcement or court records. Doing so requires either access controls and information classification to share appropriately or redaction of information in documents that should not be shared. This is particularly the case because court records are public records, rather than being shared only with other entities within the criminal justice system. Many types of sensitive data can be found in court documents, such as Social Security numbers, dates of birth, financial account information, victim names and addresses, driver's license numbers, and names of minor children. This trend has raised numerous questions about the trade-off between privacy and access to government data (e.g., Martin, 2008). Approaches to address these privacy concerns are active areas of technology development and innovation. For example, tools that use optical character recognition and text analysis can automatically identify sensitive information in documents to make it possible to either automatically protect it or require human review before release (Crandall, undated). It is not clear how widely used such technologies are, however, based on the comments of our advisory panel and available literature. In its 2009 E-filing Survey, NCSC asked about the intersection of document redaction and e-filing. In that case, responsibility for redaction frequently lay with submitters of information—and only a single respondent cited the use of *automated document redaction tools* (NCSC, 2009).

Information Delivery

The final area of technology and practice related to information and communications is information delivery, capturing both communications between the courts and the public (external communications) and those within the court system between court participants and stakeholders. We first discuss external communications and then turn to the variety of technologies and practices associated with information delivery within the court system itself.

External Communications

Courts have varied reasons for communicating with the public, such as sending relatively straightforward public notifications (e.g., jury summons), providing public access to court

information (e.g., making files available to pro se litigants),²³ and using social media and other tools to announce court events.

Public alert and notification systems can be used to contact defined sets of people to transmit information. Jury management systems (discussed previously) can be linked to notification systems to remind jurors of their summons and help ensure juror attendance. Some of these systems make it possible for jurors to answer their summons online rather than by more-traditional, paper-based processes (Rabner, 2015), and they provide a portal for jurors to opt in for reminders via email, text message, or other means. Notification systems can also be used to keep crime victims informed about events or developments in an offender's case, including information on court schedules and release and parole dates. The goal of automated *victim notification systems* is to provide victims with real-time information on an offender's status in order to prevent further victimization or repeat incidents (Bureau of Justice Assistance, undated). Information can be provided to victims through a phone call, email, text message, postal letter, and hearing-impaired device.

The increased use of case and records management systems, along with document imaging and electronic filing, has increased the ability of courts to provide public access to court files through *public information functions*. Systems that provide public access to court records online have increased, both through courts and via commercial entities that aggregate and market court information.²⁴ This is a major shift from the era in which court records were publicly available in hard copy only, requiring individuals to go to the courthouse to request access. While there are many benefits to having public records available electronically, such as reduced foot traffic in court facilities and shorter wait times at public service counters, the use of electronic systems and documents has also brought about new challenges, such as protecting sensitive data (as discussed).

The rise in the number of pro se litigants (discussed in Chapter Two) is also a trend that has pushed courts to change how they make information available to the public—in this case, citizens who are representing themselves in court matters. Courts are beginning to use technology to enable self-represented litigants to more easily access courts and resolve disputes. According to one report, the large number of self-represented litigants has pushed courts toward the use of automated forms (Sandman and Rawdon, 2014) and other resources.²⁵ The use of automated forms allows for court staff to spend less time explaining filing requirements and reduces the number of errors by litigants. Online document software that assists litigants in completing legal documents properly and easily—linked to e-filing and e-delivery mechanisms, live chat features, and legal websites—can help such litigants navigate the legal process more smoothly. For example, the New York Unified Courts uses a free, step-by-step computer program that guides self-represented litigants through a series of questions (Sandman and Rawdon, 2014). Based on the answers provided, the program will prepare personalized court forms that are ready to be served and filed.

²³ For example, Clarke, 2015.

²⁴ For example, NCSC has an aggregated website with links to online state court records (NCSC, undated e).

²⁵ For a review of these resources deployed by courts across the country, see Greacen, 2011.

Communication with the public—including pro se litigants—can also be done via the court’s *website* and through *social media tools*. Websites are becoming a common way for courts to disseminate varied types of information on processes, resources, and specific cases. In a 2005 examination of appellate courts, websites that provided court rules, forms, calendars, publications, opinions, docket information, and information on the administrative process were described as “almost standard” (Hanson, 2005). In its survey of all Ohio courts in 2010, the Ohio Supreme Court asked whether courts had websites and, if so, what they provided on them. Almost 80 percent of the courts in the state had websites, and of those, 65 percent provided public access to case records, 42 percent published court calendars, and 21 percent provided public access to case documents and the ability to pay fines and fees over the Internet (Ohio Supreme Court, 2010). Some courts use their websites to reduce the burden of disseminating information to a multitude of news sources, instead directing reporters and researchers to their websites to view the latest news and most-recent documents related to a case. Some even provide webcasts of court arguments (Hanson, 2005). Court use of social media is also spreading. According to the annual New Media Survey of judges and court personnel conducted by the Conference of Court Public Information Officers,²⁶ courts are using media tools, such as Facebook, Twitter, and YouTube, to promote events, educate the public, and release decisions. Courts are also using social media to explain court processes to pro se litigants, provide juror information, share court facility information, and provide emergency management services (Conference of Court Public Information Officers, 2014).

Internal Communications

The communications internal to the court system include the following taxonomy branches: mobile communications, fixed location communications, information presentation tools and dashboards, and personnel communications.

Reflecting technology trends in broader society, court participants have begun to use *mobile communications* technologies in the course of their duties (e.g., the increasing use of tablets and smartphones discussed previously). This use reflects both a challenge and an opportunity for court systems. When many independent actors bring their own communications devices to the courtroom, it creates infrastructure demands. At the same time, the proliferation of mobile devices has given courts an opportunity to develop their own mobile applications (apps) that give users access to publicly filed documents, information about jury service, and the ability to pay fees and fines, all from their mobile devices. For example, the Clerk of the Circuit Court in Cook County, Illinois, offers a free mobile app that can be used on iPhone, iPad, iPod Touch, and Android devices. The app allows users to search the electronic docket by a person’s name or by case number, search for traffic ticket violations by driver’s license or ticket number, view the court call roster, see updated fee schedules, locate facilities using Google Maps, and email or call a division of the court directly (NCSC, undated c).

Communications technologies have also opened up new models for courts to carry out their business, aimed at improving efficiency for all participants and the government. Although many court activities are still done face to face and with participants in the same room—linked in the criminal law to the right of individuals to face their accusers—the use of varied

²⁶ In 2014, this survey was distributed to approximately 9,000 individuals, with a response rate of approximately 9 percent. The self-selection of respondents means that the absolute numbers should be interpreted with caution. In 2014, respondents from five states made up 35 percent of the total respondents (Conference of Court Public Information Officers, 2014).

fixed location communication technology applications in the court system is spreading. Beyond everyday use of telecommunications in the business of courts (analogous to the business of any organization), the use of these technologies to hold proceedings and processes remotely is becoming more common. First in this application and diffusion was the use of voice communications for remote hearings—where use then spread over the past three or more decades (see Hanson, 2005, for a discussion of the appellate court system).²⁷

Today, courts are using *video teleconferencing systems* to implement remote *video hearing appearances*.²⁸ Many jurisdictions are now able to offer virtual or remote participation in court proceedings or other meetings (e.g., pretrial conferences) via such technological tools. Audio and video technology can make it possible to receive testimony from an expert witness located far away (Joint Technology Committee, 2014; Hanson, 2005) or to provide specialized services for court participants, such as sign language interpretation. Performing arraignments remotely also has allowed courts with a significant criminal docket to process cases more efficiently by reducing the time taken to transport defendants or prisoners from jails, which also decreases risk and saves money. However, doing so has raised concerns about whether telepresence is compatible with fairness of the judicial process and the right of the accused to face their accusers.

These technologies are in use in some courts, but the extent of their use is difficult to estimate. In a survey on the use of video remote technology in California courts, approximately 26 percent of the respondents indicated some use in their courts (Judicial Council of California, 2014, p. 8).²⁹ In another survey, 45 percent of Ohio courts reported using video for arraignments or hearings (Ohio Supreme Court, 2010). In some areas, both legislative or administrative rules—in addition to the reticence of court participants—are a barrier to the adoption of telepresence. In the California survey, the most frequently cited objection to use was on constitutional or statutory grounds (Judicial Council of California, 2014, p. 13). This was similar to an earlier survey of state courts by NCSC (McMillan, 2010). In legal practice, online depositions are an analog of video appearances in court. In the ABA survey, between two-thirds and three-fourths of participants indicated that they participated in depositions—but only 17 percent indicated that they had participated in online depositions. In most cases, this was because they had not had the occasion to do so, but a small number (2 percent or less in each case) cited court constraints, firm policy constraints, or financial constraints preventing them from doing so (Poje, 2014).

Telepresence can also offer a more cost-effective way to provide specialized capabilities, such as *remote language interpretation* for courtroom proceedings. Given how multilingual the United States is becoming, courts today are feeling pressure to provide more-efficient and -effective interpreter services. When it would be cost-prohibitive or would cause substantial

²⁷ In a now somewhat dated statistic, 53 percent of federal courtrooms reported having audio-conferencing equipment in a 2002 survey (Wiggins, 2004).

²⁸ In the 2002 survey of federal courts, 12 percent of courtrooms reported having video teleconferencing capacity (Wiggins, 2004).

²⁹ It is difficult to convert this value to an estimate of technology penetration, even for California. The survey went to all judicial officers in the state and had a 19-percent response rate. Responses were obtained from across the state, but significant numbers of the responses came from major urban areas. Because of the way that results were presented, breadth of use (e.g., the geographic spread of video appearance technology) could not be determined. Therefore, it is possible that all the respondents who indicated use came from one major metropolitan area.

case delays to use an interpreter who is physically present, *video remote language interpretation* is a solid option and “may be the best alternative for many rarer languages” (Clarke, 2014, p. 52). Remote interpreting via telephone is more widespread, but video provides a more comprehensive platform when available. According to a 2008 survey by NCSC, the number of states relying on telephone interpreting is decreasing: 86 percent of states reported using telephone interpreting in 2008 compared with 94 percent in 2006 (Green and Romberger, 2009). In 2008, 25 percent of states reported using video remote interpretation (Green and Romberger, 2009). As of 2014, 13 states have pilot programs for video remote interpretation or are expanding existing programs, and an additional 14 states are exploring or evaluating options for this capability.

Beyond communication technologies themselves, *information presentation tools and dashboards* are central to court proceedings, used by court administrators to monitor court activities and by prosecutors and counsel to present cases, support negotiation outside of trial, and present information effectively to judges to support their decisionmaking. Some of these information presentation tools are built into or overlap with technologies and tools we have already discussed—for example, case management systems that provide dashboards of court activities and judicial decision support tools that present data for action. To build data access into case management systems, for example, developers can design the systems to facilitate judicial activities rather than focus only on document storage. Crawford (2011) uses the example of judges having to scroll through many documents to find the information needed to inform their decisions. With an appropriately designed content-based case management system, judges could locate information faster using embedded presentation options that either allow search or proactively serve content to the judge based on case requirements.

In considering information presentation in court, perhaps the image that most readily comes to mind is not the judge but rather a prosecutor, plaintiff’s attorney, or defense counsel putting forth evidence and the facts of a case before the presiding judge and, potentially, a jury. With advances in technology (and research that has supported the persuasive power of multimedia presentations), what might have once been an oral argument supported only by paper exhibits may now use video, computer, and audio sources (Gruen, 2003).

One example of a video source is a document camera (or digital evidence camera), which consists of a vertically mounted television camera aimed down at a flat surface. When an object is placed on the surface, the camera displays the image on a monitor for presentation. Data from the ABA survey of attorneys suggest that these cameras are available in many courts but are not widely used (from 2011 to 2014, between 17 and 22 percent of respondents indicated that they are available [Poje, 2014].) “Enhanced whiteboards” are digital versions of traditional whiteboards, and when information is written or drawn on them, the whiteboards can display it on a computer monitor and record the session (between 10 and 12 percent of ABA survey respondents indicated that these whiteboards were available to them). Video sources may also include annotation equipment that allows someone to annotate the images produced by the document camera. Generally, there are three types of annotation equipment that may be used in court: the touch screen, light pen, and telestrator. (These tools were identified as available by between 8 and 13 percent of ABA survey respondents, although between 80 and 90 percent of the respondents indicated that they did not use the capabilities personally.³⁰) Each of these pro-

³⁰ Just more than 20 percent of the respondents indicated that their firms provided their own annotation equipment (Poje, 2014).

duces the same output—allowing a presenter or witness to overlay a drawing or other markup on top of the image. The touch screen allows users to make annotations on the screen itself and may be added to a traditional monitor or a more advanced liquid-crystal display monitor. The light pen is a stylus that is used in the same way, and the telestrator is a tablet with stylus and touch screen capabilities (Gruen, 2003).³¹

In addition to using video tools, attorneys may present their cases electronically by using laptop computers and software applications for making digital presentations (Gruen, 2003). Presentation software that is made for general use, such as Microsoft PowerPoint or Corel Presentations, can aid lawyers in creating summative digital displays or presentations that aid in the delivery of their statements. Specialized trial software allows attorneys to present exhibits side by side and display sections of transcripts or documents (which can be useful to focus the court's attention on a certain portion of a document). Audio sources often accompany video evidence, so presenters might require connecting to the courtroom audio system as well. The capabilities of multimedia technologies enable attorneys to use animations or simulations when presenting video to judge or jury; however, such presentation approaches have raised concerns about how their use affects a jury's consideration of evidence (see, for example, discussion in Wiggins, 2004).

While far from ubiquitous, use of evidence presentation capabilities is relatively widespread. In the ABA survey, between 16 and 23 percent of respondents indicated that laptops with presentation software were generally provided in their courtrooms, and between 12 and 27 percent indicated that there were capabilities for them to connect their own devices to court presentation systems (from projection screens, which were available in more than half of courtrooms, to individual monitors for trial participants, which were available in between one-quarter and one-third of the courtrooms in which respondents practiced).³² In the survey of courts in Ohio, 17 percent reported having multimedia presentation equipment available (Ohio Supreme Court, 2010).

Systems that integrate capabilities are also available, such as control systems for lawyers and the judge to centrally operate the various courtroom equipment. For instance, a lectern in the courtroom may contain a digital evidence presentation system that allows lawyers to control presentation equipment and call up the evidence they wish to present. These systems were cited as available by between 17 and 23 percent of the respondents to the ABA survey, although between about 50 and 60 percent of the respondents indicated that they did not personally use the capabilities, and between two-thirds and three-fourths of the respondents indicated that their firms brought their own capabilities to the courtroom when they needed them (Poje, 2014). Such integrated systems can include a feature called a "kill switch," which can be used to turn every display monitor in the courtroom off (Heintz, 2002; Federal Judicial Center, 2015; Gruen, 2003).

Besides assisting with the presentation of evidence during arguments, technology can also play a role in supporting jury deliberations. For example, equipment to review evidence

³¹ Earlier data from a survey of federal courts (in 2002) showed somewhat similar numbers, with 21 percent of courtrooms equipped with evidence cameras, 10 percent with a digital projector or projection screen, and 24 percent with annotation equipment (Wiggins, 2004).

³² Earlier data from a survey of federal courts indicated that 27 percent of courtrooms were equipped with wiring to connect laptop computers, 12 percent had monitors in the jury box, and 18 percent had monitors outside the jury box (Wiggins, 2004).

and exhibits could support jury decisionmaking (see, for example, Center for Jury Studies, undated). In a survey of state courts in 2002, almost half of responding courts indicated that such technology was either available for jurors to take to the jury room (13 percent) or available upon request (30 percent) (Lederer, 2002).³³

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

Beyond just the technologies or tools used by the court system, it is the practices employed and how those tools are used that drive results. We capture these ideas in a taxonomy category covering doctrine, tactics, and the knowledge associated with criminal justice functions. And the route for implementing that doctrine or those tactics in the court system is the training that provides the necessary knowledge for court participants.

In the literature and in feedback from our advisory panel members, training in the courts—whether for judges, administrators, technology and other support staff, or lawyers or pro bono litigants—was flagged as both important and, often, a concern. Training affects the ability to use available technology effectively, and shapes the efficiency and effectiveness of the court system in achieving its goals more broadly.

Many sources of training are available now to the court system and its stakeholders, especially related to management, specialist, practitioner, and participant roles (e.g., NIJ, 2013). Educational institutions, nonprofits, government entities, and others provide training for judges, specialists (e.g., interpreters), court reporters, and security officers, and other resources on court-related topics are increasingly available online. However, available data suggest that—whether it is technically available or not—enough training may not actually be happening. For example, on the specific issues of court security and preparedness, more than half of respondents to some surveys indicated that no training was provided to them (Fautsko, 2013, p. iii). With respect to training on the use of technology, available data from surveys vary depending on the court participant population examined. For example, in 2002,

Most of the [federal] courts reported that they have basic orientation programs to familiarize court staff and attorneys with the equipment and how it can be used during a court proceeding. Furthermore, the courts reported having more advanced hands-on training to prepare court staff and attorneys to operate and maintain systems they themselves will be using during court proceedings. (Wiggins, 2004, p. 734)

In contrast, in the ABA survey of private attorneys, the percentage of respondents who reported having training in courtroom technologies ranged from only 27 percent to 34 percent between 2011 and 2014 (Poje, 2014).³⁴

Training court participants, from the judge to the administrative staff, is supported by a variety of requirements for continuing education and by other resources (such as best prac-

³³ The survey also asked about technology available in the courtrooms for presentation at trial. Frequently cited technologies included television, speaker phones, real-time transcription, laptops or laptop connections, and projection screens (Lederer, 2002). Because this survey was done more than a decade before the ABA survey (Poje, 2014), the level of diffusion of many technologies was much lower at that point.

³⁴ Although approximately one-fourth of the respondents who reported not having any training believed it was not necessary and between one-fourth and one-third indicated that the courtrooms they practiced in did not utilize technology or that courtroom technology was not relevant to their practice, reasons cited among the remainder of respondents included shortages of time and a lack of available training (Poje, 2014).

tices) that define a body of knowledge to be disseminated. However, requirements vary across the country. For example, most states have mandated that judges receive a minimum number of continuing education hours, but some states require only three hours and others require up to 80 hours, and the periods for meeting the requirements vary. Furthermore, Colorado, the District of Columbia, Idaho, and Michigan have not mandated continuing judicial education hours at any court level, and some other states do not specify the number of hours required (Strickland et al., 2015). Other standards (produced by ABA or other professional organizations) also mandate continuing education to maintain knowledge and professional competencies of practitioners (ABA, 1990).

Technology-Mediated Training Tools

Technology-mediated training tools are now being used to inform and assist judges, pro se litigants, and other members of the public. Through webinars and online courses and videos, judges, court staff, and lawyers can take continuing education courses and learn about developing trends. In an effort to provide court employees with greater access to educational materials, many courts are providing Internet webinars and posting the videos and presentations on their websites for employees to easily access. In addition, some courts are posting YouTube videos that explain how to use the technology in their courtrooms so that lawyers and litigants will know what is available and how to use it prior to trial. Technology is also being used to better meet the needs of pro se litigants (Clarke, 2015). Beyond helping them directly in navigating the process (discussed previously), online resources can provide information on filing processes and court appearances. To train other members of the public, courts are using online videos and presentations to explain court operations, including how to navigate the courthouse, and to answer frequently asked questions. For jurors, courts are using mobile applications to provide 24/7 access to juror training videos.

Technology Standards for Court Information Systems

Within the doctrine and tactics taxonomy category is a subcategory for *acquisition and technology decisionmaking*, for which managers and leadership are assisted by *technology standards for court information systems*. Standards define key characteristics of technical systems and are particularly critical for defining a technology architecture that can support information-sharing with other criminal justice and service organizations. Efforts to define standards for criminal justice information systems already exist to meet this need (see IJIS Institute, undated; NCSC, 2001b). For instance, the Global Information Sharing Initiative created a standard for data exchange models called the Global Justice Extensible Markup Language (XML) Data Model (GJXDM). Later, the U.S. Departments of Homeland Security, Justice, and Health and Human Services created the National Information Exchange Model (NIEM), which incorporated the GJXDM and established a national model for data-sharing. According to the NIEM website, the model includes “a data model, governance, training, tools, technical support services, and an active community” to guide users in developing an information exchange (National Information Exchange Model, undated). These standards allow, for example, a court and a law enforcement agency to exchange data because adherence to the standards means that, even if the court and agency do not use the same information system, both systems will have common definitions and common, well-defined data elements. Despite these standards, however, members of our advisory panel cited shortfalls in the ability of current systems to share data—meaning that opportunities exist to better realize the potential of the standards going forward.

Facility Operations and Population Services

Courts, like other criminal justice organizations, manage facilities and act to meet the needs of individuals within those facilities. However, issues and requirements in this area for courts differ considerably from those in law enforcement and corrections. For example, unlike corrections, where the main driver in design is the management of offenders, court buildings and facilities are designed with the needs of the general public and court stakeholders (e.g., attorneys) in mind as well. Courts also face the challenge of addressing security concerns (given threats to judges and other court staff or to the facilities themselves) while also remaining welcoming to the public; after all, citizens should not be discouraged from using the courts to seek justice when needed. These trade-offs and challenges have been long known, and resources to inform the design of court facilities have been available for decades (e.g., Hardenbergh, Tobin, and Yeh, 1991). States and localities have their own design guidelines for facilities, a variety of which are publicly available (e.g., Michigan Court Facilities Standards Project Advisory Committee, 2000; Judicial Council of California, 2011).³⁵

For security and management reasons, court facilities need to control their *external perimeter*—whether for access by employees, court participants, or members of the general public. Basic technologies and the *perimeter physical infrastructure* used for such applications—including designs that provide single points of access to enable screening, lighting and other technologies at the perimeter of buildings (e.g., applying crime prevention through environmental design principles), and so on—are broadly utilized. These are coupled with the use of detection technologies discussed previously. Although some data are available from surveys on some court security and design choices (e.g., the court facility review by Fautsko, 2013; CCJ/COSCA Joint Committee on Court Security and Emergency Preparedness, 2010), limited data are available on the breadth of adoption of specific approaches. Technologies have been suggested that could improve the accessibility of courts to the public while maintaining security and managing people flow in court facilities. Such ideas include changes in scheduling, automated ways for citizens to check in when they arrive at courts, changes in queuing (McMillan, 2007), and better communication to the public to reduce foot traffic in court buildings (Crawford, 2011).

Inside court buildings, *internal access control* is needed to manage populations, maintain security, and meet the needs of different stakeholders (reviewed, for example, in Griebel and Phillips, 2001). Available best practice guidelines (e.g., Fautsko et al., 2013) on court security define access control technologies and practices, including for various technologies (from traditional key-based approaches to proximity identification cards using radio frequency identification).

While the facility operations and population services category includes protecting court buildings from individuals or groups seeking to cause harm, it also includes *delivering services to population*—that is, members of the public or participants in the court process that need to use the facilities, sometimes in competing ways. This goal includes providing the infrastructure needed (from meeting areas for counsel and clients to the electronic infrastructure to connect devices to the Internet) and being able to deliver information to individuals in the building so they can perform their tasks and navigate the court facilities effectively. Technologies that are in use to accomplish these goals include public displays of schedule and other data and

³⁵ NCSC provides an online bibliography of these resources (NCSC, undated b).

self-service kiosks that allow individuals to perform some tasks themselves, such as paying their court fines and fees with electronic payment, rather than having to pay a human cashier (Burton, 2009). For courts where records are still kept in paper form, relevant technologies for managing those files and delivering them to users are part of courts service provision. These technologies include radio frequency identification tags, barcoding, and other indexing and tracking methods for accounting for paper files.

Person-Worn Equipment and Weapons/Force

In our taxonomy, the person-worn equipment category covers the equipment and tools (from general use equipment to specialized technology) that criminal justice practitioners use in carrying out their duties. While such equipment is central for some criminal justice practitioners—for example, the contents of the duty belt of a law enforcement officer or the protective gear worn by a corrections professional while moving a prisoner from one place to another³⁶—it is much less central for practitioners working in the court system. The main exceptions to this generalization are court security officers who have some of the same uniform, protective equipment, weapon, and other technology requirements. Mature markets exist for these technologies and equipment, with many options available. In our review of the literature (or in information gathered from our panel members), we did not identify major concerns with available person-worn equipment for court systems.

Conclusion

The courts seek to meet various objectives, both in the outcomes of cases and in the manner that cases are processed. Courts should provide fair and impartial decisionmaking, informed by all relevant evidence, and in a manner that eliminates sentencing disparity. The court should also provide equal access to justice for all litigants. Court processes in criminal matters are designed to identify the guilty and protect the innocent, thereby protecting the public. The court should achieve these outcomes through efficient practices that balance due process with conserving fiscal resources and adjudicating cases in a timely manner, thereby lowering the cost as much as possible to both the litigants and the court system.

Today, courts are supported by a wide range of technologies and practices developed over several decades. These resources have been designed to help courts meet their varied objectives more effectively, efficiently, and safely. Equally important, if not more so, courts are applying the results of research and evaluation to inform more-effective interventions, better focusing efforts on improving outcomes, including administering fair and impartial justice. However, despite the substantial technology and practice base that exists, the court system is still challenged by resource constraints, by unique laws, and by the organizational structure in which the laws are implemented. Innovation in technology, policy, and practice can help the court system to meet these challenges and better meet the goals that society depends on the system to achieve. Chapter Four explores these opportunities for technological and other innovation across the court sector, moving toward an innovation agenda for U.S. courts going forward.

³⁶ Although some court systems are responsible for such activities as moving accused individuals or offenders from place to place, we have covered those roles and functions in our analysis of the corrections sector and therefore omitted them from this work in the interest of clarity.

From Courts Today to Courts Tomorrow: Identifying and Prioritizing Innovation Needs in Technology, Policy, and Practice

To get to the desired outcome of a better and more effective court system in the future, the first step is to determine what that desired endpoint looks like and then identify possible steps—potential innovations—that could contribute to moving us from where we are today to where we want to be tomorrow. Given the long history of courts in the United States, as well as interest from the government, the private sector, and citizens for more-efficient and more-effective justice, there is an existing literature on court needs that this effort both supports and builds on. Efforts of the past have focused on innovation needs for the court system as a whole and for more-specific groups (such as indigent defendants), as well as on obstacles for implementing technology. For example,

- In 1999, the Bureau of Justice Assistance released a report on the use of technology and its effect on indigent defense (Bureau of Justice Assistance, 1999). At the time, the development of the desktop computer was the most important technological advance of the decade. Computers and the Internet allowed attorneys to quickly conduct research and write pleadings and briefs. The report identified wide disparities in defender offices' use of technology; obstacles to its use included that (1) management did not have knowledge of computer technology or the ability to fund new technology, and (2) having staff capable of using technology and providing them training and technical support was often difficult and expensive. These areas were identified in our panel discussions as issues that courts and attorneys still face today.
- The literature also discusses assessments of state-level court technology needs. In 2010, the Technology Committee of the State Bar of Michigan Judicial Crossroads Taskforce identified how technology can be used to increase the quality of justice and ensure that the system is fair and accessible. In particular, the report stated that technology could be used “to improve (1) provision of information to the court (for example, E-filing, criminal record checks, teleconferences, and video conference testimony), (2) distribution of information within the court (for example, paperless courtrooms and docket management systems), and (3) public access to the court’s information (E-filing orders, online docket information, and electronic distribution of daily calendars)” (State Bar of Michigan Judicial Crossroads Taskforce, 2010). The report also found that technology can improve court processes involving language interpretation, jury and jury selection, long-distance court proceedings, public defense systems, and the training and education of judges and court staff.
- Such organizations as ABA, the National Association for Court Management, and the Conference of Court Public Information Officers have collected information on their

members' views and developing trends in technology—several of which were discussed in the previous chapter. For example, a 2014 survey examined social media and policies for social media use by judges, jurors, attorneys, and other courtroom participants (Conference of Court Public Information Officers, 2014).

- Some of the literature focused on needs of particular groups of the court community. For example, the Judicial Tools Working Group of the Joint Technology Committee (2014), summarized needs of judges in high-volume courts, multiple-event courts, circuit courts, and specialty courts. Some of these needs included real-time access to information from other justice agencies, a calendaring system that is adjustable and can be viewed from any device, the ability to add unstructured information to cases within the case management system, and a system that can meet all courts' privacy and nondisclosure requirements. Marlowe and colleagues (2006) also developed a research agenda focused specifically on the needs of drug courts.
- In addition, NIJ issued a report in 2009 on high-priority needs in the criminal justice system (Holder, Robinson, and Rose, 2009). The report focused on the criminal justice system as a whole, but much of it is in alignment with the needs identified by members of the Courts Advisory Panel. The NIJ report stated that to improve the efficiency of justice, there was a need for improved information- and data-sharing systems across criminal justice agencies and that web applications could facilitate this information exchange. The report also identified the need for devices providing multilingual speech translation.

Recent research from the larger, NIJ-supported effort of which this work is a component examined web technology needs for criminal justice overall, including the courts. The highest priorities for courts identified in that effort were video links to corrections facilities (i.e., telepresence), tools to assist in court procurement of new technologies, improved Internet connectivity for courts, virtual courtrooms, and educational materials to train court staff and others on key web technologies (Hollywood, Woods, et al., 2015).

In this effort—as in previous work—we use the generic term *needs* to describe the building blocks for improving the court system, which include both (1) things that courts need in order to solve an immediate problem or challenge (e.g., solutions to address how evidence can come to courts in many different electronic file formats) and (2) steps that could allow courts to take advantage of new opportunities that improvements in technology have made possible. In our work, we therefore define a *court need* as a well-defined and described action or technology that could help to improve performance.¹ These individual needs are the building blocks for an innovation agenda to improve performance on the varied objectives courts are seeking to achieve. Because there may be multiple ways to pursue the same goal, an individual need might contribute to one or more of the objectives and could be associated with multiple problems or opportunities.

In the remainder of this chapter, we describe the process that the Courts Advisory Panel went through to identify a broad range of innovation needs, we prioritize those needs to call out the most important among them, and then we discuss the identified needs and priorities.

¹ As we have observed in our past work, 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).

The Courts Advisory Panel Process

To supplement information available in published sources and to make it possible to draw directly on the expertise of court practitioners, we convened a Courts Advisory Panel for this project. As described in Chapter One and discussed in more detail in Appendixes A, B, and C, the advisory panel was held as three separate working groups—one consisting primarily of judges, one of prosecution and defense lawyers, and one of court administrators.

Identifying Innovation Needs

Before the advisory panel meetings, the participants provided input via a pre-meeting questionnaire that gathered their input on a variety of topics, including court objectives, major issues or problems facing courts, societal technology changes that created particular challenges, problems with technologies in use today, technology implementation issues, and concerns about harms that might occur as a result of court technology use.²

To identify potential innovations—building blocks for an innovation agenda aimed at the future court system—we drew on the expertise of the panel members. In structured brainstorming and discussion around problems, solutions, and potential opportunities in different areas of court operations, the panel developed a set of options that provided the ingredients for the innovation agenda. For considering the range of possible innovations that could benefit the court system as a whole, this effort was organized into five functional areas, defined as follows:

1. *Case preparation and presentation*, conducted primarily by attorneys or litigants to prepare for a case and to present evidence pertaining to that case at court hearings and trial. This area also includes judicial functions to rule on motions or evidence presented to the court. Functions here include making pretrial motions, determining bail or pretrial release, assigning counsel, carrying out discovery, determining evidence admissibility, and submitting or presenting evidence.
2. *Case-level court information management*, including exchanges of information pertaining to a specific case within the courts or between the courts and external entities, such as the prosecutor's office, defense counsel, law enforcement, pretrial services or other supervisory agencies, and the public. Functions here include filing cases, documenting the case record, maintaining court records management systems, providing for public access to court records, and providing for exchanges with other criminal justice systems or agencies.
3. *Support for court hearings*, including administrative activities that facilitate court hearings and trials. Functions here include managing juries, providing access to proceedings for litigants and the general public (e.g., facilitating in-person or remote appearances and providing translation services), and providing information about court proceedings to the general public.
4. *Facilities management*, including all processes and systems in place to manage the physical infrastructure of the courts. Functions here include maintaining court security, managing information technology, ensuring preparedness for natural disasters, and performing other building management activities.

² The full set of pre-meeting questions answered by the participants is included in Appendix B.

5. *People management*, including all processes and systems in place to manage human resources and support knowledge development and training for court staff.

These same five functional areas were used in the pre-panel questionnaire to elicit problems and concerns affecting court operations and technology today. The areas subsequently provided the structure for the in-person working groups, where we held a facilitated discussion on each area, informed by the problems, concerns, and issues raised in the pre-meeting responses. Identically structured discussions were held for each of the three working groups, with the focus on the different functional areas (and the amount of divergence from the pre-identified problems and concerns) varying based on the group discussion.

Rather than focus on innovations specific to individual challenges facing the court system or aimed at improving particular facets of court operations, the panel was allowed to think broadly and identify potential innovations that might relate to one or more areas of concern or opportunity. This avoided focusing on a single ideal future for the court system. For example, some of the problems that are recognized today are, at their heart, resource issues, because resource constraints place limits on both court operations and the ability of courts to acquire new technologies and innovate. Other problems are fundamental questions of justice related to ensuring equal protection under the law regardless of individuals' economic circumstances or to maintaining the capability of the court system to appropriately respond to legal and justice challenges in an increasingly technological world. Solutions to these problems can pull in different directions. Particularly, courts need to both expand as needed to achieve their societal goals and still pursue efficiency and conserve scarce resources. Therefore, as the panelists identified potential innovations, we tagged each idea with one or more top-level objectives (Table 4.1) that U.S. courts are seeking to achieve simultaneously; improved performance on one or more of those objectives would indicate progress. (The craft-

Table 4.1
Top-Level Objectives of the Court System

Objective	Definition
Provide fair and impartial access to justice	Protect and appropriately address the needs of all participants in the legal process, including the accused and victims in criminal cases, witnesses, and other litigants equally without bias or discrimination. Pretrial detention and access to counsel and other legal support must not depend on race, economic status, or other extra-legal factors.
Ensure due process	Protect the rights of all participants in the legal process by ensuring due process and following uniform rules of practice and procedure. Elements of due process include notice, discovery, right to bail, access to counsel, lawful and regular process, confrontation, cross-examination, the right to call witnesses, the privilege against self-incrimination, and public and timely resolution, among others. Case processing and the application of law to the facts in individual cases must be consistent and predictable.
Administer justice	Resolve disputes and provide individualized justice to individual cases. Determine the facts of a case and administer appropriate punishment to the guilty in criminal cases or appropriate penalties to those responsible for civil harm.
Protect the public	Administer punishments to the guilty as appropriate to separate dangerous criminals from the public, rehabilitate offenders, and/or deter future criminal behavior. Provide protection against the arbitrary use of governmental power. Build and maintain public trust and confidence.
Save money and time	Improve the efficiency of court operations. Maintain due process and individualized justice while disposing of cases efficiently and fairly.
Improve court competencies	Improve the competencies of staff through training, education, and readiness. Ensure an independent, impartial, and accountable judiciary.

ing of the objectives is described in more detail in Appendix D.) The objectives and the panel's views of their relative importance (which the participants provided as part of the pre-meeting questionnaire) were later part of the prioritization process for filtering the innovation needs identified by the panel.³

Linked to these objectives, the panel developed a wide variety of innovation options to better prepare the U.S. court system for the future. Each of the three working groups that made up the overall advisory panel identified a significant number of needs during their day of deliberations—between 71 and 83 per group—resulting in 237 separate raw needs at the conclusion of the workshop. In some cases, the working groups put forward identical problems and needs; for example, all three groups called out the issue of incompatible formats of digital evidence and other files that come into courts as evidence, and each then suggested the same need for standardization and consensus. In other cases, the groups produced needs that were similar to one another in important respects, though not identical.

Prioritizing Innovation Needs

In considering the path from the court system as it exists today to a more efficient and effective future state, any of the needs identified by the advisory panel could be targets for investment or action. Indeed, given the range of actors associated with innovation in the criminal justice system—including government organizations, research funders, the private sector, and even members of the public—an option may be particularly attractive based on those actors' current priorities or capabilities. But in thinking about the sector overall and an innovation agenda at the national level, such a long list of options is potentially overwhelming. At the minimum, it is necessary to identify a preferred path to focus efforts and investment and identify which options to examine first among the many available. To do so, this effort again relied on the expertise of the Courts Advisory Panel, guiding the participants through a structured prioritization process to identify which needs were viewed as the most valuable for initial action.

The prioritization process used a variant of the Delphi method,⁴ a technique developed at the RAND Corporation to elicit expert opinion about well-defined questions in a systematic and structured way.⁵ For the Courts Advisory Panel, we had each member assign a ranking to each need generated in the working group on the following three factors:

1. *How valuable would it be to meet the need?* Because the value of meeting individual needs would be expected to vary, each panelist assigned a rating for each need on a scale of 1 to 9, where 1 meant the need would not be valuable and 9 meant that meeting it could result in a 20-percent or greater improvement in performance or efficiency.⁶

³ One issue highlighted by some panel members was the range of specialty courts that exist in the United States (e.g., family, drug, community, mental health, and veteran courts) and the fact that they have goals that are distinct from the general court system. As a result, even though specialty courts were discussed and innovations relevant to them identified, the fact that particular specialty courts may focus on only a subset of these objectives affected how their requirements were prioritized in our effort.

⁴ For a more detailed description of the prioritization, please see Appendix D.

⁵ RAND Corporation (undated a) includes RAND reports describing the Delphi method, as well as applications of the technique to a range of policy problems.

⁶ This value of 20 percent was identified based on a review of the largest observed effect for previous criminal justice interventions (for a discussion, see Hollywood, Boon, et al., 2015; and Jackson et al., 2015).

2. *How technically difficult would it be to meet the need?* While meeting some needs could require only small changes in existing practices or technologies, others might be very difficult. The panel rated each need's chance of technical success on a scale of 1 (representing a 10-percent chance of succeeding) to 9 (representing a 90-percent chance of succeeding).
3. *Would the solution or technology be widely used if it was available?* For any innovation to realize its value, it must be used. As a result, if barriers—political, cost, organizational, or otherwise—mean that few organizations will use a new solution or technology, it will be less valuable overall. The panel rated each need's chance of operational success or wide use on a scale of 1 (representing a 10-percent chance of succeeding) to 9 (representing a 90-percent chance of succeeding).

Beyond looking at how the needs scored on each measure, the three measures together make it possible to calculate an estimated *expected value* for each possible innovation—that is, how valuable it would be multiplied by its probability of success. Our expected-value calculation took into account both the number of court objectives that the need was viewed as contributing to and the weighting of those objectives (described in Appendix D).

Making Prioritization Design Choices

The strength of these types of practitioner-focused information-gathering activities is that they take advantage of the expertise of individuals who are directly involved in the tasks of interest. This format seeks to ensure that the issues and needs identified are practical for existing practice and to identify needs that analysts who are not as intimately familiar with the sector might not. The central challenge in these efforts is that the topics discussed—and, therefore, the needs generated—are driven by the perspectives of the people involved. We hedge against this challenge by seeking to assemble a broadly representative panel of experts to reduce the effect of such biases (Appendix A). In this process, our use of three separate working groups composed of experts from different court components also helped reduce that potential bias, because their different perspectives on each of the functional areas (and the additional issues they raised) ensure that the process reflected a broader view of court issues, priorities, and opportunities. The group of panelists who were able to participate in the advisory panel were drawn from a wide range of entities—although, in a small group, it is difficult to be completely representative of the full diversity of the criminal justice sector. For example, the convened panel was strongest in representation from criminal and civil courts, and it had much more-limited participation of individuals with knowledge of tribal or specialty (e.g., juvenile or problem-solving) courts.

It was also the case that we presented the panel with a difficult challenge—scoring not just the value but the likelihoods of success of a wide range of technologies and other innovations. As a result, there is irreducible uncertainty in the results of this and any similar prioritization effort. Our response to these unsurprising issues is to look at the results of prioritization in multiple ways, and to present them in a way appropriate to the nature of the judgments and projections involved. As a result, rather than present ordered lists of the “top ten” needs, we present the results as tiers of needs, clustering them into groups by their scores and resisting the temptation to over-interpret small differences in scores from one need to another.

It should also be noted that our design choices for this ranking effort involved some compromises, of which two are particularly important. First, anchoring our scale at a 20-percent

improvement in performance means that any need viewed as even more valuable than that (e.g., with the potential for a 33-percent improvement) is scored the same as a need with a 20-percent improvement. We viewed this compromise as acceptable both because of previous experience with criminal justice innovations and because it provided greater ability for participants to draw distinctions among needs whose expected performance improvement fell below 20 percent.⁷ The compromise does, however, result in apparently devaluing revolutionary changes. Second, our ranking approach only implicitly includes considerations of cost. The probability of adoption of a solution or technology (our operational success measure) implicitly includes cost, because more-expensive solutions are less likely to be implemented broadly. However, we do not take on the costs that might be involved in developing the solutions or technologies associated with meeting each need. While a limitation, this is an intentional one because our innovation agenda is aimed at a broad audience (e.g., government funders, technology developers, and others), all of whom might have very different costs to meet a specific need.

Implementing the Prioritizations Across the Working Groups

The needs developed within each working group were prioritized during the respective meetings. This prioritization was based on the expected-value scores for each original need—combining the value score (weighted by the number and importance of the court objectives that the need is relevant to) and the two measures for likelihood of success. The result was used to sort the needs into three groups—Tier 1 for the highest-scoring needs, Tier 2 for the middle priorities, and Tier 3 for the remaining needs. The grouping was done using the K-means clustering algorithm, which sorts each need into a designated number of groups by minimizing differences between the need’s score and the mean score of the resulting groups. (Additional detail on the grouping process is included in Appendix D.) Each working group thus created its own list of needs assigned as Tier 1, 2, and 3, resulting in three separate lists.

Because the goal of the effort was a unified list of needs from the full Courts Advisory Panel, the research team examined and sorted all of the needs from the three groups to condense the list to make it more useful and consumable. Where possible, we eliminated duplicate needs and consolidated needs that were similar.⁸ After consolidating the lists, there were 131 needs. To prioritize this new list, we then cross-walked the prioritization of each of the original needs with the combined needs they became a part of. Each combined need was then assigned the *highest* tier ranking of any of its component needs. For example, a combined need made up of four original needs that were ranked Tiers 1, 2, 3, and 3 within their original working group lists would be assigned to Tier 1. For needs that were not combined with any others, their working group ranking became their ranking in the final listing.

To provide the advisory panel an opportunity to see and weigh in on the prioritization of the combined needs, we held a virtual “second round” of the Delphi process. This round gave all panel participants the opportunity to see the combined needs that resulted from the work of all three working groups and—for each prioritized need—respond whether they believed the tier assignment of the need was too high, too low, or correct as is. This final round of prioritiza-

⁷ Our approach to identifying and presenting the needs in tiers also had the potential to minimize the effect of this truncation.

⁸ The process of consolidation and the resulting use of the categorization and ranking data associated with individual needs are described in detail in Appendix D.

tion was done via an online data collection tool, and the default response for all needs was set at “correct as is,” meaning that participants had to weigh in only on the needs they felt were not properly ranked. Just more than 60 percent of the panel members provided at least partial responses in this round of prioritization. We calculated the net “up votes” or “down votes” for each need and used that value to adjust the need’s total expected-value score up or down. If the change in score resulted in the need moving through the boundary between its tier and a higher or lower tier, its ranking was changed. The prioritization of 44 (almost exactly one-third of the total) of the combined needs did change in this process, with 12 moving to a lower tier and 32 moving to a higher tier. Details on the calculations involved are provided in Appendix D. The full list of identified needs is presented in Appendix E.

Toward an Innovation Agenda for the U.S. Court System

Out of the discussions across the three working groups came a picture of a court system that is under stress, and where resource constraints affect not just the potential for innovation but the current operation of the system as it stands. Beyond just resources, however, the panels flagged other limits to innovation in the system, from an understandable deference to precedent in the way things are done to the decentralized nature of authority from court to court. This decentralization can mean that a court’s preference for pursuing new technology that could improve outcomes may come down to the individual preference of the judge in charge. As a result, innovation in a court—much less across the system overall—was cast as a challenge. Individual participants in the system—judges, attorneys, investigators, and so on—come with their own tools, technologies, and expectations.

Considering the Identified Needs as a Whole

What were the central issues driving the needs identified by the panel? Looking across the full list (presented in Appendix E), the needs fell into several broad classes, reflecting the concerns and views of the panel. In rough order of the number of needs that fell into each class, the major issue areas were as follows:

- *Training for court employees and ways to maintain court organizations’ technical skills.* Regarding the use and adoption of technology, identified needs included how to effectively provide technology information to judges and how to recruit and keep information technology staff in court organizations. Needs in this area ranged from the very broad (e.g., the need for training and capability-building for court staff to address the fact that technology is a part of contemporary crime) to the very specific (e.g., tools to help court administrators make the business case for sufficient information technology staff to support operations).
- *Barriers to new technology adoption, both for individual courts and for the court system as a whole.* A large number of needs focused on problems that affect the ability of courts to adopt new technology effectively. Some covered technology decisionmaking and planning within courts, to better link courts with vendors providing technology. Others called for tools to help assess return on investment on new technologies to make it possible for courts to make better decisions about the innovations they choose to pursue.

- *Technology’s potential to significantly improve court functioning and revolutionize the “court of the future.”* Needs in this area ranged from the short term (e.g., designing information systems that are more flexible to capture unstructured but still important data related to court operations) to much more far-reaching ideas to redesign court buildings and infrastructures to be more welcoming to citizens, to make it possible for people to complete their business more efficiently, and to make a more uniform set of technologies available for participants across courts and court systems.
- *Technology’s effects on the court process, including technology used in criminal or civil trials and the societal technology environment in which courts operate.* Needs related to the effects of technology on courts, both in its application and its use in society, were prominent. The need for solutions to the challenge of jurors or participants in the court process using social media to gather information or to try to affect the process—through intimidation of witnesses or jurors, for example—was raised. Concerns related to technology “within the walls of the courts” included needs to better validate risk assessment tools used during pretrial and sentencing to address bias concerns, needs to assess whether some technologies (e.g., virtual presence as a substitute for in-person appearances or meetings) have detrimental effects on due process, and needs for technologies to better help pro se litigants navigate the criminal or civil process.
- *Information-sharing.* Despite efforts to improve criminal justice information-sharing, participants highlighted several needs related to addressing residual problems in this area. Such basic issues as data format standards were raised, as were more-complex issues, such as those associated with specialty courts needing to share data with a wider range of organizations and service providers. Needs in this area also included ways that information-sharing could contribute to resolving important problems in courts today. For example, because data on individuals’ criminal histories are central in determining offenders’ sentences, more sharing of such information across courts in different jurisdictions could help reduce sentencing disparities.
- *Court security and emergency preparedness.* Security of court facilities and personnel was a driver of needs, as was preparing courts to continue their functioning in the event of a natural disaster or other major emergency incident. With respect to security, needs included developing standards to ensure appropriate—and not excessive—security for different types of courts, as well as developing new strategies to help recruit and retain security staff even though court systems are not the highest-paying employer for such individuals. Preparedness concerns included needs to develop models for better electronic backup and even “physical backup” of court data and operations; for example, court systems could share facilities if a disaster renders one area’s facilities impossible to use.
- *Data volume and quality.* Given the importance of information in court operations, there were a variety of needs associated with the increasing volume of case data (e.g., from cameras and from discovery of electronic records). Data quality was also a concern, particularly given the desire for information-sharing across the criminal justice system and the desire for data to be entered only once, by the first organization relevant to a case. Needs also were identified for approaches to understand and manage the court workload given data volume, including consensus standards for how much of currently paper records *should* be digitized and tools to better calculate and project workloads associated with a case, given the amount of electronic discovery and other data associated with it.

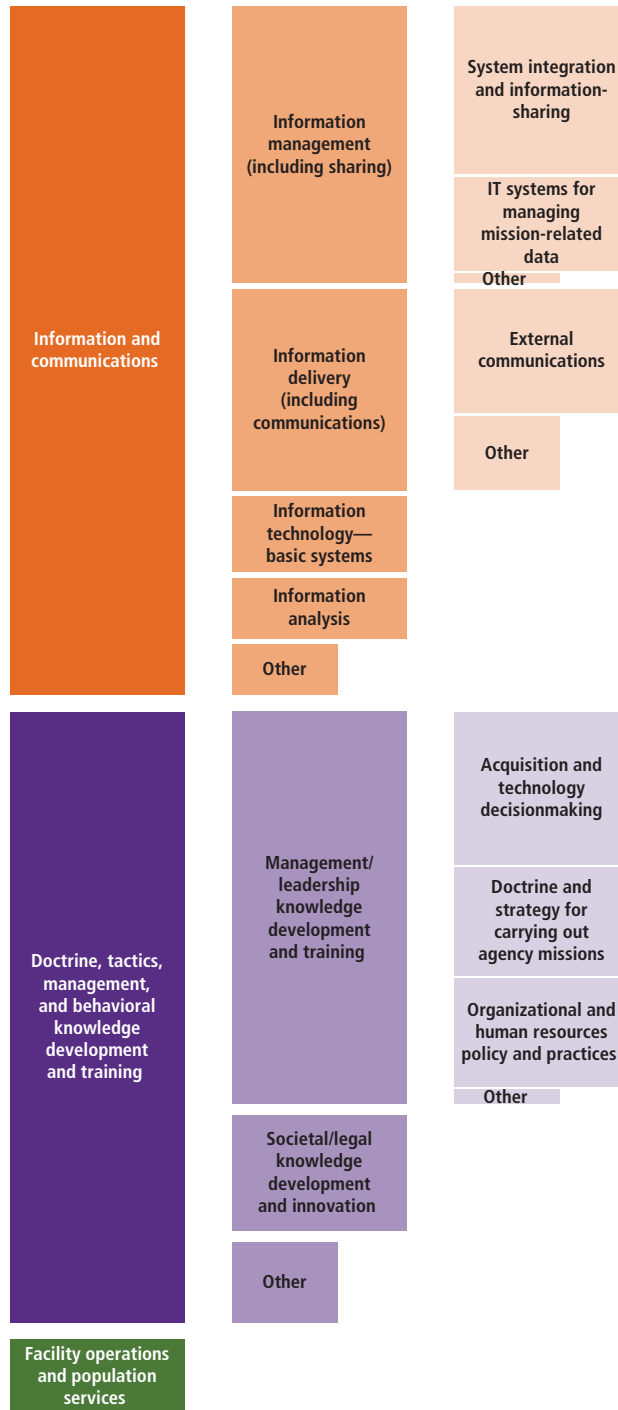
- *Data protection, release, and privacy.* The advisory panel had serious concerns about protecting court data, both to preserve the integrity of the court record and process (e.g., preventing hacking of case management systems) and to protect the individuals involved in court proceedings by keeping sensitive data private. The panel discussed several challenges to data protection, from cybersecurity shortfalls to court or governmental business models that seek revenue by selling court records to private entities. Needs identified in response included better ways to redact information from records, standards and education of court participants about what personal information *not to include* in court filings, and better tools for evaluating system security.
- *Notification and communication.* Because court proceedings rely on all the required participants appearing at the same time, when litigants or defendants do not show up, it creates schedule problems and costly staffing burdens. Although such behavior will never be eliminated, the panel identified needs for various ways to provide automated notifications and reminders. Such tools were also relevant for jury management, where both notification tools (other than traditional paper-based approaches) and tools to maintain better databases of contact information were identified as valuable. Notification needs were also extended to court staff and criminal justice practitioners, in an effort to prevent their unnecessary appearance at court if proceedings have been rescheduled.

To provide a way to look at the group of needs overall and compare these needs to those identified in other criminal justice sectors, we categorized each need using our criminal justice taxonomy of technology and practice. When assigning the court needs to taxonomy categories, we found that a significant number of the needs bridged two categories—combining, for example, a new technology or practice with the training required to use it effectively and appropriately. Approximately 30 percent of the needs had this boundary-spanning character.

The breakdown of the needs by taxonomy category is shown in Figure 4.1, where the bars in the figure are proportional in height to the percentage of the total needs that fall into each category. The columns show the successive breakdowns into the subcategories (or branches) of the taxonomy—splitting, for example, information-sharing needs from broader information technology information management system needs within the *information management* branch. Because the intent of this figure is to show a top-level snapshot (i.e., the needs “forest” rather than the “trees”), only categories or subcategories that contain 5 percent or more of the identified needs are shown. All of the remaining categories are condensed and shown as *other*.

Reflecting the importance of information in court processes, fully half of the needs fall into our category of *information and communications*. Within that category, two-fifths of the needs (or almost 21 percent of all 131 needs) relate to *information management (including sharing)*. While that subcategory accounted for most of the needs within the larger category, there were needs in four other subcategories as well, including *information delivery (including communications)* (just more than 15 percent of the 131 needs), *information technology—basic systems* (approximately 6 percent), *information analysis* (approximately 5 percent), and *information collection* (included under *other* in the figure). The remainder of the needs developed by the panel were grouped almost entirely under *doctrine, tactics, management, and behavioral knowledge development and training*, with the majority of those needs falling into our *management/*

Figure 4.1
Percentage of Needs Related to Each Taxonomy Category and Subcategory



NOTE: The bars are proportional in height to the percentage of 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 subcategories making up less than 5 percent of total needs.

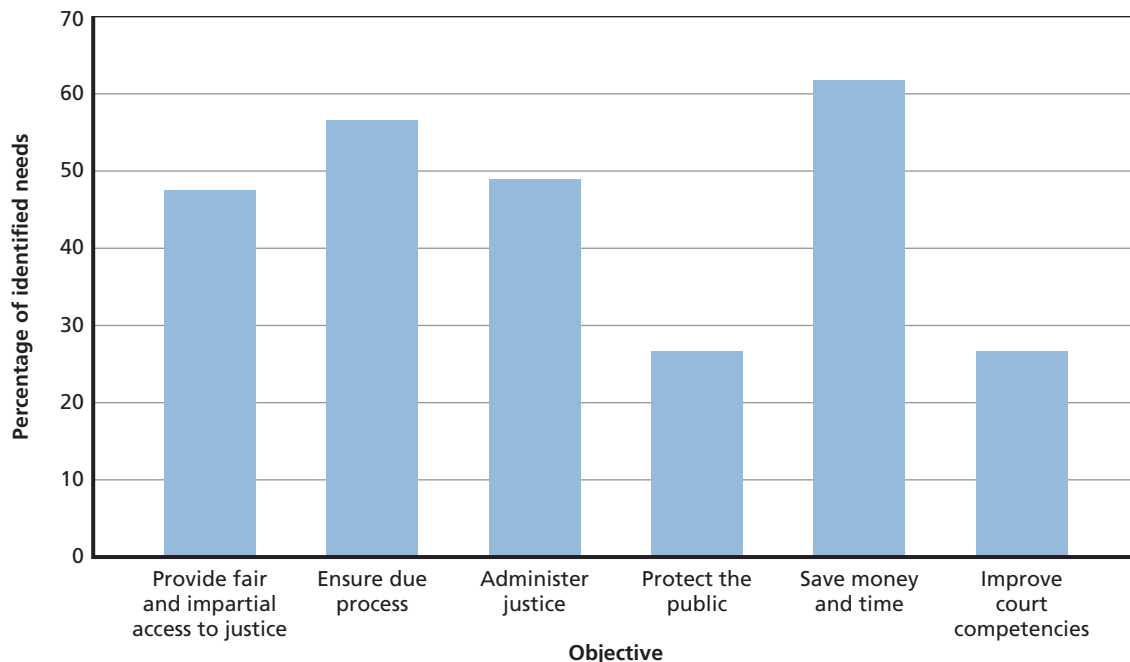
leadership subcategory (which included both court administrative leadership and judges in how we defined leadership for this effort). Notably, there were a considerable number of needs that fell under *societal/legal knowledge development and innovation*. For these needs, court innovation depends on societal changes (such as the use of more-efficient dispute resolution rather than litigation) or policy changes (such as more use of diversion programs).⁹

An alternative way to look across all the needs as a group is to view how many needs contribute to each court objective. Figure 4.2 shows that breakdown, with the bars indicating the percentage of the 131 combined needs that were linked to each objective. Percentages across all the categories add to considerably more than 100 percent because needs could be—and generally were—viewed as relevant for multiple objectives (the average number of objectives linked to a need was 2.7). The graph shows that the largest percentage of the needs were viewed as saving money and time; the objectives of ensuring due process, administering justice, and providing fair and impartial access to justice were close behind. Needs viewed as protecting the public and improving court competencies were less common.

Identifying Priority Needs to Focus the Innovation Agenda

To go from the full set of needs to a more focused innovation agenda, we utilized the prioritization information provided by the Courts Advisory Panel members (on how valuable a need would be to the court system if met, how technically straightforward it would be to achieve,

Figure 4.2
Percentage of Needs Contributing to Each Court Objective



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

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⁹ The distribution of needs for courts, unsurprisingly, was quite different from that in previous work on corrections (Jackson et al., 2015) and law enforcement (Hollywood, Boon, et al., 2015).

and whether it would be broadly adopted by courts if achieved) to organize the needs into the following three groups:

- *high priority*: the needs that were rated highly across all three measures
- *high value*: needs that might be very beneficial, but were rated lower on the other two measures because they were tough to accomplish
- *low-hanging fruit*: needs that were rated as easy to meet and would be broadly adopted, but scored as less valuable than other needs on the list.¹⁰

The remainder of this chapter presents the results of our analyses of the prioritization data, by these three groups.

High-Priority Innovation Needs

Prioritization by expected value resulted in a total of 28 Tier 1 needs, with 75 needs rated as Tier 2 and the remainder (28) in Tier 3. See Appendix E for the complete list of needs and their tiers.

The vast majority of the top-tier needs (which equate to the “high-priority” needs) fall in the *information and communications* category of our criminal justice technology and practice taxonomy. Of the 25 top-tier needs that fall cleanly into one top-level taxonomy category, 20 are related to information and communications. Of the three needs that bridge two top-level categories, information and communications is one of the two each time. The large number of high-priority needs that fall under the information and communications category are similar to innovation needs that have previously been identified throughout the literature. For example, NIJ has identified information-sharing systems that have the capability to link an individual’s records and citations across multiple jurisdictions and databases as a high-priority need (Holder, Robinson, and Rose, 2009). The remaining categories that are represented among the Tier 1 needs are *doctrine, tactics, management, and behavioral knowledge development and training* (five of the needs fall in only one category, and two of the needs bridge categories) and *facility operations and population services*, which appears in one of the needs that bridges categories. Table 4.2 presents the top-tier needs by top-level taxonomy category. The dominance of information and communication needs in the top-priority list is very different from the category breakdown of the needs overall (Figure 4.1), where there was a much more even split between that category and the doctrine and training category. Figure 4.3 shows the distribution of the high-priority needs in similar form, illustrating the differences graphically.

Looking at the sources of the needs across the three working groups, more than half of the high-priority needs (16 of 28) were combined needs made up of contributions from more than one of the groups. Six of those 16 needs had contributions from all three of the working groups. As for the representation from each group, 20 needs originated from or in part from the judges’ working group, 12 from the attorneys’ working group, and 18 from the administrators’ working group.

Some of the needs highlighted by the panel are consistent with previous efforts aimed at improving court performance and efficiency. The needs related to security and preparedness, for example, are consistent with existing best practice resources (Fautsko et al., 2013). Models for some of the other solutions exist as well—for example, developing a standard list of basic

¹⁰ These groups are not mutually exclusive.

Table 4.2
High-Priority (Top-Tier) Court Needs

Category	Problem or Opportunity	Associated Need
Information and communications	Shortfalls in the ability to notify individuals in the court building during emergencies	Adopt commercial alerting tools, which are available but not widely used.
	Reliance on technological systems for court functioning, which can create new concerns for continuity of operations when systems become overwhelmed or fail	Design systems with backup capabilities and prioritize technology support to focus on restoring critical systems when they go down. Develop, exercise, and implement response plans to address technology failure. ^{a, b}
	Maintaining continuity of operations during natural or other events	Ensure that electronic and other court data have robust backups and that courts have sufficient control over the data storage to permit this. ^c
	More-complicated cases, more materials, and more third-party information as a result of technology, which is so integrated into the lives of defendants, victims, and police, creating challenges for both prosecutors and defenders	Examine technologies to help organize and analyze large volumes of more-complicated information. Though some commercial tools are available, courts need a better understanding of how new technology could help manage the effects of digital data on caseload and workload. ^d
	Vulnerability of electronic court documents and decision records to cyber threats	Define strategies and minimum standards for protecting the “virtual filing cabinets” that hold the court’s formal records, including requirements for different document types, consensus on what documents can be accessed anonymously, and appropriate use of such tools as encryption. ^e
	Dependence on third parties and their security capabilities (e.g., county server provider, cloud provider, open source technology tool provider) to protect data	Develop standards for evaluating the security of cloud storage providers to both inform decisions and assuage concerns. ^f
	Inefficient and often ineffective paper-based processes for such tasks as victim notification and jury summons	Implement electronic communication and notification tools (commercial products already exist) to improve efficiency and effectiveness, and train prosecutors and others to use these capabilities while meeting legal requirements. ^g
	Opportunity to more effectively communicate with jurors, staff, and victims by using available commercial systems, including open source tools, electronic modes of communication, and social media	Develop guidelines and disclosure requirements to educate court and public users about the value of these tools, as well as their caveats, and mesh them with the requirements of court procedures (e.g., electronic service of process).

^a This need is associated with two taxonomy categories and is included twice in the table.

^b This need has been recognized for some time in the broader discussion of continuity of operations planning for court systems. See, for example, similar discussion in Dixon, 2013.

^c This need has also been recognized in the broader discussion of continuity of operations planning for court systems. See Dixon, 2013.

^d Lederer (2004c) flagged this issue and illustrated it using the case of terrorism-related national security trials, but it is equally relevant to complex civil litigation as well.

^e See, for example, the report and resolution on cybersecurity threats to the judicial system (American Bar Association Cybersecurity Legal Task Force, 2015), which references standards for cybersecurity from the National Institute of Standards and Technology.

^f This need echoed concerns in the ABA survey of attorneys regarding cloud storage security (Poje, 2014). Efforts for government use of cloud computing at varied levels could provide templates for developing standards across the court sector.

^g For example, the system described in Rose and Brinkman, 2008.

Table 4.2—Continued

Category	Problem or Opportunity	Associated Need
	Heavy demands on court infrastructure as a result of the common requirement to appear in person	Evaluate the transactions and interactions that could be done from a distance over the Internet and could thus minimize people having to come to or move around court buildings to conduct business. Greater transaction automation could benefit both the court system and citizens in time and money saved. ^h
	Current infrastructure that does not meet the technology expectations of new generations of court participants (judges, lawyers, and others)	Develop standard lists of basic technology that today's courtrooms should be equipped to handle, reflecting the different needs of different types of courtrooms. ^{a, i}
	Minimal or nonexistent wireless Internet and bandwidth in many court buildings	Make the investments needed to allow connectivity, and explore new technologies that make it easier to install wireless Internet in older court buildings. ^j
	Poor access to complete information to inform bail decisions	Develop tools that help judges effectively use available information—while limiting the potential for information overload—to inform bail decisions, helping maintain consistency across courts. ^k
	Poor access to complete information to inform bail decisions	Foster stronger information-sharing between courts both within states and among neighboring states (including addressing differences between unified and nonunified systems) to better inform bail decisions. ^l
	Due process concerns about remote appearances in judicial proceedings	Research which types of court interactions and hearings are not adversely affected by technology-mediated communication. Develop a consensus to address inconsistencies in different areas and to help resist institutional pressures to use technology when face-to-face contact is more appropriate or necessary. ^m
	Limited resources for prosecutors and public defenders (e.g., not enough attorneys, too high caseloads)	Encourage greater use of teleconferencing and other tools to save time, but evaluate the results of these efforts (e.g., determine whether the same work can be done by video that can be done face to face).

^h Because many court systems already use online sites to provide access to court services, there is a large basis for cost-benefit assessments of transitioning to e-court services.

ⁱ This is similar to technology lists included in the ABA Standards of Judicial Administration (ABA, 1992), described in greater detail later.

^j This need also was prominent in another component of the Priority Criminal Justice Needs Initiative, documented in Hollywood, Woods, et al., 2015.

^k The potential for decision support systems to assist judicial decisionmaking has been the subject of research (e.g., Tata, 2002, and references therein), and some commercial products are available. Emphasizing the enduring nature of this perceived need, it was highlighted in an Office of Technology Assessment report on the criminal justice system decades earlier (U.S. Congress, Office of Technology Assessment, 1988).

^l Scott (2013) examines information-sharing to support sentencing. The availability and quality of information available to judges for making bail decisions has also been an enduring concern, with discussion in the 1988 Office of Technology Assessment report examining technology's potential for criminal justice (U.S. Congress, Office of Technology Assessment, 1988). In addition, this issue is related to the broader drive for information-sharing across criminal justice sectors.

^m This is not a new concern. See Wiggins (2004) for a discussion of questions related to video conferencing, in both criminal and appellate proceedings, from more than a decade ago. DeSario (2002–2003) also explores the effects of technology use on due process. Studies have raised concerns that appearance on video can affect outcomes in judicial processes through a variety of mechanisms (see, for example, Eagly, 2015; Diamond et al., 2010).

Table 4.2—Continued

Category	Problem or Opportunity	Associated Need
	Authenticating electronic documents, which is more complex than for signed paper records	Develop centralized standards for authenticating electronic documents. Examples of implementation are available, but no practice is universally adopted. ⁿ
	Concerns about data quality within the court system as a result of inconsistency in the way data are entered, limits in clerk knowledge, hiring of individuals without appropriate skills, and other factors	Develop data and process standards, and implement policies that incentivize and support their adoption and use, including joint organizations, legal and funding requirements, and statutory changes that limit the ability of individual courts to reject a data standard that does not conform to their processes.
	Concerns about data quality within the court system as a result of inconsistency in the way data are entered, limits in clerk knowledge, hiring of individuals without appropriate skills, and other factors	Train clerks who are entering data to provide enough detail and granularity to facilitate judges' tasks and activities, including descriptive file names and semantic context information to aid in locating information later.
	Required speed of court processes to meet the needs of litigants—particularly self-represented ones (e.g., getting a copy of an order to litigants before they leave the building)	Explore whether features of technology systems provide opportunities to better meet the timeliness goals of the justice system (versus just focusing on existing technology and what it can do).
	Backlogs in forensic laboratories and the slow processing of evidence delaying justice	Pursue statutory authority or court procedural rule authority for specialists to appear via video presence to increase efficiency of staff usage. ^{a, o}
	Focus within the court system on trials, which is inconsistent with the fact that the vast majority of cases are resolved through negotiation	Develop better tools to sort cases and match them with the process most likely to get them to an outcome efficiently and effectively (e.g., negotiation, trial, diversion, specialty court), including collecting data to inform the assessment by all parties (judge, counsel, citizens) involved. ^p
	Continuing problems with bias in criminal justice outcomes for the poor and people of color, with technology potentially increasing those problems by excluding individuals who lack access or means	Collect data through electronic court information systems for better metrics and measures so that courts can hold themselves accountable for their performance and how that performance affects different segments of the population. ^q
	Data compatibility problems as a result of different data formats and types of digital data	Define consensus formats and standards for digital data to be admissible in court. ^r

ⁿ There are ongoing efforts focused on this issue, including by the Federal Judicial Center (2015). Grimm (2014) provides a summary of the major issues in this area.

^o See Smith (2013) or Weber (2013) for a comprehensive discussion of how this technology affects the Confrontation Clause of the Sixth Amendment and what is known about current Supreme Court thinking on the matter.

^p The advisory panel did not fully explore the need or potential for using technology and other innovations to facilitate these other dispute resolution or adjudication processes. For a discussion of the potential for innovation in these areas, see Moeves and Moeves, 2004. Cabral and colleagues discuss this issue of triage in the context of legal aid services, where tools could match legal resources to individuals to achieve the most with available resources and match cases to appropriate options, such as dispute resolution or court deliberation (Cabral et al., 2012).

^q There are existing efforts aimed at supporting court performance measurement (e.g., the NCSC CourTools project) that could presumably provide a foundation for addressing bias.

^r Examples of such standards for individual localities are available. See, for example, Office of the State Attorney, Fifteenth Judicial Circuit, 2011; U.S. Bankruptcy Court for the Middle District of Tennessee, 2012.

Table 4.2—Continued

Category	Problem or Opportunity	Associated Need
Doctrine, tactics, management, and behavioral knowledge development and training	Reliance on technological systems for court functioning, which can create new concerns for continuity of operations when systems become overwhelmed or fail	Design systems with backup capabilities and prioritize technology support to focus on restoring critical systems when they go down. Develop, exercise, and implement response plans to address technology failure. ^a
	Maintaining continuity of operations during natural or other events	Explore cases in which states or adjacent counties collaborate to back up each other's operations (examples exist that could serve as models). ⁵
	Maintaining continuity of operations during natural or other events	Develop more exercises and drills to determine likelihood of success, such as using red teams, performing testing, and actually operating from backup sites periodically to validate their effectiveness. [†]
	Difficulties managing the trade-off between public access and maintaining sufficient court security	Define standards and performance measures for effective security for different types of courts and locations within a court to minimize intrusiveness for court participants, staff, and the public. [‡]
	Backlogs in forensic laboratories and the slow processing of evidence delaying justice	Pursue statutory authority or court procedural rule authority for specialists to appear via video presence to increase efficiency of staff usage. ^a
	Vendor systems that try to simultaneously meet the needs of multiple stakeholders (e.g., judges, counsel, administrators), resulting in products that do not work well, driven in part by the court system's unwillingness to change its business processes ^v	Create governance structures that limit the level of autonomy that elected judges can have; that is, dissuade individual demands for customization because of the threat that customization poses to data quality and system viability. ^w

⁵ Examples of this exist in available court planning documents. See Ohio Supreme Court, 2009a; Michigan Supreme Court, 2015.

[†] The design of exercises and drills focused on measuring an emergency plan's likelihood of success is discussed in Jackson and McKay, 2011.

[‡] Examples of local standards for court security are available (see, for example, Ohio Supreme Court, 2009b; Washington Courts, 2009; and Michigan State Court Administrative Office, 2002). In addition, the National Sheriff's Association has produced a physical security checklist (National Sheriff's Association, undated), the Commission on Accreditation for Law Enforcement Agencies includes court security in its accreditation standards (Commission on Accreditation for Law Enforcement Agencies, 2010), and the Trial Court Performance Standards include security issues (Bureau of Justice Assistance, 1997, Standard 1.2), although that document does not address the full range of this identified need because it is focused on trial courts. Nevertheless, while some standards do specify inputs for security (e.g., staffing levels based on scale of operations), we were unable to identify corresponding outcome performance standards beyond requirements for testing or red-teaming implemented at a facility.

^v This problem identified by the panel (particularly in combination with other needs that were not ranked as high priority) highlights a key technology development challenge for courts and a situation where stakeholder concerns and best practices can sometimes pull in multiple directions. The involvement of stakeholders with very different requirements, as suggested here, can push development toward systems that try to be all things to all people simultaneously and therefore serve none well. However, both the literature and issues raised by our panel at other points emphasize the importance of involving the full range of stakeholders in technology planning to get buy-in and make sure the resulting product does not simply neglect the needs of important user groups. Such strategies as providing multiple interfaces for a system to serve the needs of distinct stakeholder populations can provide a way to navigate these conflicting pressures, but the fact that both problems were raised in the course of our working group meetings emphasizes the need to keep the conflict in mind during planning and adoption efforts.

^w For a recent discussion of this issue, see Lefever, 2009. For a broader historical view of this issue from the perspective of the federal courts and the administrative integration that occurred in that portion of the system, see Wood, 1995.

Table 4.2—Continued

Category	Problem or Opportunity	Associated Need
	Court culture and precedent that impede reengineering to improve performance	Adopt business process reengineering in a formalized way, including tools for process documentation and reengineering, and match processes to the goals they are trying to achieve.
Facility operations and population services	Current infrastructure that does not meet the technology expectations of new generations of court participants (judges, lawyers, and others)	Develop standard lists of basic technology that today's courtrooms should be equipped to handle, reflecting the different needs of different types of courtrooms. ^a

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

technologies that people should expect when they come into a courtroom. Precedents for such lists are included in the ABA Standards of Judicial Administration that were written in the 1990s and could be adapted to today's technology environment.¹¹ The need for information-sharing echoes the goals of existing efforts, including those of GJXDM and NIEM discussed in Chapter Three, and there is a deep literature on needs related to electronic evidence, authentication, and admissibility. However, other needs that the panel identified diverge more from the results of previous efforts; such needs include tools to match and guide cases toward the most efficient mechanism for resolving them and system-level tools to assess the cascading effects of changes in criminal justice policy and practice.

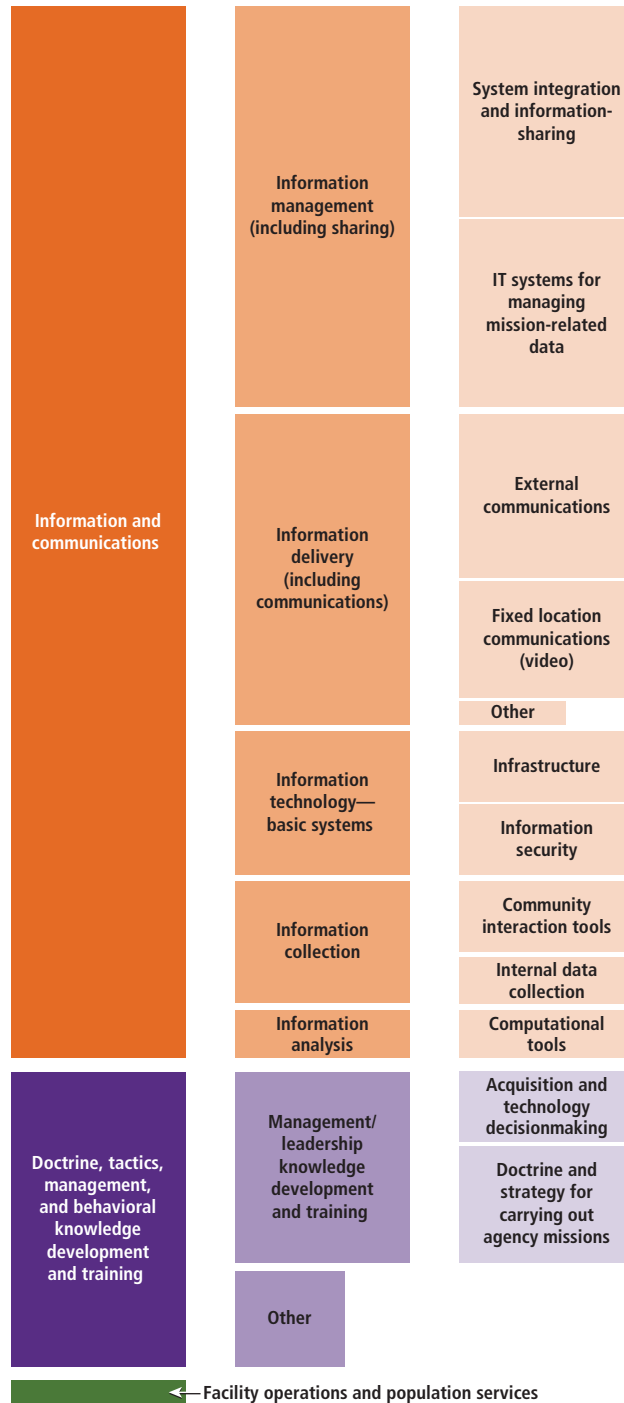
During discussion and the prioritization process, panel members commented on individual needs, providing additional context and nuance based on their experience. Participants emphasized the links between technology systems and the human systems that use and support them. For example, with respect to the need to design technological systems with backup capabilities to address the potential for the systems to go down, one participant emphasized “[We] should not accept that shutdowns will happen. A well thought-through incident response/disaster recovery plan [is needed] to address the problem and provide solutions.” Discussing the need for robust backups to be prepared for system failures, another participant added, “Backups are great. But without a proper simulated practice for reverting the backed up data, the backup is in name only.” This echoes sources in the literature that emphasize the need for backup planning, especially when a court faces an emergency or natural disaster (e.g., Dixon, 2013). Participants also highlighted the challenges that systems rooted in paper-based processes

¹¹ The 1992 trial court administration standard specifies that courts should be part of statewide automated information systems and that “judges and their staffs should have the computer hardware and software necessary to have complete access” to that system and should

have available, as appropriate, (a) computer hardware and software to provide (i) word processing capability, (ii) access to automated legal research, (iii) access to various databases . . . (iv) programs that provide spreadsheet and graphic capability, preparation of forms, automated dockets, calendaring, and records, (v) electronic mail, (vi) desktop publishing . . . (b) high speed laser printing capability, (c) personal or laptop computers for those judges who wish to use them at home or in transit, (d) separate training in computer use for judges and staff, (e) video equipment, (f) fax machines . . . and (g) other state-of-the-art technology, as appropriate, made available to other parts of the trial court. (ABA, 1992, Sections 2.80–2.82)

The capabilities listed for the automated information system in the standard include elements raised by the panel as still being a concern, including jury management, caseflow management and analysis, computer-aided transcription, and linkage with other entities in the court and criminal justice systems. Similar standards exist for other courts as well (e.g., for appellate courts, analyzed in Hanson, 2005).

Figure 4.3
Percentage of High-Priority (Top-Tier) Needs Related to Each Taxonomy Category and Subcategory



NOTE: The bars are proportional in height to the percentage of 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 subcategories making up less than 5 percent of total needs. Top-tier facility operations and population services needs are shown even though this category represents less than 5 percent of the total needs.

can have in meeting the requirements of volumes of digital data: “In existing processes, it is easier to buy a filing cabinet than it is to buy—much less install—a terabyte hard drive.”

On needs to make court buildings more connected and compatible with technologies that participants bring in—such as enabling presentation tools and providing WiFi bandwidth—participants emphasized that solutions hinge on resources to make the investments possible. However, even after investments are in place, courts still must manage expectations and determine the locus of responsibility for the functioning of the technology. As one participant noted, “I have a highly equipped and capable courtroom but inform litigants that I, as judge, take no responsibility for assuring that their systems and presentations will interface with the court systems. All litigants are advised to check before the trial/hearing date to assure themselves that they can present electronic information as planned.”

Our panel discussions also revealed some thorny issues where there is real disagreement—or differences across jurisdictions—about the use of technology. In no case was this clearer than on needs related to remote appearance and its implications for due process. Some panelists viewed this as no problem: “I have not encountered due process complaints to remote appearances. . . . We use high-definition video and big screens”; and “[Viewing] remote appearances as a deficiency is inaccurate.” Some responses were intermediate: “Remote appearances should complement but not substitute for in-person appearances.” And some pointed to serious barriers: “Confrontation Clause objections can prevent this for now”; and “Easy to do technologically, harder to do if there are legal objections.”¹² Focusing specifically on remote appearances of crime lab staff, one participant emphasized the need to account for personnel costs that can be ascribed to appearances—and how much could be saved by allowing appearances via video—to drive change.

In some cases, participants emphasized that the needs identified by the panel were technology *adoption* needs, not technology *development* ones. With respect to replacing paper-based processes for victim notification, jury summons, and similar tasks, several panelists pointed out that systems that perform these functions electronically are already available. Implemented systems include both proprietary commercial products and nonproprietary systems, providing jurisdictions options to consider over the short and long terms. Some programs already exist that seek to help jurisdictions in this effort. For example, the Bureau of Justice Assistance has been working with states since 2005 under the Statewide Automated Victim Information and Notification program, which helps courts and law enforcement create or improve their notification systems (Bureau of Justice Assistance, undated). But use of these products may require changes in policy or law: One participant cited the need for changes in his jurisdiction to allow it to transition from traditional paper methods.

No need was more clearly related to technology adoption than the requirement that courts formally implement business process reengineering to improve the results of technology acquisition and use. One panelist noted, “The effort to reorganize processes while automating them requires the involvement of senior stakeholders (including judges) to avoid expensive mistakes.” Such involvement is also critical because, as participants repeatedly noted, changes in technology could move burdens around the system in unexpected ways. For example, making an observation on making systems more responsive to the needs of individual litigants, one participant observed, “Use caution when designing features that require the further hands-on

¹² A similar mix of reactions to the technology was seen in the State of California survey on remote appearance use (Judicial Council of California, 2014).

involvement of the judge, who is already multitasking during any court hearing/trial.” Comments also reemphasized that the independence of parties in the court system is a challenge to reengineering and broad-based change: “[The] judiciary’s ability to impose process change on others outside the court, such as prosecutors and public defenders, is limited.”

High-Value Innovation Needs

The expected-value calculation behind the main prioritization discussed above includes consideration of value (and the number of court objectives where that value could be realized), likelihood of success, and likelihood of broad adoption of the innovation. Although this calculation provides a balanced view of the needs, it risks dropping from consideration those needs that, while difficult to implement (that is, they have a lower likelihood of success), might be very valuable if they do succeed. Because the separate rankings provided by each panelist allowed us to track which measure drove each need’s expected-value score, we could separately identify needs that were ranked as very valuable (that is, scored highly on the first rating from each panelist), even if their overall ranking was too low to make it into the list of top-tier needs. As described in more detail in Appendix D, this list of *high-value* needs includes any need whose median rating for value in the working group or groups that ranked it was 9—the top score that could be assigned—but whose expected-value ranking failed to meet the threshold for high-priority (Tier 1) needs. The resulting list of additional needs is presented in Table 4.3.

As was the case for many of the top-tier needs, the high-value needs include issues that have been recognized as problems for the court system for some time. For example, balancing security and privacy issues with the need for a public court record has been the subject of study and debate for many years.¹³

Low-Hanging Fruit Innovation Needs

When building an overall innovation agenda or investing in research or technology development, expected value and total value are not the only potential considerations. Including one or more projects with a high probability of success is also a relevant consideration, because doing so can help ensure the payoff of the investments overall and can balance riskier bets on innovations that may be less certain. To identify this set of potential *low-hanging fruit* from among the court needs, we filtered the results for needs that had median scores for both measures of likely success (technical and adoption) near the top of the scale. Needs were selected if the product of these two measures was at least 63 when multiplied together (that is, needs scoring 7/9, 9/7, 8/8, 8/9, 9/8, or 9/9 on the two measures), whether or not they were already included on the top-tier needs list. The results are shown in Table 4.4. Not surprisingly, a significant number of the needs were top-tier, reflecting high rankings across the board, not just on the probability of success measures. However, three new needs appeared in this list: protecting sensitive information in court records from release, developing information systems that are better able to capture nontraditional and unstructured data relevant to court cases, and using electronic tools to present information to both sides in a dispute that educates pro se litigants. These needs actually scored quite highly on all three measures in our calculations, but because they were relevant to only one or two of the court objectives, their overall expected values were lower than needs that were beneficial to more of the objectives.

¹³ See, for example, the proceedings of the annual conferences held on the topic by NCSC and the Center for Legal and Court Technology at the College of William and Mary (e.g., Center for Legal and Court Technology, 2013a).

Table 4.3
Additional High-Value Court Needs

Category	Problem or Opportunity	Associated Need
Information and communications	More-complicated cases, more materials, and more third-party information as a result of technology, which is so integrated into the lives of defendants, victims, and police, creating challenges for both prosecutors and defenders	Develop tools to help calculate workloads associated with discovery and analysis of larger bodies of information, to support arguments for changes to schedules, resources, or processes (e.g., open-file discovery models). ^b
	Balancing security and privacy with public access	In the absence of redaction, develop better ways to protect some sensitive data, through access controls, encryption, or other tools. ^c
	Problems with data accuracy and currency in interagency data-sharing systems	Develop a consensus among all participants in interagency data-sharing efforts about appropriate standards for data entry to ensure that information in the systems is correct from the outset. ^{a, d}
	Data compatibility problems as a result of different decisions made by different entities in the system, meaning sharing cannot happen (e.g., decisions made by different court components affect the defense, interacting with multiple law enforcement organizations affects the prosecution)	Make broader use of standards for information-sharing to allow compatibility (criminal justice coordinating councils are a potential model to drive change). ^e
	Lack of understanding of the system effects of different policy decisions, ranging from increases in criminal justice capacity to pushes for efficiencies in the system	Develop analysis tools or entities responsible for assessing the implications of a wide variety of changes that can cascade through the criminal justice system—for example, changes to staffing (e.g., 100 more police officers) and changes to data exchange systems, which could help inform cross-agency decisions to upgrade (criminal justice coordinating councils are a potential model).

^a This need is associated with two taxonomy categories and is included twice in the table.

^b Shifts in technology and volume of information have implications for case-weighting efforts in both civil and criminal matters and for all sides of disputes. Such calculations would also have implications for time standards for court operations (Steelman, 2010). See also NCSC, undated a.

^c Such role-based and other access- or disclosure-control issues are general issues across sectors well beyond the courts, providing a broader body of research and development on which to draw. The concept of an open court record that is a public document adds complexity in this sector, however, requiring strategies that balance a need for disclosure for the public good with a need for protection for the good of individuals going through court proceedings. For a review, see, for example, Sudbeck, 2006.

^d For example, the NIEM data standards. Furthermore, agreement for uniform use of standards and quality in data entry is also critical for effective implementation in practice.

^e The NIEM and GJXDM standards efforts are relevant to this need.

Table 4.3—Continued

Category	Problem or Opportunity	Associated Need
Doctrine, tactics, management, and behavioral knowledge development and training	Problems with data accuracy and currency in interagency data-sharing systems	Develop a consensus among all participants in interagency data-sharing efforts about appropriate standards for data entry to ensure that information in the systems is correct from the outset. ^a
	Limited resources for prosecutors and public defenders (e.g., not enough attorneys, too high caseloads), making it difficult or impossible to pursue new technologies or even do core functions like investigation	Address resource constraints because, while electronic tools can help, there are limits to the level of efficiency that technology can provide (e.g., counsel must truly understand the client file and physically get together to negotiate). Supporting assessments to quantify the limits of technology in achieving court goals would contribute to decisionmaking.
	Trouble engaging existing staff in innovation and change efforts, limiting the ability to implement new initiatives	Develop training tools or structures (e.g., a “court change academy”) to educate judges and court staff to manage organizational change, including its link to court goals and objectives—accepting that not all staff will be open to retraining and change.
	Large disparities in technological resources across court systems (in particular, some small offices have very little technological capacity) and among different agencies in the same jurisdiction (e.g., law enforcement versus court)	Continue investments to equalize technology capacity across the system, supported by criminal justice coordinating councils. ^f
	Tendency of court systems to fund the acquisition of technology without fully addressing operations and maintenance costs	Modify planning and funding processes to ensure that operations and maintenance costs are captured in acquisition decisions and included in out-year budgets. ⁹

NOTE: Needs are grouped by their top-level taxonomy category. Full categorization of needs is included in Appendix E. Needs that were already included on the top-tier list (Table 4.2) are omitted here, even if their value rating was high enough for inclusion.

^f See discussion of this issue in State Bar of Michigan Judicial Crossroads Task Force, 2010.

⁹ ABA (undated) cites examples of states and localities where funding is managed in this way. Discussions of the need for this type of budgeting and planning can be found going back many years (e.g., Schrinel, 1983, in what might be viewed as the early years of court computerization), emphasizing that this is not a new concern.

Table 4.4
Potential Low-Hanging Fruit Court Needs

Category	Problem or Opportunity	Associated Need	Top-Tier Need
Information and communications	Maintaining continuity of operations during natural or other events	Ensure that electronic and other court data have robust backups and that courts have sufficient control over the data storage to permit this.	◆
	Balancing security and privacy with public access	In the absence of redaction, develop better ways to protect some sensitive data, through access controls, encryption, or other tools.	
	Reliance on technological systems for court functioning, which can create new concerns for continuity of operations when systems become overwhelmed or fail	Design systems with backup capabilities and prioritize technology support to focus on restoring critical systems when they go down. Develop, exercise, and implement response plans to address technology failure. ^a	◆
	Opportunity to more effectively communicate with jurors, staff, and victims by using available commercial systems, including open source tools, electronic modes of communication, and social media	Develop guidelines and disclosure requirements to educate court and public users about the value of these tools, as well as their caveats, and mesh them with the requirements of court procedures (e.g., electronic service of process).	◆
	Required speed of court processes to meet the needs of litigants—particularly self-represented ones (e.g., getting a copy of an order to litigants before they leave the building)	Explore whether features of technology systems provide opportunities to better meet the timeliness goals of the justice system (versus just focusing on existing technology and what it can do).	◆
	Technology systems that are not always designed to capture unstructured data created in the practical process of court operation (e.g., notes on the case file about defendant needs, requirements for delay, annotations on exhibits at trial)	Design systems that are capable of capturing unstructured but important case data that are not official filings, and reengineer court processes to make it possible to capture the information. ^b	
	Minimal or nonexistent wireless Internet and bandwidth in many court buildings	Make the investments needed to allow connectivity, and explore new technologies that make it easier to install wireless Internet in older court buildings.	◆
	Supporting pro se litigants	Use electronic tools (such as video and PowerPoint) to present information to both sides in a dispute (e.g., divorce, family, juvenile) that educates them on the process but does not cross the line into providing legal advice. ^c	
Doctrine, tactics, management, and behavioral knowledge development and training	Reliance on technological systems for court functioning, which can create new concerns for continuity of operations when systems become overwhelmed or fail	Design systems with backup capabilities and prioritize technology support to focus on restoring critical systems when they go down. Develop, exercise, and implement response plans to address technology failure. ^a	◆

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

^a This need is associated with two taxonomy categories and is included twice in the table.

^b This is similar to issues that were raised in the NCSC survey on e-filing regarding the management of non-electronic evidence and other exhibits in electronic systems (NCSC, 2009).

^c Such approaches are similar to existing online and other programs for some family court functions (for example, those reviewed by Bowers et al., 2011).

Needs relating to the protection of sensitive information, the ability to capture unstructured data, and the use of electronic tools to assist pro se litigants were found throughout the literature. Monitoring the security of data has become a focus of many courts. As more records are being submitted and stored online, courts are having to ensure that sensitive data, such as Social Security numbers, are not displayed. Courts are exploring using automated redaction software and security classification systems to assist in blocking access to sensitive data. A report by the Joint Technology Committee (2014) suggested that case management systems need to allow judges looking at documents to take notes that are viewable only by authorized users; that automatically track the date, time, and author; and that are not permanently attached to the document. Standards also need to be developed and implemented on the data entered into case management systems and other data tracking systems used by criminal justice agencies. Standards, such as NIEM, do exist, but some agencies are unable to share information because their systems are customized differently from other agencies. Communication between courts and other criminal justice agencies and community support groups is essential to increasing the effectiveness and efficiency of the court system. Having updated, well-developed standards that are widely implemented would increase courts' ability to access real-time information.

Conclusions

As the venue for the administration of justice and for dispute resolution, and as the third branch of government balancing legislative and executive power, the U.S. court system plays critical roles for the country. Citizens want the system to achieve its goals—from effectively administering justice to ensuring fairness across the population—but in an era of scarce resources, the efficiency with which courts achieve those goals is also important. The range of participants and stakeholders in both the criminal and civil domains of the court system is wide, and as a result, effectiveness and efficiency at the societal level is about more than just whether government organizations and personnel—judges, prosecutors, public defenders, and court clerks—can perform their tasks well. Private attorneys must also be able to perform tasks (such as e-discovery) in ways that are societally efficient and that meet the requirements of a justice process that is fair and equitable.

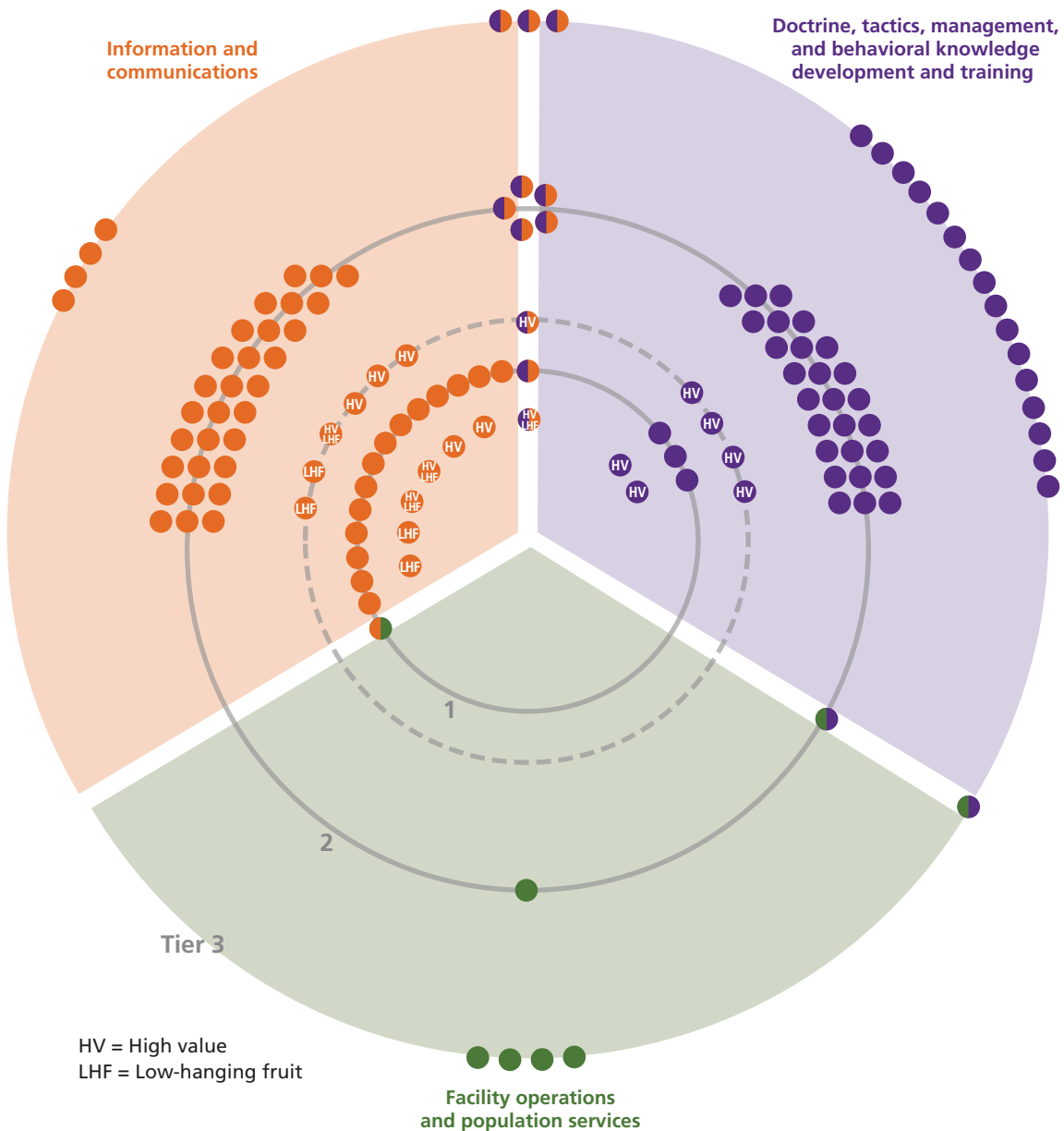
Innovation has great potential to help the U.S. court system perform better—more efficiently and more effectively—going forward. New information technology could help judges make better decisions by presenting the data that they need, when and how they need it. And it could help facilitate the negotiation that has become the main process of clearing cases in the modern judicial system. Collecting data on these varied processes has the potential to offer a window into fairness and equality unlike what has been available to date—for example, by looking inside the plea-bargaining process and assessing the outcomes for defendants, and by examining whether the pressures to gain efficiency and the changes in law that have replaced most individuals’ “day in court” with a negotiation process are achieving all the goals society expects. Indeed, in our panel, the effects of innovation on justice outcomes—for example, whether the use of video technology undermines the rights of the accused—were raised on multiple occasions, emphasizing the panel’s consideration not just of innovation for innovation’s sake but how innovation should serve the goals the court system is charged with achieving.

An Innovation Agenda Focused on Information and Communications Tools and Practices

The Courts Advisory Panel convened in this study identified a wide range of needs that could contribute to innovation in the judicial system, but when they scored those needs to narrow the innovation agenda, the picture was much more focused. Although the panel’s ranking process began with needs relatively evenly split between the information and communications category and the doctrine, knowledge, and training category, the high-priority needs were dominated by information and communications issues. That dominance is even stronger when

we include needs flagged as high value or potential low-hanging fruit. Figure 5.1 illustrates the breakdown of needs per taxonomy category and tier, as well as needs categorized as high value and low-hanging fruit. The innovation agenda for courts is identified by the needs on and within the dotted line at the center of the figure, capturing not just those needs that were ranked in the top tier overall (high priority) but also the needs that ranked as either sufficiently valuable or likely to succeed that they might also merit inclusion in a balanced approach to innovation in the courts. From the results of our panel deliberations, the clear message was that an innovation agenda for the courts should be dominated by concerns of information technology adoption and use.

Figure 5.1
Building the Court Innovation Agenda



From the needs that were rated highly enough for inclusion in our innovation agenda, we can identify several themes. We group individual needs into the following larger conceptual areas that we viewed as important for moving today's court system into the future:

- *Leveraging opportunities for greater court efficiency while ensuring that technology serves justice goals.* Five of the top-tier needs could be reasonably grouped under the theme of seeking improved court efficiency through the use of technology. The use of teleconferencing as a way to save time for court participants was central in several of these needs. In addition, the potential of technology to improve the experience of court participants was the focus of more than one need, including evaluation of how more court transactions could be done over the Internet to reduce the requirement that citizens always come to the court building. While panel participants recognized technology's potential in some areas, they were also cognizant of the need to understand and manage negative effects of innovation on the justice process. For example, one innovation agenda need that fell under this theme suggested using workload estimation tools to better understand the limits of technology for increasing efficiency while maintaining due process and other societal goals.
- *Improving security and emergency preparedness.* Six of the top-tier needs addressed concerns about the ability of courts to maintain security and to be prepared for emergencies and other incidents. With respect to security, the need for standards and performance measures for security at different locations and in different courts was called out to ensure that both security and public access could be maintained. Preparedness needs included the ability to alert individuals in court buildings during emergencies, greater exercising and drilling of courts to prepare for emergencies, and backup of court information to protect it from loss.
- *Improving quality and utilization of shared data in the justice system.* Reflecting the importance of information in the functioning of courts, five of the top-tier needs fell under a broader theme of the quality and utilization of data shared across the system. This theme includes needs related to standards and training for ensuring that data are captured appropriately and accurately and for authenticating data to ensure that the information is trustworthy. It also includes needs for more information-sharing between courts so that data cannot "fall through the cracks" between jurisdictions and for developing consensus formats for digital data used in courts to avoid incompatibility problems. Additional needs that were included in the agenda because they were rated as high value or low-hanging fruit also fell in this theme, including the need to adopt data standards and develop tools for understanding the cascading effects of changes across the justice system.
- *Strengthening analysis and use of data.* Four of the top-tier needs focused on the analysis and use of particular types of data, both to help courts work cases effectively and to better understand the courts' own functioning. These needs related to understanding the increasingly voluminous and complex data involved in some cases. Looking inward, the panel identified needs for tools and analytics to help courts manage their caseloads (e.g., to triage cases to different types of dispute resolution) and to understand the implications of their decisions (e.g., monitoring fairness and disparities in justice). The need for courts to adapt database tools that more fully capture the unstructured data generated in court processes and proceedings was considered to have a high probability of success, meriting inclusion in the innovation agenda as well.

- *Addressing concerns in maintaining and protecting the court record.* Because the court record must be maintained and the information in it protected from both manipulation and unauthorized disclosure, two record management needs rose to the top tier. These were cybersecurity concerns related to cloud storage and better ways to protect personal information of citizens in court records. Tools for better data protection appeared in both the high-value and low-hanging fruit lists.
- *Addressing basic technology shortfalls in today's courts.* Panel members raised a number of concerns about the technology infrastructure of today's courts and, therefore, their ability to innovate in ways that could improve effectiveness and efficiency. Two needs rose to the top tier: developing standard sets of technologies that courtrooms should be equipped with, so that participants can count on a baseline level of capability, and increasing investments to provide wireless and other connectivity in court buildings. Several of the needs rated as high value focused on basic shortfalls, including adapting funding models to appropriately address operation and maintenance costs of systems and providing technology to court participants to help equalize imbalances between courts, agencies, or parties to a dispute that call into question the integrity of the adversarial process for finding facts and reaching judgment.
- *Improving court technology acquisition processes.* Two needs related to improving courts' ability to acquire new technologies were prioritized, emphasizing the need for better governance in technology acquisition and for organizational innovation to take advantage of new technologies, rather than always requiring technology providers to adapt tools to the historical ways that courts have functioned.
- *Using technology for notification and public communication.* Beyond the need for public notification in the context of emergency situations, two other top-tier needs focused on the ability of court organizations to communicate with the public, whether via dedicated systems or via social media tools.

An Agenda Driven More by Adopting Existing Tools and Practices Than Developing New Ones

When considering how to implement the innovation agenda for courts, there is a significant difference between needs that can be met with current technology and practice—discussed in Chapter Three—and those that require developing new approaches or tools. Looking at the needs rated high priority, the vast majority can be implemented simply by adopting an existing technology or practice. Tools to alert the public already exist, so the need identified by the panel was to facilitate courts' use of them. Cloud storage for information is becoming ubiquitous, but the challenge was understanding the security and other issues associated with courts entrusting such firms and their systems with court records. Commercial technologies are already available for many tasks that are done in courtrooms (for example, the evidence presentation or court reporting technologies explored in Chapter Three), so the need was to determine which of those technologies should be available so that stakeholders can know what to expect when they appear in court. Social media is a tool that so many members of the public use, and they increasingly assume that they should be able to communicate with government this way. However, courts need guidelines and materials to ensure that both they and citizens understand the implications of transmitting data related to court proceedings and cases via

such channels. When examining the list of high-priority needs, almost half seem to require that courts adopt innovations that already exist—for data protection, communication, wireless Internet connectivity, and others—rather than develop anything new. Expanding the notion of adoption to include adapting technologies that exist in other sectors—for example, models for increasing transactions that can be done online, building tools for triaging caseflow, and standardizing the authentication of electronic documents—captures much more of the innovation agenda. Unsurprisingly, the needs that were added to the innovation agenda as potential low-hanging fruit are predominantly needs that could be met by adapting existing tools or capabilities to the court environment.

But while many needs did focus on existing technology or practices, others called for new development or for research and analysis to create tools that were not seen as currently available. Judges and others need better tools to quickly parse and understand larger and more-complicated bodies of data related to cases, and to integrate data from multiple criminal justice systems to inform such actions as bail decisions. Requirements for information-sharing and system integration arose multiple times during panel discussions, emphasizing the challenges in addressing some of the problems raised. Major progress toward standards and approaches for such interoperability has been made, but implementing them broadly is still a concern. Looking at the high-priority needs, perhaps one-third represent capabilities or tools that are new or are sufficiently different from existing tools to likely require significant development. For example, changes in governance structures that significantly affect judges' autonomy for technology acquisition would be a significant departure from the status quo in some court systems, and would almost certainly require significant effort to achieve. In addition, even where models already exist, the unique demands of the court environment may require development—for example, developing exercises for appropriately evaluating court security. The needs added to the agenda because of their potentially high benefits (even though they were viewed as less likely to succeed) largely require new development effort, from crafting analytical tools to understand the cascading effects of changes in the justice system to implementing entirely new training or educational structures to facilitate organizational change.

Fostering Innovation in the U.S. Court System

This effort, aimed at the national level, sought to frame an innovation agenda for the court system writ large. The value of the result will be driven by application and by how individual agencies or organizations use the identified needs to inform their choices about the future. Innovation happens at the organizational level, and so it is implementation that matters more than any promise of an idea on paper. In an effort to shape an agenda that would be useful across the diversity of court systems and broader stakeholder community, we assembled a panel that sought to capture that diversity, in roles, in home organizations, in geography, and in expertise. The panel's discussions included questions and concerns about the relevance of individual options to specific types of courts—for example, general courts versus specialty courts focused on drug issues or mental illness, large urban court systems versus smaller rural ones, and unified versus nonunified systems. Within the innovation agenda, there are potential solutions that are more or less relevant, easier or more difficult to implement, and so on depending on the nature of the court considering them. But those tensions can pull in different directions: A larger system might have more resources available to acquire new technology, but

implementation might be more tractable in a smaller system that has less of an investment in legacy systems or fewer staff to train.

It is also important to frankly acknowledge that the deliberations of a single advisory panel—however carefully selected or guided by a methodology that sought to force its deliberations to be both comprehensive and systematic—will always be a partial representation of reality, and will inevitably be shaped by the expertise and experience of the individuals involved. In our view, the results are a useful snapshot of a point in time and of the concerns and issues that were most salient to a group of experienced practitioners—even though the results should never be viewed as an absolute measure of ground truth. It is also critical to remember that as the world shifts, such an agenda must evolve over time. As time passes, the value and challenges associated with past investments and initiatives become clearer, and new issues and opportunities may arise that necessitate revisiting past assumptions and conclusions. As a result, it is necessary to maintain and update this type of document over time, whether in a centralized way or through the efforts of the broader community of researchers, practitioners, and others with interest and expertise in the subject matter.

Acknowledging the innovation agenda's limits, we hope that it can provide a starting point and contribute to the thinking of the varied organizations with needs and roles to play in court innovation. This effort has provided a set of high-priority needs that rose to the top of our panel's deliberations, as well as a broader—and much longer—set of innovation options that represent opportunities for courts and the organizations that interact with and support them. Reflecting the courts as both an actor and a venue that brings together entities across government, the private sector, and the general public, many of these needs reach outside the walls of the courthouse, creating potential benefits and requirements for many organizations and for society more generally. Pursuing these innovations is part of a broader program of improving national justice system performance through better coordination, information-sharing, and assessment to achieve the goals of appropriate, equitable, efficient, and effective administration of justice for the nation.

Table A.1
Courts Advisory Panel Members

<p>John Allen IV Director Cook County Department of Administrative Hearings Chicago, Ill.</p>	<p>Rob Gowen Attorney Capital Defense Team Shelby County, Tenn.</p>
<p>Matt Benefiel Court Administrator Ninth Judicial Circuit Court of Florida Kissimmee, Fla.</p>	<p>The Honorable Jon Hein Judge Court of Common Pleas Darke County, Ohio</p>
<p>Ray Billote Administrator Maricopa Superior Court Phoenix, Ariz.</p>	<p>Robert Hood Director Community Prosecution and Violent Crime Division Association of Prosecuting Attorneys Washington, D.C.</p>
<p>Michelle Bonner Chief Counsel, Defender Legal Services National Legal Aid and Defender Association Washington, D.C.</p>	<p>The Honorable Edwin Kelly Judge New Hampshire Circuit Court 2nd Circuit – District Division Plymouth, N.H.</p>
<p>The Honorable Jane Brady Judge New Castle County Superior Court Wilmington, Del.</p>	<p>Kenneth A. Kent Executive Director Florida Court Clerks and Comptrollers Tallahassee, Fla.</p>
<p>Robert Bruchalski Deputy Director Judicial Information Systems Division Maryland Administrative Office of the Courts Annapolis, Md.</p>	<p>Pamela Kilpela Court Manager Fourth Judicial District Court Minneapolis, Minn.</p>
<p>Craig Burlingame Chief Information Officer Massachusetts Trial Court Boston, Mass.</p>	<p>Yolanda Lewis Court Administrator Superior Court of Fulton County Atlanta, Ga.</p>
<p>David K. Byers Administrative Director Arizona Supreme Court Phoenix, Ariz.</p>	<p>Hedda Litwin Program Counsel National Attorneys General Training and Research Institute Washington, D.C.</p>
<p>Kay Chopard Cohen Executive Director National District Attorneys Association Alexandria, Va.</p>	<p>Mike Moore State’s Attorney Beadle County State’s Attorney’s Office Huron, S.D.</p>
<p>The Honorable Amy Davenport Former Chief Administrative Judge State of Vermont Montpelier, Vt.</p>	<p>John Olivier Clerk of Court Supreme Court of Louisiana New Orleans, La.</p>
<p>Paul Embley Chief Information Officer National Center for State Courts Williamsburg, Va.</p>	<p>Elizabeth Ortiz Executive Director Arizona Prosecuting Attorneys Advisory Council National Association for Justice Information Systems Phoenix, Ariz.</p>
<p>The Honorable David Emerson Judge Douglas County, Ga.</p>	<p>The Honorable James K. Roberson Chief District Court Judge District Court of North Carolina, District 15A Burlington, N.C.</p>
<p>Mark Erwin Chief Technology Officer Travis County Courts System Austin, Tex.</p>	<p>Beau Rudder Director Training Division Mississippi Office of the State Public Defender Jackson, Miss.</p>
<p>The Honorable Gary Everngam Associate Judge District Court of Maryland, District 6 Montgomery County, Md.</p>	

Table A.1—Continued

<p>The Honorable Constance Russell Judge Superior Court of Fulton County Atlanta, Ga.</p> <p>Patrick W. Ryan Administrator New Hampshire Circuit Court Concord, N.H.</p> <p>Farhad Safaie Chief Technology Officer Administrative Office of the U.S. Courts Washington, D.C.</p> <p>Brad Sibley Consultant Plano, Tex.</p> <p>Tim Smith Clerk of the Courts Seventh Judicial Circuit Putnam County, Fla.</p> <p>The Honorable Kirk W. Tabbey Judge 14A District Court, Washtenaw County Ypsilanti, Mich.</p> <p>Lucy Thomson Principal Livingston, PLLC Washington, D.C.</p>	<p>The Honorable Michael Trickey Judge Court of Appeals, Division 1 Seattle, Wash.</p> <p>Henry Valdez Director New Mexico Administrative Office of District Attorneys Albuquerque, N.M.</p> <p>The Honorable Jon Van Allsburg Judge 20th Circuit Court Ottawa County, Mich.</p> <p>Robert Wessels Former Criminal Court Administrator Harris County, Tex.</p> <p>James E. Williams Chief Public Defender Defender District 15B, Orange and Chatham Counties Hillsborough, N.C.</p> <p>Tammy Woodhams Justice Information Sharing Practitioners National Criminal Justice Association Washington, D.C.</p> <p>Robert A. Zastany Executive Director Administrative Office of the Nineteenth Judicial Circuit Waukegan, Ill.</p>
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Courts Advisory Panel Pre-Meeting Questionnaire

This appendix reproduces the text of the panel’s pre-meeting questionnaire, through which the participants provided input before the in-person working groups. The structure of the questionnaire included a section prioritizing the six court objectives and then a repeated set of questions related to each of five court functional areas: case preparation and presentation, case-level court information management, support for court hearings, facilities management, and people management. In the interest of brevity, we present one copy of those questions here, showing where the functional area name was inserted in the different question blocks.

Courts Advisory Panel Pre-Meeting Questionnaire

Thank you for agreeing to participate in the Courts Advisory Panel as part of the Priority Criminal Justice Needs Initiative, sponsored by the National Institute of Justice. The panel will bring together court experts and practitioners to prioritize court needs and to help NIJ develop its future court-related technology research goals. The outcomes will also inform technology providers about improved or new technologies to better aid courts.

You are free to skip any questions that you do not wish to answer, but we hope input from the panel is as complete as possible to help us frame the workshop discussion.

Your responses to the questions below will provide us with initial input that will maximize our time together on the day of the panel. We will discuss needs in each of the court functional areas below in more detail during the panel, including how associated technologies can help courts reach key objectives, what obstacles prevent technological innovation, and what unmet needs these technologies may address.

First, we would like your input on the importance of several court system objectives. This will inform the panel discussion by allowing us to weight different potential innovations that might be useful in achieving different court objectives.

Please assign levels of importance (0 to 100) for each court objective. Your score should reflect the importance of each objective relative to the other objectives.

The objective that you believe is most important should be given a score of 100. Then assign scores to each other objective reflecting its importance relative to that most important objective. For example, if another objective is equally important, it should be scored as 100 also. An objective that is half as important as the top goal would be scored as 50. An objective that you view as unimportant would get a score of 0.

Each objective can have any number. For example, if you think all these objectives are equally important, all would be scored as 100. If you think they are each of different levels of importance, each score would be different.

- **Provide fair and impartial access to justice:** Protect all persons, including the accused, victims, witnesses, and other litigants equally without bias or discrimination. Pretrial detention and access to counsel and other legal support must not depend on race, economic status, or other extralegal factors.
- **Ensure due process:** Protect the rights of the accused and of victims by ensuring due process and following uniform rules of practice and procedure. Elements of due process include notice, discovery, right to bail, counsel, lawful and regular process, confrontation, cross examination, the right to call witnesses, the privilege against self-incrimination, and public and timely resolution, among others. Case processing and the application of law to the facts in individual cases must be consistent and predictable.
- **Administer justice:** Resolve disputes and provide individualized justice to individual cases. Determine the facts of a case and administer appropriate punishment to the guilty in criminal cases or appropriate penalties to those responsible for civil harm.
- **Protect the public:** Administer punishments to the guilty as appropriate to separate dangerous criminals from the public, rehabilitate offenders, and/or deter future criminal behavior. Provide protection against the arbitrary use of governmental power. Build and maintain public trust and confidence.

- **Save money and time:** Improve the efficiency of court operations. Maintain due process and individualized justice while disposing of cases efficiently and fairly.
- **Improve court competencies:** Improve the competencies of staff through training, education, and readiness. Ensure an independent, impartial, and accountable judiciary.

Court Functional Areas

To set up our discussion during the workshop of ways that new innovations or technologies might help courts, we are going to ask you about the major problems you perceive in each of a set of court functions. We have defined five court functional areas, and will ask you about problems and technology issues that exist in each. The functional areas are:

1. **Case preparation and presentation**, conducted primarily by attorneys or litigants to prepare for a case and to present evidence pertaining to that case at court hearings and trial. Also includes judicial functions to rule on motions or evidence presented to the court. Functions here include pretrial motions, bail or pretrial release determinations, assignment of counsel, discovery, determinations of evidence admissibility, and evidence submission/presentation.
2. **Case-level court information management**, including exchanges of information pertaining to a specific case from the courts to or between external entities, such as the prosecutor's office, defense counsel, law enforcement, pretrial services or other supervisory agencies, and the public. Functions here include case filing, documenting the case record, maintaining court records management systems, providing for public access to court records, and providing for exchanges with other criminal justice systems or agencies.
3. **Support for court hearings**, including administrative court functions that facilitate court hearings and trials, such as providing access to proceedings for litigants and the general public (e.g., facilitating in-person or remote appearances and providing translation services), general public information about court proceedings, and jury management.
4. **Facilities management**, including all processes and systems in place to manage the physical infrastructure of the courts. Functions here include court security, information technology management, preparedness efforts for natural disasters, and other building management activities.
5. **People management**, including all processes and systems in place to manage human resources and support knowledge development and training for court staff.

Though we expect each person's responses will be informed by their individual experience, we encourage you to think broadly about courts in general (e.g., different types of courts, small and large court systems, unified vs. nonunified courts, and courts in rural or urban settings).

Court Functional Area N. [NAME OF FUNCTIONAL AREA]

Description of [NAME OF FUNCTIONAL AREA].

What are the major issues or problems that exist in courts around conducting [NAME OF FUNCTIONAL AREA]?

We are going to use these problems to start discussion at the Courts Advisory Panel, so encourage you to give us the top problems you believe currently get in the way of efficient and effective functioning around case preparation and presentation at trial. Please give us as many issues as you would like. If this questionnaire does not provide enough space, please feel free to email us with any additional information.

Problem 1: _____

Problem 2: _____

Problem 3: _____

Problem 4: _____

Problem 5: _____

Please use the space below to identify additional problems if needed: _____

Are there particular issues related to changes in technology in society overall (e.g., widespread availability of smartphones, availability of digital evidence) that pose specific challenges for [NAME OF FUNCTIONAL AREA]? _____

What are the major issues or problems with the technologies that are used today for [NAME OF FUNCTIONAL AREA]? If technology isn't currently used to help in this area (or function), please explain. _____

What obstacles are there to implementing technologies to support [NAME OF FUNCTIONAL AREA] in your court system (or the court systems with which you are most familiar)? Please indicate whether each obstacle is major, minor, or not an obstacle in your experience. [Check boxes for each option]

- Cost
- Buy-in from judges
- Buy-in from attorneys
- Buy-in from administrators
- Buy-in from court oversight or budgetary authorities
- Infrastructure to accommodate technology (e.g., no Internet connectivity)
- Human resources to manage and maintain the technology
- Lack of training on use of technology
- Offers limited improvement over current court practices
- Other (please specify) _____
- Other (please specify) _____
- Other (please specify) _____

Do you think any of the following harms might be associated with greater use of technologies in a court system for [NAME OF FUNCTIONAL AREA]? Select as many or as few as appropriate. [Check boxes for each option]

- Violating privacy
- Compromising data integrity or security
- Preventing due process
- Undue burden on court actors (specify judges, attorneys, litigants, administrators, other court staff) _____
- Lengthening case processing time
- Considerable costs that would be better allocated elsewhere
- Other (please specify): _____

Are there any other points about issues/problems or technologies related to [NAME OF FUNCTIONAL AREA] that you think are important for us to include in setting up the workshop discussion? _____

(The questionnaire then included identical question blocks for each court functional area.)

Courts Advisory Panel Agenda

This appendix presents the implemented agenda of each working group of the Courts Advisory Panel, held one day each at the RAND Corporation's Arlington, Virginia, office, May 12–14, 2015. Each working group had an identical agenda.

8:30–9:00 a.m.	Welcome, overview, and introductions	<i>Introductory session explaining panel process</i>
9:00–10:00 a.m.	Group discussion of court functional areas	<i>What are the problems encountered in each area? What are possible technology or other solutions?</i>
10:00–10:15 a.m.	Break	
10:15–11:30 a.m.	Group discussion, <i>continued</i>	
11:30–12:00 p.m.	Lunch break	
12:00–1:30 p.m.	Complete group discussion	
1:30–1:45 p.m.	Break	
1:45–2:30 p.m.	Final brainstorming session	<i>What technologies or needs have we missed? What needs do not fall neatly into the group functional areas?</i>
2:30–3:30 p.m.	Prioritize technology needs	
3:30–4:00 p.m.	Conclusion	

Detailed Methodology

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

Framing Top-Level Objectives for the U.S. Court System

Because of the complexity of its criminal justice system, the United States asks agencies and entities within that system to pursue multiple goals simultaneously. These goals can be viewed at the individual level (e.g., ensuring due process and justice for an individual accused of a crime or party to litigation) or at the societal level (e.g., providing access to justice uniformly for all citizens or protecting the public at large by administering justice for dangerous individuals). Building on previous RAND work in this area (Jackson et al., 2015), the research team framed six top-level objectives of the court system, (see Table 4.1 for definitions of each objective):

1. Provide fair and impartial access to justice.
2. Ensure due process.
3. Administer justice.
4. Protect the public.
5. Save money and time.
6. Improve court competencies.

These objectives are informed by the literature on the court system writ large, its role in society, and previous efforts to measure court performance (e.g., Wildhorn, Lavin, and Pascal, 1976; Keilitz, 2000). The objectives sought to cover the range of activities relevant to the courts, including both criminal and civil cases. The team received feedback on the objectives from panel members and revised the objectives in response. The objectives provided a structure for considering potential court innovations, because some new technologies or changes in policy or practice might be beneficial in different ways. And some innovations might have benefits across multiple objectives, while others might affect only one.² As we discuss in the next

¹ The text in this appendix draws heavily on similar description in Hollywood, Boon, et al., 2015; Hollywood, Woods, et al., 2015; and Jackson et al., 2015.

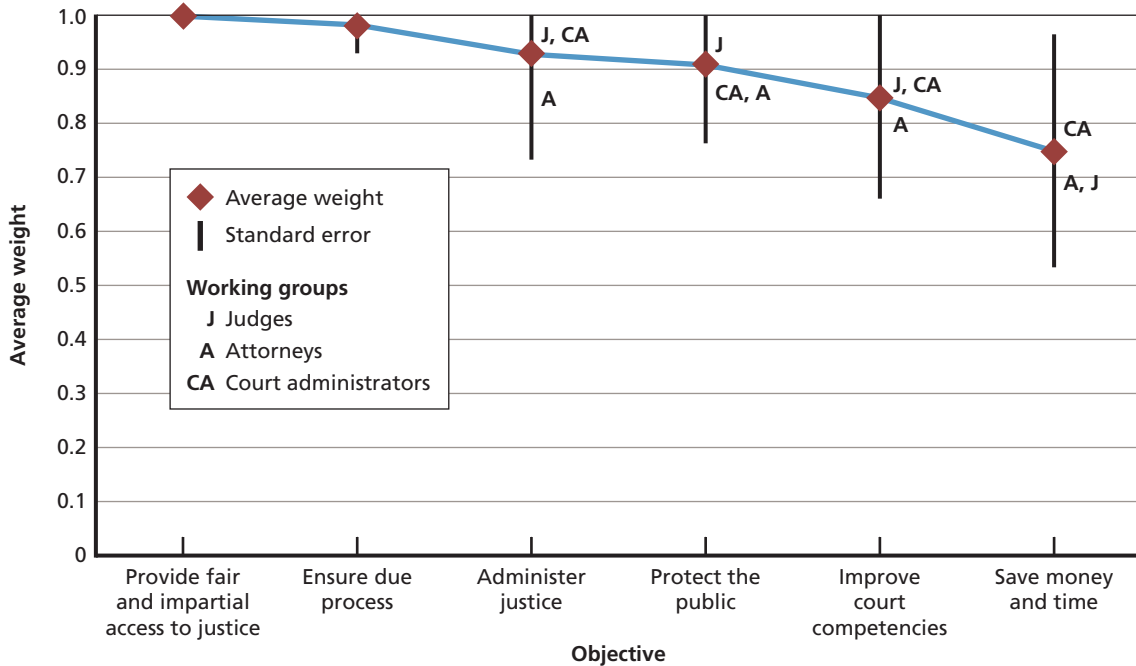
² Rabinovich-Einy (2008) discusses this issue in the context of the Israeli court system, emphasizing that innovations can have many effects on court operations beyond the increases in efficiency that changes (such as implementing e-filing or other information technology to support court processes) are often primarily aimed at achieving.

sections, when all other factors were equal, innovations that the panelists viewed as benefiting multiple court objectives ranked as higher priority.

Pre-Workshop Data Collection

The research team used a pre-workshop questionnaire to gather initial data and inform planning for the workshop discussions. The questionnaire asked two sets of questions. The first asked panelists to weight the relative importance of the six objectives for courts, because there can be significant variation in this importance for real-world policy challenges. As a result, we needed a measure of the different priorities that panelists placed on each objective. To do this, panelists gave each objective a score from 0 to 100, and they were asked to give a score of 100 to the objective that they thought was most important. Each other objective was then measured against that most important objective, receiving a weight from 100 (if it was equally important to the highest-priority objective) to 0 (if it was viewed as unimportant). These scores were then averaged across all panelists' responses to produce a set of weights on the objectives. The results (normalized to 1 across the panel) are presented in Figure D.1; the red diamonds present the average weights, and the error bar shows one standard deviation around the mean, truncated at 1. The modest differences between the weights show that the panelists viewed all six of the objectives as quite important—indeed, just more than 10 percent of the panelists viewed them all as *equally* important. Because our panel was split into three different working groups—judges, attorneys, and court administrators—we could examine how the weightings differed across the groups. On the objectives where there was greater spread in the weightings, there was

Figure D.1
Weighted Priority of Courts Objectives



some variation across the working groups (in the figure, the average weight for each group is shown by the position of the labels next to the error bars), but that variation was not substantial.

The second set of questions asked panelists to identify key problems related to technologies for each of five court functional areas (case preparation and presentation, case-level court information management, support for court hearings, facilities management, and people management). For functional area, panelists were asked to identify problems in the area, technologies that pose challenges to that function, problems with current technologies used to support the function, obstacles to implementing new technologies in the area, and whether use of new technologies could cause additional problems (such as workload, privacy, or security shortfalls). Panelists' comments were used to create a list of initial problems for each functional area.

Generating Court Needs

As described in Chapter Four, needs were generated through structured discussion with members of the Courts Advisory Panel. The panel consisted of three day-long meetings, each with a separate working group—one of judges, one of counsel (both prosecuting and defending attorneys), and one of court administrators. To brainstorm needs, each group held five discussions, one for each functional area. At the start of each discussion, panelists reviewed the lists of initial problems from the questionnaire responses and identified additional problems. Panelists then brainstormed potential solutions that could be addressed through research or science and technology investment—that is, the specific needs. The panelists also identified which court objectives each need supported (by marking a simple “yes” if the need supported the objective). In all, the three working groups generated 237 needs.

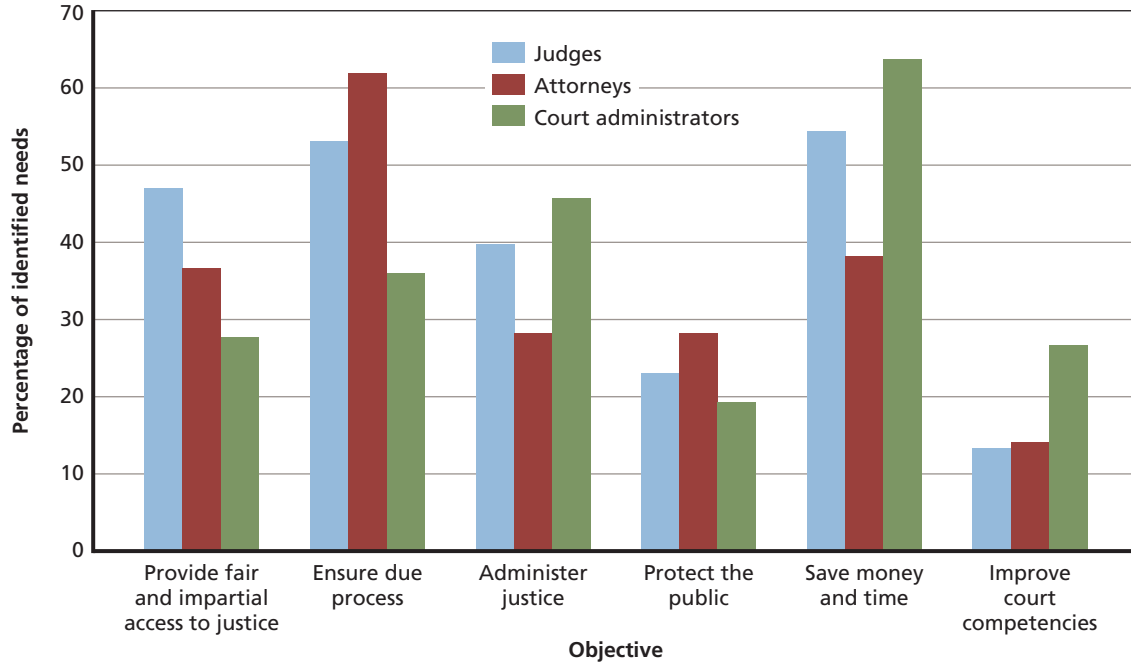
How Did the Identified Needs Differ Across Working Groups?

Because the panel was split into separate working groups for different practitioners, we can examine the differences between the needs generated by each group, which offers a window into the priorities of different elements of the sector. As described in Chapter Four, our main analysis focused on the combined needs (which were often made up of needs from multiple working groups). But to perform subanalyses of each group, we looked at the full subset of the combined needs that could be linked to that group. In other words, if a combined need “contained” a need from that working group, we included the combined need in our subanalysis. As a result, some combined needs are included in two or even all three of the group-by-group analyses to provide an accurate descriptive distribution of their priorities.

When we look at how the needs map to the court objectives to which they contribute, the differences we observe between working groups reflect the different roles of those court participants (Figure D.2). The judges' and attorneys' groups had more needs linked to the fair and impartial access to justice and due process objectives, while the court administrators' group had more needs expected to contribute to improving efficiency (saving money and time) and court competencies. Interestingly, members of the judges' group also identified a large number of needs related to saving money and time, and both the judges' and administrators' groups were comparable with respect to needs for improving the effective administration of justice.

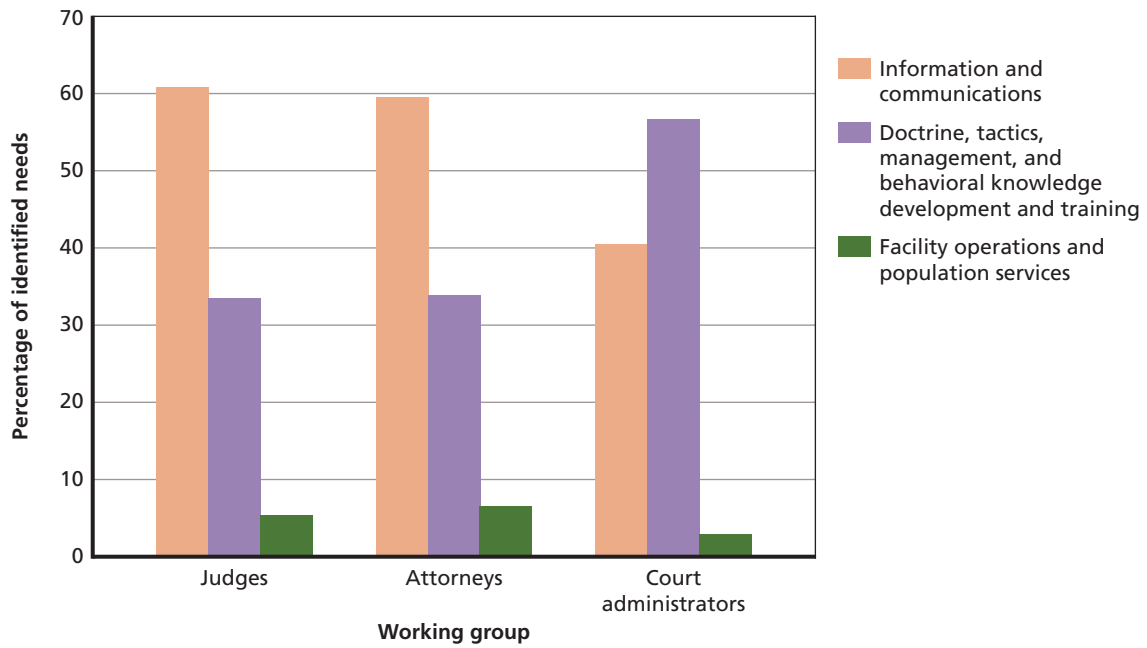
When we look at how the needs identified by the different working groups fall across the taxonomy categories (Figure D.3), we observe only one notable difference—a near “flip” of the relative proportions of needs focused on the *information and communications* category

Figure D.2
Percentage of Needs Contributing to Each Court Objective, by Working Group



RAND RR1255-D.2

Figure D.3
Percentage of Needs Falling in Each Taxonomy Category, by Working Group



RAND RR1255-D.3

and the *doctrine, tactics, management, and behavioral knowledge development and training* category (needs covering process and training activities) between the court administrator group and the judges and attorneys (where the breakdown was comparable). As with the differences in objectives, this difference is consistent with the different roles of the panel members in the court system, where a greater focus on training and process might be expected from administrative leadership.

Consolidating Court Needs

As described in Chapter Four, each panel identified between 71 and 83 individual needs, for a total of 237 raw needs at the conclusion of the three working groups. To reduce these needs to a more tractable number and avoid duplicates across the groups, the research team consolidated the needs into a smaller set of 131 needs. This process was done through iterative sorting of the needs, first into conceptual categories (e.g., court information technology staffing, emergency preparedness) and then within the categories to identify either similar or complementary needs that could be consolidated. When we did consolidate multiple raw needs into one, we wrote a new combined need that sought to preserve all the key concepts and details from the original needs that composed it. Table D.1 provides examples of original and combined needs to illustrate the results of this process.

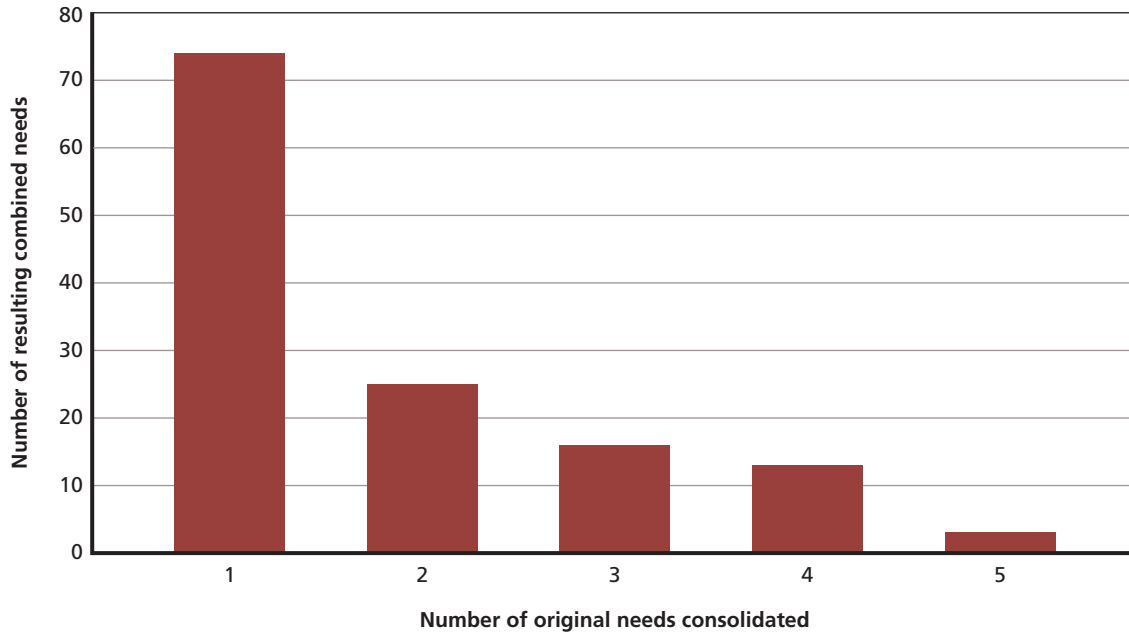
Although the consolidation process significantly reduced the total number of needs for subsequent analysis and discussion, the majority of the final needs were actually not changed—that is, they were carried forward through the process in their original form. Figure D.4 is a histogram of the number of needs consolidated into each of the combined needs, showing that 74 of the resulting 131 (56 percent) were carried forward in their original form. For combined needs that were made up of multiple original needs (i.e., setting aside the 74 needs that were carried forward without consolidation), the average number of needs merged was just under three.

When we consolidated the needs, all of the court objectives that were associated with the original raw needs were assigned to the resulting combined need. That is, if two original needs were each tagged with a different court objective, then we tagged the combined need with both objectives. There frequently was overlap between the objectives of original needs being combined into one need. However, the average number of objectives assigned to combined needs was slightly higher (average of 3.4 objectives, median of 3) than the original needs that were not combined with others (average of 2.1 objectives, median of 2).

Table D.1
Example Original and Combined Needs

Original		Combined	
Problem or Opportunity	Need	Problem or Opportunity	Need
Technology reliability is a barrier to using new systems; use of remote testimony in a jury trial could be a problem because of the increase in burden	Build in a backup for technology (other than catastrophic failure of the electric grid) to be able to address within 24 hours and build in prioritization with information technology support to prioritize responses (e.g., trial issue vs. "my mouse is broken").	Reliance on technological systems for court functioning, which can create new continuity of operations concerns when systems become overwhelmed or fail	Design systems with backup capabilities and prioritize technology support to focus on restoring critical systems when they go down. Develop, exercise, and implement response plans to address technology failure.
Maintaining continuity of operations given natural or other events	Accepting that shutdowns will happen, have a well exercised and updated plan for backup sources of capability.		
Reliance on electronic records and information-sharing systems to replace counsel preparing paper files makes the process vulnerable to the system slowing down or failing	Design and implement systems for reliability, and design for backup to reduce the probability of technological failure.		
Juror "research" on the Internet or social media activity during the trial (e.g., "friending the defendant")	Restrict social media and device use during trials.	Juror misbehavior using mobile devices or social media (e.g., researching witnesses or the parties during trial)	Determine best practices to address this misbehavior, which could range from educational efforts to simple prohibition of mobile devices.
Challenges maintaining the jury pool given media and other factors	Build more-effective tools to educate or persuade jurors not to do things they are not supposed to (e.g., research the defendant on the Internet).		
Space constraints (physical and virtual) for records and evidence management	Explore technology and other options to keep required files, particularly given increasing volume of material, and manage the handoff of responsibility for appropriate/quality file retention as the process continues (e.g., from prosecutors to the court).	Space constraints (physical and virtual) for records and evidence management	Develop best practices for retaining court files in the new electronic environment and support planning and procurement decisions that ensure adequate storage.
Space constraints (physical and virtual) for records and evidence management	Address procurement and other issues to enable acquisition of information technology storage capabilities needed for electronic systems.		

Figure D.4
Number of Original Needs Consolidated to Produce Combined Needs



RAND RR1255-D.4

Prioritizing Court Needs

Overall prioritization of the needs relied on ranking needs within individual working groups, reranking needs across the entire panel membership (after consolidating the combined needs), and identifying supplemental needs based on individual score components. Each process is described below.

Ranking Needs within Working Groups

As described in the main body of the report, each member of a working group scored each need developed in that group on a 1 to 9 scale for three characteristics: (1) the value of meeting the need for improving court performance or efficiency (with a 9 calibrated as a 20-percent or greater improvement overall), (2) the technical likelihood of success, and (3) the likelihood that a solution meeting the need would be broadly adopted by court systems if it was developed. We used a 9-point scale for the value rankings in particular to allow participants to make two high-medium-low judgments—first, was the benefit of the need very high (falling in the 7–9 range), medium (4–6), or low (1–3), and second, does the need fall in the middle or on an extreme of the subscale (e.g., for a need that was in the 7–9 range, is it a 7, 8, or 9)? Panelists also had an opportunity to write comments about why they rated needs as they did.

We then mathematically combined the value score and both 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 the probability of successfully fielding a technological breakthrough. Estimating expected value is the baseline

approach in decision analysis for assessing the worth of choosing an option under uncertainty (de Neufville, 1990, pp. 312–313). RAND researchers have used expected value to prioritize criminal justice technology needs across a range of prior reports.³ Mathematically, the total expected value (EV) for a need is given by

$$E[V_{ij}] = M_{ij} * \left(\frac{1}{W} \sum_{k=1}^6 w_k * I_{ik} \right) * \Pr(S_{ijt}) * \Pr(S_{ijo}).$$

Here, M_{ij} is the rating for potential impact; w_k is the weight on the objective; I_{ik} is an indicator that is 1 if the need supports objective k , and 0 otherwise; W is a normalizing constant; $\Pr(S_{ijt})$ is the rating on technical likelihood of success; and $\Pr(S_{ijo})$ is the rating on operational likelihood of success.

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 court sector 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.⁴

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 value scale at the top (i.e., any need with an expected value of greater than 20-percent improvement would still be rated only 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 used the resulting expected-value scores to cluster each working groups' needs into three tiers—numbered 1 (highest expected values) through 3 (lowest expected values). This was done using the K-means clustering algorithm, which is a predominant clustering algorithm that iteratively partitions data into k subsets in which each element is assigned to the subset with the closest mean. Notably, K-means is the only clustering algorithm in the “Top Ten Algorithms in Data Mining” from the Institute of Electrical and Electronics Engineers' International Conference on Data Mining (Wu et al., 2007). K-means is a heuristic algorithm

³ RAND reports on criminal justice technology needs include Hollywood, Boon, et al., 2015; Hollywood, Woods, et al., 2015; and Jackson et al., 2015.

⁴ The median is the score that has the middle rank (50 percent of scores are higher and 50 percent are lower) in the data. We chose medians because they are robust and 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.

for subdividing data elements into k sets such that the total of the squared differences between each data point and its cluster center (i.e., each cluster's average) is minimized. Mathematically, we want to divide the data points into sets 1, 2, . . . K so that the following measure is minimized:

$$\min \sum_{i=1}^K \sum_{x_j \text{ in set } i} \|x_j - \mu_i\|^2.$$

Here, μ_i is the center, or average, of cluster i . This measure, also called the *within-cluster sum of squares* or *cluster cohesion*, is one of the most common measures for assessing how effectively the data have been portioned into clusters overall. The reason a heuristic algorithm like K-means is used is that minimizing cluster cohesion is known to be hard to solve exactly.⁵ We used the open-source data-mining tool KNIME (Version 2.11.1; see description in Berthold et al., 2009), implemented in the statistical software package R.

Ranking Combined Needs Across the Entire Panel

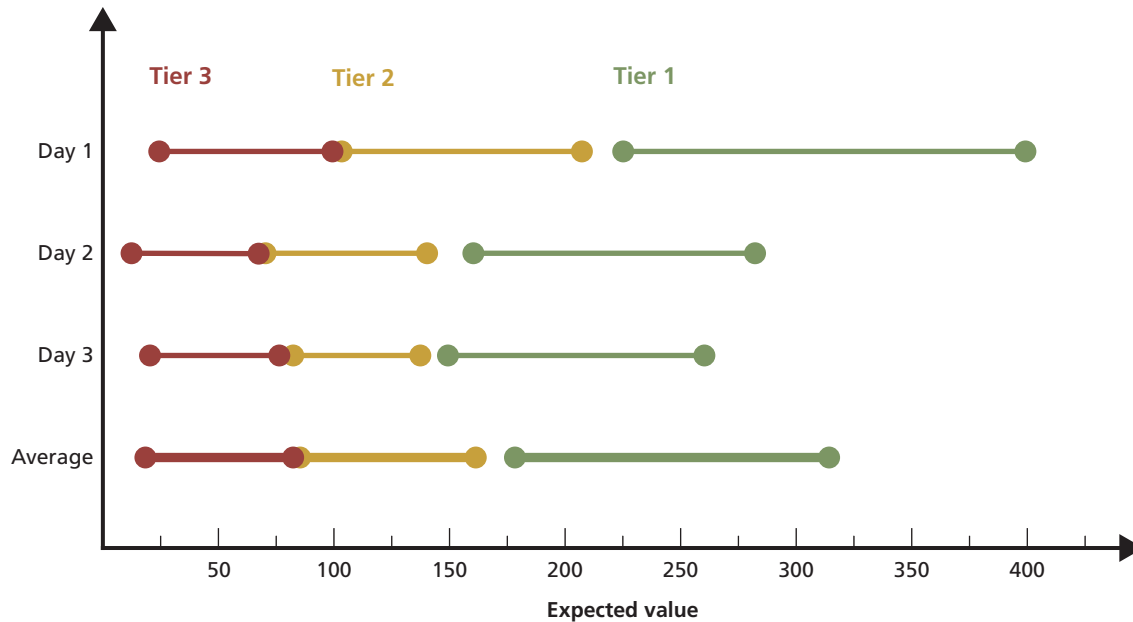
Because the ranking and scoring of needs was done individually in the working groups, we needed a method to relate the results of those rankings to the combined needs—many of which were constructed of needs from multiple working groups. When we ranked the combined needs, we preserved the *highest* tier—that is, a combined need's tier score was the highest of any of its component needs. For example, if three needs were combined whose tiers were 1, 3, and 3, the combined need would be Tier 1. This consolidation had the effect of “up biasing” the distribution of ranks in the combined needs from the original ones (i.e., we were preferentially dropping low tierings in favor of high ones), but the process sought to preserve the higher priority if any working group had scored a need highly.

As described in Chapter Four, we held a second ranking round that showed the newly combined and tiered needs to the entire panel. This allowed members of all three working groups to see the combined needs and needs that had been identified by other groups, and it gave them the opportunity to weigh in one more time on their rankings. Members could “up vote” or “down vote” needs on this list that they viewed as being tiered incorrectly. During this step, the net number of up or down votes received by a need could move it in the rankings. The probability of a need changing tier was affected by how close its expected value was to the boundary between its starting tier and the next one up or down; that is, a need that was very close to the boundary required fewer net votes to move than one that was far from the boundary.

We used the expected-value scores as the scale to determine a need's distance from the boundaries of the different tiers. However, because the individual working groups had assigned their own scores to needs and the initial tiering of needs was done at the group level, these boundaries were different from group to group (see Figure D.5, days 1, 2, and 3). In order to use expected values for the cross-working group reprioritization, we had to normalize each need's score to a common scale. To do that, we calculated average values for the top and bottom of

⁵ Mathematically, it is as difficult as an NP (nondeterministic polynomial time) problem.

Figure D.5
Ranges of Expected Values for Tiered Needs in Each Working Group and on Average



each tier's range across the groups, and then multiplied each need's original expected-value score by the ratio between the top and bottom of its tier and the overall average. That is, for a need from Day 2 in Tier 1, the normalization ratio would be

$$\frac{\left(\frac{\text{Overall average value for top of Tier 1}}{\text{Day 2 value for top of Tier 1}} + \frac{\text{Overall average value for bottom of Tier 1}}{\text{Day 2 value for bottom of Tier 1}} \right)}{2}$$

This normalization served to adjust the scores of needs into the average range for the tier that the individual workshop already assigned to it. In a small number of cases, this use of the average top and bottom values for the tier did not move a need's score enough to get it into the average range. In those cases (which included ten of the final 131 needs), the expected-value score was set manually to get it just inside the range of the relevant tier; that is, we raised it slightly to get it to the low value of the tier if the normalized score was too low or lowered it slightly if the normalized score was above the range for the appropriate tier.

We then assigned expected values to the combined needs based on the normalized scores for the component needs; this process was identical to the way tiers were assigned—that is, the *highest* value for any of the original needs that were consolidated became the expected-value score for the combined need.

To translate the up and down votes from the second round of prioritization into changes in expected value, the base design decision was that an up vote (or a down vote) from *every* member of the panel should be able to move a need the entire distance from bottom to top (or top to bottom) of the scoring scale. As a result, the full extent of the scale was divided by the number of individuals voting on the needs, producing a result of 7.86 expected-value points per net vote. That is, if a need with a normalized score of 100 received one net up vote (which

could happen if one member voted it up and all other members viewed it as tiered appropriately, two members voted it up and one voted it down, and so on), its expected value would change to 107.86.

We then compared these new expected values with the boundary values for the tiers to see if the change was enough to move any needs up or down in the prioritization. We set a higher bar for needs to move two tiers—from Tier 1 to Tier 3, or vice versa—than to move one rank, reflecting the much more substantial change in prioritization involved. If the score for a need broke through the top or bottom of its existing tier (e.g., a Tier 3 need’s normalized score increased above the top of the Tier 3 range), its rank was changed to the tier one rank up or down, *even if the new score did not fully enter the range for that higher or lower tier*. (Keep in mind, some expected-value scores do not fall into the boundaries of any tier, as seen in Figure D.5.) However, to increase or decrease by two tiers (only possible in Tiers 1 and 3), the normalized score had to increase or decrease by an amount that fully placed the need into the range two tiers away. As a result of the voting in the second round, 87 needs did not change their tier position, 12 needs fell one tier, and 32 needs rose one tier. No needs changed by two tiers. These were the final rankings used for the panel results.

Identifying Additional, Component-Based Rankings

As described in Chapter Four, we also generated two more lists of needs based on the individual scores rather than the expected values. These lists included *high-value* needs, which scored highly for the value component of our calculations (i.e., the median value score for a need—or a component of a combined need—was 9 in the group where it was rated), and *low-hanging fruit* needs, which scored highly for both probability of success measures (i.e., the median rankings for likelihood of technical success and broad use were 7 and 9, 9 and 7, 8 and 8, 8 and 9, 9 and 8, or 9 and 9 in the group where the need was rated). Combined needs were included in this list if any of their component needs met either of the criteria. Because these rankings used the component scores for the initial rankings, inclusion on these lists was not affected by the results of the second-round voting that adjusted overall prioritization based on expected value. See Tables 4.3 and 4.4 for the complete lists.

Full List of Court Needs

This appendix presents the full list of problems and associated combined needs identified by the Courts Advisory Panel, their ranking tier (1, 2, or 3), and whether they were identified as high value (if not high expected value) or low-hanging fruit. Needs in each taxonomy category are presented in Tables E.1 through E.3. (No needs identified by the panel fell into the person-worn equipment and weapons/force category.) Where our literature review identified published materials or ongoing efforts relevant to the identified needs and not already discussed in Chapter Four (i.e., for high-priority, high-value, or potential low-hanging fruit needs), we include those resources in notes to the tables.

Table E.1
Information and Communications Needs for the Court Sector

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
Information analysis					
Computational tools	More-complicated cases, more materials, and more third-party information as a result of technology, which is so integrated into the lives of defendants, victims, and police, creating challenges for both prosecutors and defenders	Examine technologies to help organize and analyze large volumes of more-complicated information. Though some commercial tools are available, courts need a better understanding of how new technology could help manage the effects of digital data on caseload and workload. ^a	1	◆	
	More-complicated cases, more materials, and more third-party information as a result of technology, which is so integrated into the lives of defendants, victims, and police, creating challenges for both prosecutors and defenders	Develop tools to help calculate workloads associated with discovery and analysis of larger bodies of information, to support arguments for changes to schedules, resources, or processes (e.g., open-file discovery models).	2	◆	
	Vast amount of personally identifiable information collected by new technologies (e.g., cameras), which could lead to changes in confidentiality and public access laws and, thus, the requirements for protecting that information	Develop standards and better technological tools for redacting personally identifiable information in court records. ^{a, b}	2		
	Issues with appointment of counsel, timeliness of counsel starting, availability of counsel for misdemeanor cases, and so on, meaning that individuals may not get a lawyer until months after initial arrest and after many court events (e.g., first appearance, bail setting)	Explore technology that could help more efficiently and quickly assign counsel, identify any conflicts for individual cases, and connect counsel to client. ^{a, c}	2		
	Focus within the court system on trials, which is inconsistent with the fact that the vast majority of cases are resolved through negotiation	Develop better tools to sort cases and match them with the process most likely to get them to an outcome efficiently and effectively (e.g., negotiation, trial, diversion, specialty court), including collecting data to inform the assessment by all parties (judge, counsel, citizens) involved. ^a	1		

^a This need was associated with more than one taxonomy category or subcategory, so it is listed more than once in this appendix.

^b Redaction of records and the privacy implications of public access to court records have been a concern for some time (see, for example, NCSC, undated e). However, the implications of new data streams being integrated into court files (e.g., broader use of police video cameras) may broaden the range of complications with public access and record release.

^c See discussion in NIJ, 2015a.

Table E.1—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Lack of understanding of the system effects of different policy decisions, ranging from increases in criminal justice capacity to pushes for efficiencies in the system	Develop analysis tools or entities responsible for assessing the implications of a wide variety of changes that can cascade through the criminal justice system—for example, changes to staffing (e.g., 100 more police officers) and changes to data exchange systems, which could help inform cross-agency decisions to upgrade (criminal justice coordinating councils are a potential model).	2	◆	
Individual analytical methods	Concerns about the suitability of the risk and needs assessments that help determine sentencing and release from the corrections system	Perform additional validation of risk assessment tools to assess their effect on equitable application of justice, including examination of different types of data available to feed the tools. ^d	2		
	Concern about blanket security policies requiring individuals to be shackled during court appearances	By using risk assessment tools to make individualized security decisions, limit the use of shackling to individuals for whom it is absolutely necessary. ^e	2		
Information collection					
Community interaction tools	Opportunity to more effectively communicate with jurors, staff, and victims by using available commercial systems, including open source tools, electronic modes of communication, and social media	Develop guidelines and disclosure requirements to educate court and public users about the value of these tools, as well as their caveats, and mesh them with the requirements of court procedures (e.g., electronic service of process). ^a	1		◆
	Heavy demands on court infrastructure as a result of the common requirement to appear in person	Evaluate the transactions and interactions that could be done from a distance over the Internet and could thus minimize people having to come to or move around court buildings to conduct business. Greater transaction automation could benefit both the court system and citizens in time and money saved.	1		
	Supporting pro se litigants	Develop systems that provide access to forms for self-represented litigants in a way that is easy for them to learn how to use and that can lead them through the process of providing necessary information for legal filings (e.g., an interface similar to Turbo Tax, a technological “interviewer” interface). ^{a, f}	2		

^d There is a relatively large literature on the design and validation of risk assessment tools. In addition, researchers have performed some meta-analysis across tools (e.g., Schwalbe, 2007; Singh, Grann, and Fazel, 2011; Hanson and Morton-Bourgon, 2009).

^e There are current discussions and changes in policy in this area, particularly with respect to shackling youth defendants (Khadaroo, 2015). See discussion of the broader issue in Schwartzapfel, 2015.

^f For a variety of examples, see Johnson, 2009; Clarke, 2015; and Cabral et al., 2012.

Table E.1—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
Internal data collection: Organizational performance-monitoring tools	Continuing problems with bias in criminal justice outcomes for the poor and people of color, with technology potentially increasing those problems by excluding individuals who lack access or means	Collect data through electronic court information systems for better metrics and measures so that courts can hold themselves accountable for their performance and how that performance affects different segments of the population.	1		
Internal data collection: Primary record-keeping methods and tools	Push to adopt new technology, potentially even when risk is too great or value is not sufficient	Continue human involvement in court recording (whether or not a traditional court recorder) to ensure that proceedings are captured appropriately. ^g	2		
Laboratory tools and techniques for evidence analysis (forensics technologies)	Backlogs in forensic laboratories and the slow processing of evidence delaying justice	Find funding streams and investments to reduce backlogs and speed the processing and transmission of results. ^h	2		
Information delivery (including communications)					
External communications: Public alert and notification	Shortfalls in the ability to notify individuals in the court building during emergencies	Adopt commercial alerting tools, which are available but not widely used.	1		
	Inefficient and often ineffective paper-based processes for such tasks as victim notification and jury summons	Implement electronic communication and notification tools (commercial products already exist) to improve efficiency and effectiveness, and train prosecutors and others to use these capabilities while meeting legal requirements. ⁱ	1		
	Opportunity to more effectively communicate with jurors, staff, and victims by using available commercial systems, including open source tools, electronic modes of communication, and social media	Develop guidelines and disclosure requirements to educate court and public users about the value of these tools, as well as their caveats, and mesh them with the requirements of court procedures (e.g., electronic service of process). ^a	1		◆

^g On this issue, there is clearly disagreement among entities within the court system (potentially explaining its position in the middle tier of identified needs). Some systems now use technology to provide recording, while others have not made the change from traditional court reporting. For example, several pieces in the *New York Times* argued different sides of this issue (“Room for Debate: Are Court Stenographers Necessary?” 2014).

^h Federal funding is available for addressing backlogs for processing DNA (deoxyribonucleic acid) evidence (NIJ, 2015b). The broader issue of case backlogs was explored in the National Research Council’s review of forensic science in the United States (Committee on Identifying the Needs of the Forensic Sciences Community, National Research Council, 2009).

ⁱ For a discussion of varied efforts related to jury improvement, see, for example, Center for Jury Studies, undated.

Table E.1—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Disruption of court schedules as a result of members of the public, pro se litigants, and others not appearing for pretrial or court dates or consuming court staff time with scheduling and other inquiries	Use automated reminders (phone call or text message) to increase show rates. ^j	2		
	Disruption of court schedules as a result of members of the public, pro se litigants, and others not appearing for pretrial or court dates or consuming court staff time with scheduling and other inquiries	For counties where pretrial elements are not included in the court case management system, manage reminders and contact through a pretrial program.	2		
	Problems with data accuracy in electronic jury management systems, driven by the data sets that feed them, making it difficult to find people who have moved	Explore better ways to identify individuals who have moved and improve feeder data sets to get better—and more representative—candidate lists for juries. ^k	3		
External communications: Public information functions	Lack of knowledge among the public about the court system	Increase public education to ensure an understanding of the roles and purview of different parts of the system (e.g., integrate lessons into the civics curriculum). ^l	2		
	Disruption of court schedules as a result of members of the public, pro se litigants, and others not appearing for pretrial or court dates or consuming court staff time with scheduling and other inquiries	Employ technological strategies to reduce staff time devoted to answering inquiries; for example, provide more open access to court schedule information through case management systems or implement a centralized call center for individuals to make their inquiries.	2		
	Lack of a method to easily provide the public with process data, information from dockets, and other court data	Develop tools to make it easier for court systems to produce and maintain a more effective web presence for providing court data to the public. ^m	2		

^j Some literature suggests that live callers are more effective than automated reminders (Schnacke, Jones, and Wilderman, 2012, and references therein) but have different cost implications for the court system. The Legal Design Lab has a collection of studies and examples from the United States and abroad of messaging approaches for improving appearance rates (Legal Design Lab, 2015).

^k The need for up-to-date source lists is widely recognized; is included in relevant standards, such as those published by ABA (2005); and has been examined in surveys of courts that explore jury procedures (e.g., Mize, Hannaford-Agor, and Waters, 2007). Randall, Woods, and Martin (2008) examined the effects of the quality of source lists on representativeness of jury pools in one county.

^l Initiatives aimed at this goal are being carried out by a variety of entities, including, for example, the Administrative Office of the U.S. Courts (undated), individual jurisdictions (Killilea, 2011), and associations (ABA, 2016).

^m For example, the Administrative Office of the U.S. Courts has produced a toolbox of resources to help courts build public-facing websites (Administrative Office of the U.S. Courts, undated).

Table E.1—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
External communications: Public information provision and training for criminal justice system roles	Balancing security and privacy with public access	Develop guidelines for courts, litigants, and others on what personally identifiable information should and should not be included in court records—with the goal of minimizing collection of unnecessary data. ^{a, n}	2		
	Supporting pro se litigants	Develop systems that provide access to forms for self-represented litigants in a way that is easy for them to learn how to use and that can lead them through the process of providing necessary information for legal filings (e.g., an interface similar to Turbo Tax, a technological “interviewer” interface). ^a	2		
	Supporting pro se litigants	Use electronic tools (such as video and PowerPoint) to present information to both sides in a dispute (e.g., divorce, family, juvenile) that educates them on the process but does not cross the line into providing legal advice.	2		◆
	Supporting pro se litigants	Use technology to enable legal assistance at a distance. Courts are not allowed to provide legal advice, but the bar could adopt modes similar to what doctors are doing now by allowing lawyers to offer tele-advice (i.e., use telecommunications and information technologies to help provide access to needed information remotely). ^{a, o}	2		
	Supporting pro se litigants	Develop models that allow nonlawyers to provide assistance to pro se litigants who cannot afford lawyers or procedures that allow victim advocates to take a more central role in the trial process. ^{a, p}	3		
External communications	Required speed of court processes to meet the needs of litigants—particularly self-represented ones (e.g., getting a copy of an order to litigants before they leave the building)	Explore whether features of technology systems provide opportunities to better meet the timeliness goals of the justice system (versus just focusing on existing technology and what it can do).	1		◆

ⁿ For example, Rule 5.2 of the Federal Rules of Civil Procedure includes such guidelines (U.S. Supreme Court, 2016).

^o Yu (2007) describes a legal commons model for this sort of assistance, where technology provides access to the broader community of legal professionals willing to provide legal aid. Cabral and colleagues (2012) provide a comprehensive discussion of business models and options for technological enhancement of access to justice, including using mobile technologies in doing so.

^p For discussion of different models, see Zorza and Udell, 2014.

Table E.1—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
Fixed location communications: Video	Maintaining continuity of operations during natural or other events	Allow court appearances by video during extreme weather, balancing concerns about the potential effect of the technology on defendants' rights with their right to a speedy hearing or trial.	2		
	Due process concerns about remote appearances in judicial proceedings	Research which types of court interactions and hearings are not adversely affected by technology-mediated communication. Develop a consensus to address inconsistencies in different areas and to help resist institutional pressures to use technology when face-to-face contact is more appropriate or necessary.	1		
	Limited resources for prosecutors and public defenders (e.g., not enough attorneys, too high caseloads)	Encourage greater use of teleconferencing and other tools to save time, but evaluate the results of these efforts (e.g., determine whether the same work be done by video that can be done face to face).	1		
	Challenges associated with victim testimony—particularly child victims—in court, which can be a particular concern in pro se cases where the accused self-represents	Explore technological options to mediate interaction and cross-examination to maintain process while protecting victims. ^q	2		
	Backlogs in forensic laboratories and the slow processing of evidence delaying justice	Pursue statutory authority or court procedural rule authority for specialists to appear via video presence to increase efficiency of staff usage. ^a	1		
	Increasingly multilingual populations, which present challenges for translation	Develop new approaches to provide translation and other services for non-English speakers to assist them in navigating the justice process. ^r	2		
Information presentation tools and dashboards	Resistance by judges and lawyers to accept new electronic technology, particularly when “electronic paper” is not superior to physical paper for moving through files rapidly (e.g., clerks tabbing files, documents readily able to flip through and find information)	Build electronic systems to deliver information in a quick, accessible way to the end users (judges, prosecution, and defense attorneys) in a way that matches their workflow and requirements. Some past attempts at developing such systems have failed to take into account the needs of all users, but efforts are under way to move products in this direction.	2		
	Poor access to complete information to inform bail decisions	Develop tools that help judges effectively use available information—while limiting the potential for information overload—to inform bail decisions, helping maintain consistency across courts. ^a	1		

^q See discussion of this issue in Cowan, 2013.

^r A variety of translation options are available. Maintaining available staff to perform in-person translation is costly, and real-time telephonic translation has both strengths and weaknesses. But real-time technological translation is improving over time, potentially making these options more available in the future.

Table E.1—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Poor access to information to file and rule on pleas	Develop tools to aggregate information about not just the case but the defendants in criminal cases (and contextual information that might determine eligibility for diversion or alternative programs), and get that information into the hands of the prosecutor, defense, and judge, which could help move cases to resolution more quickly. ^a	2		
Information management (including sharing)					
	Data translation issues that can lead to data misinterpretation, as a result of court staff collecting data for their internal needs and not in a way that is readily usable by others	Create training or information tools to make the data translation and export process easier and less burdensome for clerks to share data with others. Organizational models such as central access points (e.g., research units) can also be a solution. ^{a, s}	2		
IT systems for managing mission-related data	Reliance on technological systems for court functioning, which can create new concerns for continuity of operations when systems become overwhelmed or fail	Design systems with backup capabilities and prioritize technology support to focus on restoring critical systems when they go down. Develop, exercise, and implement response plans to address technology failure. ^{a, t}	1	◆	◆
	Maintaining continuity of operations during natural or other events	Ensure that electronic and other court data have robust backups and that courts have sufficient control over the data storage to permit this. ^u	1	◆	◆
	Increased volume of digital data as a result of new trends in criminal justice technologies (e.g., body cameras)	Monitor how the volume of digital evidence is evolving on the criminal side and whether it becomes a challenge (e.g., to store or to analyze) to timely and effective court operations. ^v	2		
	More-complicated cases, more materials, and more third-party information as a result of technology, which is so integrated into the lives of defendants, victims, and police, creating challenges for both prosecutors and defenders	Examine technologies to help organize and analyze large volumes of more-complicated information. Though some commercial tools are available, courts need a better understanding of how new technology could help manage the effects of digital data on caseload and workload. ^a	1	◆	
	Space constraints (physical and virtual) for managing records and evidence	Develop best practices for retaining court files in the new electronic environment and support planning and procurement decisions that ensure adequate storage. ^{a, w}	2		

^s Criminal justice information-sharing standards and data models (e.g., NIEM) could contribute to addressing this need.

^t See, for example, similar discussion in Dixon, 2013.

^u See Dixon, 2013.

^v See Goodison, Davis, and Jackson, 2015.

^w For an example of such efforts for individual courts, see Judicial Council of California, 2016.

Table E.1—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Risk of harmful disclosure of court records as a result of data sharing, unclear or inconsistent classification of information, and data within a single case record having different confidentiality requirements	Harmonize processes or build features into information systems to ensure reliable information classification and reduce the probability of improper release. Solutions exist but need to be adapted to court requirements. ^x	2		
	Authenticating electronic documents, which is more complex than for signed paper records	Develop centralized standards for authenticating electronic documents. Examples of implementation are available, but no practice is universally adopted.	1		
	Concerns about data quality within the court system as a result of inconsistency in the way data are entered, limits in clerk knowledge, hiring of individuals without appropriate skills, and other factors	Build into record entry systems rules or expert tools that help ensure complete data entry and appropriate information structure so that data are available when needed for decisionmaking. ^y	2		
	Concerns about data quality within the court system as a result of inconsistency in the way data are entered, limits in clerk knowledge, hiring of individuals without appropriate skills, and other factors	Train clerks who are entering data to provide enough detail and granularity to facilitate judges' tasks and activities, including descriptive file names and semantic context information to aid in locating information later.	1		
	Technology systems that are not always designed to capture unstructured data created in the practical process of court operation (e.g., notes on the case file about defendant needs, requirements for delay, annotations on exhibits at trial)	Design systems that are capable of capturing unstructured but important case data that are not official filings, and reengineer court processes to make it possible to capture the information.	2		◆
	Shortcomings of electronic case management systems, leading to an inability to move away from paper files	Design systems that capture all necessary documents and filings, including artifacts created in paper outside the court system (e.g., sealed depositions).	2		
IT systems for managing organizational resources	Issues with appointment of counsel, timeliness of counsel starting, availability of counsel for misdemeanor cases, and so on, meaning that individuals may not get a lawyer until months after initial arrest and after many court events (e.g., first appearance, bail setting)	Explore technology that could help more efficiently and quickly assign counsel, identify any conflicts for individual cases, and connect counsel to client. ^a	2		

^x This issue is not unique to the court system; therefore, addressing it is appropriately viewed as a facet of the more general problem of managing sets of data that have different degrees of sensitivity to minimize the damages of improper or inadvertent disclosure.

^y Ingredients to enable such features are readily available (e.g., embedded validation rules within database entry systems, checks to ensure completeness of records) that, at a minimum, help build a comprehensive approach to reduce data-recording errors and omissions in court systems.

Table E.1—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
System integration and information-sharing	Major workload and practical problems in managing transitions between file systems (paper to electronic, between records management systems)	Develop best practice protocols for transitions, including standards for data conversion and the extent of conversion (e.g., how much paper should be digitized).	2		
	Unclear lines between what is and is not considered part of the official court file now that electronic systems can store intermediate work product (e.g., judicial notes)	Define requirements that some categories of judicial work product need to be confidential, even if they are stored in the same system with official public files. ^a	3		
	Balancing security and privacy with public access	In the absence of redaction, develop better ways to protect some sensitive data, through access controls, encryption, or other tools.	2	◆	◆
	Vulnerability of electronic court documents and decision records to cyber threats	Define strategies and minimum standards for protecting the “virtual filing cabinets” that hold the court’s formal records, including requirements for different document types, consensus on what documents can be accessed anonymously, and appropriate use of such tools as encryption. ^a	1	◆	
	Increasing threats to judges and court officials from some extremist groups	Collaborate with fusion centers to get available information on threats to help assess and respond to them.	2		
	Breakdowns in the discovery process (particularly in cases involving pro se litigants) disrupting court schedules and hurting efficiency	Use electronic systems to facilitate the sharing of discovery materials without the court having to directly manage the process. ^z	3		
	Poor access to complete information to inform bail decisions	Develop tools that help judges effectively use available information—while limiting the potential for information overload—to inform bail decisions, helping maintain consistency across courts. ^a	1		
	Poor access to information to file and rule on pleas	Develop tools to aggregate information about not just the case but the defendants in criminal cases (and contextual information that might determine eligibility for diversion or alternative programs), and get that information into the hands of the prosecutor, defense, and judge, which could help move cases to resolution more quickly. ^a	2		

^z For a discussion of these issues from the perspective of the defense in criminal proceedings, see Gelb, 2012.

Table E.1—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Concerns about data quality within the court system as a result of inconsistency in the way data are entered, limits in clerk knowledge, hiring of individuals without appropriate skills, and other factors	Develop data and process standards, and implement policies that incentivize and support their adoption and use, including joint organizations, legal and funding requirements, and statutory changes that limit the ability of individual courts to reject a data standard that does not conform to their processes.	1		
	Problems with data accuracy and currency in interagency data-sharing systems	Develop a consensus among all participants in interagency data-sharing efforts about appropriate standards for data entry to ensure that information in the systems is correct from the outset. ^a	2	◆	
	Focus within the court system on trials, which is inconsistent with the fact that the vast majority of cases are resolved through negotiation	Develop better tools to sort cases and match them with the process most likely to get them to an outcome efficiently and effectively (e.g., negotiation, trial, diversion, specialty court), including collecting data to inform the assessment by all parties (judge, counsel, citizens) involved. ^a	1		
	Data compatibility problems as a result of different data formats and types of digital data	Define consensus formats and standards for digital data to be admissible in court.	1		
	Data compatibility problems as a result of different decisions made by different entities in the system, meaning sharing cannot happen (e.g., decisions made by different court components affect the defense, interacting with multiple law enforcement organizations affects the prosecution)	Make broader use of standards for information-sharing to allow compatibility (criminal justice coordinating councils are a potential model to drive change).	2	◆	
	Data compatibility problems as a result of different decisions made by different entities in the system, meaning sharing cannot happen (e.g., decisions made by different court components affect the defense, interacting with multiple law enforcement organizations affects the prosecution)	Examine cloud or federally provided computing systems to enable data management and sharing. ^a	2		
	Significant effort expended to move records from trial to appellate courts	Take advantage of records becoming electronic and, rather than having to gather and ship records to a separate court, develop ways to merely grant access privileges and link to records electronically (models are evolving demonstrating this). ^a	3		

Table E.1—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Disparities in prosecutors' access to information, resulting in disparities in sentencing for defendants with the same offense and history (since prior offense history can affect sentencing)	Provide more-uniform access to court data across court systems to address sentencing disparities. ^{aa}	2		
	Poor access to complete information to inform bail decisions	Foster stronger information-sharing between courts both within states and among neighboring states (including addressing differences between unified and nonunified systems) to better inform bail decisions.	1		
	Problems validating adequate and complete discovery, particularly when third parties are involved (e.g., forensic laboratories)	Encourage electronic information-sharing between the state and litigants, which provides a better record of the actual sharing of discovery information (e.g., who accessed which files) versus assuming information has been shared appropriately. ^{bb}	2		
	Lack of clarity on the requirements for sharing digital evidence	Promote a common understanding of what it means to share digital evidence (e.g., footage from a security camera at a private site). Does it mean offering the opportunity to access evidence (similar to physical evidence in an evidence room), does it mean always providing a copy of the evidence, or something else?	2		
	Perceived regulatory, statutory, procedural, or other barriers that continue to require use of paper or that create a cultural unwillingness to share data, even when capabilities are in place to do so electronically	Develop consensus standards and, if needed, address statutory or other barriers that limit the willingness of agencies to share data. ^a	2		
	Requirements for specialty courts and models aimed at service provision (and other nontraditional court roles) to share information with external service providers and agencies	Assess the issues associated with sharing data between specialty courts and external service providers and agencies; determine best practices for data-sharing to facilitate not just the operation of specialty courts and service provision models but assessment of their effectiveness as well. ^{cc}	2		

^{aa} Addressing this need is related to broader efforts to improve criminal justice information-sharing (e.g., NIEM and related standards).

^{bb} Gelb (2012) discusses related issues, including the challenges associated with the defense's access to electronic materials during discovery in criminal trials.

^{cc} Several efforts at the Center for Court Innovation have focused on this issue (e.g., Hack, 2003; Young, 2001). Petrla and Fader-Towe (2010) also provide a comprehensive review and set of practices related to addressing the Health Insurance Portability and Accountability Act and other privacy laws in such collaborations.

Table E.1—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Limited access to centralized information-sharing systems as a result of security policies, denying information to participants who could benefit (e.g., public defenders)	Develop a more-open access model that can still meet security requirements. ^a	2		
Information technology—basic systems					
Information security	Vulnerability of electronic court documents and decision records to cyber threats	Define strategies and minimum standards for protecting the “virtual filing cabinets” that hold the court’s formal records, including requirements for different document types, consensus on what documents can be accessed anonymously, and appropriate use of such tools as encryption. ^a	1	◆	
	Dependence on third parties and their security capabilities (e.g., county server provider, cloud provider, open source technology tool provider) to protect data	Develop standards for evaluating the security of cloud storage providers to both inform decisions and assuage concerns.	1		
Information security: User authentication and access management	Significant effort expended to move records from trial to appellate courts	Take advantage of records becoming electronic and, rather than having to gather and ship records to a separate court, develop ways to merely grant access privileges and link to records electronically (models are evolving demonstrating this). ^a	3		
	Limited access to centralized information-sharing systems as a result of security policies, denying information to participants who could benefit (e.g., public defenders)	Develop a more-open access model that can still meet security requirements. ^a	2		
Infrastructure: Information technology hardware, networks/capacity, connectivity	Space constraints (physical and virtual) for managing records and evidence	Develop best practices for retaining court files in the new electronic environment and support planning and procurement decisions that ensure adequate storage. ^a	1		
	Current infrastructure that does not meet the technology expectations of new generations of court participants (judges, lawyers, and others)	Develop standard lists of basic technology that today’s courtrooms should be equipped to handle, reflecting the different needs of different types of courtrooms. ^a	1		
	Minimal or nonexistent wireless Internet and bandwidth in many court buildings	Make the investments needed to allow connectivity, and explore new technologies that make it easier to install wireless Internet in older court buildings.	1	◆	◆

Table E.1—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Increased demand for wireless Internet and other technology as a result of court employees using commercial services	Implement policies to block or limit access to specific sites (such as social media) on public resources. ^{dd}	3		
	Lack of display technologies for digital evidence in some courtrooms (e.g., not all have monitors)	Provide local mobile capabilities to backfill the shortfall (e.g., bring in a monitor and connect it to a laptop) or otherwise address the display requirements.	2		
	Technology asymmetries between sides of a dispute ^{ee}	Fund common technology infrastructure to allow enough access to both parties in a dispute. ^a	3		
	Data compatibility problems as a result of different decisions made by different entities in the system, meaning sharing cannot happen (e.g., decisions made by different court components affect the defense, interacting with multiple law enforcement organizations affects the prosecution)	Examine cloud or federally provided computing systems to enable data management and sharing. ^a	2		

^{dd} Such technologies are available from Internet and cybersecurity providers.

^{ee} Lederer (2004c) discusses this problem in the context of terrorism cases, where the prominence of the case may mean that resources for the prosecution are unlimited in any real sense.

Table E.2
Doctrine, Tactics, Management, and Behavioral Knowledge Development and Training Needs for the Court Sector

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Trouble engaging existing staff in innovation and change efforts, limiting the ability to implement new initiatives	Develop training tools or structures (e.g., a “court change academy”) to educate judges and court staff to manage organizational change, including its link to court goals and objectives—accepting that not all staff will be open to retraining and change.	2	◆	
Management/leadership knowledge development and training					
	Threats to jury integrity and witness willingness to testify from social media and mobile devices, which enable disclosure of information and cyber harassment	Assess the prevalence and types of information leaks and cyber harassment of justice system participants, and implement strategies and policies to address these issues (potentially including, for example, prohibiting mobile devices in court, increasing public education, and changing law or policy on jury anonymity and tampering). ^a	2		
Acquisition and technology decisionmaking	Courts’ tendency to be reactive to technology changes rather than plan ahead	Explore mechanisms to enable greater foresight into technology trends so court systems can be more proactive and less reactive. ^a	2		
	Limited resources for prosecutors and public defenders (e.g., not enough attorneys, too high caseloads), making it difficult or impossible to pursue new technologies or even do core functions like investigation	Address resource constraints because, while electronic tools can help, there are limits to the level of efficiency that technology can provide (e.g., counsel must truly understand the client file and physically get together to negotiate). Supporting assessments to quantify the limits of technology in achieving court goals would contribute to decisionmaking. ^a	2	◆	
	Push to adopt new technology, potentially even when risk is too great or value is not sufficient	Determine in which contexts the risk of technology failures may outweigh the value it can provide (e.g., in appeals proceedings, where time is limited, the perceived cost of technology failure delaying proceedings is high).	3		
	Bad experiences with some technology that lead judges to conclude that the risks of introducing it into the courtroom are too great	Create customized training resources—and materials that “market” technology and its value—that can translate the technological perspective into terms relevant to decisionmakers in the court system. ^a	2		
	Uncertainty about which technologies provide a positive return on investment	On a long enough timeline to capture later life-cycle costs, such as required upgrades and compatibility issues, assess which technologies produce cost savings, particularly when considering actual extent of use. ^b	2		

^a This need was associated with more than one taxonomy category or subcategory, so it is listed more than once in this appendix.

^b Research efforts to evaluate specific technologies, if designed on a long enough timeline, could meet this need.

Table E.2—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Vendor systems that do not meet needs	Develop open systems in-house, in an effort to better address requirements, and create incentives for other stakeholders to join in the development effort.	3		
	Vendor systems that try to simultaneously meet the needs of multiple stakeholders within the courts (e.g., judges, counsel, administrators), resulting in products that do not work well, driven in part by the court system's unwillingness to change its business processes	Develop better partnerships with vendors to match software design with the court's requirements—potentially adapting both to better meet the range of court system needs. Dysfunctions in the software market have produced turnover in that sector because vendors have not been able to survive (e.g., vendors do better in portions of the market where software can be more standardized).	2		
	Unequal accrual of the benefits of transitioning to electronic documents and systems (e.g., electronic warrants help many players but may increase work for judges)	Design technology to ensure that systems are not optimized for one group of stakeholders at the expense of others.	2		
	Vendor systems that try to simultaneously meet the needs of multiple stakeholders (e.g., judges, counsel, administrators), resulting in products that do not work well, driven in part by the court system's unwillingness to change its business processes	Involve external facilitators to help navigate the political difficulties and management challenges of framing technological system specifications, given the number of stakeholders for court systems.	2		
	Vendor systems that try to simultaneously meet the needs of multiple stakeholders (e.g., judges, counsel, administrators), resulting in products that do not work well, driven in part by the court system's unwillingness to change its business processes	Develop resources that teach courts to become better consumers of technology, including documentation and educational materials on the real costs of customization and tools to better articulate the business processes and goals so that technologies can be matched to them.	2		
	Vendor systems that try to simultaneously meet the needs of multiple stakeholders (e.g., judges, counsel, administrators), resulting in products that do not work well, driven in part by the court system's unwillingness to change its business processes	Create tools to help develop or modify business processes that can be adopted across stakeholders (or match business processes to existing software capabilities), making it possible for technologies to function effectively (examples of consensus development and ranking processes are available). ^a	2		
	Vendor systems that try to simultaneously meet the needs of multiple stakeholders (e.g., judges, counsel, administrators), resulting in products that do not work well, driven in part by the court system's unwillingness to change its business processes	Create governance structures that limit the level of autonomy that elected judges can have; that is, dissuade individual demands for customization because of the threat that customization poses to data quality and system viability.	1		

Table E.2—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Court culture and precedent that impede reengineering to improve performance	Adopt business process reengineering in a formalized way, including tools for process documentation and reengineering, and match processes to the goals they are trying to achieve. ^a	1		
	Tendency of court systems to fund the acquisition of technology without fully addressing operations and maintenance costs	Modify planning and funding processes to ensure that operations and maintenance costs are captured in acquisition decisions and included in out-year budgets.	2	◆	
	Lack of shared information on initiatives being done elsewhere that may have already solved problems	Develop a tool to search for best practices on specific topics, issues, vendors, systems, and so on across different groups, states, and court systems to allow systems to learn from each other efficiently. ^c	2		
	Integration of different elements of technology as an opportunity for cost savings (e.g., install a high-end audio system that can be a hub for many other technologies versus installing everything separately)	Explore and document the potential cost savings from integrating technologies.	3		
	Versioning of technologies (e.g., operating system upgrades), which poses a challenge for keeping staff up to date and managing the information technology staff required to implement updates	Develop better models to keep up rather than catch up with technology upgrades (e.g., do not hold off for five years and then upgrade)—although the new leasing model for software may create different dynamics for keeping software current.	2		
	Lack of court staff with project management or acquisition experience, creating problems in project execution and making courts a difficult customer for providers	Provide leadership training for individuals transitioning into management positions (e.g., from judges to administrators); recruit staff with appropriate experience.	3		
Acquisition and technology decisionmaking: Technology use and application	Shortfalls in users' knowledge of technology, leading to improper or ineffective use	Develop clear, consumable instructions to ensure that those using the technology (lawyers, court officers, etc.) understand how to use it, reducing the probability of errors. ^a	2		
	Insufficient delivery of information to judges on technology, what it can do, and its link to court operations and functions	Develop new strategies and methods to efficiently deliver information to judges on new technologies. ^a	2		

^c Organizational efforts to share best practices across the court system do exist—including those carried out by NCSC, the Center for Legal and Court Technology, and the Center for Court Innovation—but the panel's identification of this need suggests that broadening or augmenting existing efforts could be useful.

Table E.2—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
Doctrine and strategy for carrying out agency missions	Maintaining continuity of operations during natural or other events	Explore cases in which states or adjacent counties collaborate to back up each other's operations (examples exist that could serve as models).	1		
	Maintaining continuity of operations during natural or other events	Develop more exercises and drills to determine likelihood of success, such as using red teams, performing testing, and actually operating from backup sites periodically to validate their effectiveness. ^{a, d}	1		
	Unclear lines between what is and is not considered part of the official court file now that electronic systems can store intermediate work product (e.g., judicial notes)	Define requirements that some categories of judicial work product need to be confidential, even if they are stored in the same system with official public files. ^a	3		
	Disincentive for individuals to enter the courts, because of public disclosure requirements, bulk sales of court records, and challenges for expungement	Explore business models that create disincentives for large-scale data collection (e.g., per-page charges), and consider legislative or contractual changes to limit the disclosure and sale of data and to address requirements for expungement under relevant circumstances. ^e	2		
	Difficulties managing the trade-off between public access and maintaining sufficient court security	Define standards and performance measures for effective security for different types of courts and locations within a court to minimize intrusiveness for court participants, staff, and the public. ^a	1	◆	
	Supporting pro se litigants	Use technology to enable legal assistance at a distance. Courts are not allowed to provide legal advice, but the bar could adopt modes similar to what doctors are doing now by allowing lawyers to offer tele-advice (i.e., use telecommunications and information technologies to help provide access to needed information remotely). ^a	2		
	Supporting pro se litigants	Develop models that allow nonlawyers to provide assistance to pro se litigants who cannot afford lawyers or procedures that allow victim advocates to take a more central role in the trial process. ^a	3		

^d See, for example, similar discussion in Dixon, 2013.

^e NCSC maintains a compendium of state rules on bulk data sale (NCSC, undated e). In 2005, SEARCH, the National Consortium for Justice Information and Statistics, produced a report that comprehensively examines issues around the bulk sale of criminal justice data, including court data (SEARCH Group, 2005).

Table E.2—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Effects of technology implementation and fee structures on economically disadvantaged populations	Create mechanisms to address defendants who are unable to pay the fees associated with some technologies—for example, fee-based access to electronic records, as well as some community corrections technologies, such as continuous alcohol monitors and Global Positioning System monitors. ^a	2		
	A potential major shift in court activities as a result of a possible transition to driverless automobiles (e.g., entire courts that are no longer needed, reductions in a large stream of fee revenue that the system depends on)	Begin planning for how these shifts in technology will affect the criminal justice sector, in terms of revenue, costs, and activities (e.g., law enforcement can focus effort on different needs). ^f	3		
	Courts' tendency to be reactive to technology changes rather than plan ahead	Explore mechanisms to enable greater foresight into technology trends so court systems can be more proactive and less reactive. ^a	2		
	Perceived regulatory, statutory, procedural, or other barriers that continue to require use of paper or that create a cultural unwillingness to share data, even when capabilities are in place to do so electronically	Develop consensus standards and, if needed, address statutory or other barriers that limit the willingness of agencies to share data. ^a	2		
	Variety of political and managerial expertise among judges	Develop tools to train judges on relevant aspects of the political process and how to advocate for their needs within the organization.	3		
	Focus within the court system on trials, which is inconsistent with the fact that the vast majority of cases are resolved through negotiation	Because only a small percentage of cases go to trial, train judges to be "settlement officers," ensuring that the system is equipped to handle the majority of cases efficiently.	2		
	Issues with appointment of counsel, timeliness of counsel starting, availability of counsel for misdemeanor cases, and so on, meaning that individuals may not get a lawyer until months after initial arrest and after many court events (e.g., first appearance, bail setting)	Develop resources to better inform judges' decisions when appointing counsel (and to inform the public about these decisions), including an assessment of the costs and benefits of appointing counsel early versus late.	2		
	Court culture and precedent that impede reengineering to improve performance	Adopt business process reengineering in a formalized way, including tools for process documentation and reengineering, and match processes to the goals they are trying to achieve. ^a	1		

^f This concern is also explored in Hollywood, Woods, et al., 2015.

Table E.2—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Vendor systems that try to simultaneously meet the needs of multiple stakeholders (e.g., judges, counsel, administrators), resulting in products that do not work well, driven in part by the court system's unwillingness to change its business processes	Create tools to help develop or modify business processes that can be adopted across stakeholders (or match business processes to existing software capabilities), making it possible for technologies to function effectively (examples of consensus development and ranking processes are available). ^a	2		
Organizational and human resources policy and practices	Significant turnover among security officers as a result of low pay	Develop strategies to help maintain staff despite pay and other issues.	3		
	Focus within the court system on trials, which is inconsistent with the fact that the vast majority of cases are resolved through negotiation	Reassess which personnel (judges, magistrates, mediators, etc.) can most cost-effectively resolve cases suitably, quickly, and efficiently. Institutionalizing these processes would require law and statutory changes. (The appearance of private-sector mediation firms emphasizes this need and developing trend.) ^{a, g}	2		
	Limited resources for prosecutors and public defenders (e.g., not enough attorneys, too high caseloads), making it difficult or impossible to pursue new technologies or even do core functions like investigation	Address resource constraints because, while electronic tools can help, there are limits to the level of efficiency that technology can provide (e.g., counsel must truly understand the client file and physically get together to negotiate). Supporting assessments to quantify the limits of technology in achieving court goals would contribute to decisionmaking. ^a	2	◆	
	Wide variation among jurisdictions on the capability level of appointed counsel, appropriate levels of caseloads, etc.	Determine caseload standards to make it possible to perform assessments across jurisdictions. ^h	3		
	Shortfalls in the technology skills of court staff, limiting the ability to implement new initiatives	Update job requirements for court management staff to create a body of employees whose technology skills are sophisticated enough to support innovation.	2		
	Lack of court system employees who can effectively translate technology to the court context and train colleagues to use it effectively	Recruit individuals to court positions who have the skills to assist in technology adoption and training, and facilitate peer-to-peer knowledge transfer within organizations.	2		
	Technology at trial that requires local information technology support staff to address any problems	Make the business case for and recruit sufficient information technology staff to maintain responsive support for trials.	2		

^g See, for example, Clarke and Flango, 2011; Ver Steegh, 2012.

^h There are initiatives under way related to caseload standards for assigned counsel (see, for example, Lefstein, 2011).

Table E.2—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Strained relationships between information technology staff and court staff, impeding collaboration and hindering innovation	Invest in the time necessary to build relationships and trust between information technology staff and court staff.	2		
	Approach of having an information technology director rather than a chief information officer in court systems	Develop training and education to support reframing the role of chief technologists in court organizations; their responsibility should be to ensure that information technology systems contribute to the smooth and effective functioning of the court, rather than simply focusing on technologies separated from the context of their application. ⁱ	3		
	Challenges retaining information technology staff as the recession ends and other opportunities become available	Recruit for the technical workforce through the H-1B visa program as an alternative source of skilled workers.	3		
	Challenges retaining information technology staff as the recession ends and other opportunities become available	Recruit retired military veterans from local bases as a potential source of skilled staff who have ties to the area and a tendency to stay long term.	3		
	Challenges retaining information technology staff as the recession ends and other opportunities become available	Show potential hires that the public sector is more patient in investing in staff members, compared with the private-sector model of recruiting new staff when technology changes and letting go of staff from the previous technology generation.	3		
Officer/practitioner knowledge development and training					
Policies and knowledge for carrying out roles	Difficulties managing the trade-off between public access and maintaining sufficient court security	Define standards and performance measures for effective security for different types of courts and locations within a court to minimize intrusiveness for court participants, staff, and the public. ^a	1	◆	
	Large number of crimes now facilitated by technology, creating challenges for court offices both to maintain expertise in technology and to present the cases to juries	Increase training and build the capability and expertise to address changes in the crime environment. ^j	3		
Technology use and application	Problems with data accuracy and currency in interagency data-sharing systems	Develop a consensus among all participants in interagency data-sharing efforts about appropriate standards for data entry to ensure that information in the systems is correct from the outset. ^a	2	◆	

ⁱ Based on the way many court systems are advertising positions—that is, via explicit searches for chief information officers—it appears that a shift to this view may already be under way in some areas of the country.

^j Some sources of this training are available. For example, according to the U.S. Secret Service's National Computer Forensics Institute, "training courses are offered to state and local law enforcement, prosecutors and judges through funding from the federal government" (National Computer Forensics Institute, undated).

Table E.2—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Data translation issues that can lead to data misinterpretation, as a result of court staff collecting data for their internal needs and not in a way that is readily usable by others	Create training or information tools to make the data translation and export process easier and less burdensome for clerks to share data with others. Organizational models such as central access points (e.g., research units) can also be a solution. ^a	2		
	Shortfalls in users' knowledge of technology, leading to improper or ineffective use	Develop clear, consumable instructions to ensure that those using the technology (lawyers, court officers, etc.) understand how to use it, reducing the probability of errors. ^a	2		
	Bad experiences with some technology that lead judges to conclude that the risks of introducing it into the courtroom are too great	Create customized training resources—and materials that “market” technology and its value—that can translate the technological perspective into terms relevant to decisionmakers in the court system. ^a	2		
Societal/legal knowledge development and innovation					
	High costs of electronic discovery for businesses, which encourage settlement and reduce willingness to use the court system to resolve disputes	Develop a new consensus about what level of electronic discovery is appropriate or proportional, taking costs to litigants into account so that this does not become an increasingly serious barrier to access to justice in the civil arena. ^k	2		
	Vast amount of personally identifiable information collected by new technologies (e.g., cameras), which could lead to changes in confidentiality and public access laws and, thus, the requirements for protecting that information	Develop standards and better technological tools for redacting personally identifiable information in court records. ^a	2		
	Balancing security and privacy with public access	Develop guidelines for courts, litigants, and others on what personally identifiable information should and should not be included in court records—with the goal of minimizing collection of unnecessary data. ^a	2		
	Burden on participants in the justice process as a result of the common requirement to appear in person	Add flexibility to trial rules to allow video presence (or other innovations) for some parties (e.g., a party in a divorce appearing for a short hearing).	2		

^k Examples are available in the literature of cases in which the participants negotiated proportional discovery plans to address the costs of expansive discovery requests (e.g., Kozubek, 2011). Legal scholars have also taken on this issue from the perspective of understanding the reasonableness of searches and the ability of individuals in a case to defend that their efforts to provide full discovery were appropriate (e.g., Bennett, 2014). Other scholars have developed resources for judges to help address these issues (e.g., Rothstein, Hedges, and Wiggins, 2012).

Table E.2—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Pro se litigant demands for access to electronically available files and tools equal to that of other actors in the system	Develop a consensus about the appropriate level of access to e-filing tools for pro se litigants who may not have computer and Internet access at home (considering, for example, library closing times and other sites where access could be provided).	3		
	Technology asymmetries between sides of a dispute	Fund common technology infrastructure to allow enough access to both parties in a dispute. ^a	3		
	Effects of technology implementation and fee structures on economically disadvantaged populations	Create mechanisms to address defendants who are unable to pay the fees associated with some technologies—for example, fee-based access to electronic records, as well as some community corrections technologies, such as continuous alcohol monitors and Global Positioning System monitors. ^a	2		
	Backlogs in forensic laboratories and the slow processing of evidence delaying justice	Pursue statutory authority or court procedural rule authority for specialists to appear via video presence to increase efficiency of staff usage. ^a	1		
	Limited resources for prosecutors and public defenders (e.g., not enough attorneys, too high caseloads)	Develop innovative policies to move more conflict resolution and problem-solving outside the criminal justice system. ^l	2		
	Focus within the court system on trials, which is inconsistent with the fact that the vast majority of cases are resolved through negotiation	Reassess which personnel (judges, magistrates, mediators, etc.) can most cost-effectively resolve cases suitably, quickly, and efficiently. Institutionalizing these processes would require law and statutory changes. (The appearance of private-sector mediation firms emphasizes this need and developing trend.) ^a	2		
	Vendor systems that are optimized for the portions of the criminal justice system that have the greatest market power (e.g., a records management system developed with police in mind, but not prosecutors or defenders)	Develop incentives for developers to build systems that meet the needs of smaller, more-specific pieces of the criminal justice market.	3		
	Significant difficulty in building actual workflows into the technology, much less reengineering those workflows for process improvement	Adapt court approaches to procurement and implementation to reflect the reality that most technology development efforts require iteration to adapt technology to workflows and vice versa. Implementing such a multiple-cycle process is not compatible with usual public funding models that treat an acquisition as a one-time event.	3		

^l Such efforts would be consistent with movement toward alternative dispute resolution approaches for some disputes.

Table E.2—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Aging infrastructure and outdated facilities (e.g., physical and electrical infrastructure)	Develop funding mechanisms (e.g., part of court fees) both to support the infrastructure required to adopt new technologies and to address other infrastructure shortfalls. ^a	3		
	Large disparities in technological resources across court systems (in particular, some small offices have very little technological capacity) and among different agencies in the same jurisdiction (e.g., law enforcement versus court)	Continue investments to equalize technology capacity across the system, supported by criminal justice coordinating councils.	2	◆	
	External grant funding that focuses on single parts of the system (e.g., law enforcement), failing to address the full cycle of what happens to data down the line (e.g., lack of support for prosecutors who then use the data produced)	Rebalance the allocation of external funding support across the system to address the full life cycle and the downstream effects of earlier-stage investments.	2		
Specialist/technologist knowledge development and training					
Policies and knowledge for carrying out roles	Maintaining continuity of operations during natural or other events	Develop more exercises and drills to determine likelihood of success, such as using red teams, performing testing, and actually operating from backup sites periodically to validate their effectiveness. ^a	1		
Tactics and practices	Reliance on technological systems for court functioning, which can create new concerns for continuity of operations when systems become overwhelmed or fail	Design systems with backup capabilities and prioritize technology support to focus on restoring critical systems when they go down. Develop, exercise, and implement response plans to address technology failure. ^a	1	◆	◆
Technology use and application	Challenges keeping information technology staff up to speed on emerging technology	Use external contractors as a partial source of expertise; a mix of contractors can be a source of embedded training on new technology for permanent court staff.	2		
Technology-mediated training tools					
	Insufficient delivery of information to judges on technology, what it can do, and its link to court operations and functions	Develop new strategies and methods to efficiently deliver information to judges on new technologies. ^a	2		
	Shortfalls in training resources, limiting the ability to get value out of already adopted technologies	Develop better training tools, centralized resources, or other approaches to transfer knowledge to judges and other court staff on how to use available technologies.	2		

Table E.3
Facility Operations and Population Services Needs for the Court Sector

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
External/perimeter physical infrastructure					
	Missed court appearances resulting from efforts to maintain sufficient physical security in court facilities	Develop tools to allow people to check in while in the security line to ensure that they are not sanctioned for nonappearance.	3		
	Uninviting nature of court facilities for many portions of the population	Design court infrastructure to be more welcoming and engaging. ^{a, b}	3		
Internal environment control					
	Threats to jury integrity and witness willingness to testify from social media and mobile devices, which enable disclosure of information and cyber harassment	Assess the prevalence and types of information leaks and cyber harassment of justice system participants, and implement strategies and policies to address these issues (potentially including, for example, prohibiting mobile devices in court, increasing public education, and changing law or policy on jury anonymity and tampering). ^{a, c}	2		
	Juror misbehavior using mobile devices or social media (e.g., researching witnesses or the parties during trial)	Determine best practices to address this misbehavior, which could range from educational efforts to simple prohibition of mobile devices. ^d	2		
Internal physical infrastructure					
	Uninviting nature of court facilities for many portions of the population	Design court infrastructure to be more welcoming and engaging. ^a	3		
	Current infrastructure that does not meet the technology expectations of new generations of court participants (judges, lawyers, and others)	Develop standard lists of basic technology that today's courtrooms should be equipped to handle, reflecting the different needs of different types of courtrooms. ^a	1		
Architectural design and systems	Keeping defined groups separate within court facilities (e.g., jurors, witnesses, and the public; juveniles and adults)	Enable better ways to manage movement by designing separate entrances and paths of movement within the building, security, and deliberation spaces to be put in place during renovation or new building. ^e	3		

^a This need was associated with more than one taxonomy category or subcategory, so it is listed more than once in this appendix.

^b See, for example, discussion related to courthouse design from the Project for Public Spaces (Levy, Kent, and Nikitin, undated).

^c For a discussion, see Ittner, 2014.

^d For a discussion of juror use of these tools and potential responses, see Morrison, 2011, and Aaronson and Patterson, 2013. Because of the prominence of concerns regarding jurors' social media use, there has been substantial focus on these issues both inside the court system and among researchers.

^e NCSC provides a variety of resources on court architecture design best practices (NCSC, undated b).

Table E.3—Continued

Category and Subcategory	Problem or Opportunity	Associated Need	Tier	High Value	Low-Hanging Fruit
	Opportunity to provide a one-stop shop for various groups and organizations by designing court facilities to meet the needs of participants	Design a building with all relevant stakeholders in mind (e.g., colocation of multiple traffic-related functions so that all tasks can be done in one place).	3		
	Aging infrastructure and outdated facilities (e.g., physical and electrical infrastructure)	Develop funding mechanisms (e.g., part of court fees) both to support the infrastructure required to adopt new technologies and to address other infrastructure shortfalls. ^{a, f}	3		

^f Questions have been raised about criminal justice entities relying on fees as a revenue stream, particularly the disparate effects that doing so can have on different populations (see, for example, Shapiro, 2014).

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Society relies on the judicial system to play numerous roles. It is the link between law enforcement and the corrections system and serves as a check on their power over citizens. It also adjudicates civil disputes, serving as a venue for negotiation and resolution of various problems. In playing these roles, courts today are challenged by a wide range of issues, such as high caseloads, resource constraints, disparities in justice outcomes, and increasing needs to share information. For the courts to adapt to these challenges and take advantage of new opportunities to improve their ability to play their critical roles, the court system needs innovation. This report draws on published literature and new structured deliberations of a practitioner Courts Advisory Panel to frame an innovation agenda. It identifies and prioritizes potential improvements in technology, policy, and practice for the court system. Some of the top-tier needs identified by the panel and researchers include developing better tools to sort cases and match them with the process most likely to get them to an outcome efficiently and effectively, defining strategies and minimum standards for protecting the “virtual filing cabinets” that hold the court’s formal records, and expanding the court-related transactions and interactions that could be done from a distance over the Internet. Such high-priority needs provide a menu of innovation options for addressing key problems or capitalizing on emerging opportunities for the court system. 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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ISBN-10 0-8330-9535-8
ISBN-13 978-0-8330-9535-0

