Although the term “law enforcement technology” most readily evokes images of smart guns or DNA analysis, there are many “less glamorous” roles that can be played by technology that nonetheless can have a dramatic impact on the ability of law enforcement organizations to police their jurisdictions and ensure public safety. One of the main areas is the administration and management of departments and their deployment of their human and technical assets.

Some central findings of this chapter include:

- **Information Technology**—while most police officers now have access to computer technology in their workspaces, IT-related needs are still high priority for most departments. The existence of a “digital divide” between rural/small departments and large departments is troubling from the perspective of local law enforcement.

- **Training**—issues surrounding training, including both training on technology and technology to facilitate training, are clearly important. Departments reported significant shortfalls in training technology and raised questions about the quality of that which is available. More than half of local departments rated better technology to train their personnel as a high priority.

- **Technology Acquisition**—departments differ in their perceptions of the different risks associated with technology acquisition. In addition, perceived liability, technology reliability/effectiveness, and public opinion risks vary among different technologies. While state police organizations appear to ascribe a higher prior-
ity to information to aid technology acquisition, the great majority of all departments rate it as at least a medium priority.

- **Accountability**—while not as high a priority as some other concerns, technology to improve police accountability was listed as a high priority by a large fraction of departments. Not unexpectedly, this area is a higher priority for departments serving larger numbers of citizens.

**INFORMATION PROCESSING**

In a society constantly reminded of the potential of the Internet, it is almost unnecessary to point out the potential for information technologies to benefit the operations of an organization. In the case of law enforcement, where problems often involve the effective allocation of limited officers across an entire jurisdiction, complete, reliable, and timely information can be a “force multiplier,” enabling law enforcement agencies to focus their resources more effectively.

**Computer Hardware**

According to the results of recent law enforcement surveys, most police departments have access to computers. The 1997 Law Enforcement Management and Administrative Statistics (LEMAS) study found 82 percent of local police departments using workspace or centralized computers (Reaves and Goldberg, 2000, p. 24).

The RAND Law Enforcement Survey, conducted in 2000, found 96 percent of local police had computers in their workspaces. Fifty-four percent of respondents to the RAND survey characterized their

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1 The findings of the LEMAS study were published as three reports: Reaves and Goldberg, *Law Enforcement Management and Administrative Statistics, 1997: Data for Individual State and Local Agencies with 100 or More Officers*, cited herein as “Reaves and Goldberg, 1999”; Reaves and Goldberg, *Local Police Departments 1997*, cited herein as “Reaves and Goldberg, 2000”; and Goldberg and Reaves, *Sheriffs’ Departments 1997*, cited herein as “Goldberg and Reaves, 2000.”

2 For the LETS survey to local police, percentages have been statistically adjusted to represent the entire population. See Appendix A for a description of the adjustment methodology. For the LETS survey to state police and the FTS survey to crime labs, results are reported as unadjusted percentages.
workspace computers as “modern” or “state of the art,” while 34 percent described theirs as “old but serviceable,” and only 7 percent said theirs were “obsolete.” All state police surveyed by RAND had computers in workspaces. Eighty-seven percent characterized their computers as “modern” or “state of the art” (LETS, 22g).

When examining whether computer technology had been brought into police patrol cars, RAND found that about two-thirds of urban departments serving populations greater than 75,000 did have computers in police cruisers, while somewhat less than half of the smaller urban departments and only 5 percent of rural departments have computers in cars. This is a very large gap between rural and other departments. Fifty-three percent of state police indicated they have computers in patrol cars.

**Computerized Data and Networks**

**Computer Network and Remote Database Access**

Because of the increase in capability that comes from networking computers and gaining access to centralized databases of information, it is of interest what fraction of the law enforcement community has these resources available. Among local police departments, those serving larger populations are more likely to have access to computer networks and to regional or national databases (LETS, 22). All state police responding to the RAND survey reported having computer networks available to their departments and all indicated that their agency had computer access to other regional or national databases (LETS, 22, 20).

**Local Area Networks (LAN) and Wide Area Networks (WAN)**

To gain a deeper understanding of the kinds of network resources that are available, the RAND survey also asked if departments had access to local area networks (LANs) or wide area networks (WANs). Almost all state police and better than half of local police departments have local area networks. Eighty percent of state police use wide area networks; however, only 18 percent of local police agencies report utilizing WANs. It should be noted, however, that depending on the needs of a department, a WAN might not be necessary or helpful to a local police force.
Integrated Data Systems

Another computer-based technology that can augment law enforcement effectiveness is the ability to integrate the many streams of data involved in police work. The RAND Law Enforcement Survey found that 41 percent of local police have integrated, computerized, crime/traffic/arrest data systems. Among local police, we found no significant differences between municipal/city and county police/sheriffs’ departments in the percentage that had such systems. However, there were some significant differences across local police departments by size of population served. Between 30 and 40 percent of rural and urban departments serving populations less than 25,000 have integrated crime, traffic, and arrest data systems, as compared to 52–69 percent of the police departments in larger urban settings. Only 20 percent of state police reported having integrated crime/traffic/arrest data systems.

National Crime Information Center (NCIC)

The National Crime Information Center (NCIC) standards define an array of abilities a field officer should be able to perform electronically from a patrol car. A description of these functions and the databases to support them are included in the following text boxes. The RAND Law Enforcement Survey found 80 percent of state police and 62 percent of local police operate communications systems compliant with NCIC 2000 standards.

2000 Capabilities

When the NCIC 2000 system is complete and operational, a field officer in a patrol car will be able to:

- Enter a wanted person’s fingerprint, mug shot, and identifying images;
- Identify a wanted person using a fingerprint;
- Modify a fingerprint entered into the system with a new fingerprint;
- Link a wanted person’s fingerprint to one entered by another organization;
- Cancel a wanted person’s fingerprint; and
- Receive ownership of a linked fingerprint when the original owner canceled the entry (Imel and Hart, 2000, p. 81).

The NCIC workstation and the mobile imaging unit (MIU) are based on Intel’s Pentium technology. The FBI has published hardware and software requirements. The FBI will provide workstation applications software to the states at no cost (Imel and Hart, 2000, p. 82).
NCIC 2000 Databases

The FBI’s National Crime Information Center (NCIC) 2000 began operations July 11, 1999, replacing the older system, in use since 1967. The NCIC 2000 system can process more than 2.4 million transactions a day, with storage of and access to more than 39 million records. The system will provide to local, state, and federal law enforcement agencies information organized in the following 17 databases: Canadian police information center, criminal history queries, criminal justice agency identifier, deported felons, foreign fugitives, gang and terrorist members, missing persons, persons subject to protection orders, stolen articles, stolen boats, stolen guns, stolen license plates, stolen securities, stolen vehicles, U.S. Secret Service protective file, unidentified persons, and wanted persons (FBI Press Release, July 15, 1999).

Priorities of Computer-Related Needs

In an effort to gauge the relative priority of the many potential information technology needs of police departments, the RAND Law Enforcement Survey asked respondents to characterize their needs for computer hardware, software, and training, Internet/e-mail access, and networked computers as high, medium, low, or not a priority. The survey instrument did not define these terms.

In comparing local police ratings across the computer-related needs as shown in Figure 2, what is most noticeable is that more departments see Internet/e-mail access and networked computers as a low/not a priority than is the case for computer hardware, software, and training. Furthermore, relatively few departments see Internet/e-mail access as a high priority need. The reason may be that departments have Internet access and locally networked computers and, as a result, they see less future need for them; this is consistent with the relatively high proportion of departments that report having networks (see above). On the other hand, there continues to be demand for additional hardware, software, and training. It may also be the case that departments value hardware, software, and training more than e-mail and network capabilities. It is interesting to note that even though 54 percent of respondents indicated their computers were modern or state of the art and 34 percent indicated
they were old but serviceable (LETS, 22g), approximately 55 percent of the departments still indicate that computer hardware is a high priority. This finding emphasizes the importance of not just availability of computers but their quality as well.

In comparing each computer-related need by category of department by size of population served, what is most noticeable is that rural departments tend to assign higher priority to these needs than do urban departments. This observation is discussed more fully in the next section. Additionally, state police departments almost never assigned a need “low” or “no priority”; readers should not make too much of the state police responses, however, as the sample was small.
Closing the “Digital Divide”

In order to address the question of whether or not a digital divide exists between small and large law enforcement departments, the RAND Law Enforcement Survey asked about the availability of different digital technologies and the quality of those technologies. For this analysis, we grouped the different sizes of local police departments into two categories:\(^3\)

- Rural and small departments (included rural departments and urban departments serving populations less than 25,000)
- Large departments (included urban departments serving populations greater than 25,000)

Do departments serving larger populations have significantly better digital technology than rural departments or urban departments serving smaller populations? In general, the answer is yes—supporting the assertion that there is a digital divide between large and small local police departments. To illustrate:

- A higher percentage of rural and small departments than larger departments indicate lack of availability of computers or digital technology.
- A greater percentage of rural and small departments than larger departments have either obsolete or old-but-serviceable computers in the workspace.
- For all categories, larger departments tend to have more modern computer equipment and technology than rural or small departments.

Given that there appears to be an actual digital divide, is it simply because those without extensive computerization perceive little or no need for it?

No. The RAND Law Enforcement Survey found that urban departments serving a population more than 25,000 did not differ signifi-

\(^3\)These groupings were derived based on the results of regression analyses and t tests of statistical significance to determine whether the mean differences between strata were statistically significant or not. Differences were significant at p<0.01.
significantly from rural and small urban departments in their perceived need for computer or digital technology. Overall, about half of the large departments and half of the rural and small departments rated having networked computers within their agency as being a high priority. A quarter of large, rural, and small departments rated Internet/e-mail access as a high priority.

Broader Visions for Information Technology

Advances in information technology are important to local police forces for more reasons than just what they can do for the administration of the force. Taking a broader view of the issue, the IT revolution also requires changes in the way departments think about the "systems" within society with which they interact. These shifts in "systems thinking" are necessary so law enforcement can remain effective in light of the changes that IT is catalyzing in society and what those shifts mean for police missions and tasks. These changes in thinking require adjustment both above and below the level of the local department.

Above the level of the local police department, it is becoming increasingly clear that government agencies and governments as a whole need to take more holistic approaches to information technology. One noteworthy example of such is Kentucky's Unified Criminal Justice Information System (UCJIS),

... an information system that utilizes technology to capture electronically at the earliest opportunity data built on a set of unique identifiers (charge and individual). This data will appear as a seamless record of an individual's encounters with the criminal justice system. The mission of the UCJIS is to provide for the collection and availability of accurate up-to-date information relating to individuals charged with or convicted of a criminal offense in a timely and easily accessible manner to the criminal justice community while maintaining appropriate security and privacy standards.4

Other states with somewhat similar initiatives include Alaska, California, Colorado, Connecticut, Delaware, Florida, Georgia,

4See http://www.state.ky.us/agencies/ucjis/index.html.
Hawaii, Kansas, Maine, Massachusetts, Minnesota, Michigan, Nebraska, New Jersey, Pennsylvania, and Wisconsin.5

The Washington State Department of Corrections is developing an Offender Management Network Information (OMNI) system. When completed in 2005, the system is planned to include the following modules:

- Case File Audit,
- Case Management,
- CCO Workload/Assignment,
- Chemical Dependency,
- Chronos,
- Classification,
- Community Service,
- Cost of Supervision,
- Detainers & Warrants,
- Disciplinary & Violations/Sanctions,
- End of sentence review,
- Grievance,
- Indeterminate Sentence Review Board,
- Inmate Trust Accounting,
- Inmate Property Tracking,
- Interstate Compact/Border Administration,
- Legal Financial Obligations,
- Medical & Dental Records, Offender,
- Offender Groups,
- Offender Minimum Management Unit (OMMU),
- Pre-Sentence Investigation,

5For summary on the basic approach, agencies involved, organizational structure, and funding of these see http://www.bjis.state.wi.us and associated Web links.
The system is the state’s largest investment in information technology in recent years. Wisconsin and California are undertaking or considering similar efforts. Such expansive, interconnected systems are designed on the premise that beyond sharing information with all parts of what is traditionally considered the law enforcement or criminal justice systems, there are benefits to facilitating appropriate information flow between the criminal justice system and education, social services, transportation, and other agencies or organizations.

It should be noted that there are often serious technical issues to interconnecting and promoting information exchange and use among different systems. These technical issues represent an important area of R&D if these transitions are to be facilitated. One example of a set of technical issues being sorted through can be found in the area of electronic legal documents. The era of legally recognized electronic documents is just beginning, but it has potential to improve convenience and reduce costs in many areas, including law enforcement and the criminal justice system. LegalXML, a non-profit organization comprised of volunteer members from private industry, non-profit organizations, government, and academia, is developing open, non-proprietary technical standards for legal documents. There are many other efforts to use XML to facilitate sharing of information, much of which is supported by the federal community. Examples include a standard for electronic filing adopted by courts, a standard

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7XML stands for Extensible Markup Language. For current information on this, search the World Wide Web for “XML” or “LegalXML.”
for sharing of intelligence data, and a standard for sharing rap sheet information.

In addition to understanding the systems changes that must occur above the level of the local or state law enforcement department, information technology advance is catalyzing changes below the department level that are also important for police forces to consider. Since 1970, both computing power and communications capacity have been doubling every two years. The information revolution may continue at this rate for another decade or longer (Nichiporuk and Builder, 1995). The information revolution tends to weaken hierarchies—such as traditionally organized law enforcement agencies—through two processes:

- The shift from relative poverty to abundance in information permits individuals to bypass hierarchies that have—deliberately or inadvertently—controlled or limited information.
- Alternative human organizational forms—based mainly on the network—have proved more effective and efficient for transacting information than hierarchies. In information-intensive enterprises, hierarchical organizations may not be competitive with networks (Nichiporuk and Builder, 1995, p. 27).

This last point may become especially important to law enforcement if criminal enterprises adopt networked, rather than hierarchical, organization. Transnational criminal organizations are gaining strength partly because they are adept at building networks (Sterling, 1994). In this area, the change in society catalyzed by network-focused organization and activity could pose a serious threat to law enforcement in the near to mid term.

Although such network-focused organizations will pose a challenge to police forces, it is also possible that, by making changes in the way law enforcement operates, network arrangements can be adapted for the benefit of public safety. One example of this potential is found in Portland, Oregon. The Portland Police Bureau is strongly oriented toward community policing. As a result, ways in which networks and IT can facilitate and strengthen community policing is a high priority. Some examples of activities under consideration include:
To improve information collection: issue a notebook computer to all personnel, install communications software on notebook computers and establish a live communications link in cars, install voice transcription software for incident reporting by officers, and improve processes for citizen crime reporting.

To improve mutual information access: work to change any statutes that unnecessarily prohibit information sharing, work to overcome any organizational biases that inhibit sharing, and set up network mechanisms that allow all city agencies and schools to access portions of each other’s management information systems.

To disseminate information widely: post up-to-date, readily understandable crime data on the Portland Police Bureau website, and post information that shows what was done or learned after an incident was reported.

To improve internal and external communication: make sure every employee has an Internet e-mail address, issue portable telephones to officers, establish a channel through which citizens could check on the status of crimes they reported, look into the possibility of using technology to free officers from frequent and lengthy trips to court, and use video technology to supplement (but not replace) face-to-face meetings (Institute for Law and Justice, 1999, pp. 24–28).

Such applications of technology, by strengthening the community and organizational networks on which good and responsive police work depend, could represent a way that a network-focused approach could result in increases in the effectiveness of police.

**PLANNING**

**Tele- and Video-Conferencing**

Just as is the case for all organizations whose members are not concentrated in a single geographic area, if teleconferencing (conference calls) and videoconferencing can substitute for some face-to-face meetings, then time and money spent traveling to meetings can be reduced and those resources can then be applied more productively.

The RAND survey found that 60 percent of local departments have conference call equipment that is “serviceable” or better, but only 10
percent have video conferencing equipment “serviceable” or better. All state police respondents have conference call equipment that is at least “serviceable,” while one-third have modern or state-of-the-art videoconferencing equipment (the other two-thirds have none).

Likely due to their higher absolute demand for use of the technology, larger urban departments and state police are, in general, better equipped for conferencing.

RISK MANAGEMENT

In assessing the impact of risk perception on technology concerns of local law enforcement, it is relevant to examine the idea of risk along each of the three “axes” discussed earlier—liability/risk (traditional risk management), technological risk, and risk associated with public reactions.

Overall, the perceived risks associated with technologies from the perspective of liability varied greatly from technology to technology and differed for different-sized departments. The technologies for which risk/liability were most frequently identified as barriers to future adoption included handheld electrical devices (both direct and stand-off), flash grenades, tire deflation spikes, and rubber bullets. In examining how the perception of risk differed by the size of the population served, medium-sized departments (serving between 25,000 and 75,000 people) were most often the most concerned about individual technologies compared to either larger or smaller departments (LETS, 31,36).

Examining the perception of the operational risks associated with these technologies—based on departments’ identifying reliability/effectiveness of the technology as a barrier to future acquisition—other interesting patterns present themselves. For most technologies, approximately 7 percent of local departments indicated that questions about reliability or effectiveness were a barrier. Three technologies stood out as markedly above this average value—smart guns (14 percent), electrical disruption devices for automobiles (11 percent), and tire deflation spikes (10 percent). Furthermore, these three technologies also represented the cases where there was the greatest divergence in the perceived risk between differently sized populations of departments. For example, while 35 percent of the
largest urban departments indicated that this factor was a barrier to their acquisition of smart guns, only 10 percent of rural departments did so. In general, large departments were more concerned with technological risk than smaller departments (LETS, 31,36).

There was far more agreement on the public opinion linked risks associated with the technologies addressed on the RAND Police Survey. For most technologies, about 5 percent of local departments indicated that public opinion would be a barrier to future acquisition. The only two technologies that stood out markedly from this pattern were handheld electrical devices (both direct and stand-off) for which public opinion was cited by 11 and 13 percent of local departments respectively. There were few clear patterns in concern about public opinion based on size of jurisdiction though larger departments tended to consider it more of a factor than smaller ones. There was also little divergence in the percentages of different-sized departments that cited this factor for individual technologies. The one technology for which there was significant divergence was for stand-off electrical devices. Twenty percent of departments serving 25,000–75,000 people cited public opinion as a barrier to their acquisition while only 5 percent of departments serving 75,000–225,000 did so. The significance of this observation, if indeed it is significant, is unclear (LETS, 31,36).

TECHNOLOGY ACQUISITION

Because of the importance of information access in reducing the risks associated with adopting new technology, the perceived need for this type of information on the part of police organizations is of interest. The RAND survey asked respondents to rate their need for information to make better technology-related plans and decisions as high, medium, or low/no priority. Overall, 45 percent of local departments rated this as high priority, 48 percent as medium priority, and 7 percent as low/no priority. Among state police the percentages were 75, 17, and 8, respectively (LETS, 9a). Although this does indicate a much higher priority on the part of state police organizations on the availability of this information, it is noteworthy that only 7 percent of the local departments rated this as a low priority.

The survey also asked respondents to rate their need for standards by which equipment or other technology can be judged or certified.
Overall, 26 percent of local departments rated this as high priority, 59 percent as medium priority, and 16 percent as low/no priority. Among state police the percentages were 67, 25, and 8, respectively (LETS, 9); once again these results appear to indicate a closer focus on technology acquisition at the state police level. The only medium level of priority placed on technology standards by local police organizations is in conflict with discussions from focus group participants which considered reliable technology standards to be very important. It is also somewhat in conflict with the higher priority which local departments placed on interoperability (LETS, 9) since standards can support attempts to make technologies purchased by different departments interoperable. As a result, this somewhat anomalous result may depend on the calculus survey respondents applied to compare the abstract concept of “standards” to other more operational priorities and needs.

TRAINING

In the adoption of any new technology, integrating it into the operations of an organization is always an important step with respect to the real, long-term effect of the technology on organizational productivity or effectiveness. Without this integration process—the “human” portion of technology adoption—resources spent on even the most powerful technology are wasted since its intended users will not be able to apply it effectively. Because of the numerous possible functions of new technology, the relationships between technology and training in the law enforcement sphere is complex. At the minimum, at least three links between them can be identified, each with qualitatively different consequences:

1. People have to be trained to use technology. It is not uncommon for funding to be available to acquire technology without being available to train people to use it. In extreme cases the technology is unused because no one knows how to use it; in other cases it is underutilized because people are not trained to use its full capabilities. Here, increased supply of technology increases demand for training.

2. The purpose of some technology is to train people. Examples of such training technology include tutorial software and audio-
visual training aids. Here, increased supply of technology increases supply of training.

3. Technology can be designed to perform functions with minimal help from trained operators. Examples range from bar code scanners to robotic laboratory test equipment. Here, increased supply of technology decreases subsequent demand for training once routines and operations of the organization have been adapted to the new technology.

In all three of these cases, adoption of new technology will require a training period after the technology is introduced before its benefits are realized. It is through training that members of the organization are taught how to use new technology; by paying sufficient attention to the training process, the chance that any given resource investment in new technology will pay off can be greatly increased.

Current Availability of Training Technology and Technology Training

Because of its criticality in effective technology adoption, understanding the current availability of training resources in law enforcement is of significant importance.

Training Technology

Since advances in computer and other technologies can be applied to training tasks (potentially increasing the effectiveness or training or broadening the audience exposed to it), the RAND Law Enforcement Survey asked about the overall availability and the quality of the training technology currently in use by police departments.

From the responses to the survey, it appears that training equipment represents a significant technology shortfall in many departments. A number of departments indicated that computer-based training equipment (40 percent) and training equipment in general (27 percent), were not currently available to their staff. Only a few departments indicated that training equipment was not needed (LETS, 29).

Of those departments that had training technology in these two areas, only a quarter indicated that it was modern or state of the art.
Thirty-five percent of departments considered their training equipment and 21 percent considered their computer-based training equipment to be old but serviceable. One of out 10 departments reported having obsolete equipment both in terms of computer-based training equipment and training equipment in general.

Of the state police departments surveyed, most of them had training technology available to them. Unlike local police departments, a greater percentage of state-level departments indicated the quality of their computer and training technology was modern or state of the art.

Training Management Systems

Because of the challenge of managing the training programs of potentially complex departments, technology can also play a role in facilitating the task. While 40 percent of state police reported they have computerized training management systems, only 12 percent of local police have them (LETS, 16). It should be noted, however, that for many small departments (whose training programs are presumably easier to coordinate), such a system might not be necessary.

Future Needs Related to Training

Local law enforcement officials have consistently identified training as a major shortfall. Smaller departments, in particular, find it difficult to break away personnel to get the training they need. This cuts across all areas of law enforcement, including crime laboratories. When local or state law enforcement organizations seek training, several federal sources exist to provide it. The FBI is a major provider of training, the National Law Enforcement and Corrections Technology Centers provide training on crime mapping and other subjects, and the Department of Defense is becoming more involved in law enforcement training. Technology that can help provide training locally could be one way to approach this need.

In exploring this topic, the RAND survey asked respondents to rate their need for technology to more effectively or efficiently train personnel as high, medium, or low/no priority. Overall, 58 percent of local departments rated this as high priority, 35 percent as medium
priority, and 6 percent as low/no priority. We found no significant
differences among local police by urbanicity or size of population
served. Among state police the percentages were 58, 41, and 0, re-
spectively (LETS, 9e).

In addition, the survey also asked respondents to rate their need for
training to use technology presently available or being acquired by
their agency. Overall, 43 percent of local departments rated this as
high priority, 43 percent as medium priority, and 14 percent as
low/no priority. Urban departments were more likely to rate both
types of training as being a high priority than rural departments. The
larger the size of population served by a department, the more likely
it was to assign a higher priority to training to use technology
presently available to their department. Among state police the per-
centages were 50, 42, and 8, respectively (LETS, 9f). This demand for
training on current technologies emphasizes that law enforcement
organizations believe they are not adopting current technologies as
effectively as they might and are therefore not gaining the maximal
amount of benefit from them.

A third of local police departments felt that funding was a major
contributing factor to their agency’s training shortfalls. Lack of
funding included insufficient budgets to cover training costs, equip-
ment, or officers’ salaries (including overtime and backfill pay). Eight-
teen percent of local police departments also cited a lack of time,
manpower, or trainers as being a major training shortfall. Lack of
time or manpower in this case refers to insufficient manpower to free
up officers for training, or lack of time to allow officers to take “time-
off” from regular duties to participate in training exercises (LETS, 10).

Computer training, which included both training to use computers
(or software) and computer-based training (software and equip-
ment), was viewed by only a small percentage of local police depart-
ments as being a training shortfall. Yet, as noted earlier, computer
training at the same time was rated by two-thirds of local police as
being a high priority with respect to their department’s computer-
related needs (LETS, 10).

Other training shortfalls mentioned included the unavailability of
training locally. This category included reliance on other city or po-
lace departments to provide training, lack of space or facilities for
training, lack of departmental in-service training capability, remote location of the department, and long travel distances necessary to attend training. About 2 percent of departments also mentioned keeping up with mandated training (including advances and changes in technology, legal updates, etc.) as being problematic (LETS, 10).

Other training shortfalls cited by local police included:

- A need for various forms of specialized training such as defensive tactics, community policing, telecommunications/communications operations, emergency vehicle and pursuit operations, 911 dispatchers, drug investigations, technology crimes (e.g., identity theft)
- A need for administrative-type training such as report writing and interviewing methods
- Lack of a centralized database to track agency-wide training
- A few local police also commented that training was not seen as an organizational priority within their agency (LETS, 10).

Perceived training shortfalls were somewhat related to urbanicity and size of population served. Rural and urban departments serving populations less than 25,000 were somewhat more likely to report lack of funding and less likely to cite availability of computer training and/or computer software as being major contributors to their agency’s training shortfalls. For local police in large metropolitan areas (more than 225,000) lack of time, available manpower, and available trainers were the reasons mentioned most frequently as contributing any training shortfalls within their department (LETS, 10).

Similar to local police, 20 percent of state police departments indicated that lack of funding was an important contributing factor to any training shortfalls. Keeping up with mandated training and having to rely on other agencies for training were also cited (LETS, 10).

Interviewees also indicated that there is a tremendous amount of duplication of curricula with little effort being made to develop standards with respect to curricula.
Training as a Factor Limiting Technology Acquisition

Overall, training was among the top three factors cited by local and state-level departments as influencing acquisition decisions. As would be expected given the significant differences among them, how important training requirements are in terms of influencing future acquisition decisions or usage of different policing and less-than-lethal weapons technologies varied. Here, we summarize the findings as reported in Chapter 2 (Crime Prevention) and Chapter 3 (First Response).

With respect to different types of policing technologies:

- Relatively few local police (less than 10 percent) felt that training requirements were an important factor with respect to the use of video cameras either in patrol cars or in fixed or mobile surveillance.

- Only 10 percent of departments considered training to be key with respect to acquisition of night vision/electro-optic devices, smart guns, and for most vehicle stopping/tracking devices (tire deflation spikes, stolen vehicle tracking) and digital imaging devices (fingerprints, mug shots).

- The exceptions were electrical/engine disruption devices and suspect composites where as many as 20 percent of local police viewed training requirements as influencing the use or acquisition of these devices.

- State police organizations surveyed saw training as relatively more important than local forces. The percentage of state organizations citing training as a factor went as high as 47 percent for handheld electrical devices.

The importance of training requirements with respect to future acquisition decisions showed no clear trends by size of population served by local police. The exception was in terms of use of tire deflation spikes: Rural departments were less likely to view training as being important—possibly as a function of lesser need for these devices. Conversely, large urban (greater than 225,000) departments were more likely to view training as being important—again, perhaps reflecting greater usage of these devices by these departments.
Medium- to large-sized departments were more likely to view training as being important with respect to mobile or fixed-site surveillance, tire deflation spikes, and for most digital imaging devices. These departments were less likely to view training requirements as a limiting factor for night vision devices or other types of vehicle-stopping devices (e.g., electrical/engine disruption and stolen vehicle tracking).

Approximately one out of five local departments viewed training as a factor limiting future acquisition or use of less-than-lethal (LTL) devices. In particular, a quarter of local police across all size categories considered training requirements to be a limiting factor for use of flash/bang grenades. Whereas, the other types of devices or agents showed more variation in terms of relative importance placed on training. There was no clear pattern seen by size of population served in terms of training being viewed as a key factor influencing use or acquisition of the other types of LTL weapons or devices included in the survey. The exception was use of pepper spray where rural departments or those departments serving urban populations 75,000 or less were somewhat more likely to view training as being a limiting factor with respect to usage.

With the exception of pepper spray, about one-third of state police departments considered training requirements as being a limiting factor in the use or acquisition of LTL devices. These departments tended to view training as being somewhat more important with respect to the use of blunt trauma/soft projectile devices and flash/bang grenades than for the other devices listed.

**Forensic Science Education**

Education in forensic sciences is offered at several colleges and universities across the country, but their programs vary in scope and content. Programs are housed in various academic departments; a forensics program in a chemistry department, for example, may well emphasize forensic chemistry but may not cover other forensic theory and methods in the same depth. As a result, newly graduated forensic scientists must spend a year or two in on-the-job training to become fully qualified.
Furthermore, many labs cannot afford recommended levels of continuing education and in-service training. Of those survey respondents reporting a separate training budget, the average amount was $1,102 per technical staff member; however, this can be misleading because there is great variability in funding available for training, ranging from zero to more than $2,000 per testifying examiner. ASCLD recommends each technical staff member receive $1,000 in continuing education training annually; of the labs that reported training budget information, more than 60 percent indicated that they budget less than this recommended amount per staff member.

**Distance Learning**

The U.S. Army is currently implementing a large-scale distance learning program, which calls for converting portions of hundreds of courses to distance learning, at a total cost of about $840 million for infrastructure and courseware development over a 13-year period. Proponents of distance learning expect its benefits to include:

- Lower costs to agencies offering and receiving courses, once the courseware is developed,
- Less time away from students’ normal workplace duties, and
- Increased training capacity.

Distance learning strategies could represent an approach to meeting the training needs of departments or laboratories whose employees must fit training around operational commitments or are too remote to make traveling to training opportunities practical.

**ACCOUNTABILITY**

The highest calling of those who enforce our laws is not to be masters of technology but servants of justice. It is increasingly clear, however, that technology has a role to play in such service. Justice requires that law enforcement be accountable to agency leadership and to the public. As videotaping of the Rodney King beating and subsequent

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8See, for example, Scheck et al. (2000) quoted in Chapter 5.
incidents have shown, technology will play a role in making law enforcement accountable.

Technology can be beneficial both in serving to deter and/or document police abuses of power and to provide objective evidence of proper police actions if wrongful accusations are made against officers. Technology can be abused, however, if surveillance technologies are used to violate reasonable standards of personal privacy, if polygraph or other investigative technologies are used oppressively, or if crowd control technologies are used to suppress peaceful dissent. On the other hand, technology can help make police-public confrontations less volatile and can help make review of police use of force more effective, objective, and accepted.

Among respondents to the RAND survey, the larger local, as well as the state, departments ranked technology for improving accountability as high priority (Table 22). As might be expected, agencies that serve larger publics tend to rate this a higher priority than those with fewer people in their jurisdictions (LETS, 9).

**Accountability to Police Leadership**

In addition to accounting for their actions to the citizens they serve, police commanders also must be accountable to those higher in their organizations. One central component of that process is collection of accurate data on crime incidence that is used to both guide and justify activities intended to reduce its level. The RAND survey found 23

<table>
<thead>
<tr>
<th>Population Served</th>
<th>Low/Not Priority</th>
<th>Medium Priority</th>
<th>High Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>16%</td>
<td>47%</td>
<td>37%</td>
</tr>
<tr>
<td>Urban &lt;25K</td>
<td>5%</td>
<td>46%</td>
<td>49%</td>
</tr>
<tr>
<td>Urban 25–75K</td>
<td>7%</td>
<td>48%</td>
<td>45%</td>
</tr>
<tr>
<td>Urban 75–225K</td>
<td>6%</td>
<td>42%</td>
<td>52%</td>
</tr>
<tr>
<td>Urban &gt;225K</td>
<td>5%</td>
<td>30%</td>
<td>64%</td>
</tr>
<tr>
<td>All Local Police</td>
<td>8%</td>
<td>46%</td>
<td>46%</td>
</tr>
<tr>
<td>State Police</td>
<td>0%</td>
<td>27%</td>
<td>73%</td>
</tr>
</tbody>
</table>

SOURCE: LETS, 9d. Numbers are statistically adjusted percent of departments.
percent of local police stating they use crime mapping and analysis for command review and planning of operations (Table 23). The larger the population a department serves, the more likely it is to do crime mapping and analysis. A relatively small percentage of local police use formal crime-mapping techniques or process similar to New York City’s COMPSTAT\(^9\) or Los Angeles’ FASTRAC,\(^10\) as compared to the more widespread use of less formal or automated processes. About one-third of state police indicate that they use crime mapping and analysis for command review and planning of operations. Most of these departments use a less formal or automated process than what is currently being used in New York City or Los Angeles (LETS, 21).

In comparison, about one-third of state police indicate that they use crime mapping and analysis for command review and planning of

<table>
<thead>
<tr>
<th>Population Served</th>
<th>Yes, department does crime mapping and analysis</th>
<th>Less formal crime mapping techniques used</th>
<th>Formal crime mapping techniques used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>14%</td>
<td>12%</td>
<td>1%</td>
</tr>
<tr>
<td>Urban &lt;25K</td>
<td>20%</td>
<td>18%</td>
<td>2%</td>
</tr>
<tr>
<td>Urban 25–75K</td>
<td>34%</td>
<td>31%</td>
<td>3%</td>
</tr>
<tr>
<td>Urban 75–225K</td>
<td>57%</td>
<td>52%</td>
<td>6%</td>
</tr>
<tr>
<td>Large Urban &gt;225K</td>
<td>69%</td>
<td>44%</td>
<td>23%</td>
</tr>
<tr>
<td>Overall Local</td>
<td>23%</td>
<td>20%</td>
<td>2%</td>
</tr>
<tr>
<td>State</td>
<td>33%</td>
<td>7%</td>
<td>27%</td>
</tr>
</tbody>
</table>

**Table 23**

**Crime Mapping and Analysis by Local Police, by Population Served**

SOURCE: LETS, 21. Numbers are statistically adjusted percents of local police indicating use of crime mapping and analysis for command review and planning of operations.

\(^9\)COMPSTAT has four key components: (1) accurate and timely intelligence, (2) rapid deployment, (3) effective tactics, and (4) follow-up and assessment. Crime data collection and mapping are crucial to the first of these components.

\(^{10}\)FASTRAC stands for “focus, accountability, teamwork, response, and coordination,” the Los Angeles Police Department’s command accountability model for results-oriented policing. Crime trends and patterns are tracked daily using computerized statistical databases, and area commanders meet weekly with the Chief and senior managers to discuss their efforts to reduce Part I crimes.
operations. Most of these departments use a less formal or automated process than what is currently being used in New York City or Los Angeles. About 20 percent of state police geocode and map either incidents or hot spots; while 13 percent also geocode calls for service and arrests (LETS, 24).

**Video Cameras in Patrol Cars**

Among state and local law enforcement agencies the most common use of video cameras is in patrol cars. Video cameras in patrol cars can provide credible evidence against lawbreakers, as well as evidence for or against police accused of abusive behavior. In 1997, 46 percent of all larger local police departments with 100 or more officers were found to be using video cameras in patrol cars (Reaves and Goldberg, 1999, p. xvii). By 2000, 62 percent of these departments made some use of this technology.

Among local police department of all sizes, RAND found 15 percent making widespread use of patrol car video camera surveillance, with 30 percent making limited use of this technology, and 55 percent not using it at all. Among state police, 33 percent reported making widespread use of the technology, with the remaining 67 percent reporting limited use (LETS, 36c).

In general, the larger urban departments are more likely to be using video cameras in patrol cars. The exception is the estimate that only 8 percent of departments serving populations greater than 225,000 use video cameras in patrol cars. The reason for this deviation is unclear, though it may be that these departments operate so many units that widespread outfitting of patrol cars proves cumulatively too expensive.

Unlike local police, all of the state police reported using video cameras in their patrol cars, with one-third indicating widespread usage.

Overwhelmingly, most local police considered cost to be the factor limiting future acquisition of video camera surveillance equipment. Rural and urban departments serving populations less than 25,000 were more likely than larger departments to consider cost a limiting factor. This is not surprising given the demand for the technology is undoubtedly much less in jurisdictions with fewer interactions be-
tween citizens and police and fewer criminal incidents. When judging a trade-off between patrol car cameras and other investments, these departments would certainly judge the relative weights differently than organizations in which the pay-off to video is higher. Relatively few local police (less than 10 percent) considered training requirements or reliability to be important factors influencing acquisition decisions. This is also not unexpected given the characteristics of the technology.

Similarly, three-quarters of state police departments surveyed considered cost to be the single most important factor limiting future acquisition of video camera surveillance equipment.

**Internet Use**

The posting of information on the Internet is one route organizations can take to make their operations more transparent and accessible to the public. RAND found that almost 60 percent of local police departments use the Internet to allow the public to communicate with their department via e-mail, and half of departments use the Internet to provide general information about the department (Table 24). Sixteen percent use the Internet to provide the public with information about crime statistics or crime maps showing the location of recent incidents. In addition, 9 percent of departments use the Internet to gather general information (including sharing of information with other agencies) or information specific to criminal activity (e.g., sexual predators, missing persons, or fugitives). A quarter of all local police do not use the Internet at all (LETS, 17).

Internet usage varies among local police by size of population served. In general, rural and urban departments serving populations less than 25,000 are less likely to use the Internet than larger departments. The larger departments were more likely than rural or small urban departments to use the Internet to allow individuals to communicate via e-mail with their department or to provide general information about their agency.
Table 24

Internet Use by Local Police

<table>
<thead>
<tr>
<th>Internet Use</th>
<th>Overall</th>
<th>Rural (&lt;25K)</th>
<th>Urban (25K–75K)</th>
<th>Urban (75K–225K)</th>
<th>Large Urban (&gt;225K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allow individuals to communicate via e-mail with department</td>
<td>59%</td>
<td>64%</td>
<td>49%</td>
<td>89%</td>
<td>78%</td>
</tr>
<tr>
<td>Provide general information about the department</td>
<td>50%</td>
<td>42%</td>
<td>44%</td>
<td>75%</td>
<td>80%</td>
</tr>
<tr>
<td>Provide crime maps/crime statistics</td>
<td>16%</td>
<td>7%</td>
<td>16%</td>
<td>21%</td>
<td>36%</td>
</tr>
<tr>
<td>Does not use the Internet</td>
<td>24%</td>
<td>20%</td>
<td>32%</td>
<td>7%</td>
<td>11%</td>
</tr>
</tbody>
</table>

SOURCE: LETS, 17. Numbers are statistically adjusted percentage of local police indicating for what purpose(s) they use the Internet.

Civil Rights

Because it was deemed to be insufficiently accountable to the community on civil rights issues, the Los Angeles Police Department (LAPD) has been put under a consent decree by the Department of Justice that requires the city to build a computerized system for tracking police officers’ activities. The system is expected to cost millions of dollars. The Pittsburgh Bureau of Police, under a similar federal decree, has a comparable system. In addition, the LAPD is being required to collect data on the ethnicity and gender of people subjected to traffic and pedestrian stops, to assess whether there is bias in selecting whom to detain (Newton and Daunt, 2000).

Just as pervasive surveillance through CCTV or other technology can be resented by the public, systems designed to improve officers’ accountability to citizens and improve discipline can cause resentment within law enforcement agencies. For example, in the Los Angeles Police Department the newly introduced complaint system “is rejected as unfair by most officers, [contributing] to the disciplinary system’s lack of legitimacy” (Wilms, Schmidt, and Norman, 2000, p. 66). LAPD’s FASTRAC, inspired by New York’s COMPSTAT, is in-
tended to help top management audit crime patterns and departmental operations. Instead the system is said to “have reduced captains’ ability to make decisions because they are, as one officer put it, ‘always looking over their shoulders to see what the Chief wants’” (Wilms, Schmidt, and Norman, 2000, p. 27).

In marked similarity to the concerns expressed by officers with respect to monitoring and tracking technologies, these same issues can generate public concerns over what may seem to be the most benign and beneficial technologies. For example, there is a technology called ShotSpotter, currently being field tested, that senses the sound of gunshots and triangulates to determine gunshot location. Despite the fact that the technology is designed only to pick up sound characteristic of gunshots, people at community meetings have complained, “you have these sensors out there, and you hear everything we’re saying—and we have a problem with that.” An officer’s private response to this (in contrast to police objections to monitoring cited above) was, “if the part of the community that’s violating the law thinks that we can hear them, we don’t have a problem with that.” We also note that many people welcome ShotSpotter’s potential for reducing random gunfire in their neighborhoods.

**Use of Force Tracking Systems**

To assess the breadth of application of another civil rights related administrative technology, the RAND Law Enforcement Survey asked how many departments had systems to track the lethal and non-lethal use of force by officers. The survey found 40 percent of state police have such a computerized system. In contrast, only 7 percent of local police reported having such systems (LETS, 16).

**Complaint Management Systems**

The Los Angeles Police Department’s Board of Inquiry into the Rampart Area corruption incident made 108 recommendations for improving performance and accountability of the department. Implementation of many of these could be made less costly and burdensome through use of appropriate advanced technology. Specifically, one calls for review of the LAPD’s “automated systems to determine if they are able to capture and produce information which
may be required for effective audits and corruption investigations. For example, the Police Arrest and Crime Management Information System (PACMIS) database (or its successor, CCAD) must allow for retrieval of information on all officers involved in any given arrest” (Board of Inquiry, 2000).

To determine how widespread the use of such complaint systems was among state and local police, the topic was included in the RAND survey. Among respondents to the RAND Law Enforcement Survey, 60 percent of state police have a computerized complaint management system supporting Internal Affairs or the Inspector General, while only 7 percent of local police have such systems (LETS, 16).

Public Opinion and Privacy Issues

Respondents to the RAND Law Enforcement Survey considered public opinion to be least important in terms of influencing future acquisition decisions across all categories of policing technology devices and agents. However, large departments were more likely than smaller departments to cite public opinion as being key across all categories of policing technologies.

It is important to note, however, that while public opinion may not be a current concern, police use of technology is an area that has the potential to generate significant reactions from citizens. As a result, the salience of public opinion as a technology decisionmaking criterion could change rapidly. For the sake of example, use of databases containing personal information is becoming an increasingly salient issue to members of the public. A survey commissioned by the Bureau of Justice Statistics found 90 percent of adult Americans are concerned about possible misuse of personal information. Some 22 percent claim to have been a victim of an improper invasion of privacy by law enforcement or government tax, social service, welfare, or license agencies. Of those surveyed, 66 percent distinguish between access to conviction records and access to records of persons arrested but not convicted. Eighty-nine percent consider it very important to have a right to review their records and have errors corrected (Opinion Research Corporation International, 2000). As a result, it is critical for police organizations to remain cognizant of what the public considers appropriate law enforcement activity. If
they do not, the potential always exists for individuals of groups to seek recourse via litigation or the political process for behavior—either technological or otherwise—that they deem inappropriate.¹¹

¹¹See, for example, Human Rights Watch (1998).
Part II

FEDERAL CHALLENGES AND CHOICES